APPENDIX B – LOCAL CALIBRATION RESULTS

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B.1 Flexible Pavement Performance Prediction Models

B.1.1 Fatigue Cracking Model – Bottom-up

B.1.1.1 Option 1a

No sampling

Table B-1 Option 1a local calibration results – no sampling

Parameter	Global model	Local model
SEE	7.64	6.71
Bias	-4.19	-1.29
R^2	0.01	0.02
t-test pvalue	0.00	0.00
Intercept = 0	0.00	0.00
Slope = 1	0.00	0.00
C1	1.00	0.50
C2	1.00	0.56

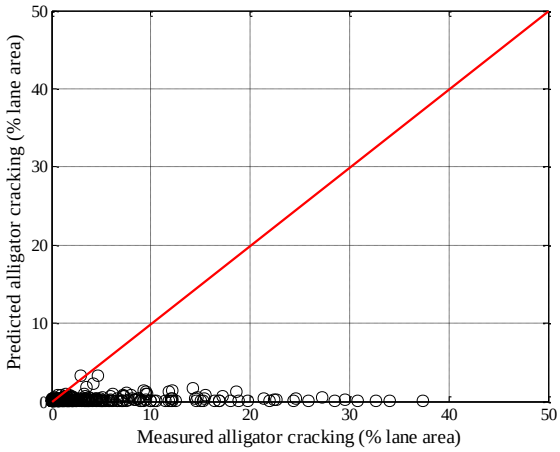
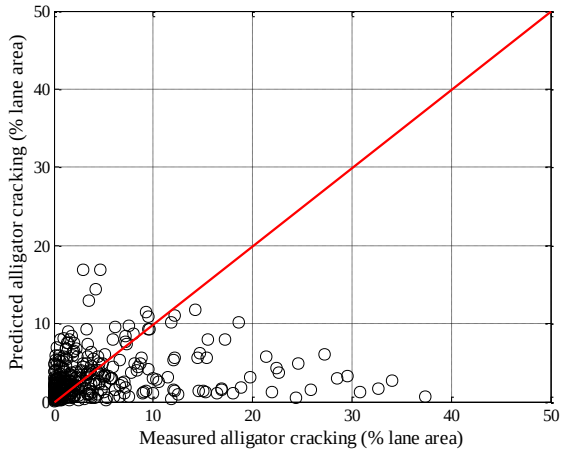
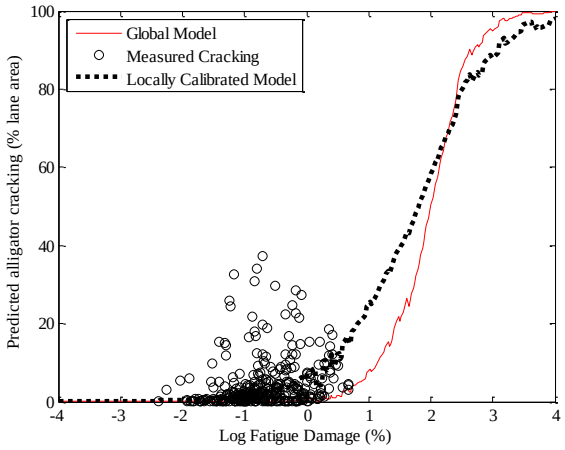


Figure B-1 Option 1a measured versus predicted fatigue cracking – no sampling

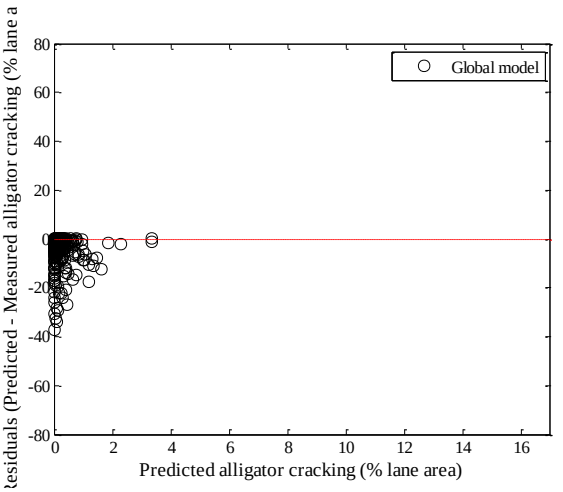


(a) Measured vs. predicted cracking

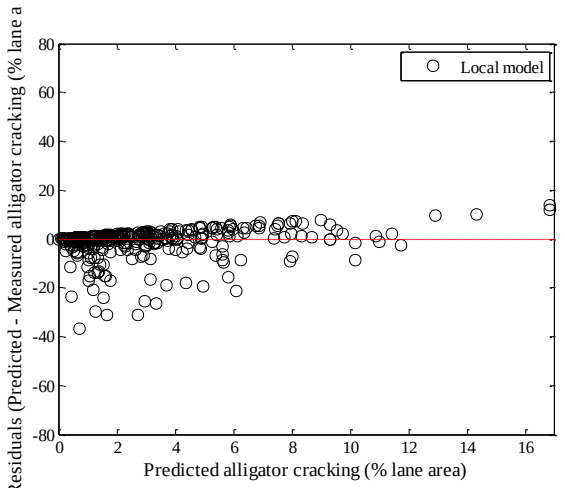


(b) Fatigue damage predicted cracking

Figure B-2 Option 1a local calibration results - no sampling



(a) Measured vs. predicted cracking



(b) Fatigue damage predicted cracking

Figure B-3 Option 1a local calibration residual plots - no sampling

Reliability

Table B-2 Option 1a global and local alligator cracking model reliability – no sampling

Global model reliability equation	Local model reliability equation
$s_{e(Alligator)} = 1.13 + \frac{13}{1+e^{7.57-15.5\times log(D)}}$	$s_{e(Alligator)} = 2.3988 + \frac{15.676}{1+e^{0.1475-0.4641\times log(D)}}$

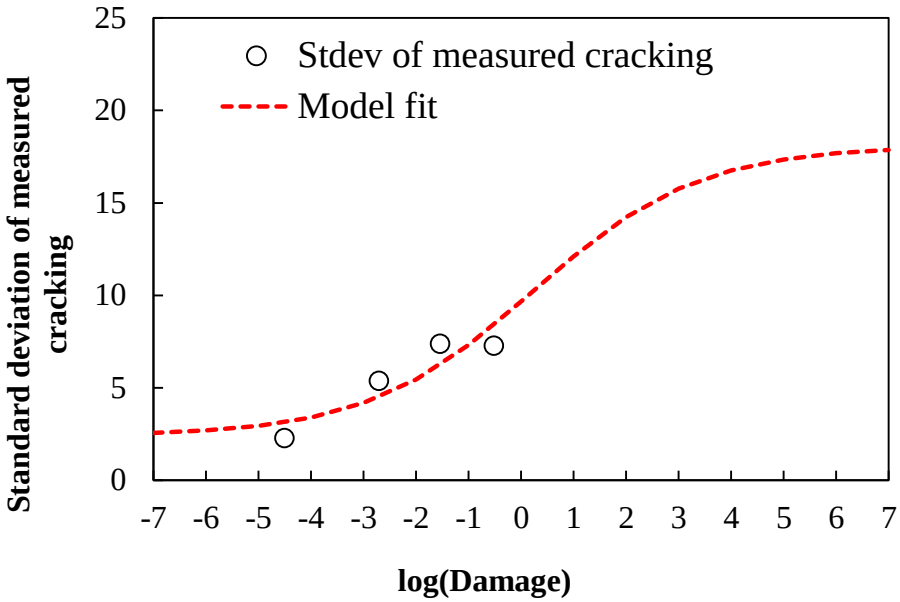
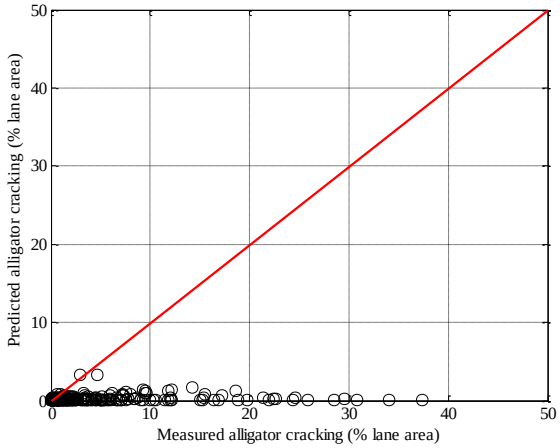


Figure B-4 Option 1a fitted reliability model after local calibration –no sampling

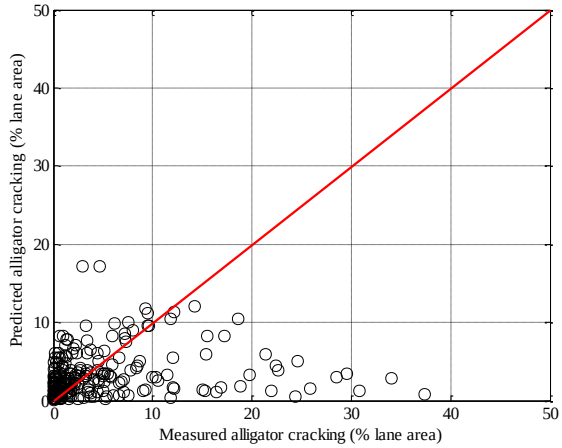
Split sampling

Table B-3 Option 1a local calibration results – split sampling

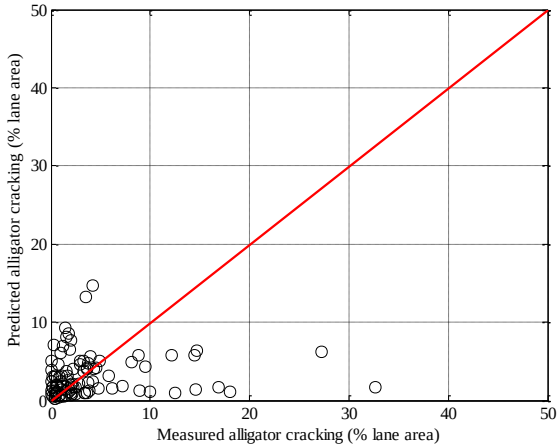
Parameter	Global model	Local model calibration	Local model validation
SEE	8.02	7.00	6.00
Bias	-4.39	-1.37	-0.78
R^2	0.02	0.03	0.01
t-test pvalue	0.00	0.00	0.20
Intercept = 0	0.00	0.00	0.00
Slope = 1	0.00	0.00	0.00
C1	1.00	0.50	0.50
C2	1.00	0.56	0.56



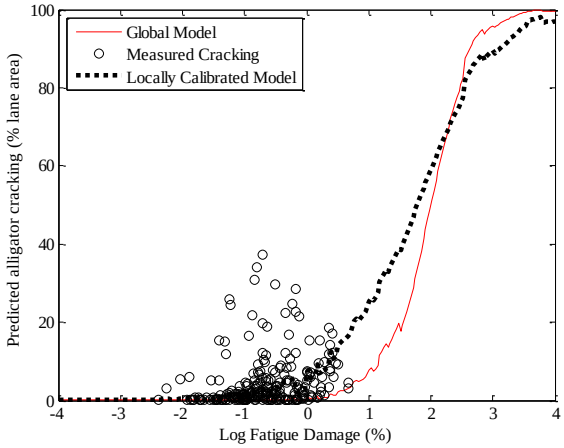
(a) Global model



(b) Local model

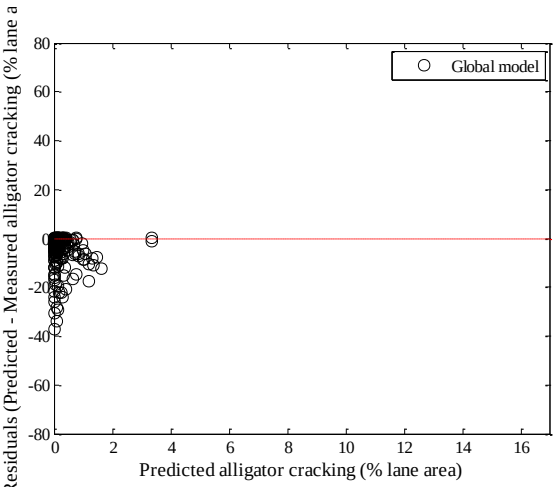


(c) Local model validation

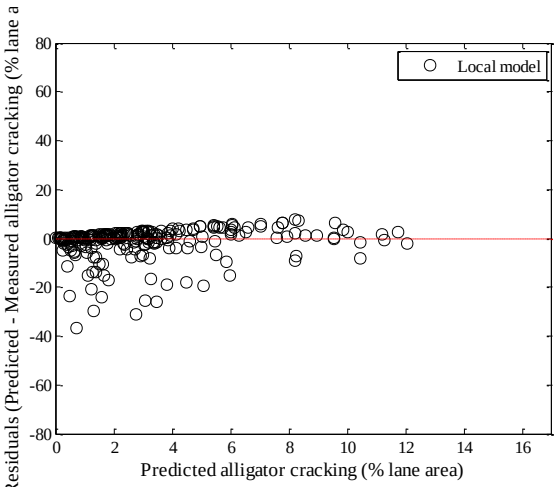


(d) Fatigue damage predicted cracking

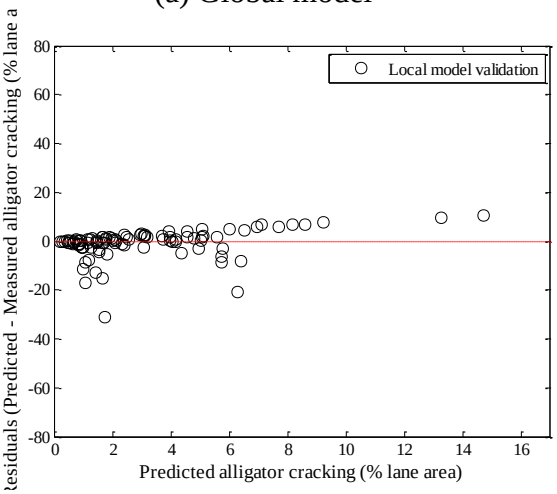
Figure B-5 Option 1a local calibration results - split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-6 Option 1a local calibration residual plots - split sampling

Reliability

Table B-4 Option 1a global and local alligator cracking model reliability – split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Alligator)} = 1.13 + \frac{13}{1+e^{7.57-15.5\times log(D)}}$	$s_{e(Alligator)} = 0.6 + \frac{24}{1+e^{0.1-0.5\times log(D)}}$

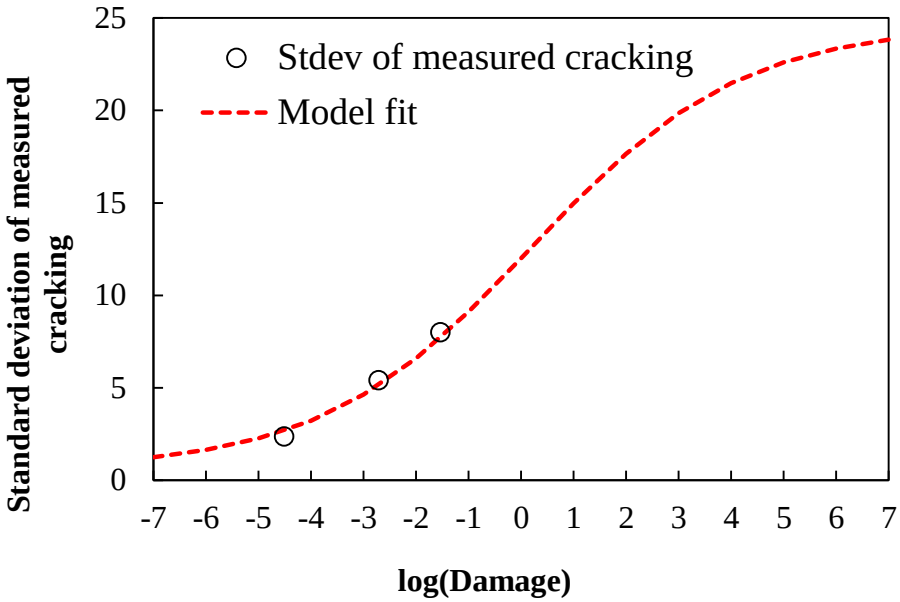


Figure B-7 Option 1a fitted reliability model after local calibration – split sampling

Repeated split sampling

Table B-5 Option 1a local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	7.65	7.69	6.79	8.35
Bias	-4.19	-4.20	-4.66	-3.66
C1	1.00	1.00	-	-
C2	1.00	1.00	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	6.71	6.76	5.84	7.39
Bias	-1.22	-1.24	-1.64	-0.68
C1	0.50	0.50	0.47	0.50
C2	0.56	0.56	0.56	0.56
Local Model Validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	6.71	6.69	4.90	8.48
Bias	-1.20	-1.22	-2.68	0.43
C1	0.50	0.50	0.47	0.50
C2	0.56	0.56	0.56	0.56

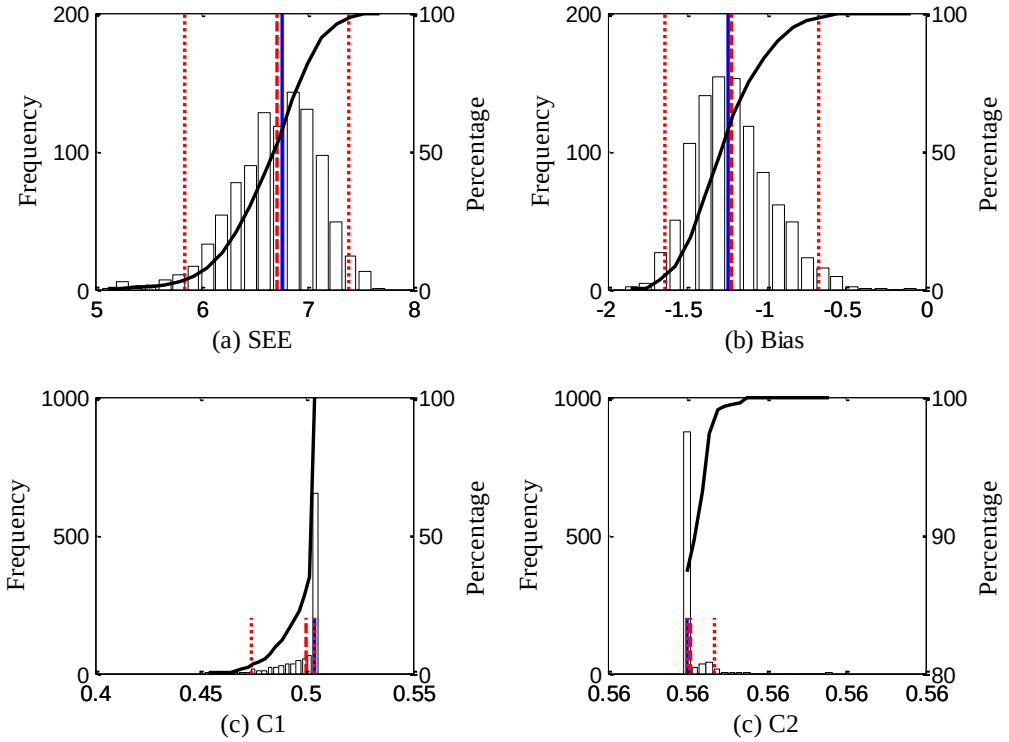


Figure B-8 Option 1a repeated split sampling frequency distributions – calibration

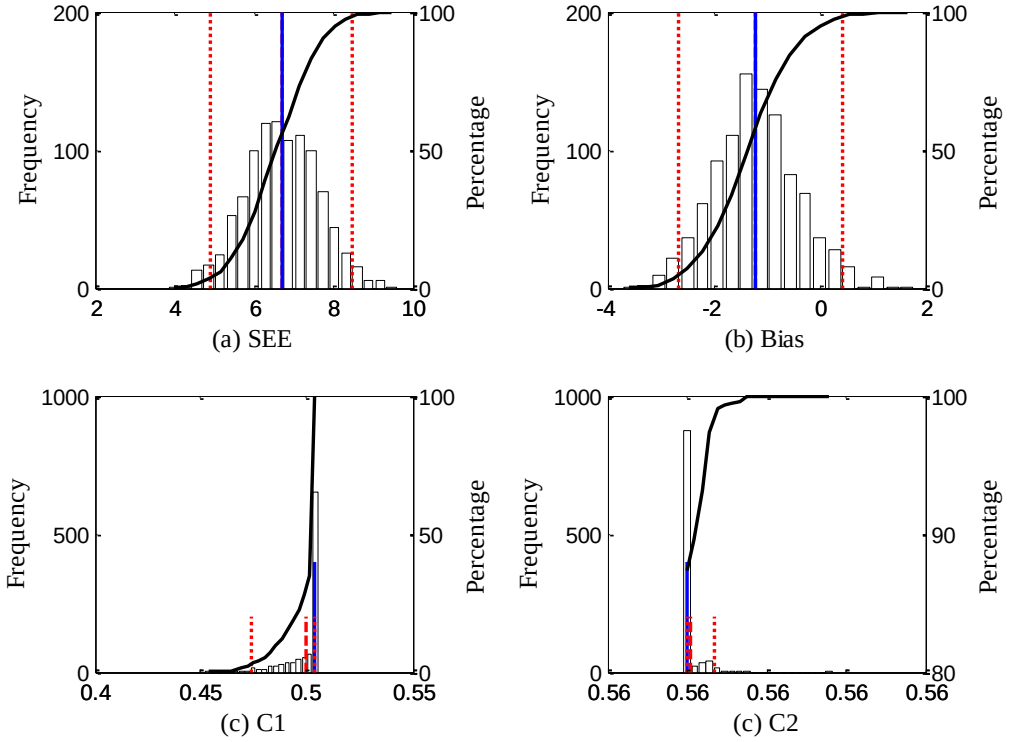
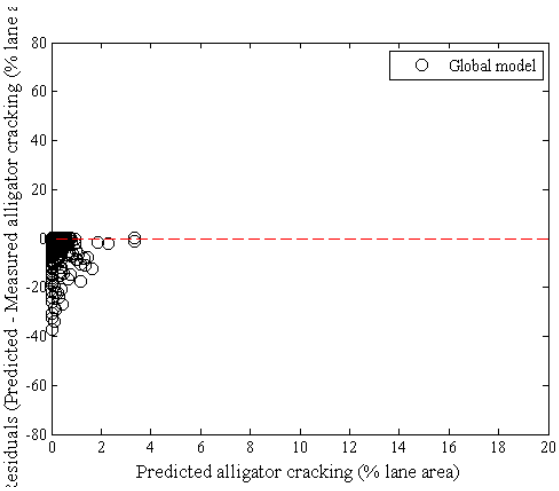
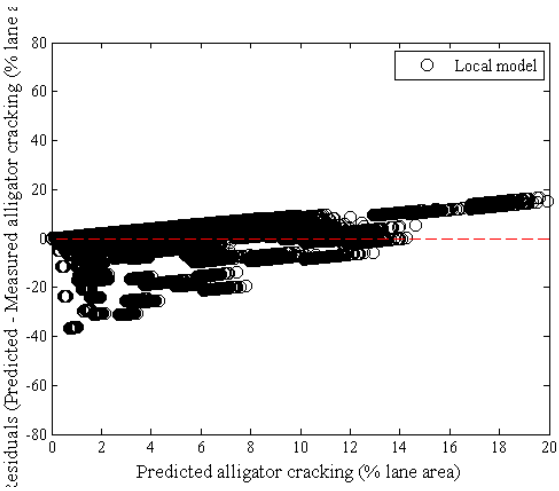


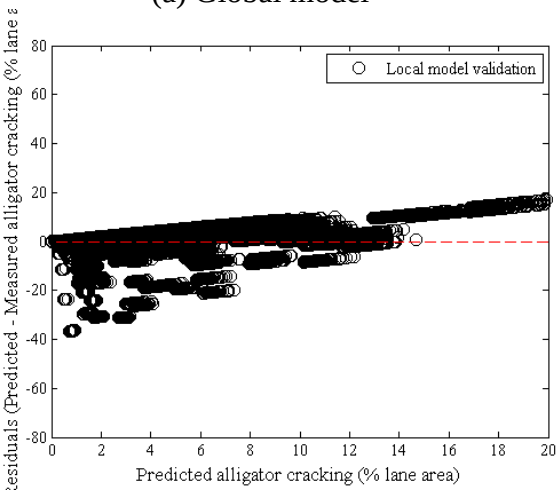
Figure B-9 Option 1a repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-10 Option 1a local calibration residual plots – repeated split sampling

Reliability

Table B-6 Option 1a global and local alligator cracking model reliability – repeated split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Alligator)} = 1.13 + \frac{13}{1+e^{7.57-15.5\times log(D)}}$	$s_{e(Alligator)} = 0.9919 + \frac{17.093}{1+e^{0.1103-0.4361\times log(D)}}$

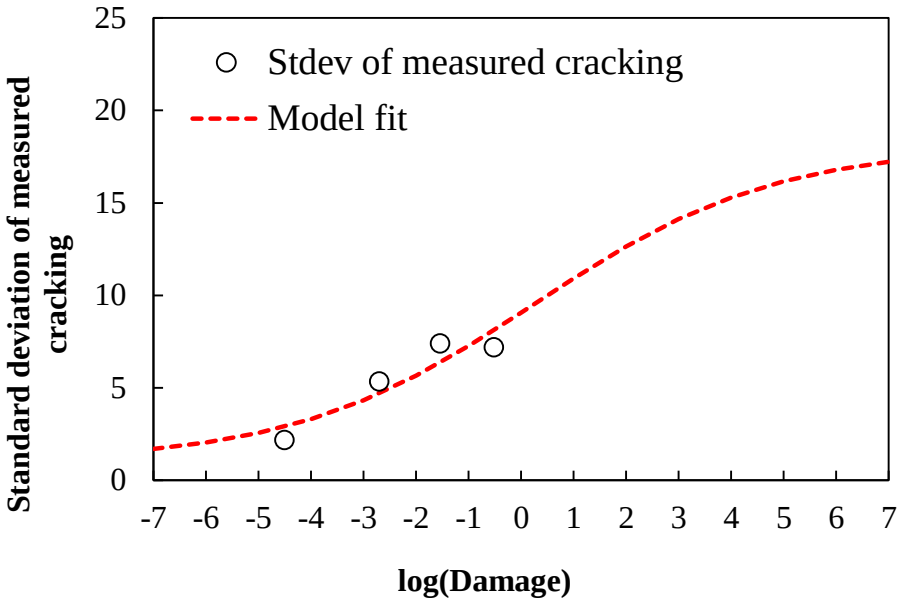


Figure B-11 Option 1a fitted reliability model after local calibration – repeated split sampling

Bootstrapping

Table B-7 Option 1a local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	7.62	7.61	6.38	8.93
Bias	-4.19	-4.18	-5.01	-3.45
C1	1.00	1.00	-	-
C2	1.00	1.00	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	6.69	6.66	5.53	7.88
Bias	-1.16	-1.15	-1.87	-0.43
C1	0.50	0.50	0.46	0.50
C2	0.56	0.56	0.56	0.56

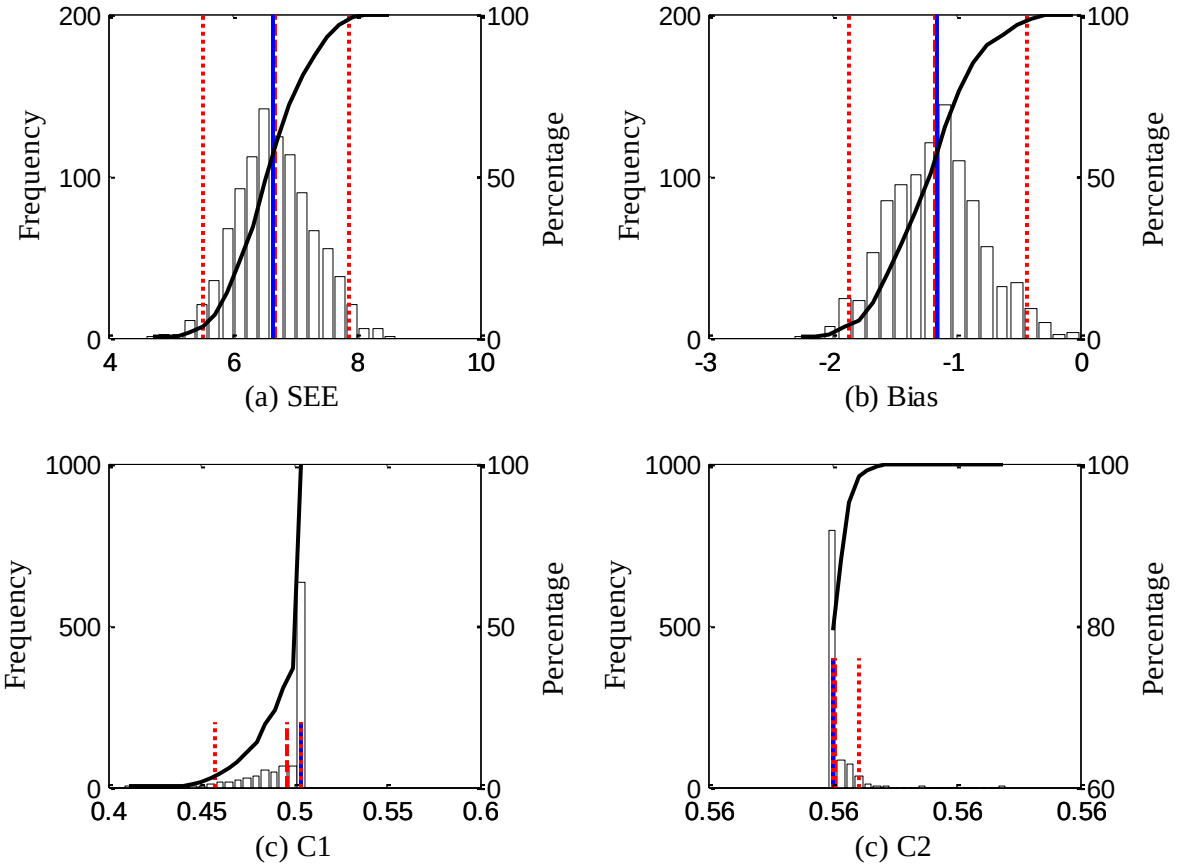


Figure B-12 Option 1a bootstrapping frequency distributions

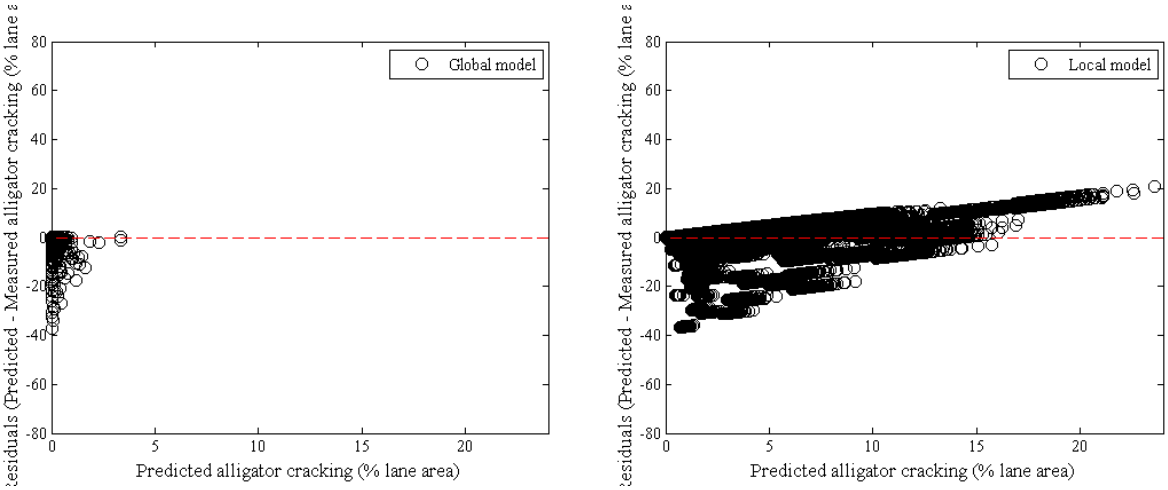


Figure B-13 Option 1a local calibration residual plots – bootstrapping

Reliability

Table B-8 Option 1a global and local alligator cracking model reliability – bootstrapping

Global model reliability equation	Local model reliability equation
$s_{e(Alligator)} = 1.13 + \frac{13}{1 + e^{7.57 - 15.5 \times log(D)}}$	$s_{e(Alligator)} = 0.7874 + \frac{17.817}{1 + e^{0.0699 - 0.4559 \times log(D)}}$

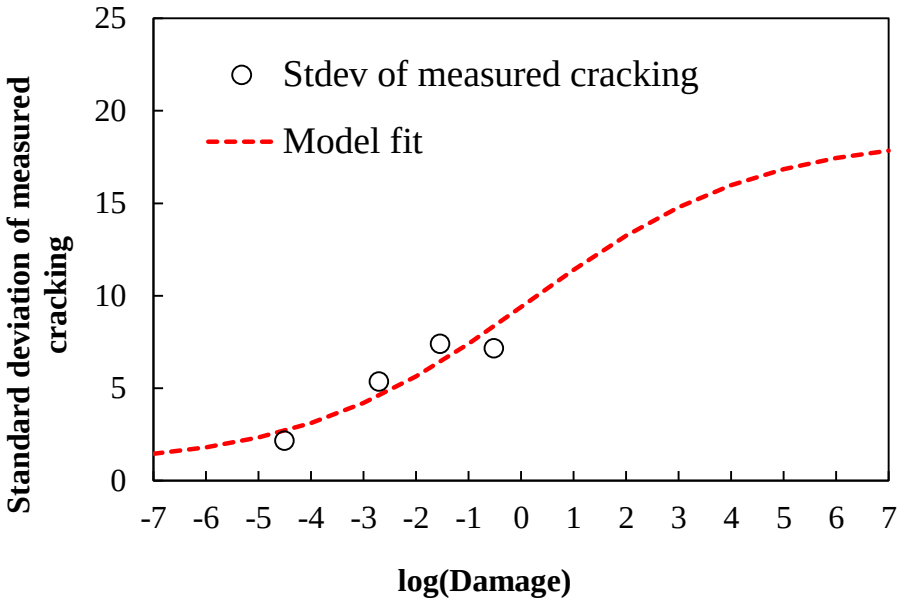


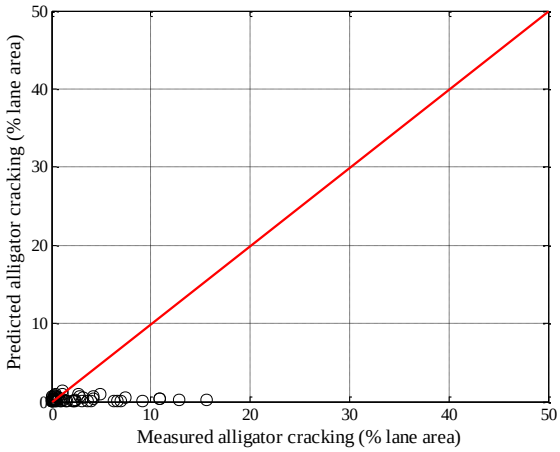
Figure B-14 Option 1a fitted reliability model after local calibration – bootstrapping

B.1.1.2 Option 1b

No sampling

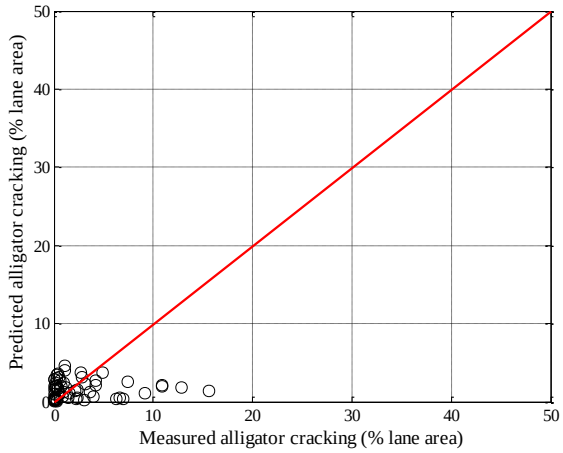
Table B-9 Option 1a local calibration results – no sampling

Parameter	Global model	Local model
SEE	4.02	3.67
Bias	-2.00	-0.75
R^2	0.00	0.00
t-test pvalue	0.00	0.09
Intercept = 0	0.00	0.00
Slope = 1	0.00	0.00
C1	1.00	0.68
C2	1.00	0.56

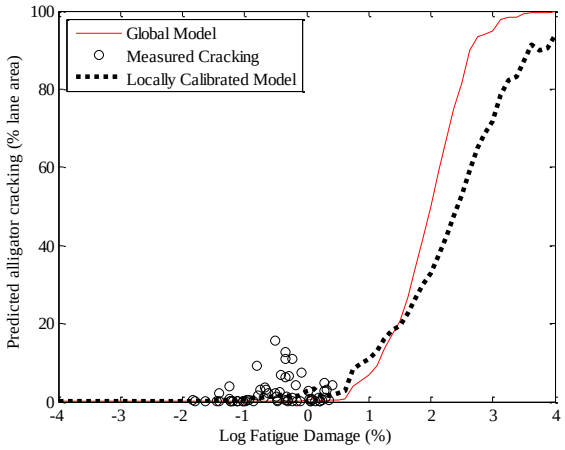


Global model

Figure B-15 Option 1b measured versus predicted fatigue cracking – no sampling

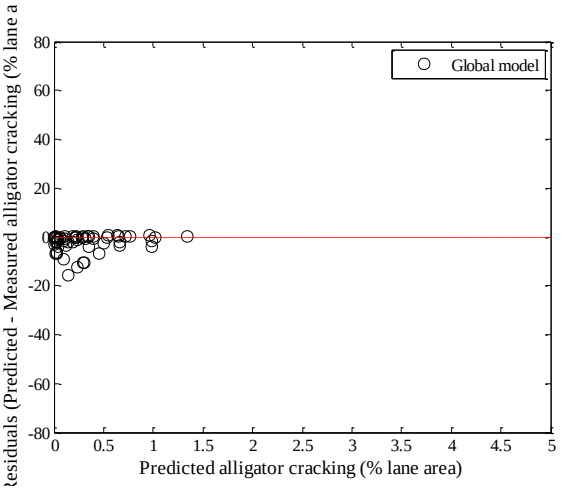


(a) Measured vs. predicted cracking

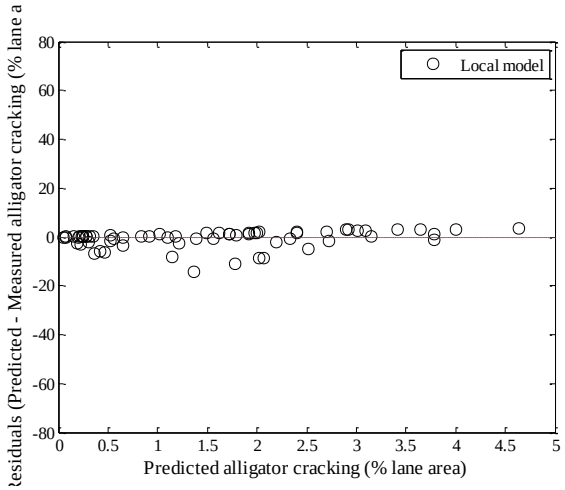


(b) Fatigue damage predicted cracking

Figure B-16 Option 1b local calibration results – no sampling



(a) Global model



(b) Local model

Figure B-17 Option 1b local calibration residual plots – no sampling

Reliability

Table B-10 Option 1b global and local alligator cracking model reliability – no sampling

Global model reliability equation	Local model reliability equation
$s_{e(Alligator)} = 1.13 + \frac{13}{1+e^{7.57-15.5\times log(D)}}$	$s_{e(Alligator)} = 0.01 + \frac{22.074}{1+e^{1.00-0.5328\times log(D)}}$

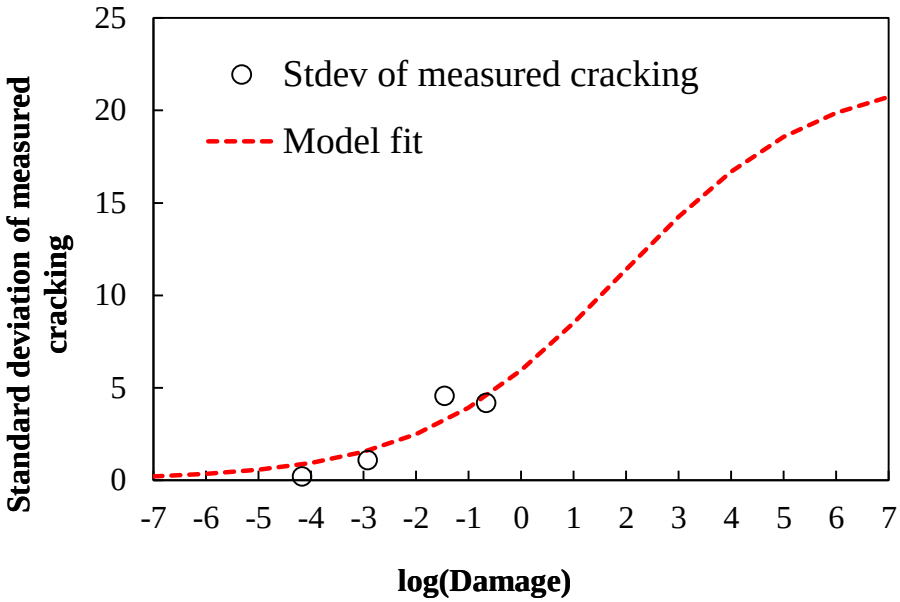
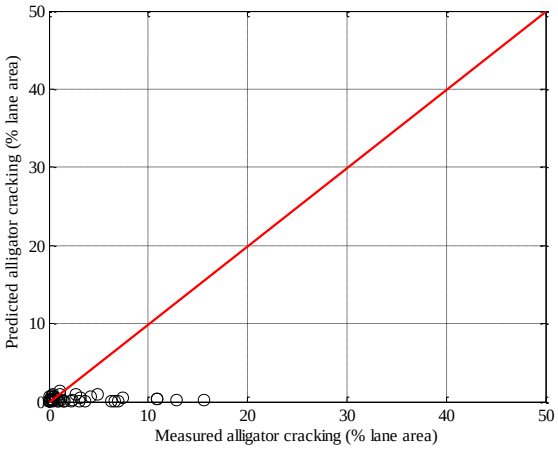


Figure B-18 Option 1b fitted reliability model after local calibration –no sampling

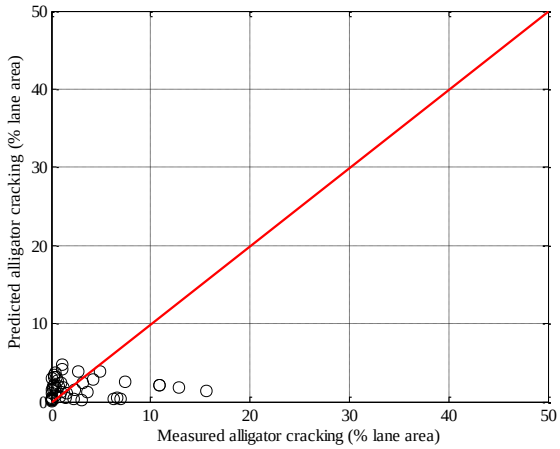
Split sampling

Table B-11 Option 1b local calibration results – split sampling

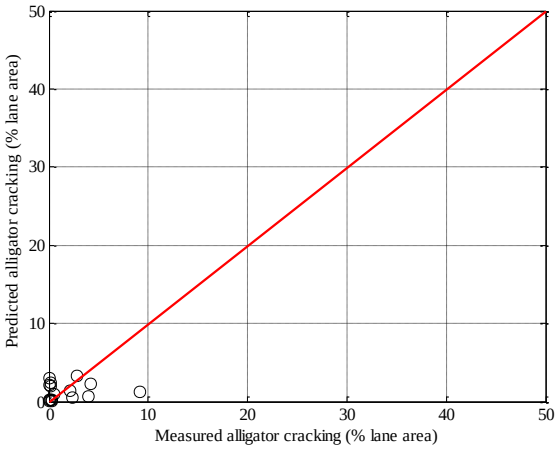
Parameter	Global model	Local model calibration	Local model validation
SEE	4.40	4.02	2.64
Bias	-2.22	-0.84	-0.34
R^2	0.00	0.00	0.02
t-test pvalue	0.00	0.14	0.59
Intercept = 0	0.00	0.00	0.00
Slope = 1	0.00	0.00	0.00
C1	1.00	0.68	0.68
C2	1.00	0.56	0.56



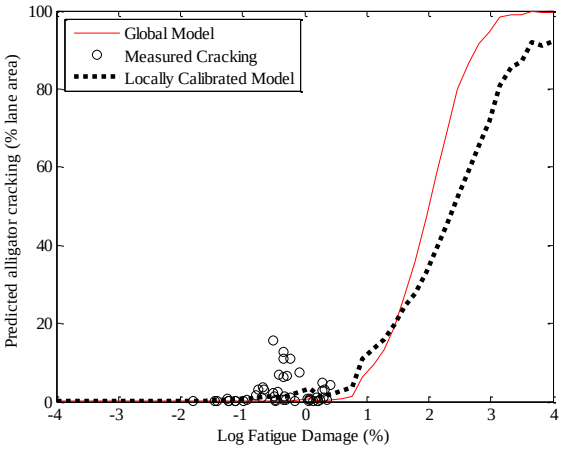
(a) Global model



(b) Local model

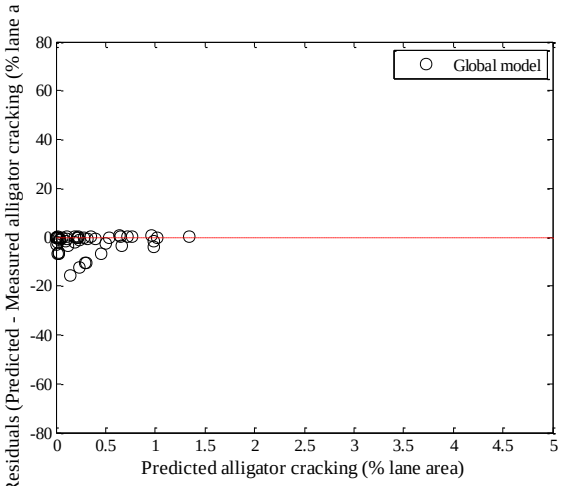


(c) Local model validation

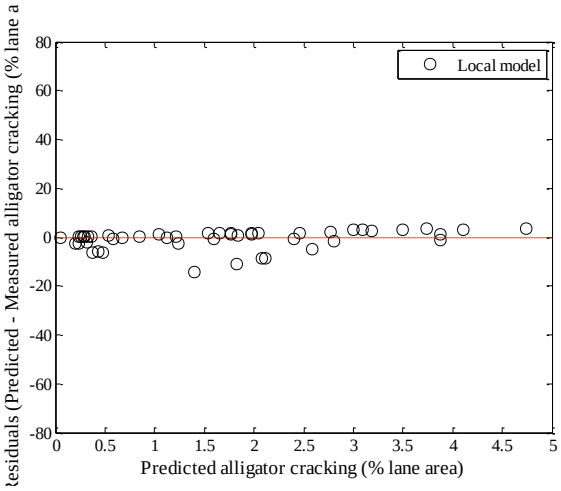


(d) Fatigue damage predicted cracking

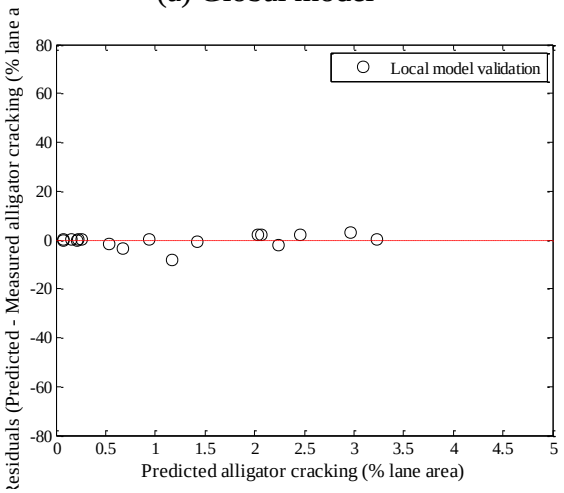
Figure B-19 Option 1b local calibration results - split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-20 Option 1b local calibration residual plots - split sampling

Reliability

Table B-12 Option 1b global and local alligator cracking model reliability – split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Alligator)} = 1.13 + \frac{13}{1+e^{7.57-15.5\times log(D)}}$	$s_{e(Alligator)} = 0.01 + \frac{24.715}{1+e^{1.00-0.6448\times log(D)}}$

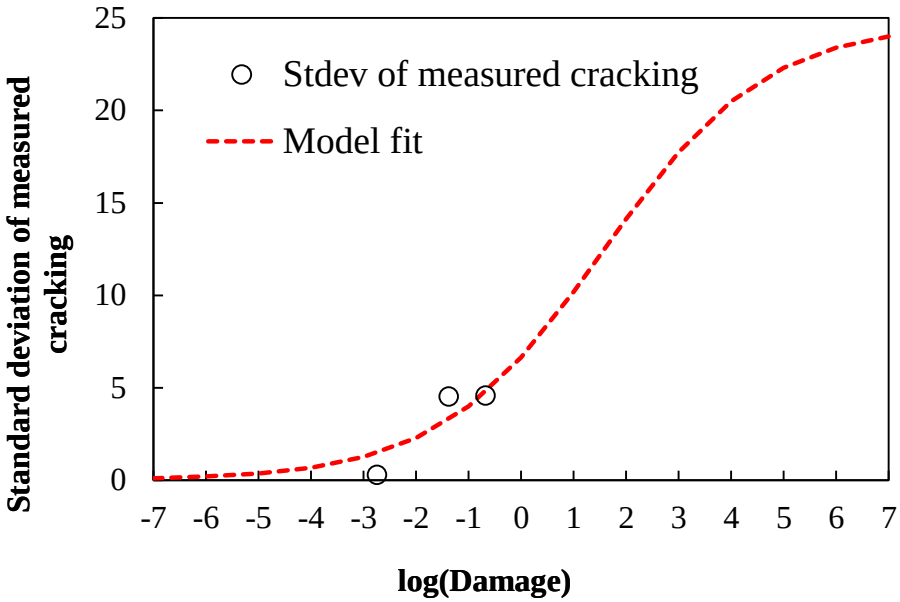


Figure B-21 Option 1b fitted reliability model after local calibration – split sampling

Repeated split sampling

Table B-13 Option 1b local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	4.03	4.10	3.03	4.74
Bias	-2.01	-2.03	-2.56	-1.41
C1	1.00	1.00	-	-
C2	1.00	1.00	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	3.66	3.72	2.77	4.27
Bias	-0.73	-0.76	-1.04	-0.32
C1	0.68	0.68	0.61	0.72
C2	0.56	0.56	0.56	0.56
Local Model Validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	3.77	3.76	1.87	5.41
Bias	-0.63	-0.69	-2.37	1.54
C1	0.68	0.68	0.61	0.72
C2	0.56	0.56	0.56	0.56

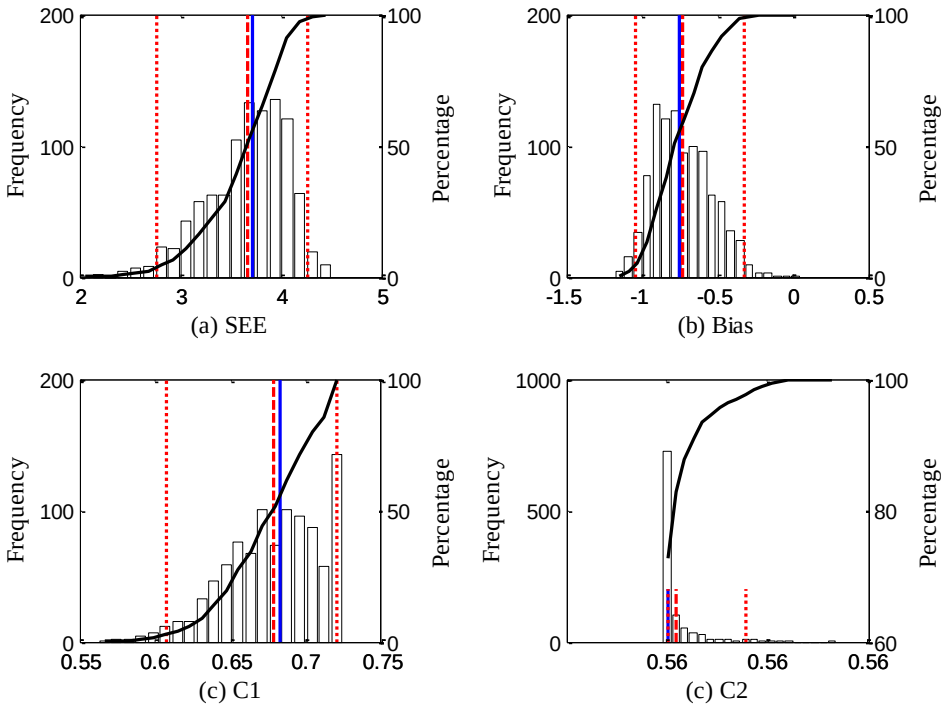


Figure B-22 Option 1b repeated split sampling frequency distributions – calibration

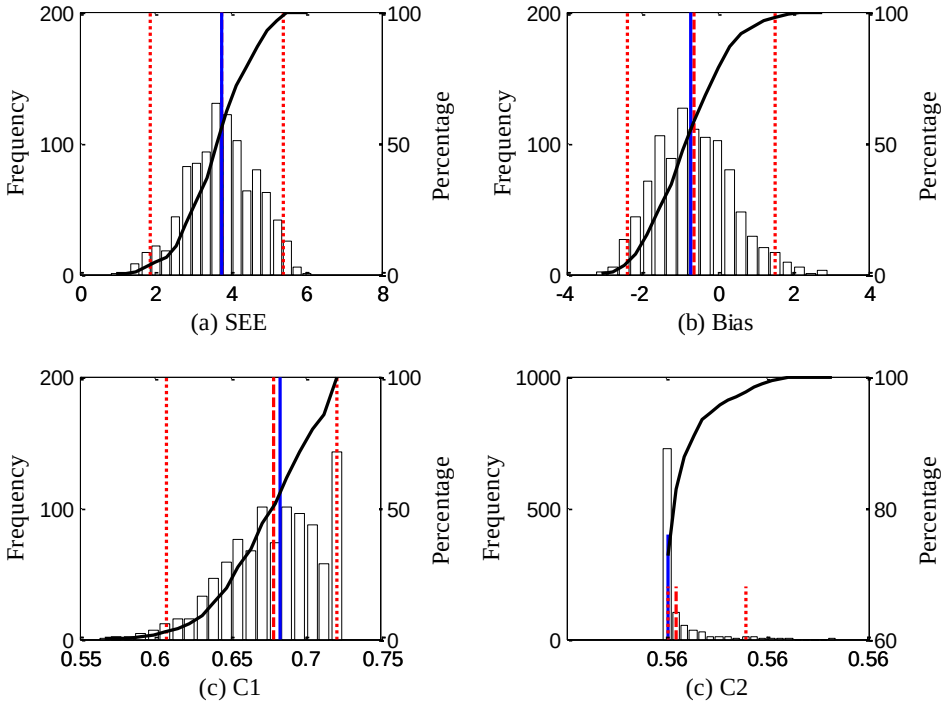
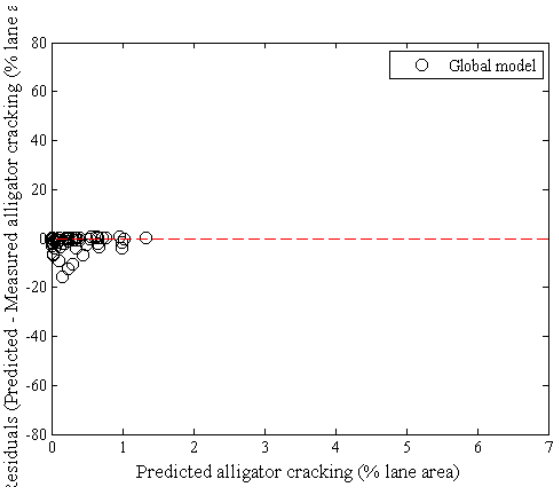
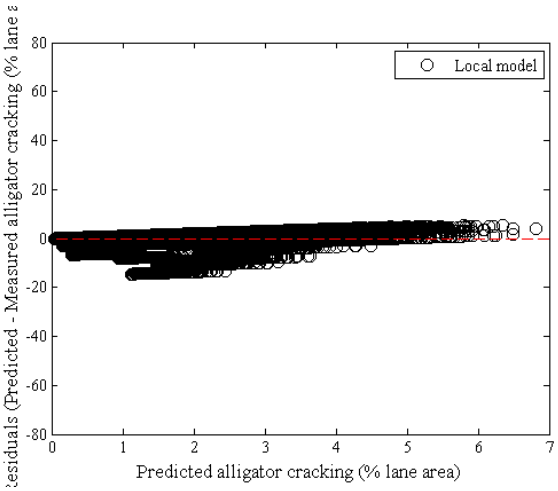


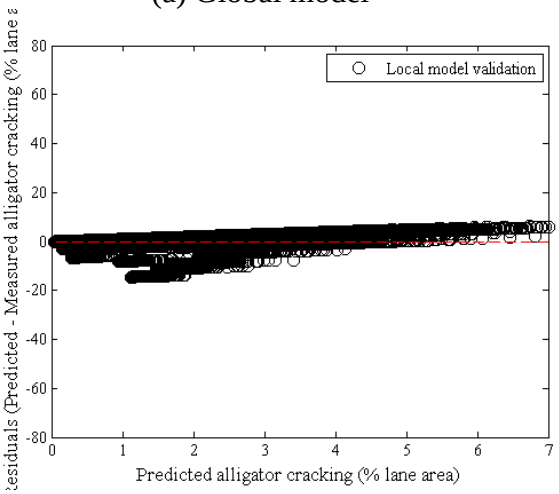
Figure B-23 Option 1b repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-24 Option 1b local calibration residual plots – repeated split sampling

Reliability

Table B-14 Option 1b global and local alligator cracking model reliability – repeated split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Alligator)} = 1.13 + \frac{13}{1+e^{7.57-15.5\times log(D)}}$	$s_{e(Alligator)} = 0.01 + \frac{33.088}{1+e^{1.397-0.5985\times log(D)}}$

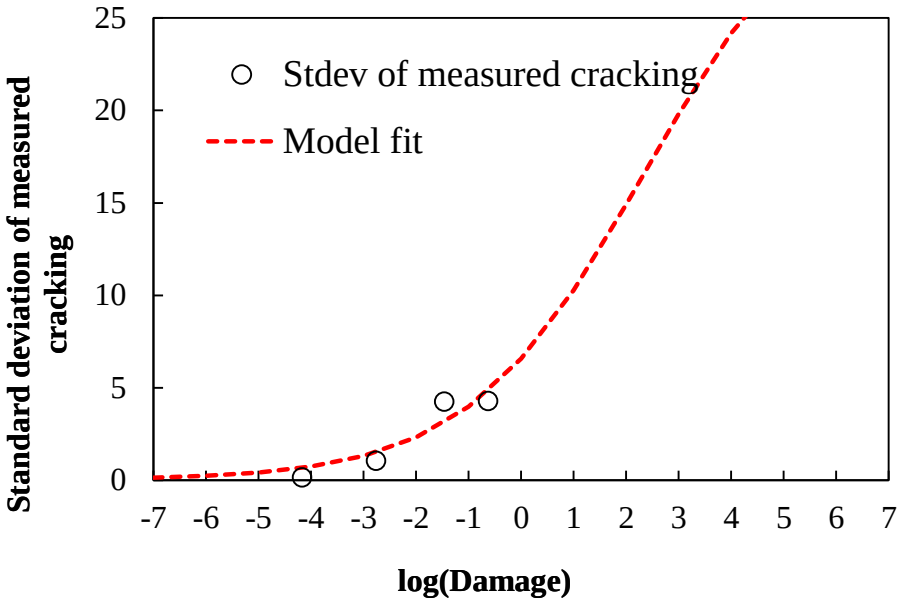


Figure B-25 Option 1b fitted reliability model after local calibration – repeated split sampling

Bootstrapping

Table B-15 Option 1b local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	3.97	3.98	2.70	5.33
Bias	-2.01	-2.00	-2.95	-1.19
C1	1.00	1.00	-	-
C2	1.00	1.00	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	3.60	3.62	2.50	4.75
Bias	-0.69	-0.69	-1.26	-0.15
C1	0.67	0.68	0.59	0.72
C2	0.56	0.56	0.56	0.56

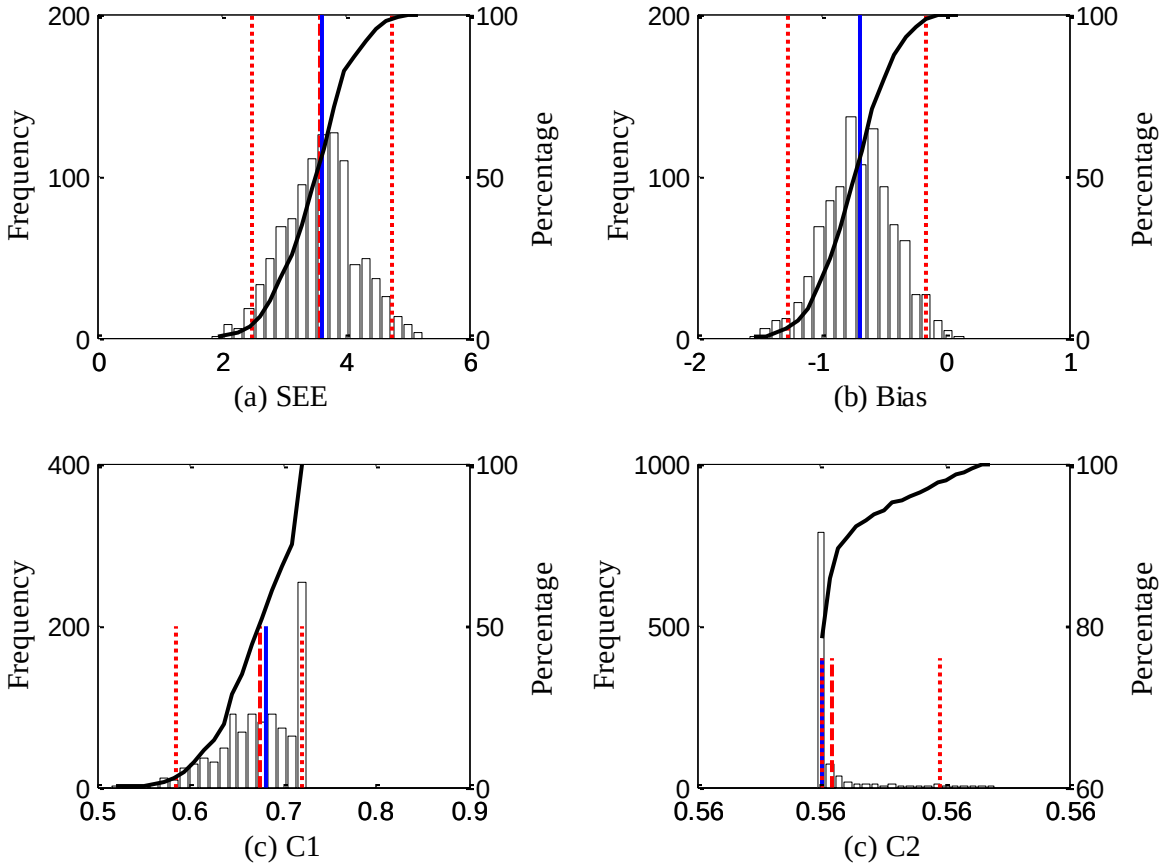


Figure B-26 Option 1b bootstrapping frequency distributions

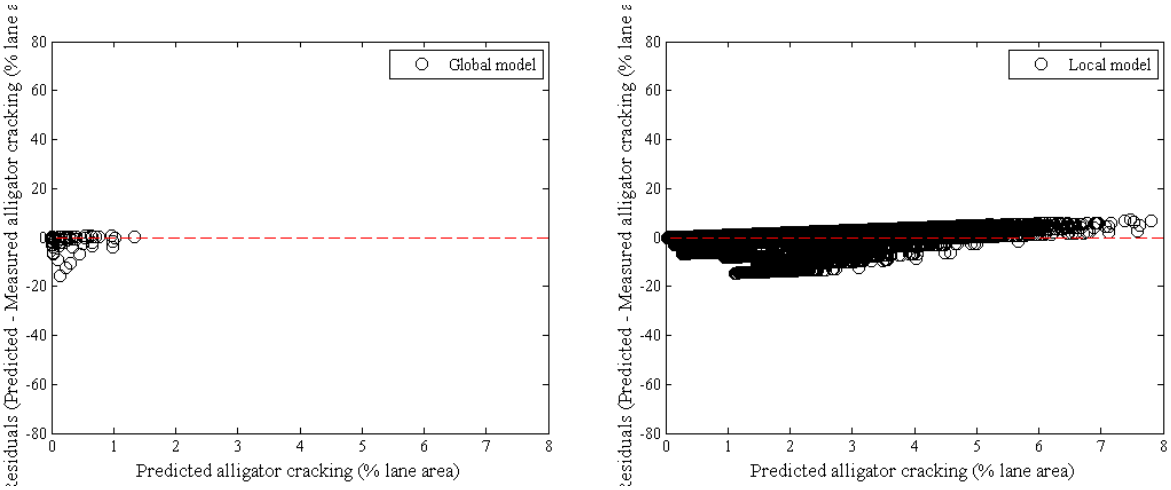


Figure B-27 Option 1b local calibration residual plots – bootstrapping

Reliability

Table B-16 Option 1b global and local alligator cracking model reliability – bootstrapping

Global model reliability equation	Local model reliability equation
$s_{e(Alligator)} = 1.13 + \frac{13}{1+e^{7.57-15.5\times log(D)}}$	$s_{e(Alligator)} = 0.01 + \frac{32.913}{1+e^{1.3972-0.5976\times log(D)}}$

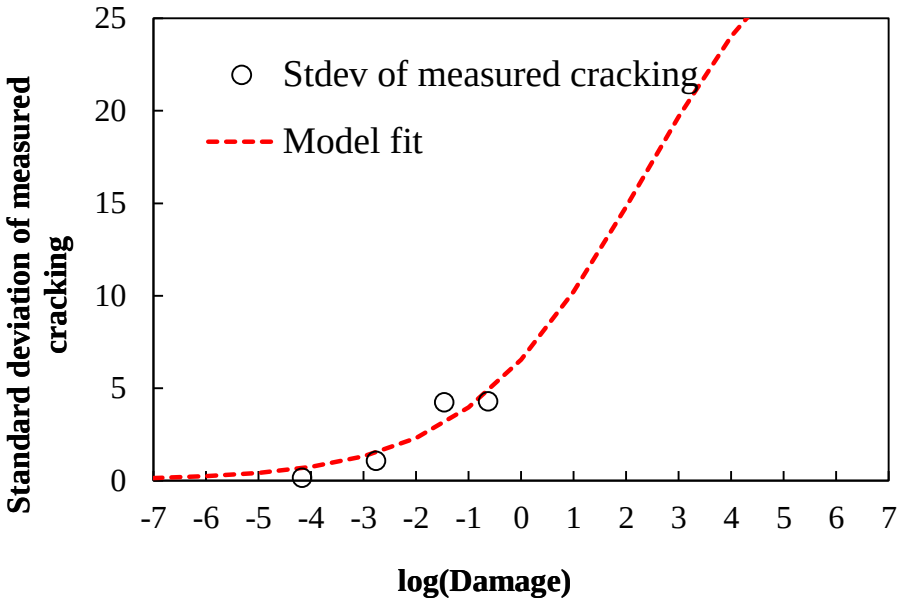


Figure B-28 Option 1b fitted reliability model after local calibration – bootstrapping

B.1.2 Fatigue Cracking Model – Top-down

B.1.2.1 Option 1

No sampling

Table B-17 Option 1 local calibration results – no sampling

Parameter	Global model	Local model
SEE	741.21	644.47
Bias	-409.32	-125.44
R^2	0.01	0.03
t-test pvalue	0.00	0.00
Intercept = 0	0.00	0.00
Slope = 1	0.00	0.00
C1	7.00	3.32
C2	3.50	1.25

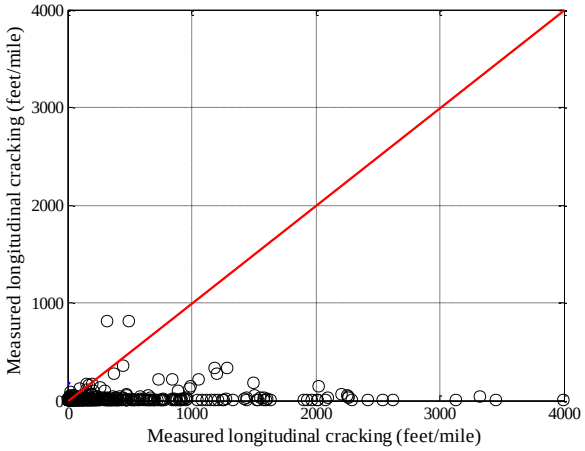
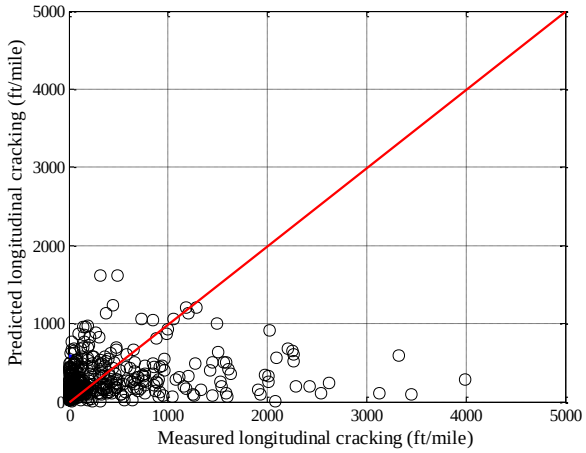
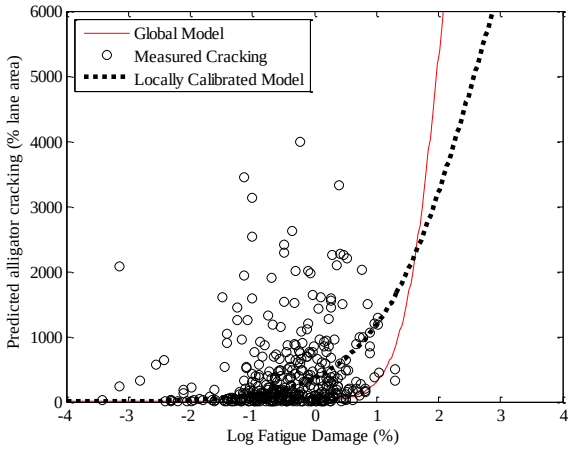


Figure B-29 Option 1 measured versus predicted fatigue cracking – no sampling

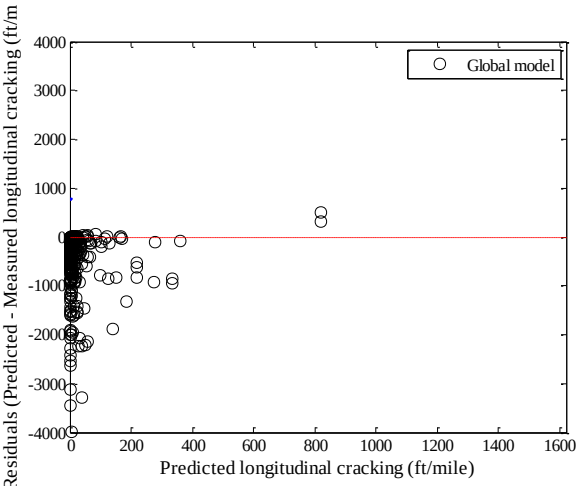


(a) Measured vs. predicted cracking

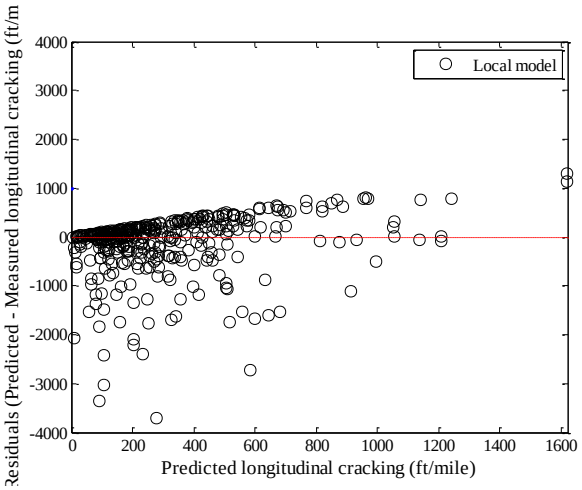


(b) Fatigue damage predicted cracking

Figure B-30 Option 1 local calibration results - no sampling



(a) Global model



(b) Local model

Figure B-31 Option 1 local calibration residual plots - no sampling

Reliability

Table B-18 Option 1 global and local alligator cracking model reliability – no sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 150 + \frac{2300}{1+e^{2-0.6\times log(D_{td}+0.0001)}}$

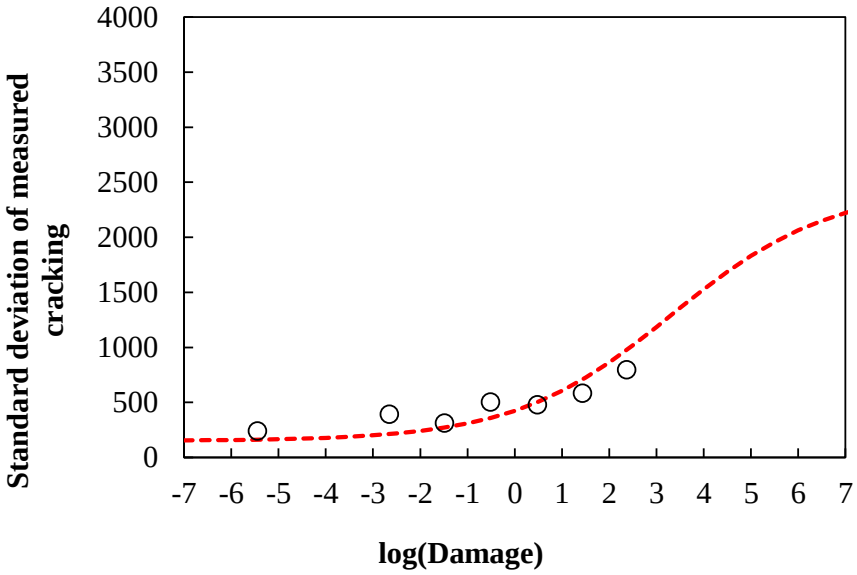
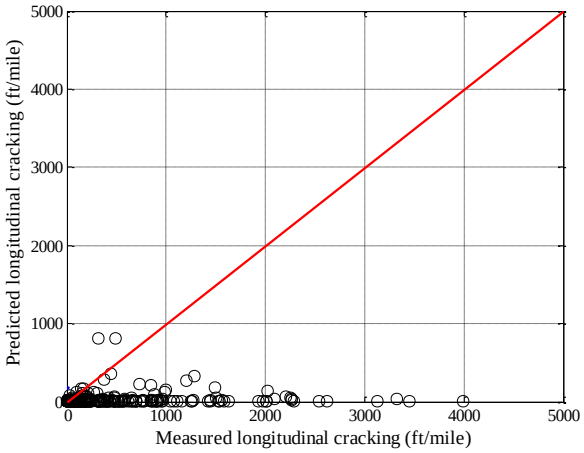


Figure B-32 Option 1 fitted reliability model after local calibration –no sampling

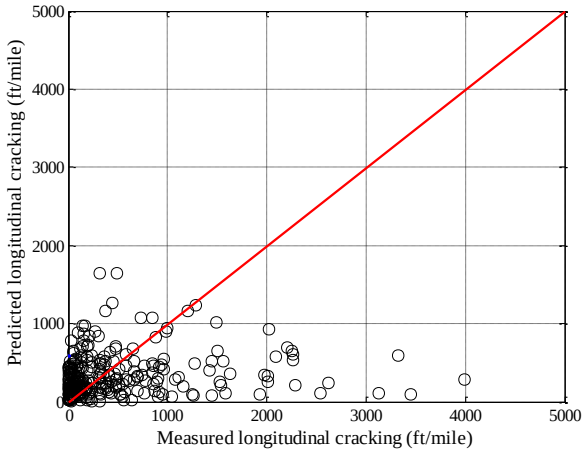
Split sampling

Table B-19 Option 1 local calibration results – split sampling

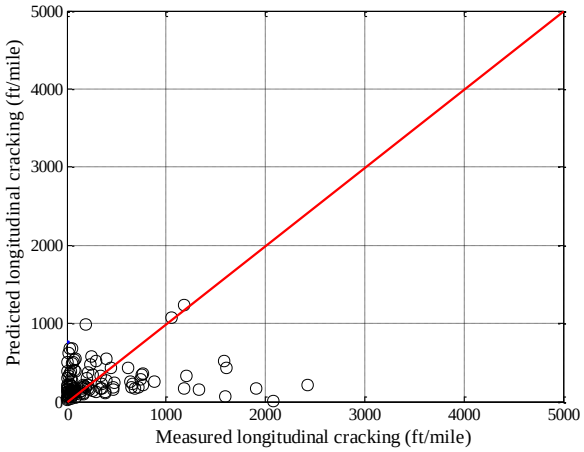
Parameter	Global model	Local model calibration	Local model validation
SEE	807.52	700.71	494.75
Bias	-453.48	-141.54	-68.73
R^2	0.00	0.02	0.02
t-test pvalue	0.00	0.00	0.13
Intercept = 0	0.00	0.00	0.00
Slope = 1	0.00	0.00	0.00
C1	7.00	3.30	3.30
C2	3.5	1.25	1.25



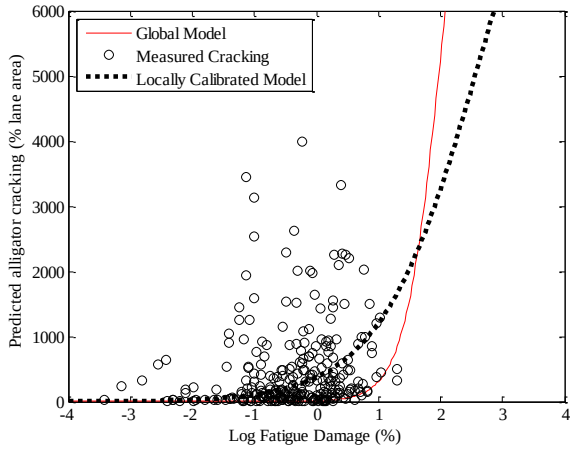
(a) Global model



(b) Local model

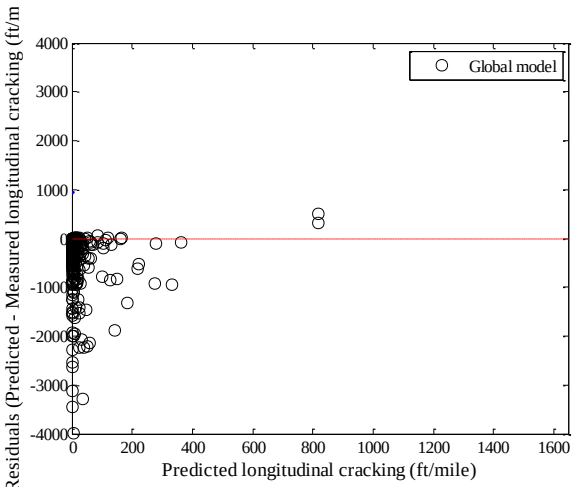


(c) Local model validation

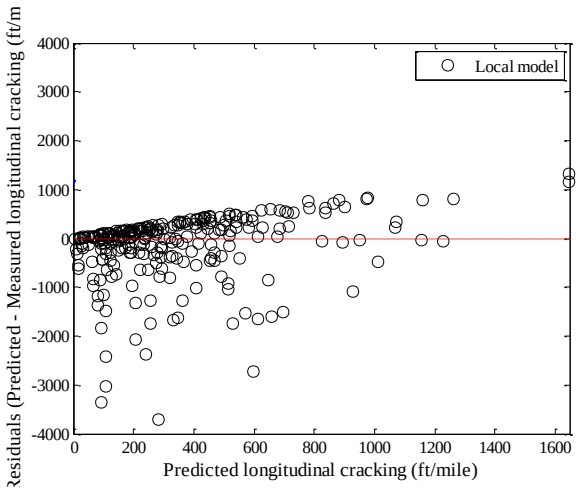


(d) Fatigue damage predicted cracking

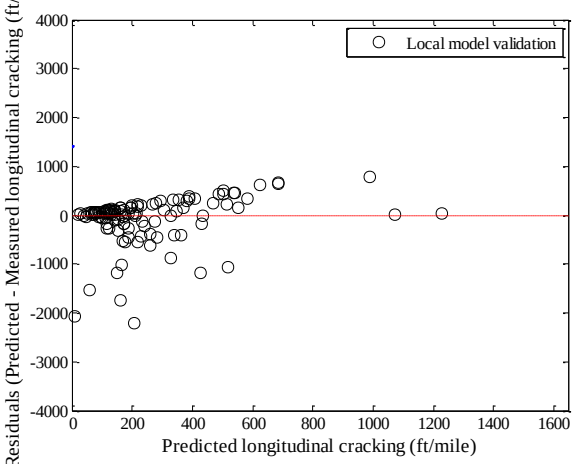
Figure B-33 Option 1 local calibration results - split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-34 Option 1 local calibration residual plots - split sampling

Reliability

Table B-20 Option 1 global and local alligator cracking model reliability – split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 150 + \frac{2300}{1+e^{2.1-0.4\times log(D_{td}+0.0001)}}$

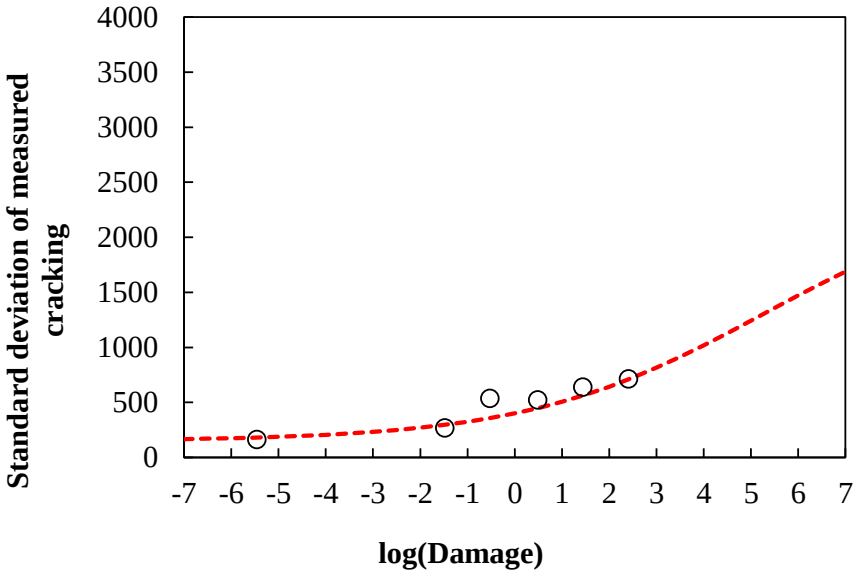


Figure B-35 Option 1 fitted reliability model after local calibration – split sampling

Repeated split sampling

Table B-21 Option 1 local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	739.96	742.34	642.99	818.50
Bias	-408.56	-408.06	-460.33	-353.78
C1	7.00	7.00	-	-
C2	3.50	3.50	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	642.53	645.28	555.83	710.83
Bias	-124.58	-124.76	-157.32	-90.77
C1	3.32	3.32	3.16	3.52
C2	1.25	1.25	1.25	1.25
Local Model Validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	648.70	650.68	466.25	830.75
Bias	-124.93	-128.32	-308.60	64.65
C1	3.32	3.32	3.16	3.52
C2	1.25	1.25	1.25	1.25

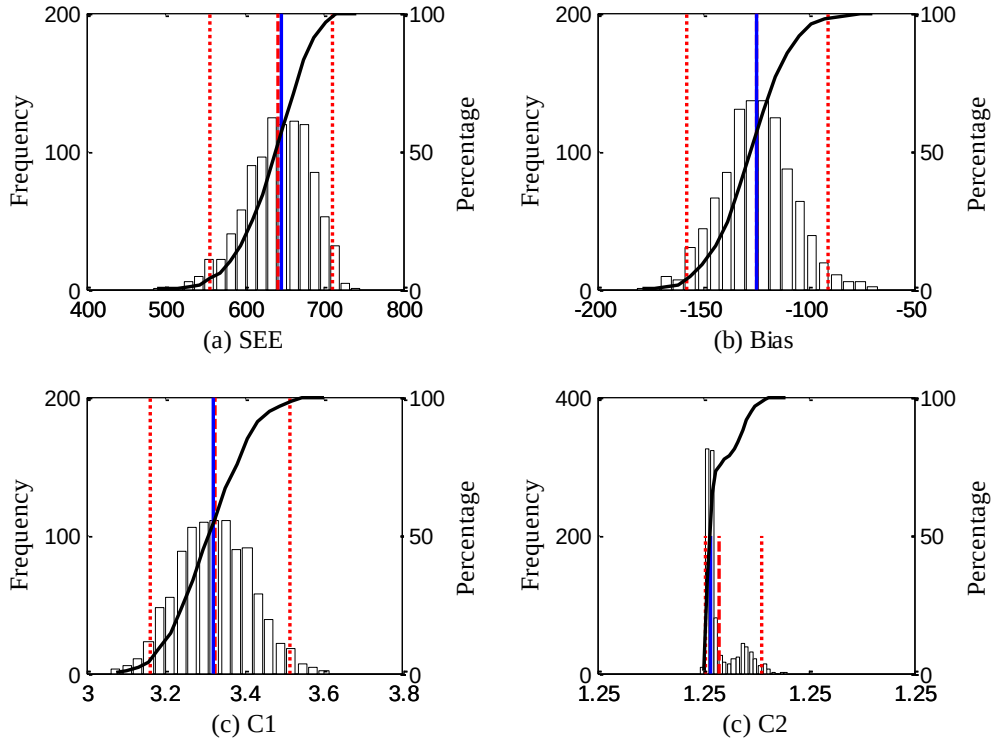


Figure B-36 Option 1 repeated split sampling frequency distributions – calibration

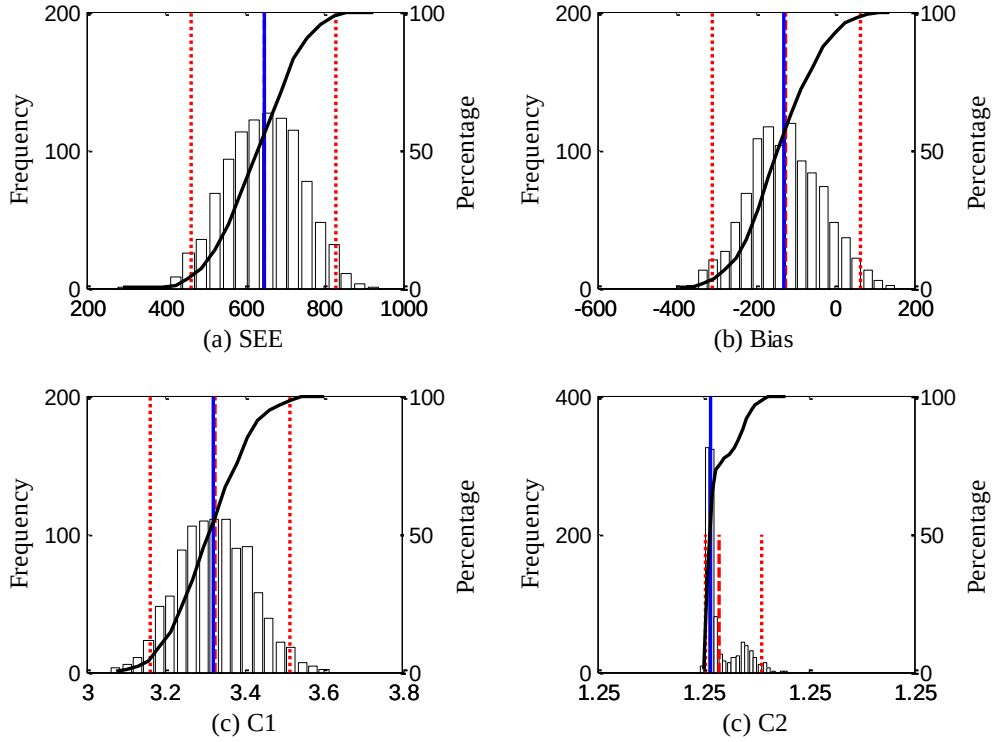
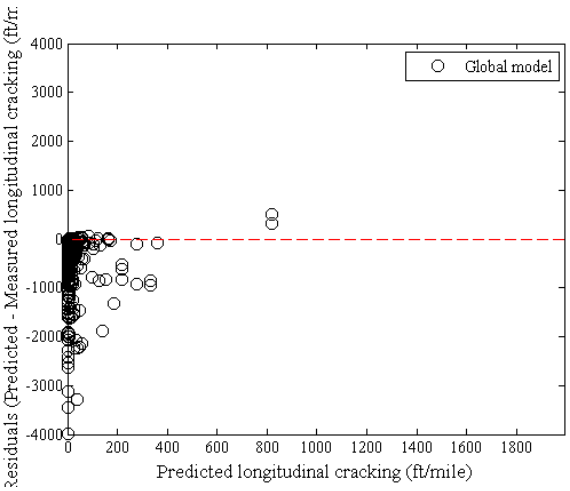
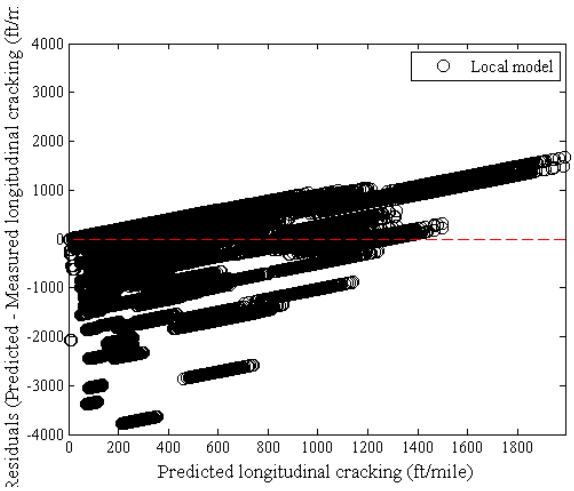


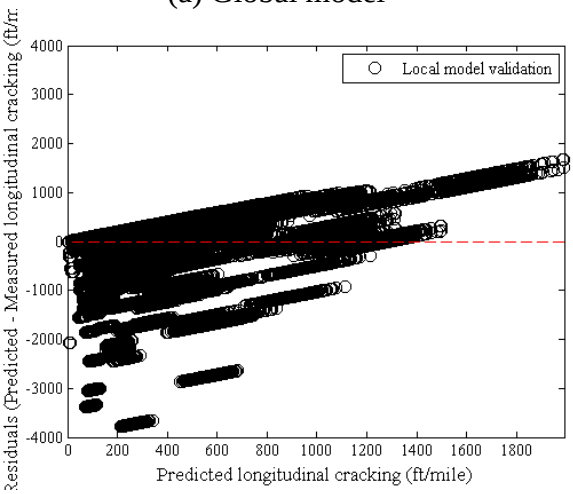
Figure B-37 Option 1 repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-38 Option 1 local calibration residual plots – repeated split sampling

Reliability

Table B-22 Option 1 global and local alligator cracking model reliability – repeated split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 150 + \frac{2300}{1+e^{2.2-0.61\times log(D_{td}+0.0001)}}$

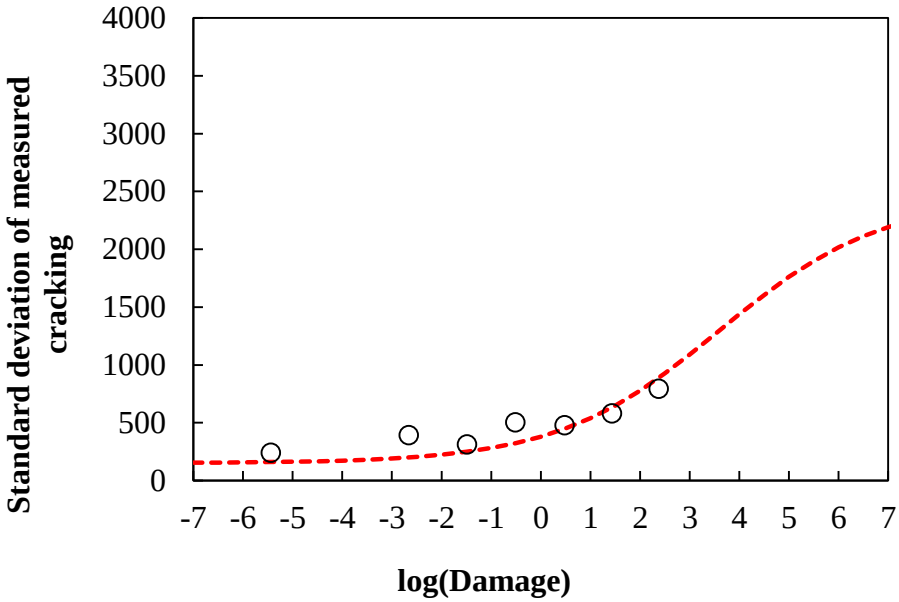


Figure B-39 Option 1 fitted reliability model after local calibration – repeated split sampling

Bootstrapping

Table B-23 Option 1 local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	741.41	738.34	614.64	871.40
Bias	-411.36	-409.36	-495.00	-335.23
C1	7.00	7.00	-	-
C2	3.50	3.50	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	641.44	640.16	526.91	759.87
Bias	-122.72	-121.44	-175.87	-73.53
C1	3.32	3.32	3.04	3.58
C2	1.25	1.25	1.25	1.25

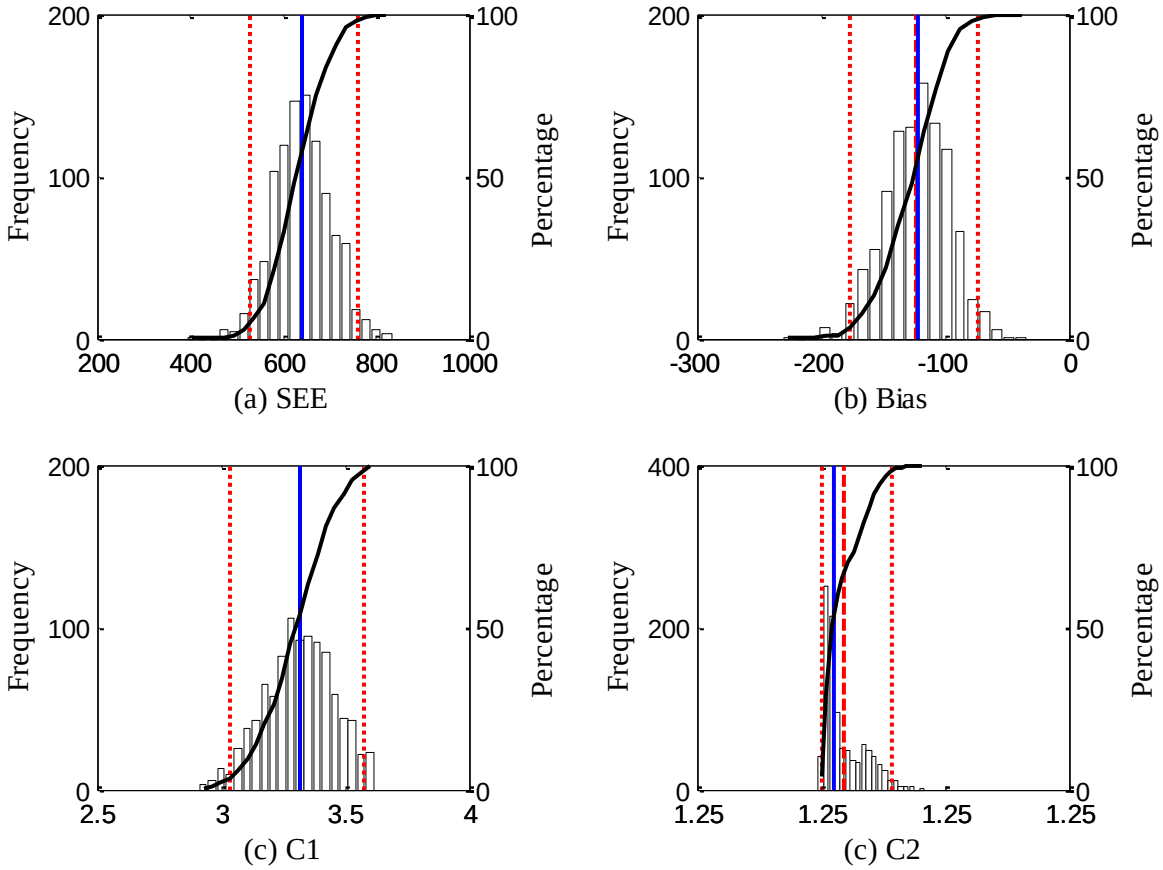
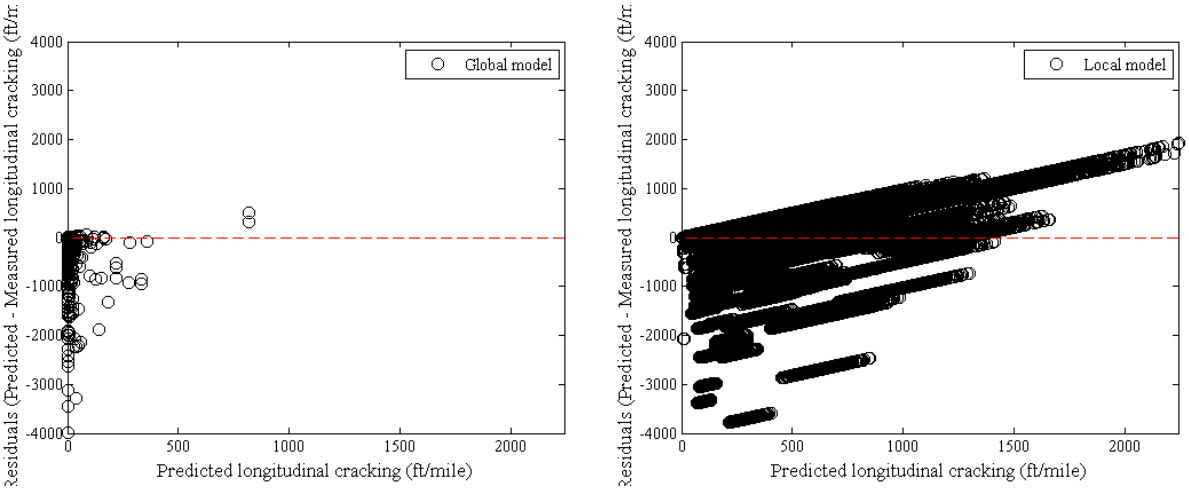


Figure B-40 Option 1 bootstrapping frequency distributions



(a) Global model (b) Local model

Figure B-41 Option 1 local calibration residual plots – bootstrapping

Reliability

Table B-24 Option 1 global and local alligator cracking model reliability – bootstrapping

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 150 + \frac{2300}{1+e^{1.9-0.6\times log(D_{td}+0.0001)}}$

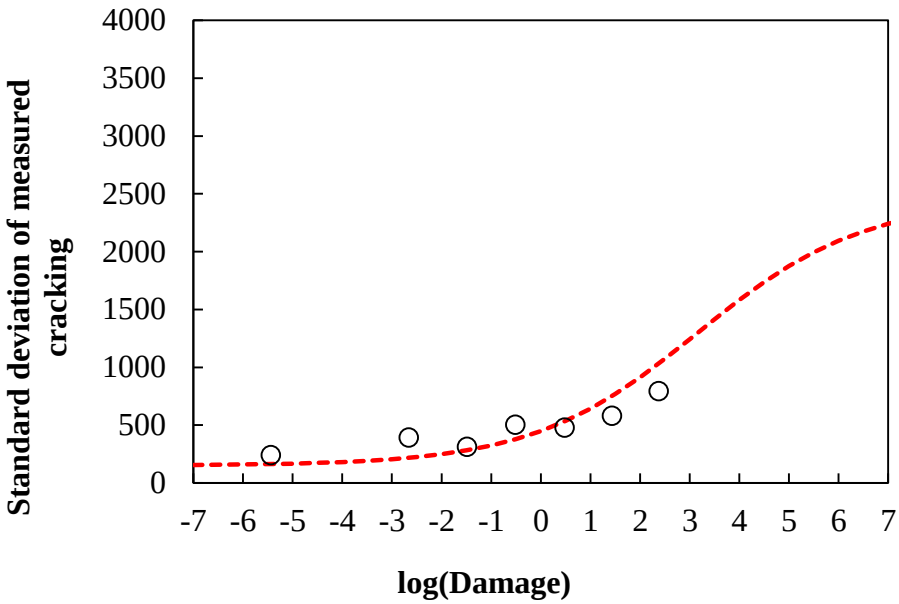


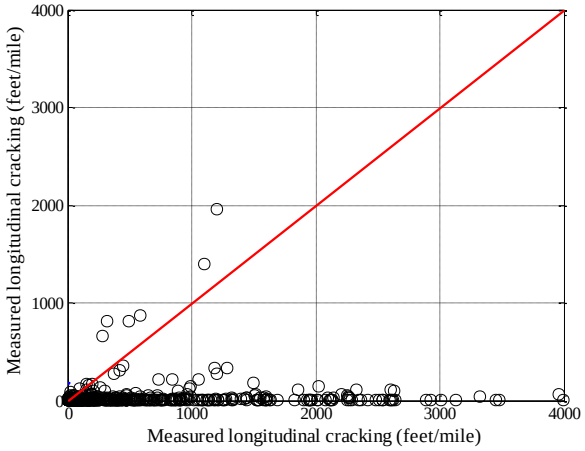
Figure B-42 Option 1 fitted reliability model after local calibration – bootstrapping

B.1.2.2 Option 2

No sampling

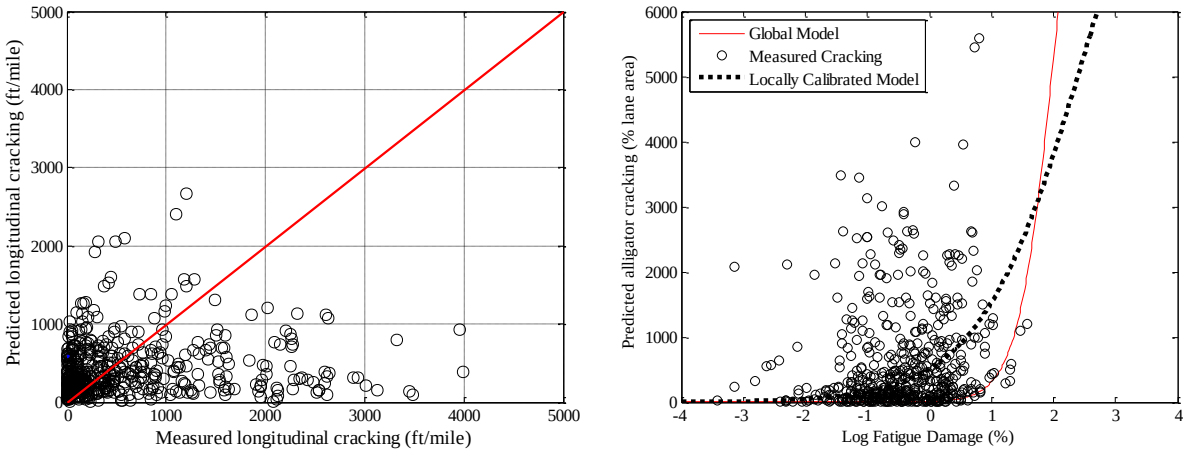
Table B-25 Option 2 local calibration results – no sampling

Parameter	Global model	Local model
SEE	998.85	856.06
Bias	-580.99	-185.37
R^2	0.01	0.03
t-test pvalue	0.00	0.00
Intercept = 0	0.00	0.00
Slope = 1	0.00	0.00
C1	7.00	2.97
C2	3.50	1.20



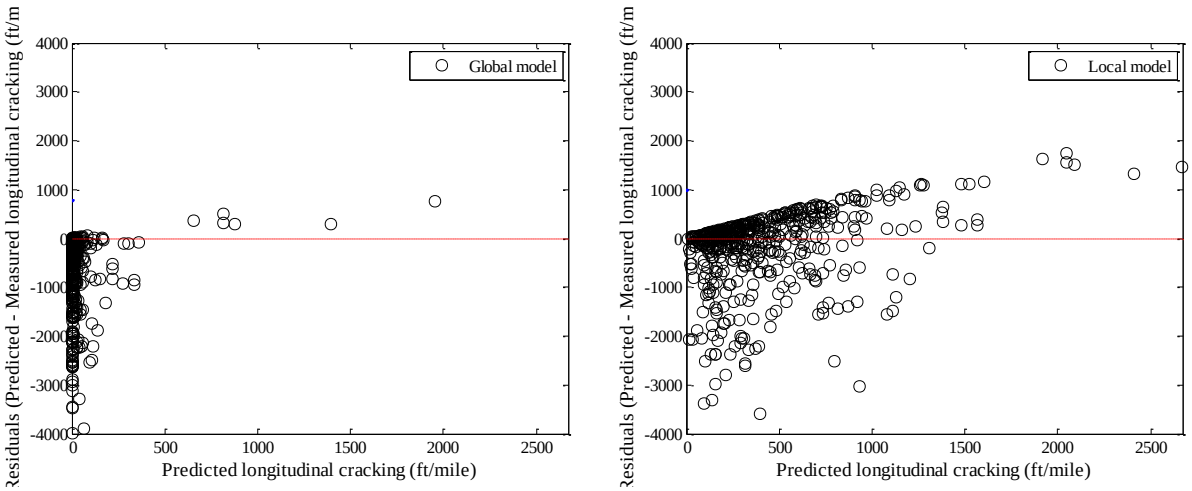
Global model

Figure B-43 Option 2 measured versus predicted fatigue cracking – no sampling



(a) Measured vs. predicted cracking (b) Fatigue damage predicted cracking

Figure B-44 Option 2 local calibration results – no sampling



(a) Global model (b) Local model

Figure B-45 Option 2 local calibration residual plots – no sampling

Reliability

Table B-26 Option 2 global and local alligator cracking model reliability – no sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 300 + \frac{3000}{1+e^{1.8-0.61\times log(D_{td}+0.0001)}}$

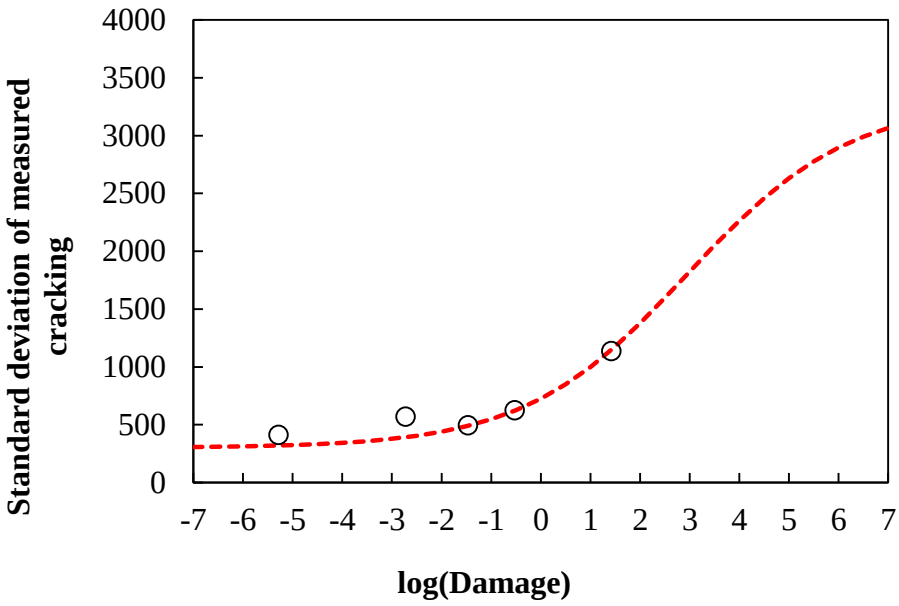
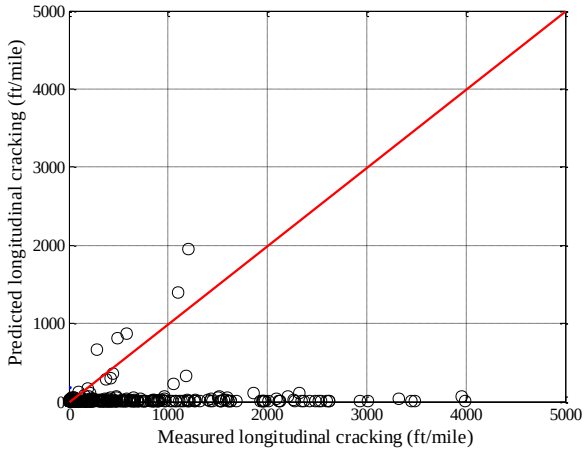


Figure B-46 Option 2 fitted reliability model after local calibration –no sampling

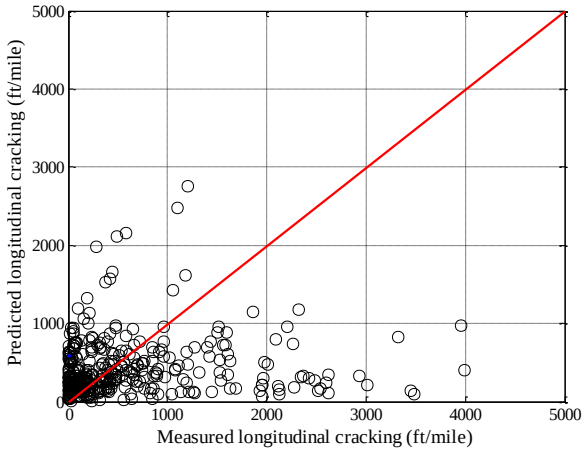
Split sampling

Table B-27 Option 2 local calibration results – split sampling

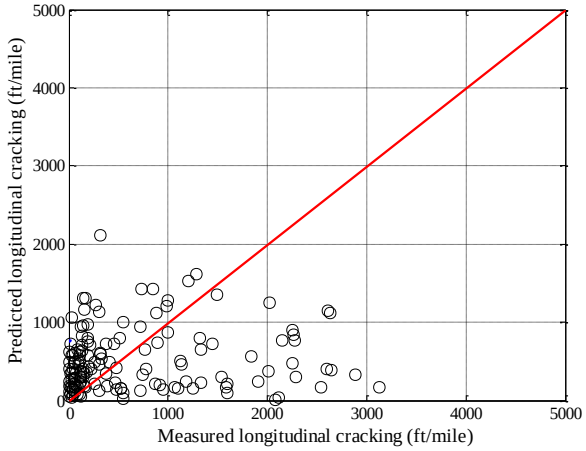
Parameter	Global model	Local model calibration	Local model validation
SEE	997.83	858.43	856.74
Bias	-563.66	-177.72	-148.71
R^2	0.01	0.03	0.01
t-test pvalue	0.00	0.00	0.03
Intercept = 0	0.03	0.00	0.00
Slope = 1	0.00	0.00	0.00
C1	7.00	2.93	2.93
C2	3.50	1.20	1.20



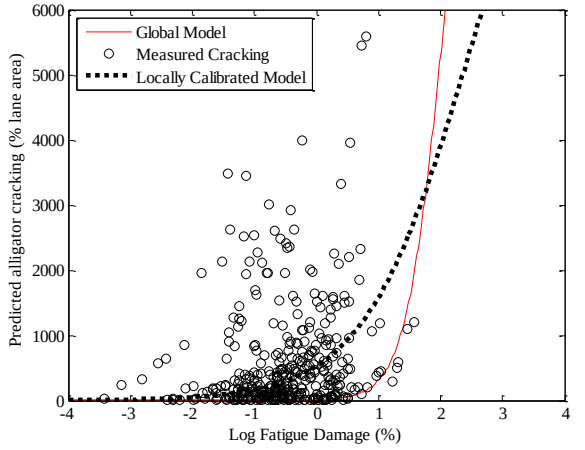
(a) Global model



(b) Local model

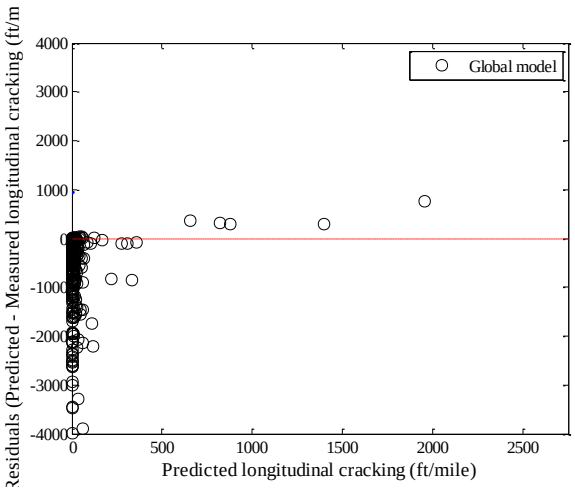


(c) Local model validation

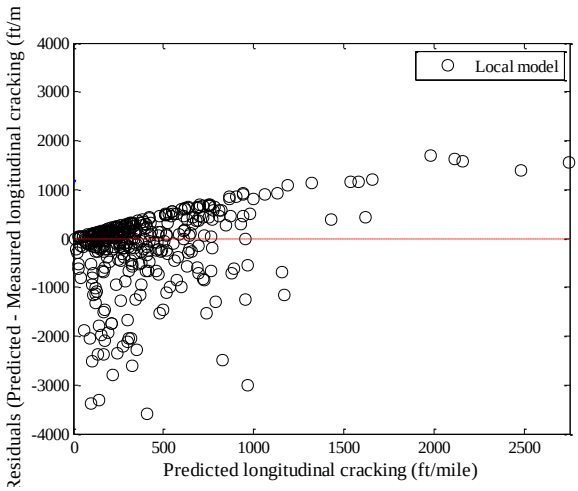


(d) Fatigue damage predicted cracking

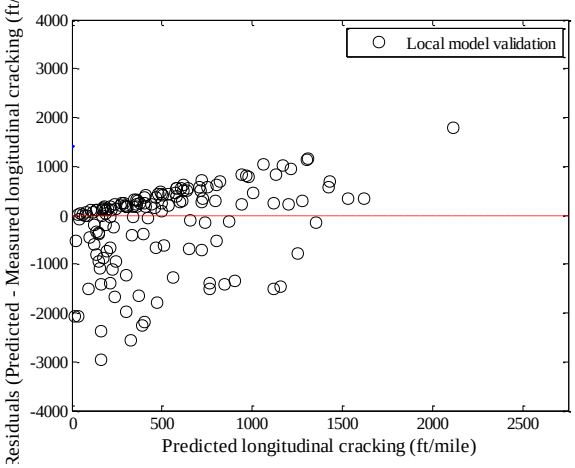
Figure B-47 Option 2 local calibration results - split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-48 Option 2 local calibration residual plots - split sampling

Reliability

Table B-28 Option 2 global and local alligator cracking model reliability – split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 250 + \frac{3000}{1+e^{1.9677-1.2723\times log(D_{td}+0.0001)}}$

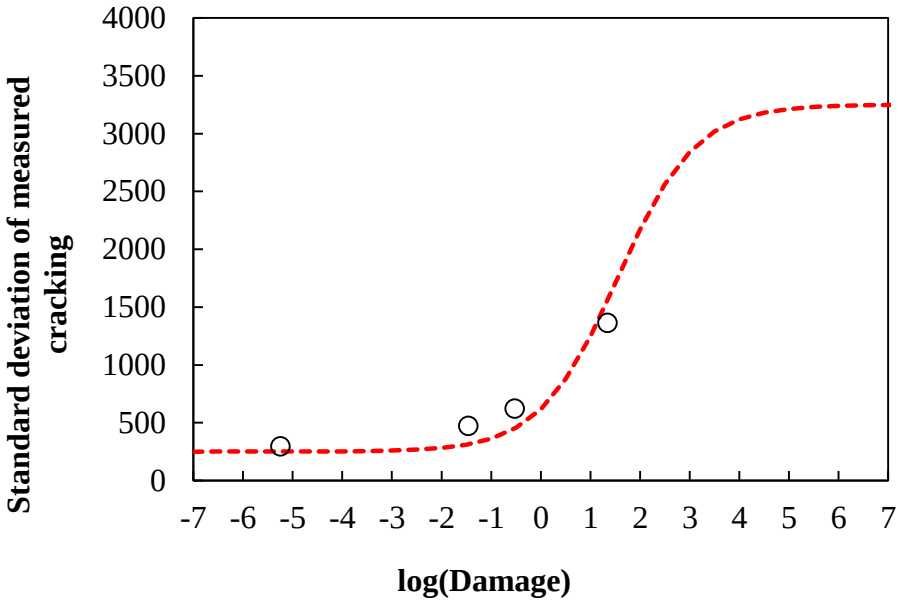


Figure B-49 Option 2 fitted reliability model after local calibration – split sampling

Repeated split sampling

Table B-29 Option 2 local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	997.60	1007.73	865.75	1092.97
Bias	-581.11	-583.28	-646.35	-509.97
C1	7.00	7.00	-	-
C2	3.50	3.50	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	853.26	857.89	748.64	935.63
Bias	-184.74	-184.62	-237.16	-128.13
C1	2.98	2.98	2.75	3.20
C2	1.20	1.20	1.20	1.20
Local Model Validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	864.65	861.78	648.52	1084.79
Bias	-180.99	-182.84	-417.00	93.67
C1	2.98	2.98	2.75	3.20
C2	1.20	1.20	1.20	1.20

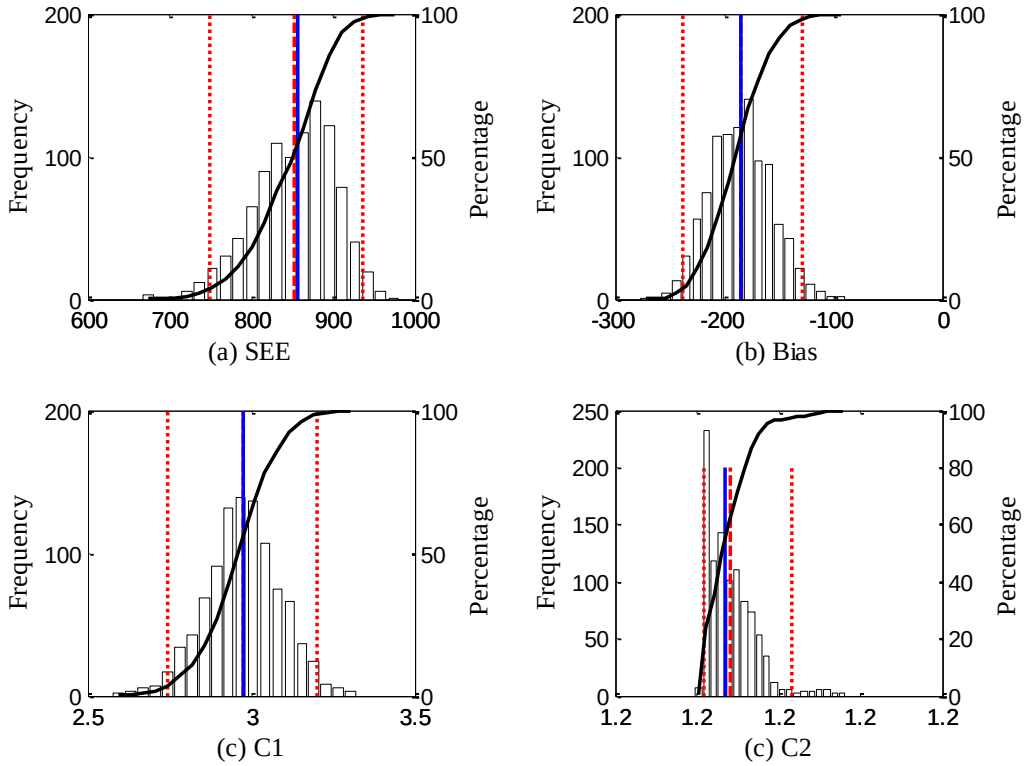


Figure B-50 Option 2 repeated split sampling frequency distributions – calibration

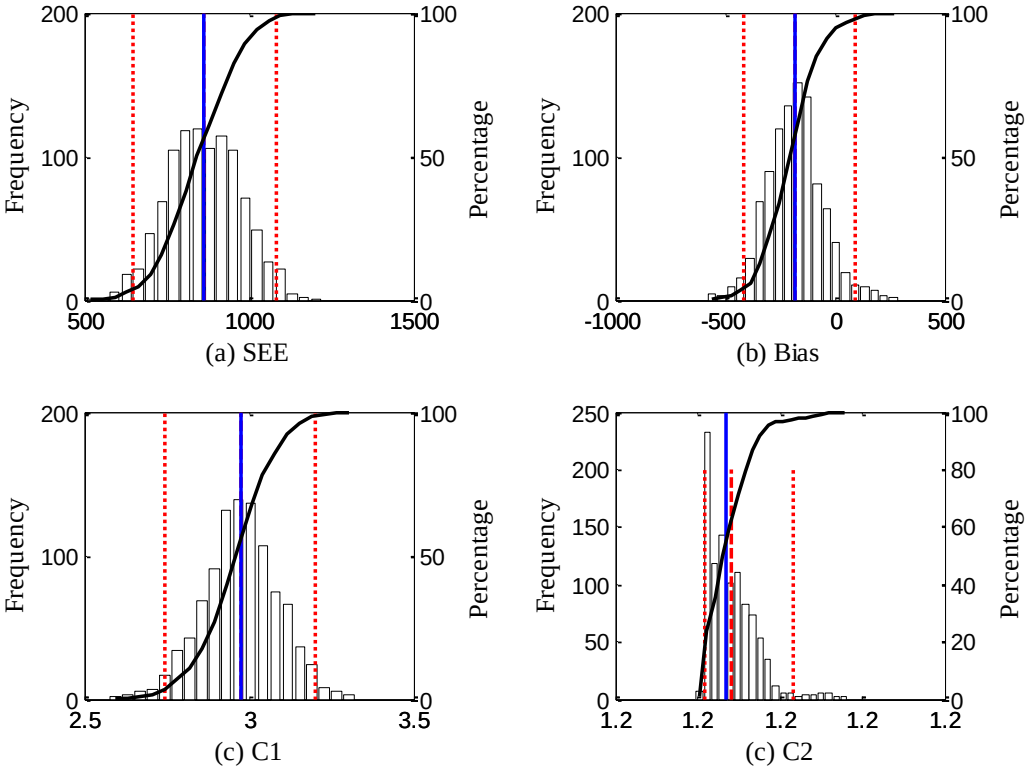
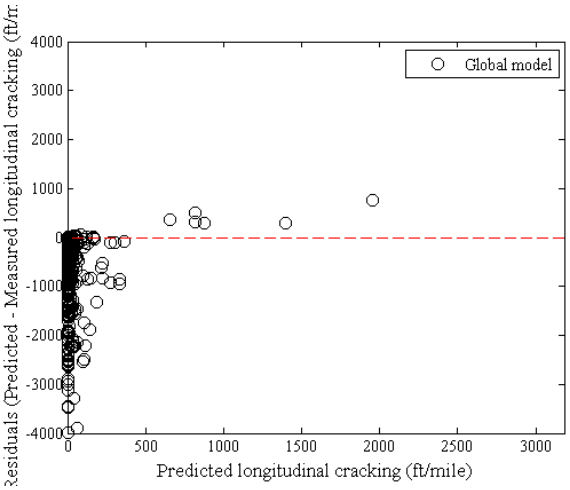
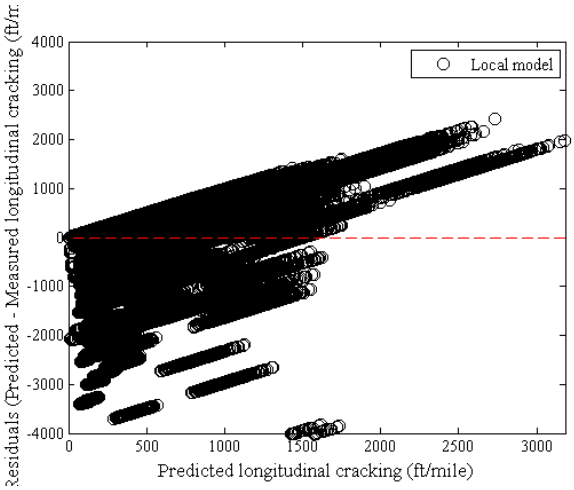


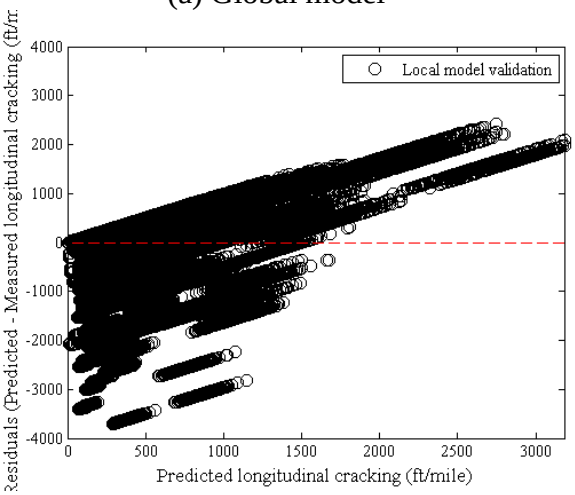
Figure B-51 Option 2 repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-52 Option 2 local calibration residual plots – repeated split sampling

Reliability

Table B-30 Option 2 global and local alligator cracking model reliability – repeated split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 300 + \frac{3000}{1+e^{1.8-0.61\times log(D_{td}+0.0001)}}$

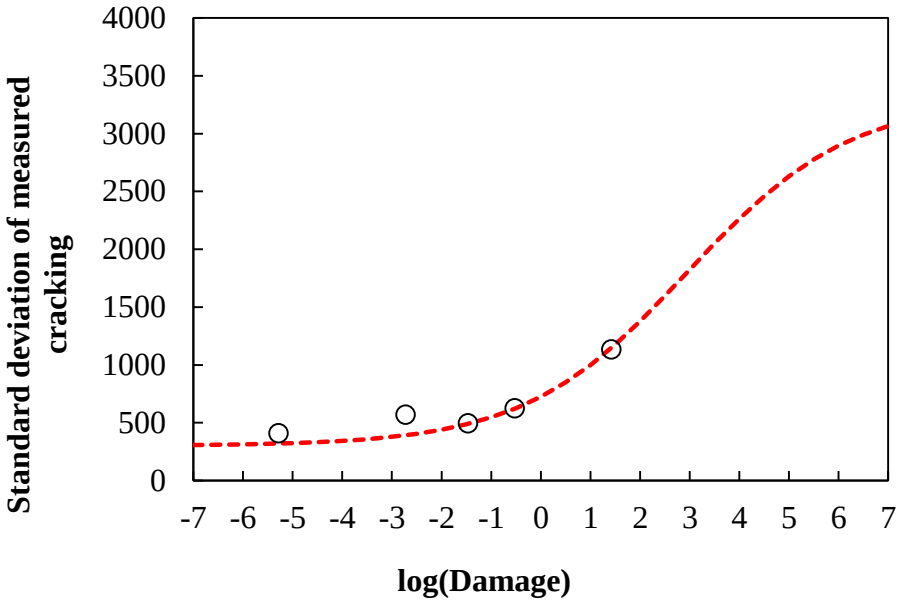


Figure B-53 Option 2 fitted reliability model after local calibration – repeated split sampling

Bootstrapping

Table B-31 Option 2 local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	996.20	992.28	831.70	1200.25
Bias	-580.85	-580.61	-691.15	-480.97
C1	7.00	7.00	-	-
C2	3.50	3.50	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	850.44	847.03	717.48	1018.32
Bias	-181.97	-180.66	-264.64	-105.74
C1	2.97	2.98	2.64	3.29
C2	1.20	1.20	1.20	1.20

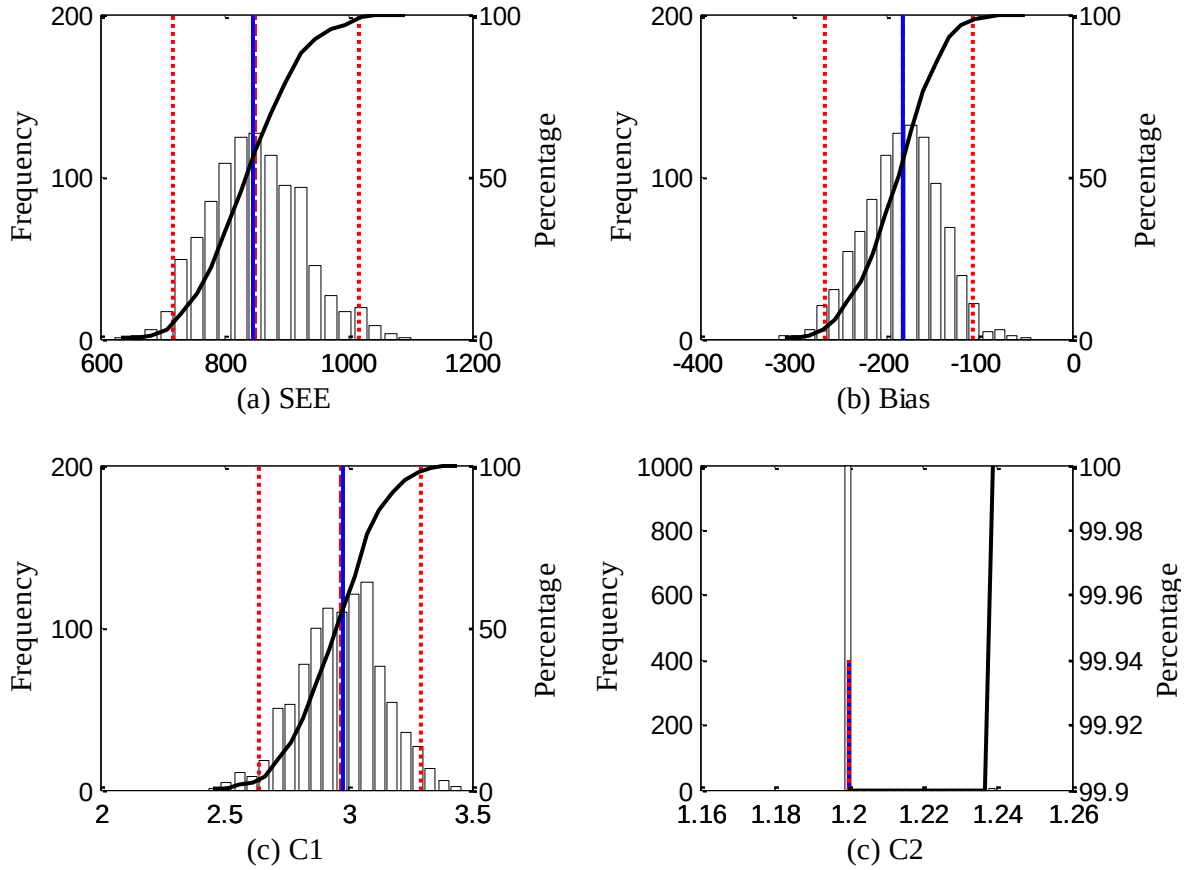


Figure B-54 Option 2 bootstrapping frequency distributions

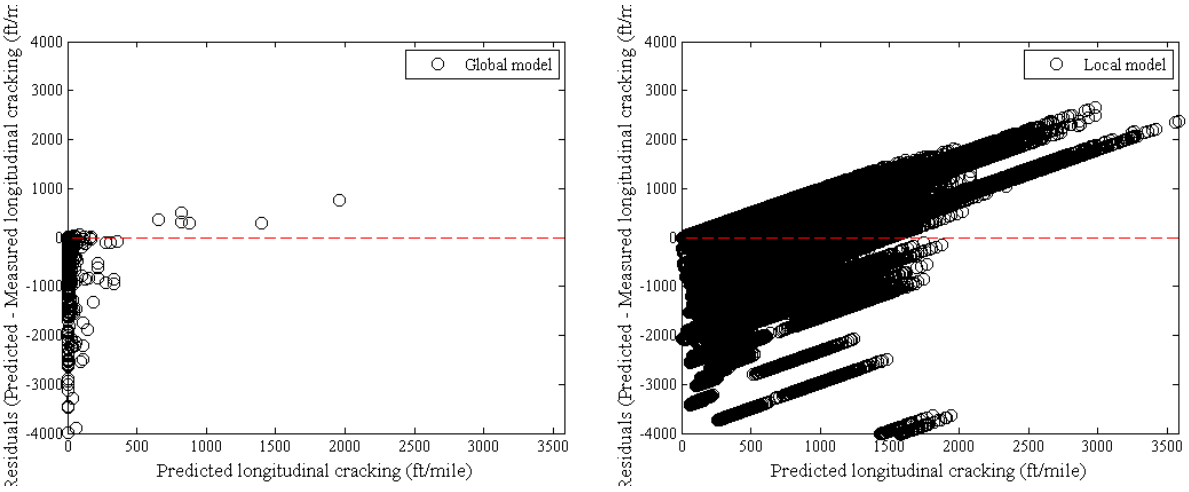


Figure B-55 Option 2 local calibration residual plots – bootstrapping

Reliability

Table B-32 Option 2 global and local alligator cracking model reliability – bootstrapping

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 300 + \frac{3000}{1+e^{1.8-0.61\times log(D_{td}+0.0001)}}$

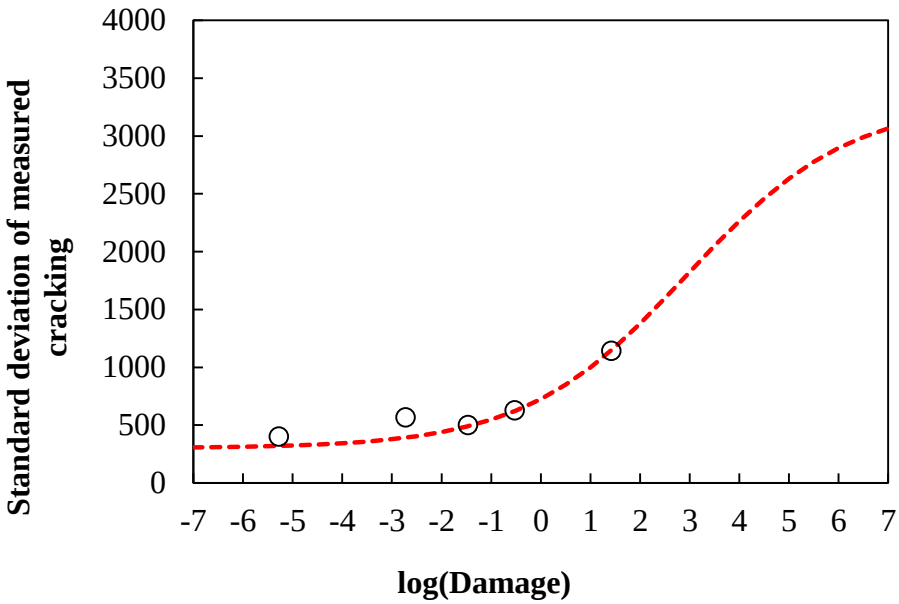


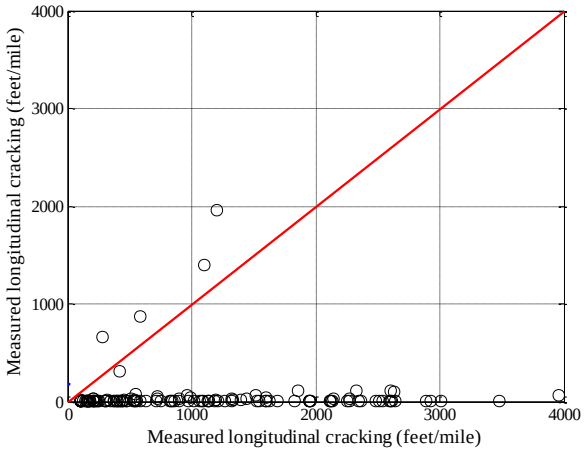
Figure B-56 Option 2 fitted reliability model after local calibration – bootstrapping

B.1.2.3 Option 4

No sampling

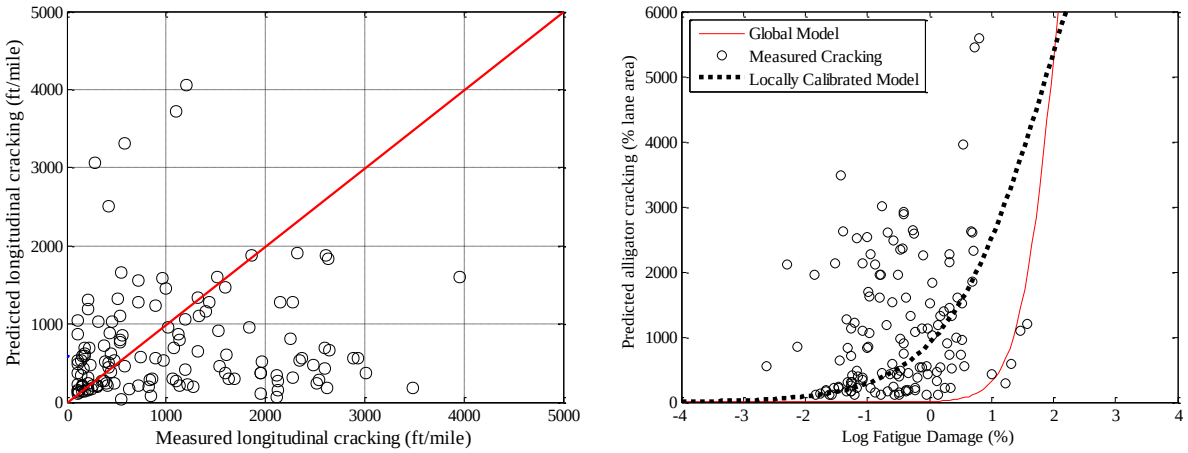
Table B-33 Option 4 local calibration results – no sampling

Parameter	Global model	Local model
SEE	1518.82	1213.53
Bias	-1071.64	-382.70
R^2	0.00	0.04
t-test pvalue	0.00	0.00
Intercept = 0	0.12	0.00
Slope = 1	0.00	0.00
C1	7.00	2.36
C2	3.50	1.20



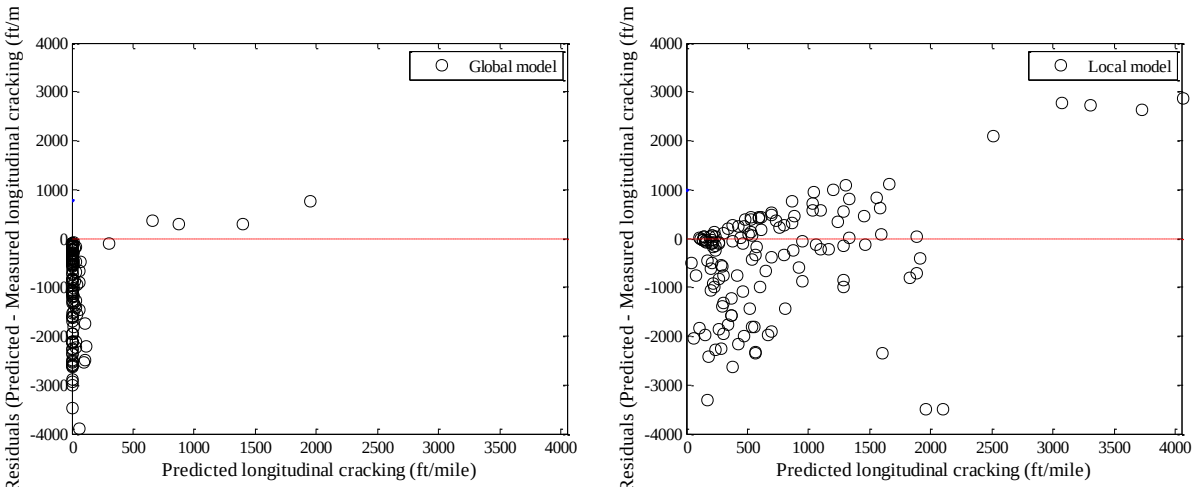
Global model

Figure B-57 Option 4 measured versus predicted fatigue cracking – no sampling



(a) Measured vs. predicted cracking (b) Fatigue damage predicted cracking

Figure B-58 Option 4 local calibration results – no sampling



(a) Global model (b) Local model

Figure B-59 Option 4 local calibration residual plots – no sampling

Reliability

Table B-34 Option 4 global and local alligator cracking model reliability – no sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 700 + \frac{3000}{1+e^{1.0-0.8\times log(D_{td}+0.0001)}}$

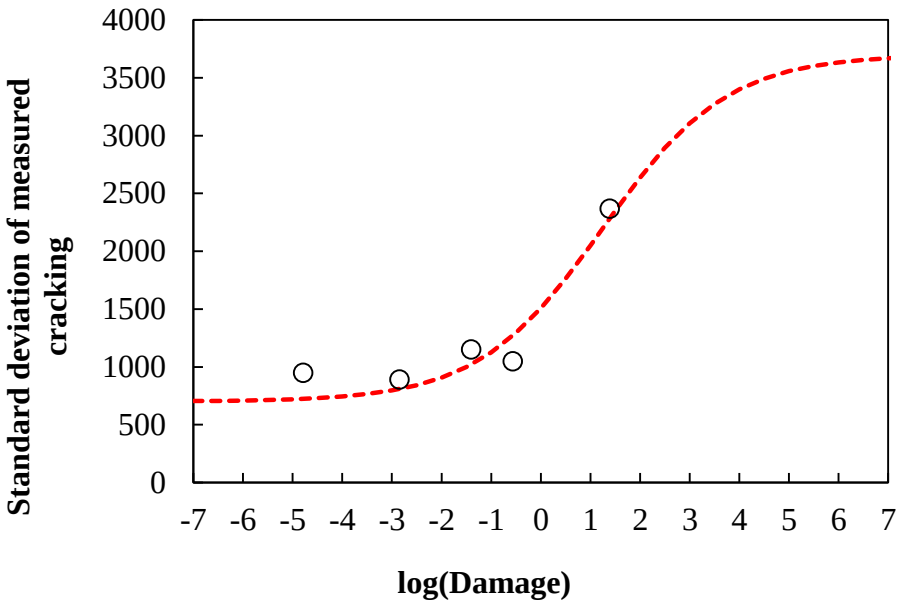
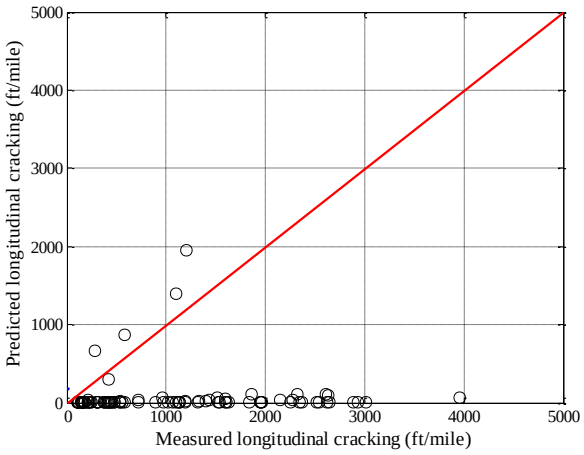


Figure B-60 Option 4 fitted reliability model after local calibration –no sampling

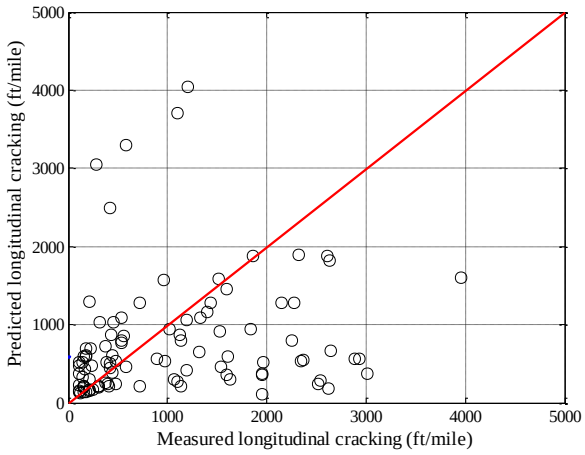
Split sampling

Table B-35 Option 4 local calibration results – split sampling

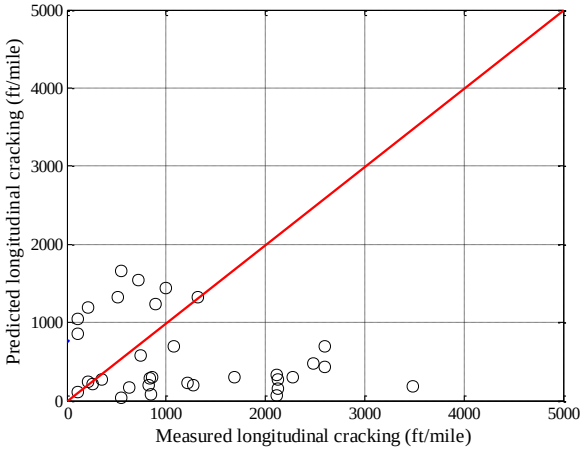
Parameter	Global model	Local model calibration	Local model validation
SEE	1537.23	1193.07	1313.41
Bias	-1040.89	-310.60	-618.73
R^2	0.00	0.08	0.07
t-test pvalue	0.00	0.01	0.00
Intercept = 0	0.14	0.00	0.00
Slope = 1	0.00	0.00	0.00
C1	7.00	2.37	2.37
C2	3.50	1.20	1.20



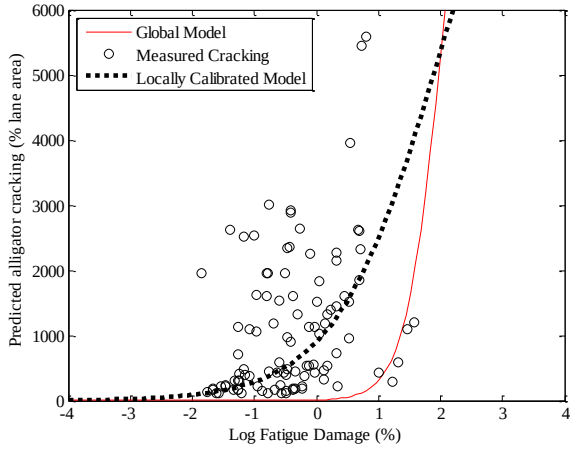
(a) Global model



(b) Local model

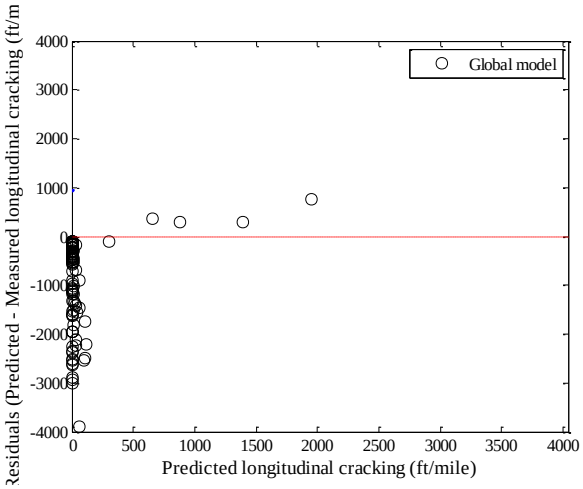


(c) Local model validation

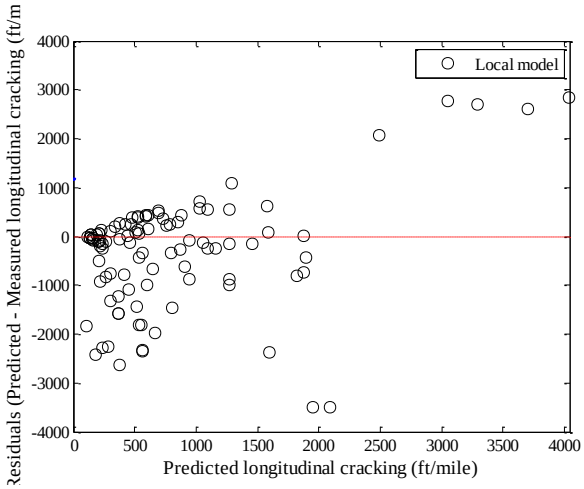


(d) Fatigue damage predicted cracking

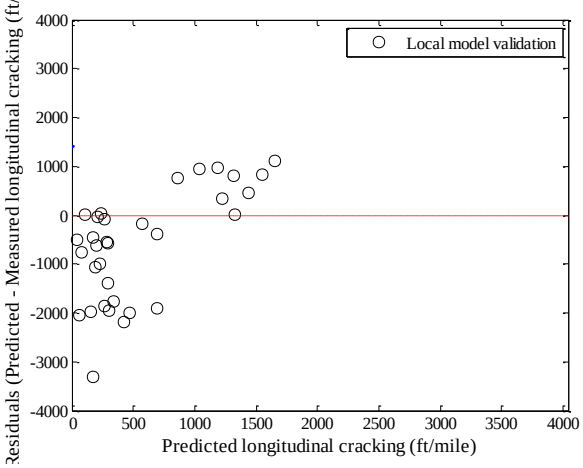
Figure B-61 Option 4 local calibration results - split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-62 Option 4 local calibration residual plots - split sampling

Reliability

Table B-36 Option 4 global and local alligator cracking model reliability – split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 700 + \frac{3000}{1+e^{0.5-1.0\times log(D_{td}+0.0001)}}$

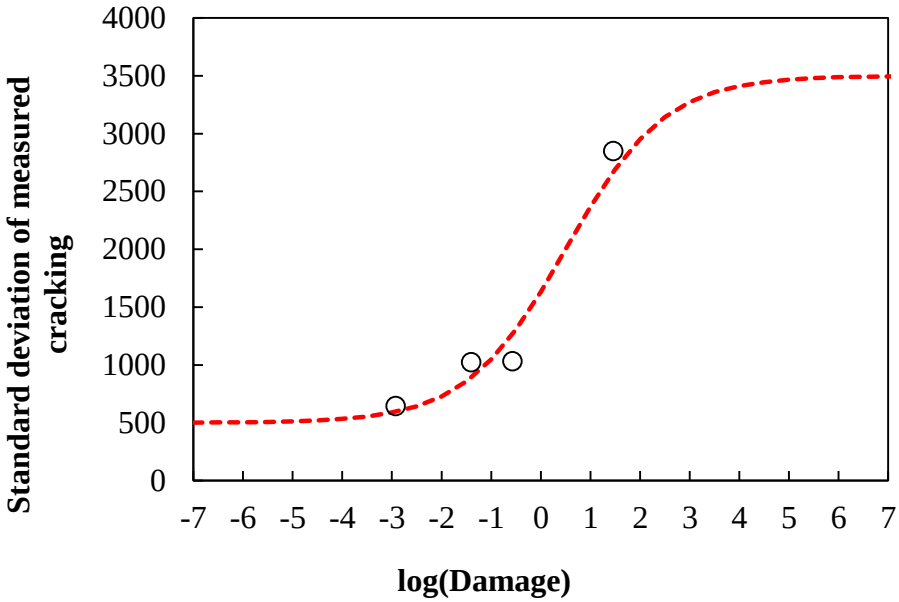


Figure B-63 Option 4 fitted reliability model after local calibration – split sampling

Repeated split sampling

Table B-37 Option 4 local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	1526.24	1566.61	1262.97	1704.61
Bias	-1077.40	-1082.03	-1243.48	-898.41
C1	7.00	7.00	-	-
C2	3.50	3.50	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	1200.63	1208.68	973.63	1378.28
Bias	-322.87	-321.70	-485.94	-159.86
C1	2.27	2.39	1.79	2.40
C2	1.20	1.20	1.20	1.20
Local Model Validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	1283.29	1268.41	777.59	1800.53
Bias	-287.20	-364.11	-900.44	719.47
C1	2.27	2.39	1.79	2.40
C2	1.20	1.20	1.20	1.20

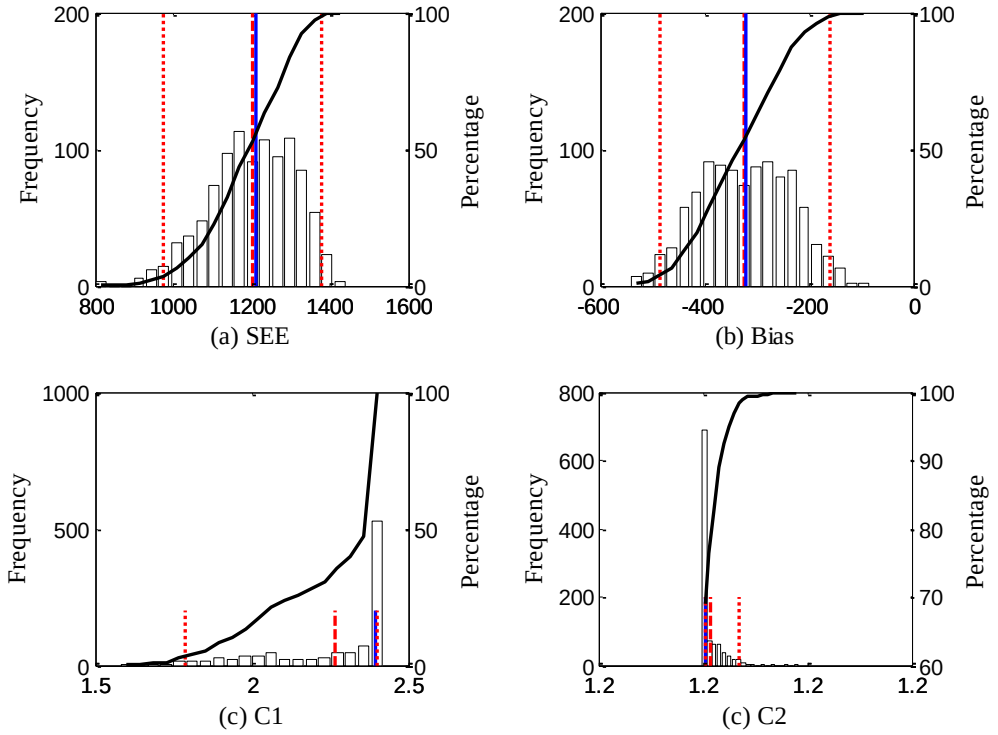


Figure B-64 Option 4 repeated split sampling frequency distributions – calibration

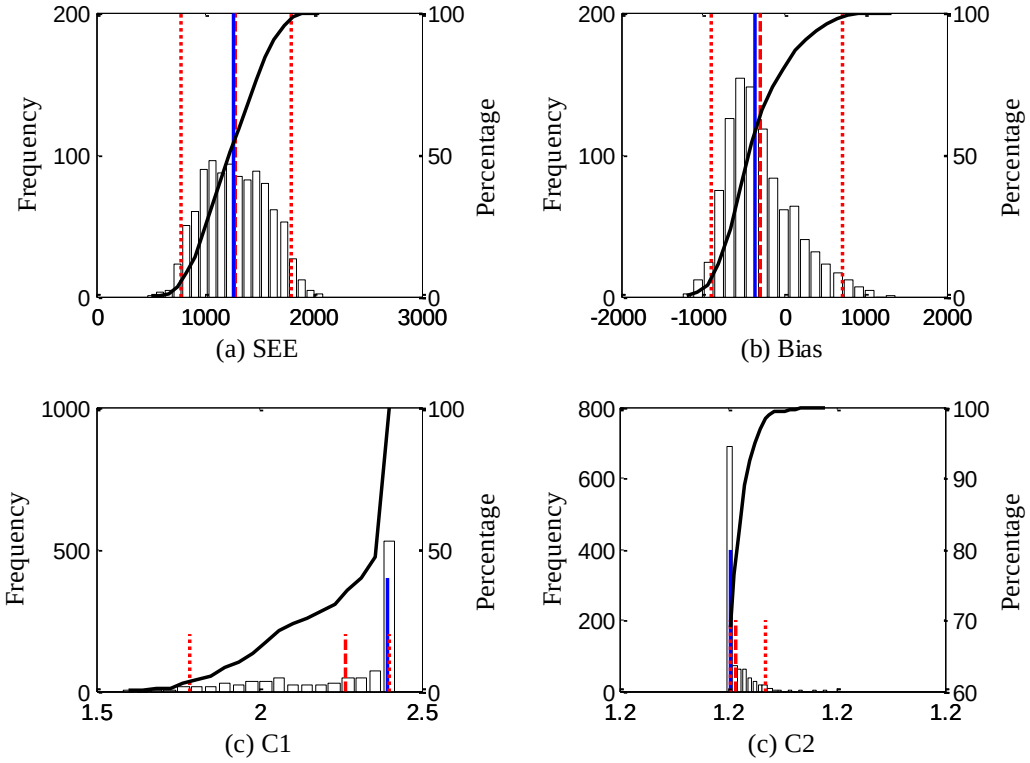
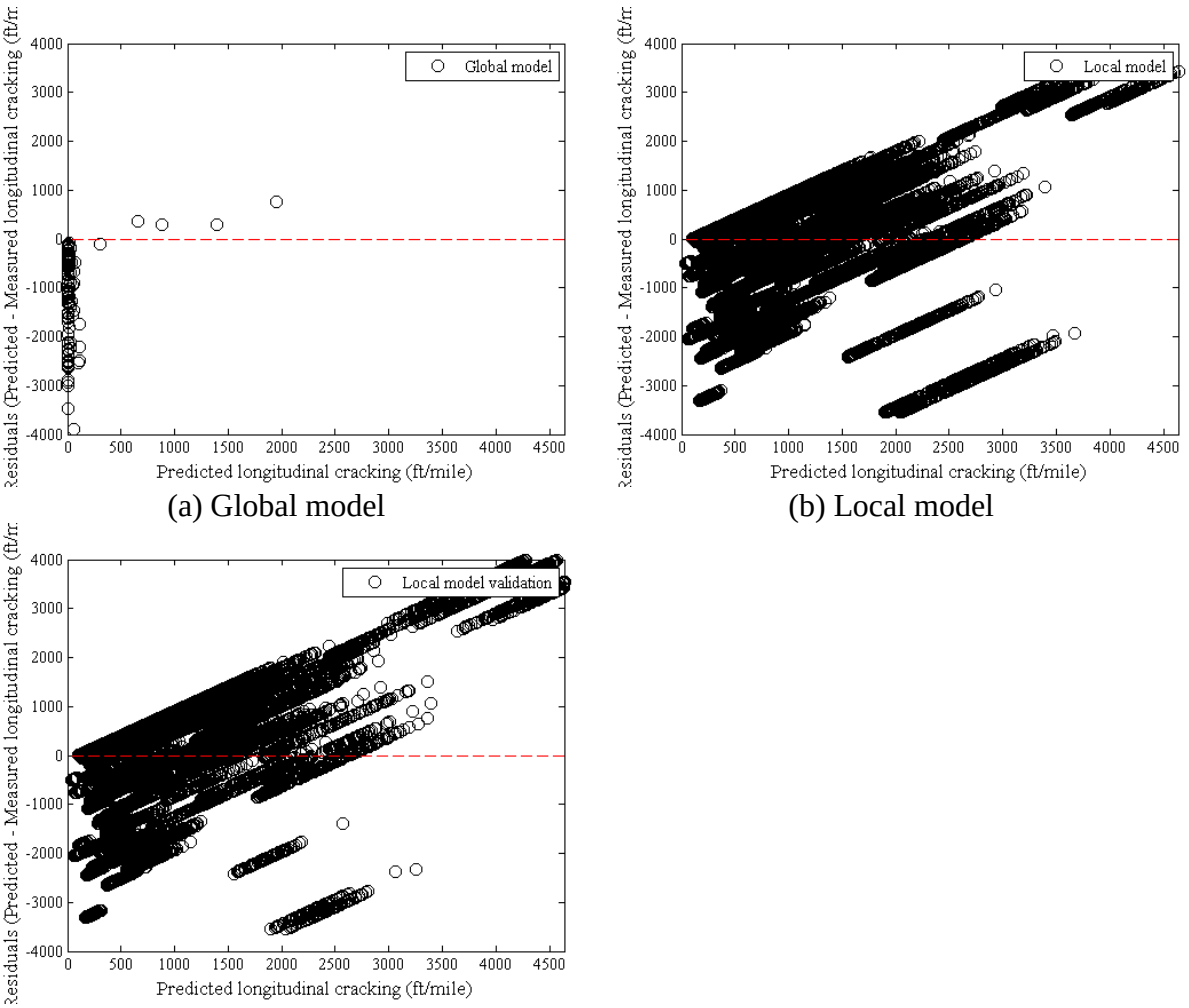


Figure B-65 Option 4 repeated split sampling frequency distributions – validation



(a) Global model

(b) Local model

(c) Local model validation

Figure B-66 Option 4 local calibration residual plots – repeated split sampling

Reliability

Table B-38 Option 4 global and local alligator cracking model reliability – repeated split sampling

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 700 + \frac{3000}{1+e^{1.1-0.9\times log(D_{td}+0.0001)}}$

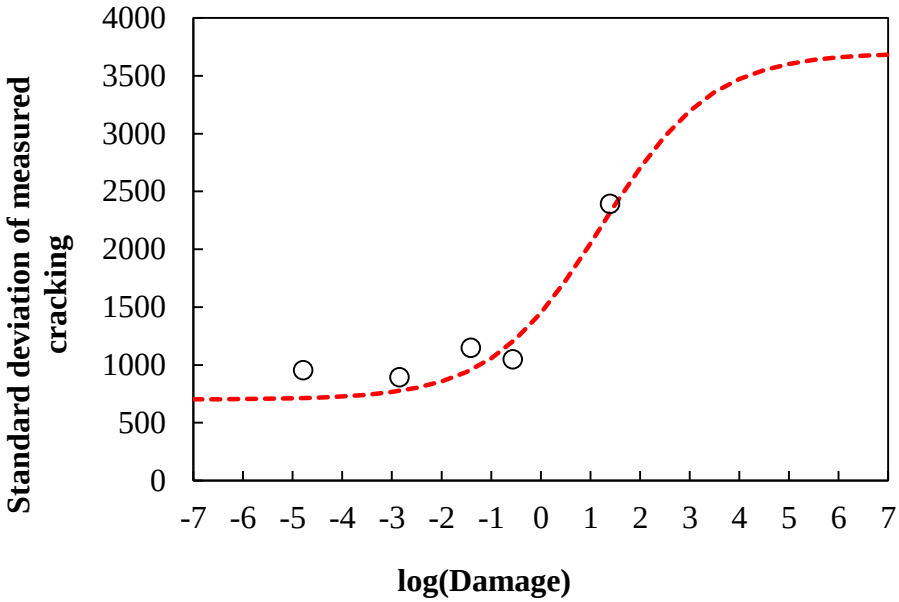


Figure B-67 Option 4 fitted reliability model after local calibration – repeated split sampling

Bootstrapping

Table B-39 Option 4 local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	1512.27	1501.86	1169.60	1930.76
Bias	-1072.23	-1060.70	-1385.29	-807.29
C1	7.00	7.00	-	-
C2	3.50	3.50	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	1189.44	1187.05	898.51	1488.09
Bias	-283.96	-282.67	-507.09	-67.54
C1	2.23	2.36	1.69	2.40
C2	1.20	1.20	1.20	1.20

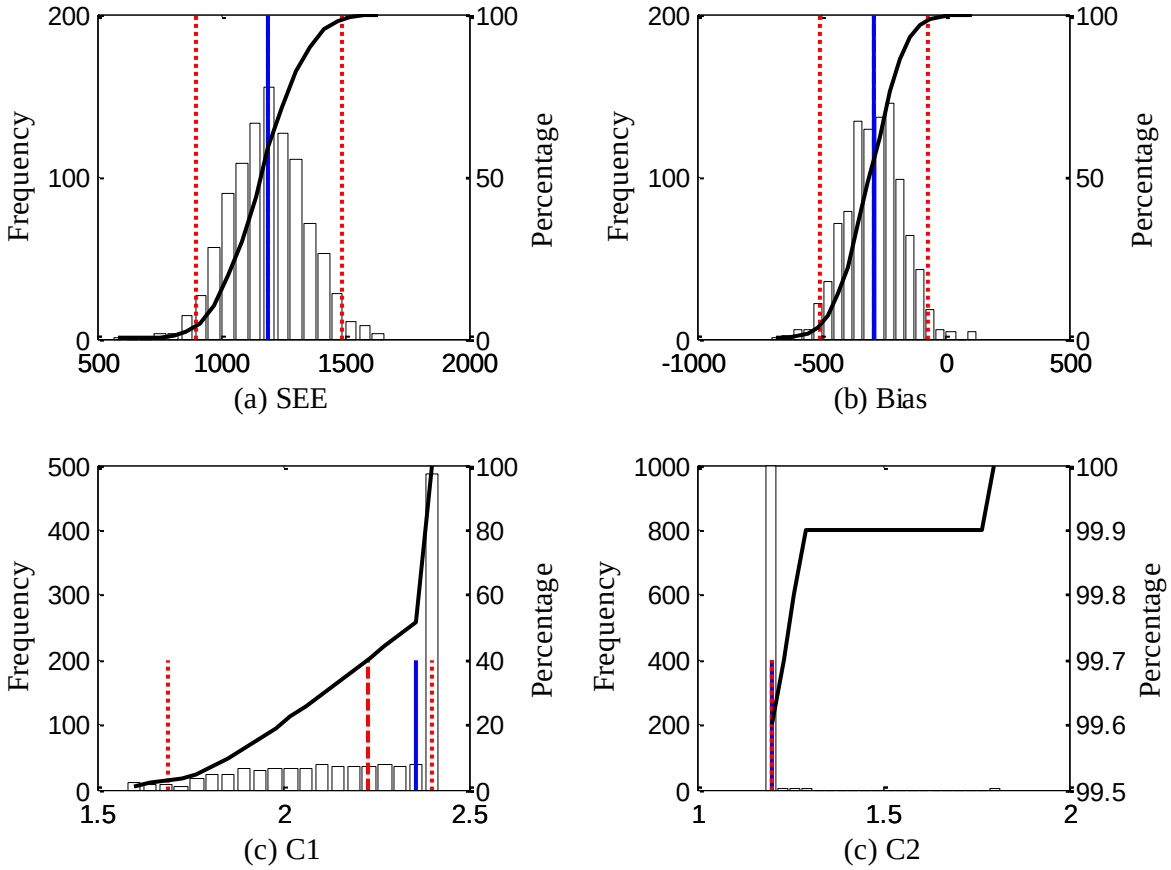


Figure B-68 Option 4 bootstrapping frequency distributions

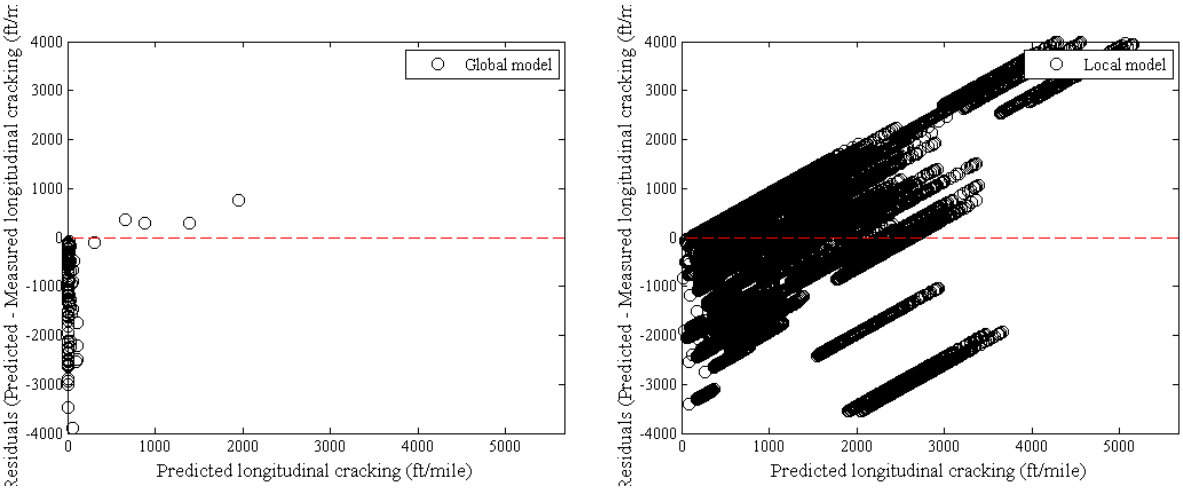


Figure B-69 Option 4 local calibration residual plots – bootstrapping

Reliability

Table B-40 Option 4 global and local alligator cracking model reliability – bootstrapping

Global model reliability equation	Local model reliability equation
$s_{e(Longitudinal)} = 200 + \frac{2300}{1+e^{1.07-2.165\times log(D_{td}+0.0001)}}$	$s_{e(Longitudinal)} = 700 + \frac{3000}{1+e^{1.1-1.0\times log(D_{td}+0.0001)}}$

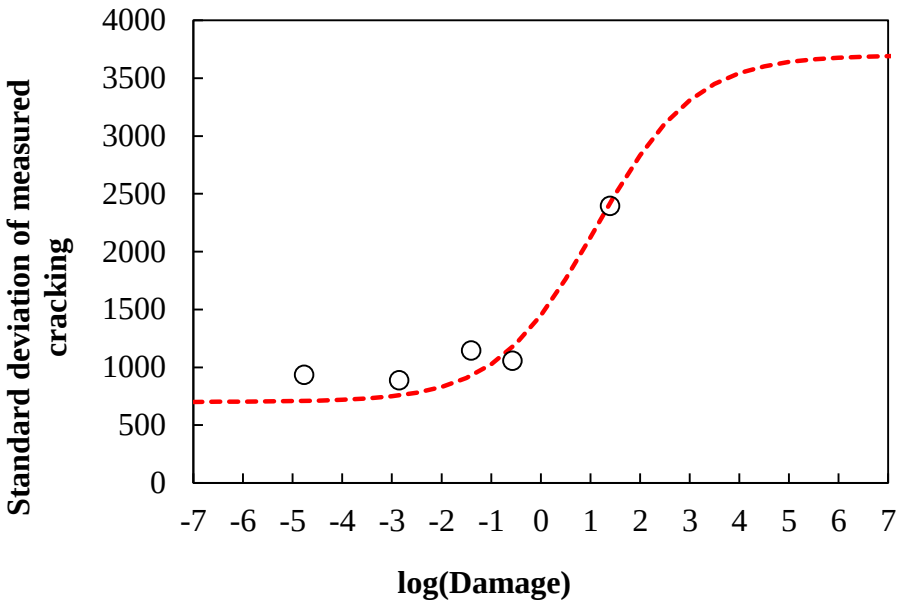


Figure B-70 Option 4 fitted reliability model after local calibration – bootstrapping

B.1.3 Rutting Model

B.1.3.1 Option 1 – Method 1

No sampling

Table B-41 Option 1: Method 1 – Global model goodness of fit – no sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0786	-0.0037
Base rut	0.1267	0.1111
Subgrade	0.2242	0.2143
Total rut	0.3431	0.3217

Table B-42 Option 1: Method 1 – Global model *p*-values

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.3220	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0000	0.0000	0.0000

Table B-43 Option 1: Method 1 – Local model goodness of fit– no sampling

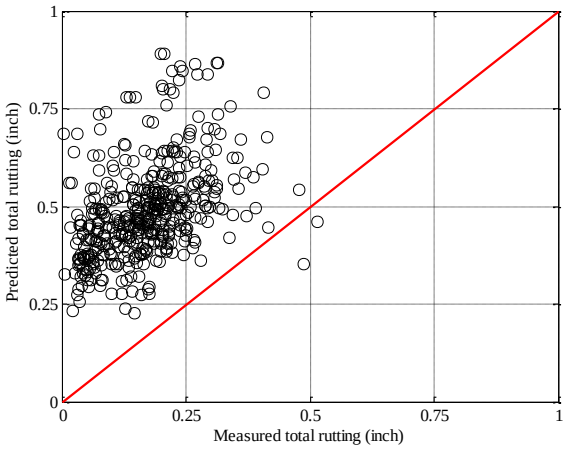
HMA layer	SEE	Bias
AC rut	0.0783	-0.0094
Base rut	0.0262	-0.0034
Subgrade	0.0228	-0.0003
Total rut	0.0869	-0.0132

Table B-44 Option 1: Method 1 – Local model *p*-values– no sampling

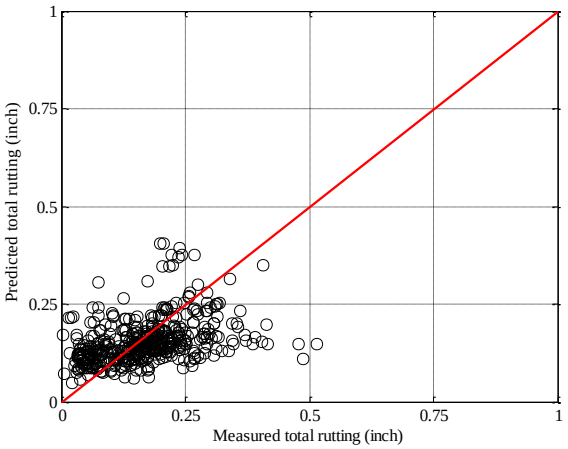
HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0110	0.0000	0.0000
Base rut	0.0054	0.0000	0.0000
Subgrade	0.7695	0.0000	0.0000
Total rut	0.0013	0.0000	0.0000

Table B-45 Option 1: Method 1 – Local model *p*-values– no sampling

Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.9580
Base rutting (bs1)	1.0000	0.1181
Subgrade rutting (bsg1)	1.0000	0.0410

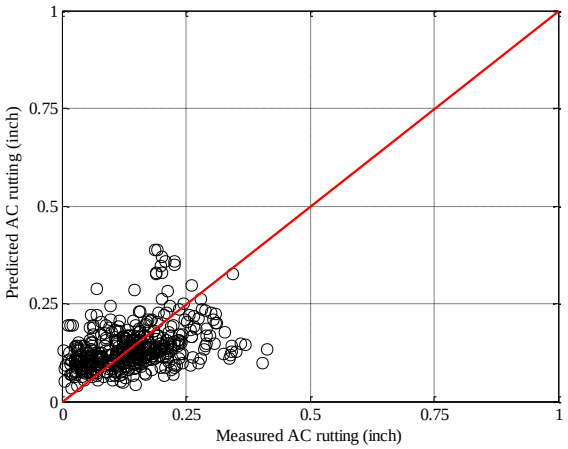


(a) Global model

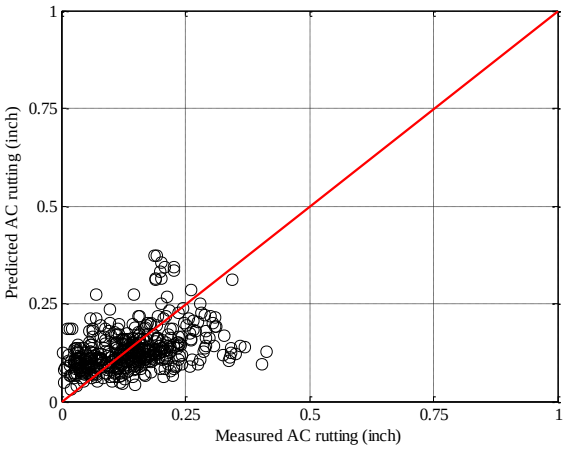


(b) Local model

Figure B-71 Option 1: Method 1 Total rutting local calibration results - no sampling

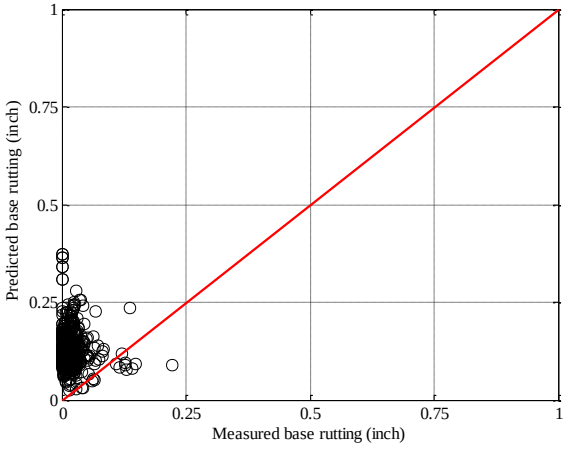


(a) Global model

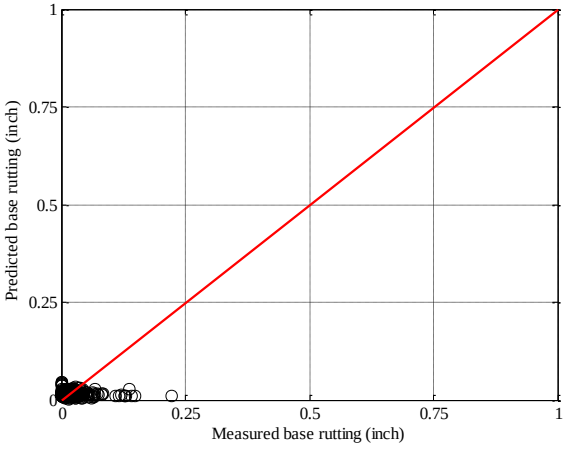


(b) Local model

Figure B-72 Option 1: Method 1 HMA rutting local calibration results - no sampling

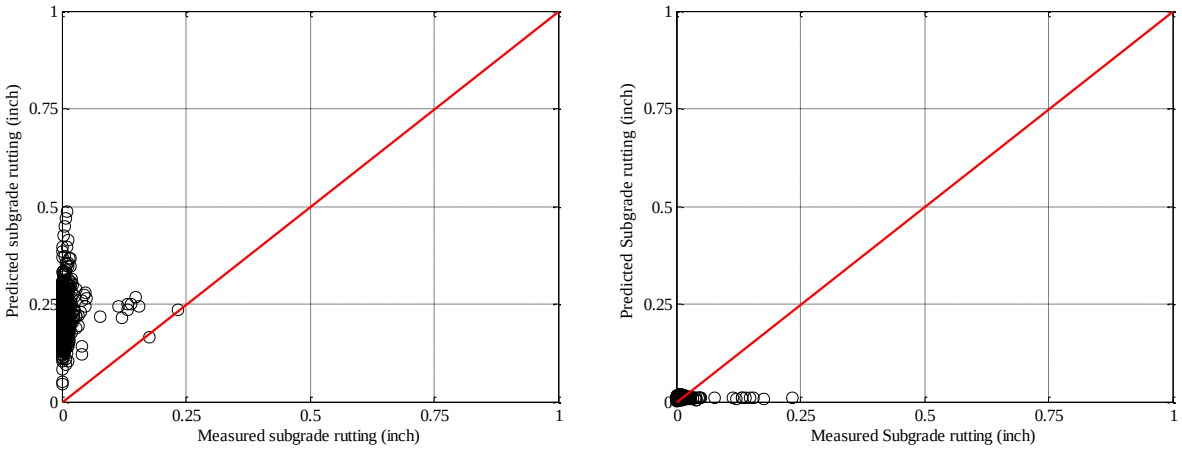


(a) Global model



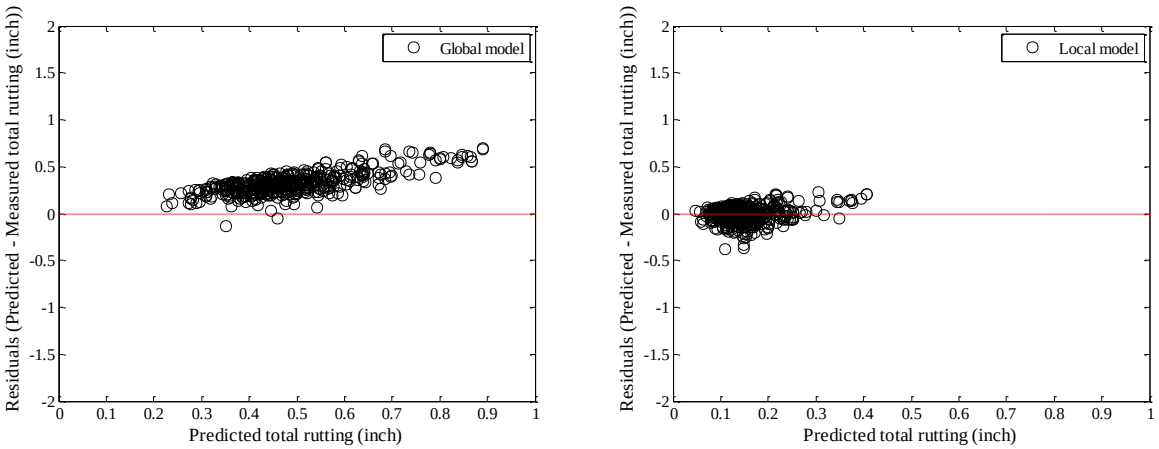
(b) Local model

Figure B-73 Option 1: Method 1 Base rutting local calibration results - no sampling



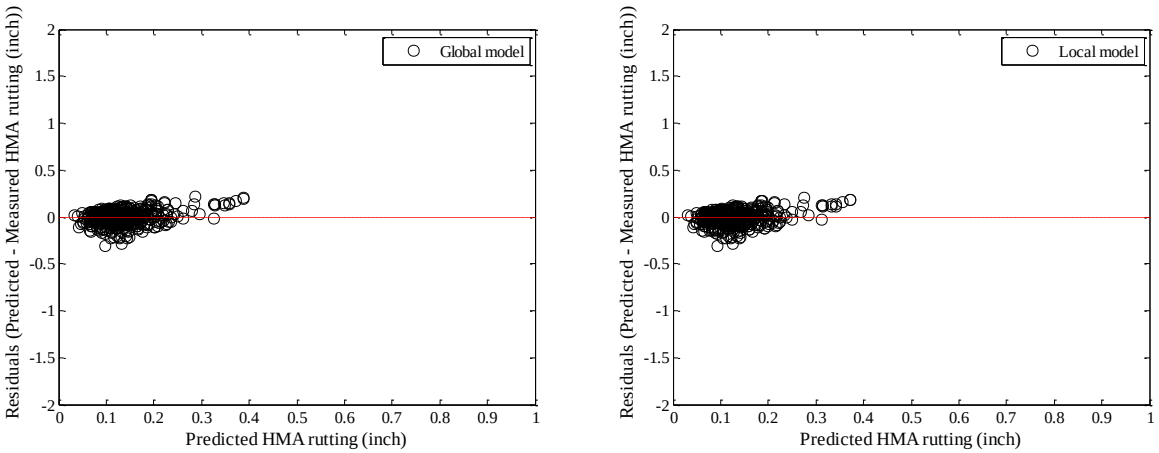
(a) Global model (b) Local model

Figure B-74 Option 1: Method 1 Subgrade rutting local calibration results - no sampling



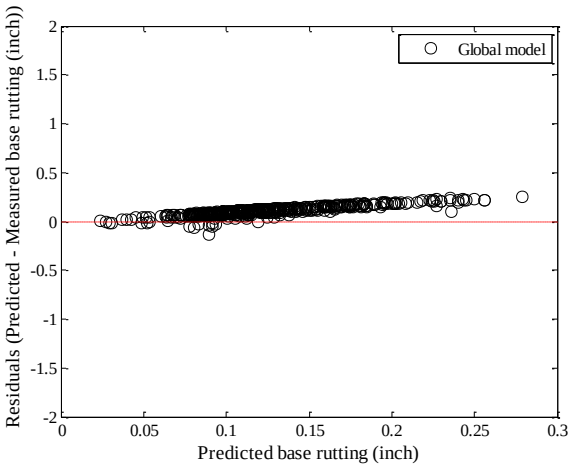
(a) Global model (b) Local model

Figure B-75 Option 1: Method 1 Total rutting residual plots - no sampling

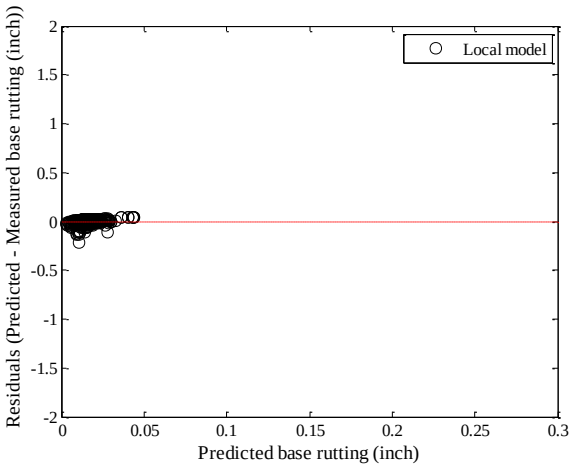


(a) Global model (b) Local model

Figure B-76 Option 1: Method 1 HMA rutting residual plots - no sampling

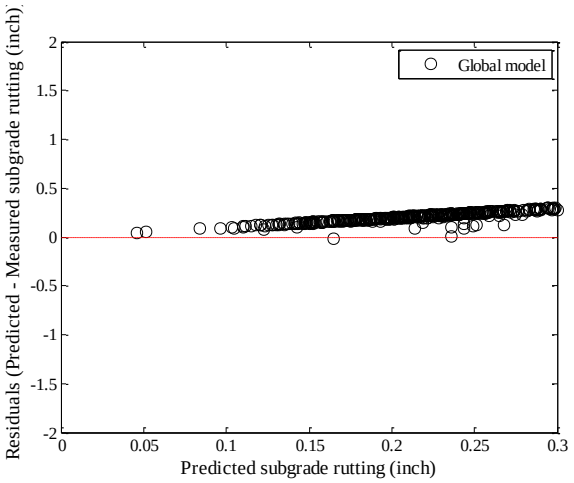


(a) Global model

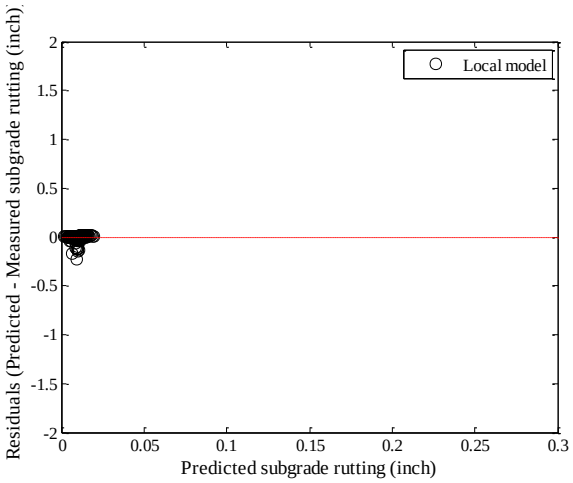


(b) Local model

Figure B-77 Option 1: Method 1 Base rutting residual plots - no sampling



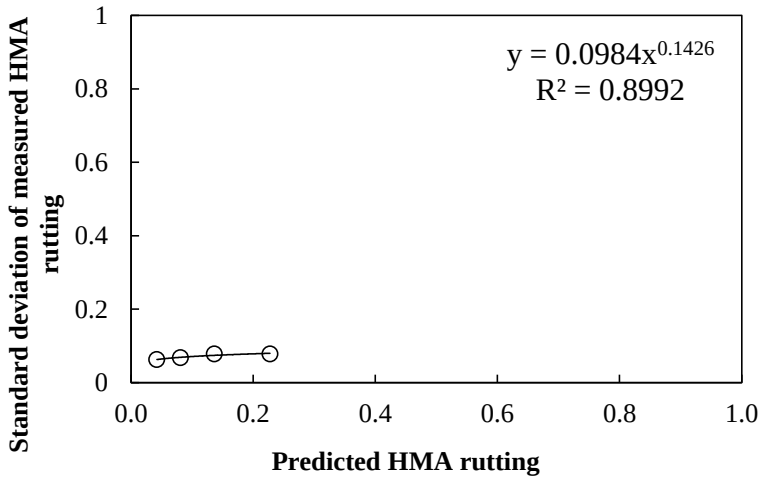
(a) Global model



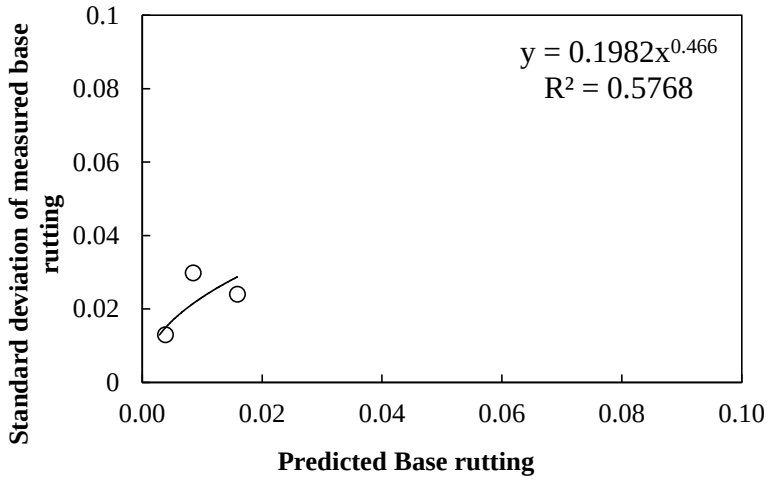
(b) Local model

Figure B-78 Option 1: Method 1 Subgrade rutting residual plots - no sampling

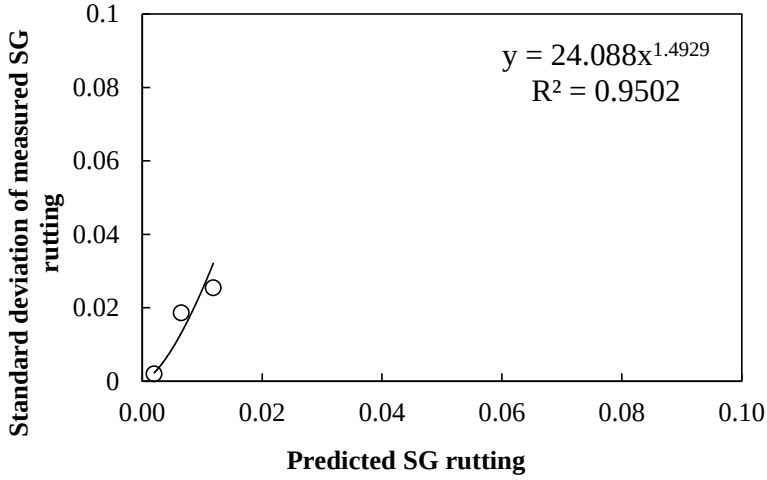
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-79 Rutting model reliability equations – option 1 method 1 – no sampling

Split sampling

Table B-46 Option 1: Method 1 – Global model goodness of fit – split sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0769	0.0034
Base rut	0.1313	0.1134
Subgrade	0.2243	0.2139
Total rut	0.3534	0.3306

Table B-47 Option 1: Method 1 – Global model *p*-values - split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.4496	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0000	0.0000	0.0000

Table B-48 Option 1: Method 1 – Local model goodness of fit– split sampling

HMA layer	SEE	Bias
AC rut	0.0759	-0.0080
Base rut	0.0268	-0.0040
Subgrade	0.0236	-0.0004
Total rut	0.0853	-0.0125

Table B-49 Option 1: Method 1 – Local model *p*-values– split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0674	0.0000	0.0000
Base rut	0.0086	0.0000	0.0000
Subgrade	0.7433	0.0000	0.0000
Total rut	0.0109	0.0000	0.0000

Table B-50 Option 1: Method 1 – Local model *p*-values – split sampling

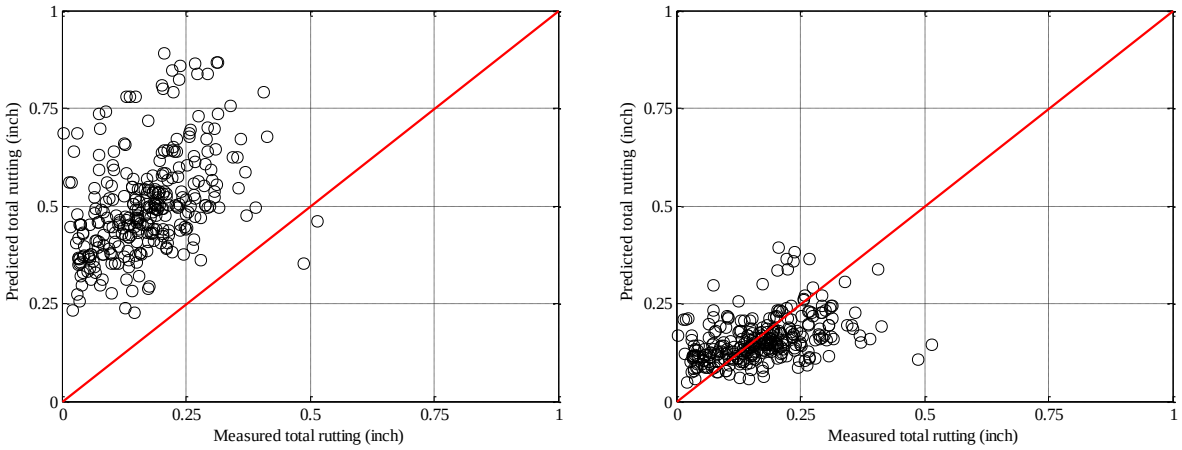
Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.9204
Base rutting (bs1)	1.0000	0.1209
Subgrade rutting (bsg1)	1.0000	0.0435

Table B-51 Option 1: Method 1 – Local model validation p-values – split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0000	0.0000	0.0000
Base rut	0.5941	0.0000	0.0000
Subgrade	0.3416	0.0000	0.0000
Total rut	0.0002	0.0000	0.0000

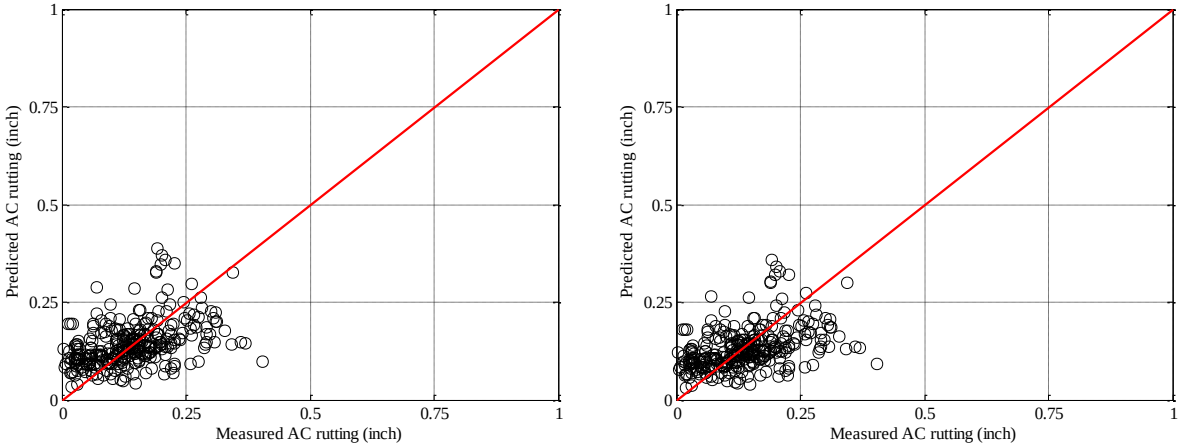
Table B-52 Option 1: Method 1 – Local model validation SEE and bias – split sampling

HMA layer	SEE	Bias
AC rut	0.0841	-0.0281
Base rut	0.0250	-0.0011
Subgrade	0.0210	0.0017
Total rut	0.0913	-0.0276



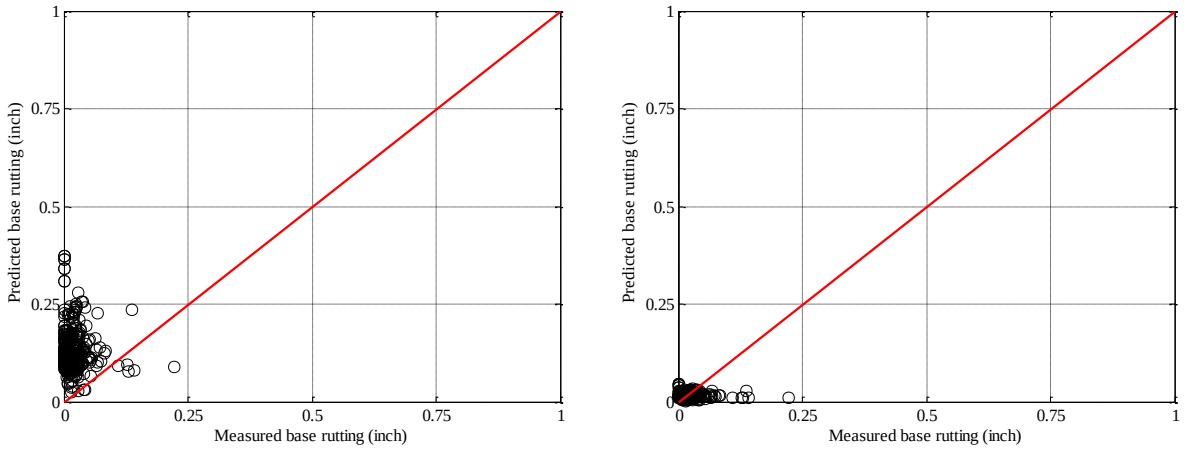
(a) Global model (b) Local model

Figure B-80 Option 1: Method 1 Total rutting local calibration results - split sampling



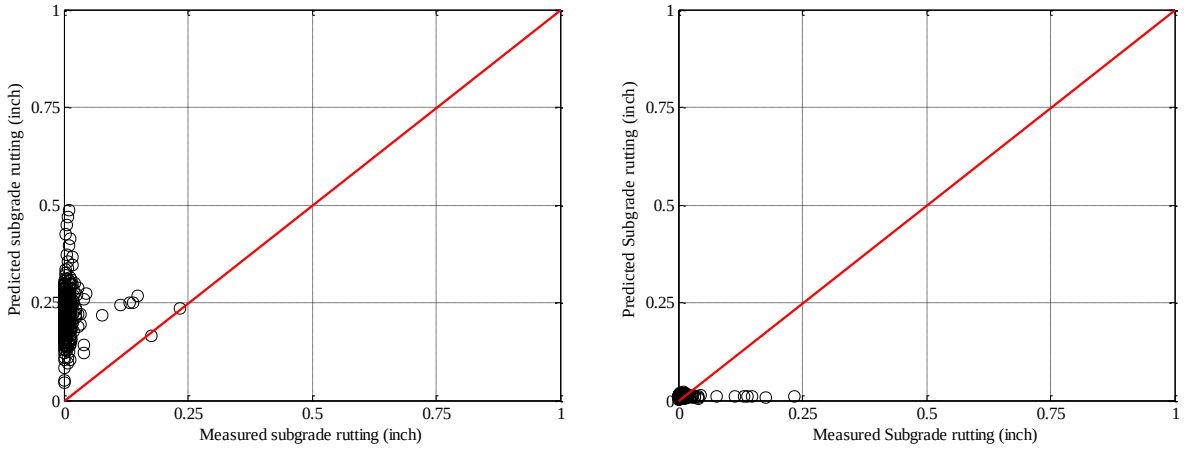
(a) Global model (b) Local model

Figure B-81 Option 1: Method 1 HMA rutting local calibration results - split sampling



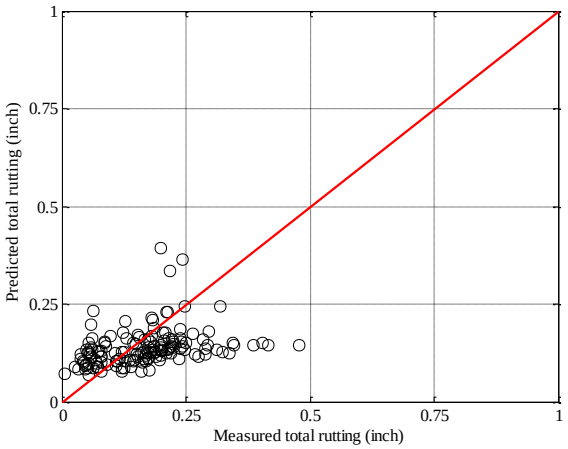
(a) Global model (b) Local model

Figure B-82 Option 1: Method 1 Base rutting local calibration results - split sampling

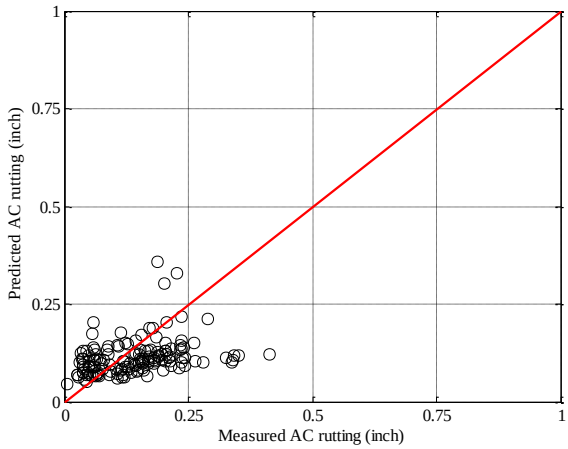


(a) Global model (b) Local model

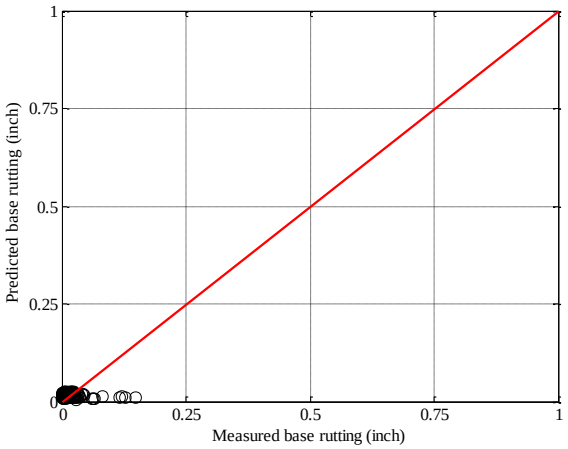
Figure B-83 Option 1: Method 1 Subgrade rutting local calibration results - split sampling



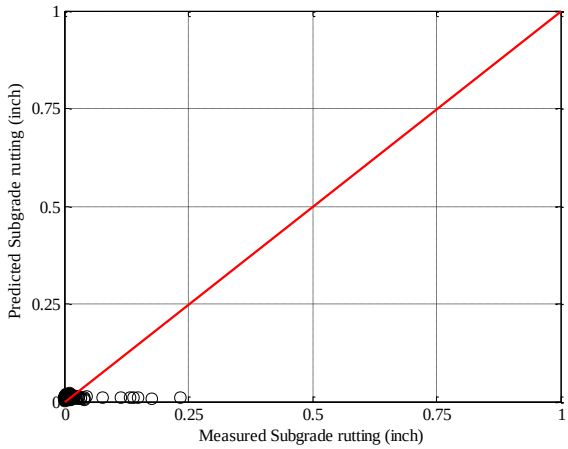
(a) Total rutting



(b) HMA rutting

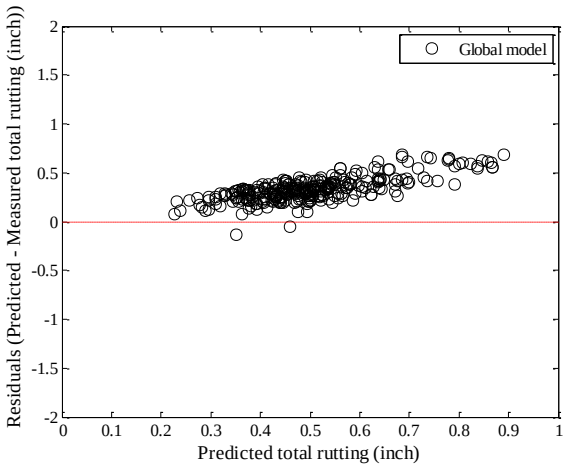


(c) Base rutting

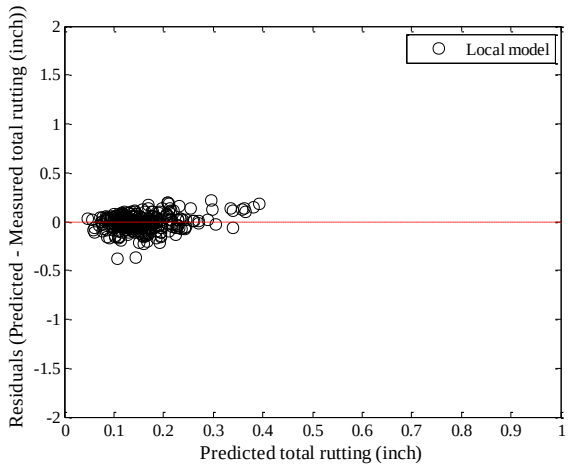


(d) Subgrade rutting

Figure B-84 Option 1: Method 1 Rutting model validation – split sampling

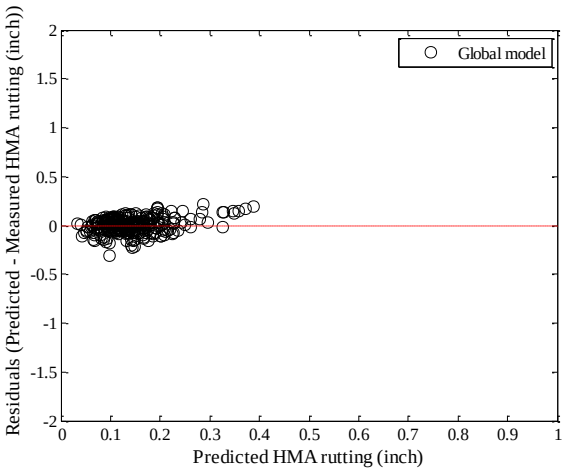


(a) Global model

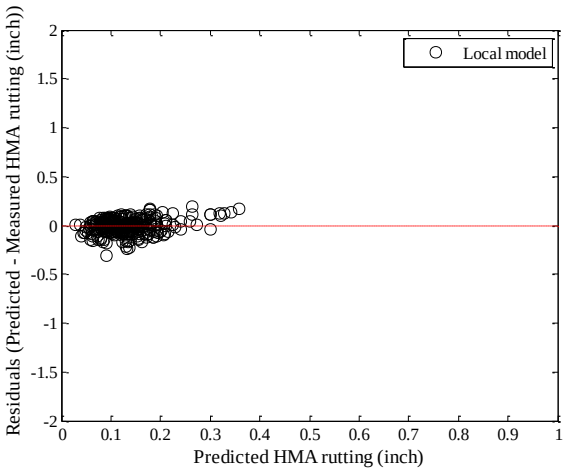


(b) Local model

Figure B-85 Option 1: Method 1 Total rutting residual plots - split sampling

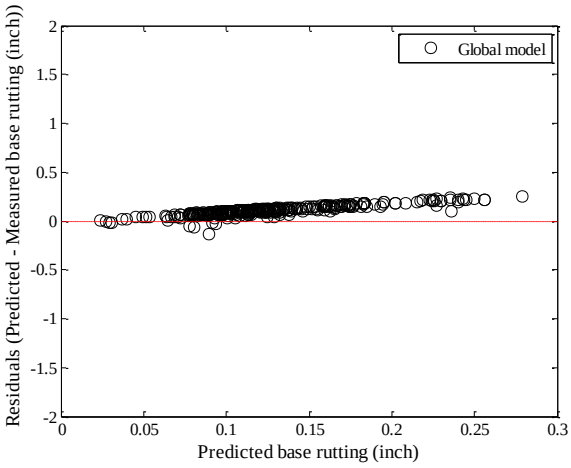


(a) Global model

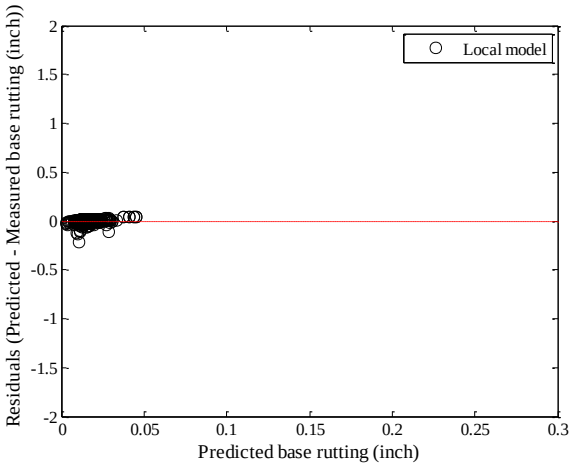


(b) Local model

Figure B-86 Option 1: Method 1 HMA rutting residual plots - split sampling

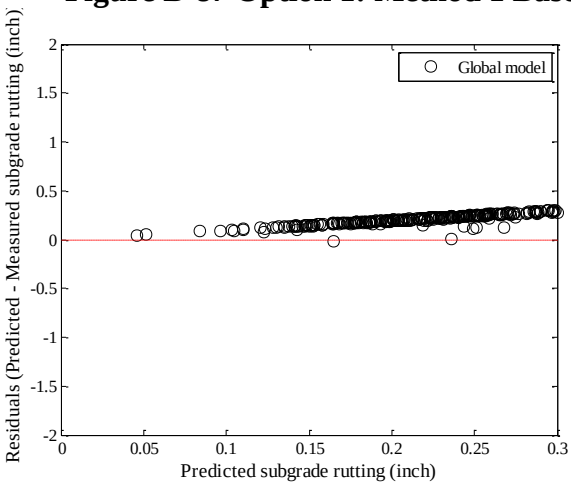


(a) Global model

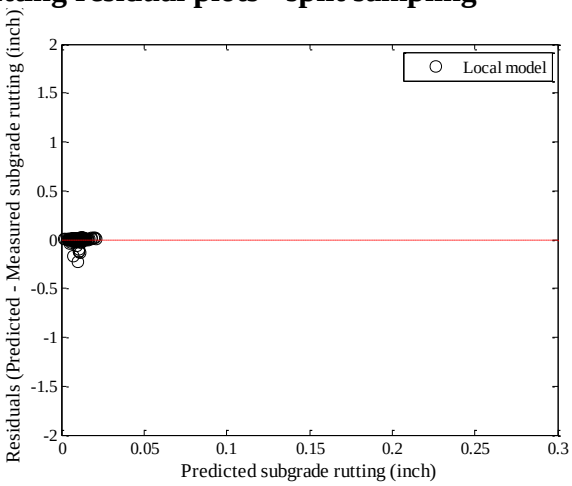


(b) Local model

Figure B-87 Option 1: Method 1 Base rutting residual plots - split sampling

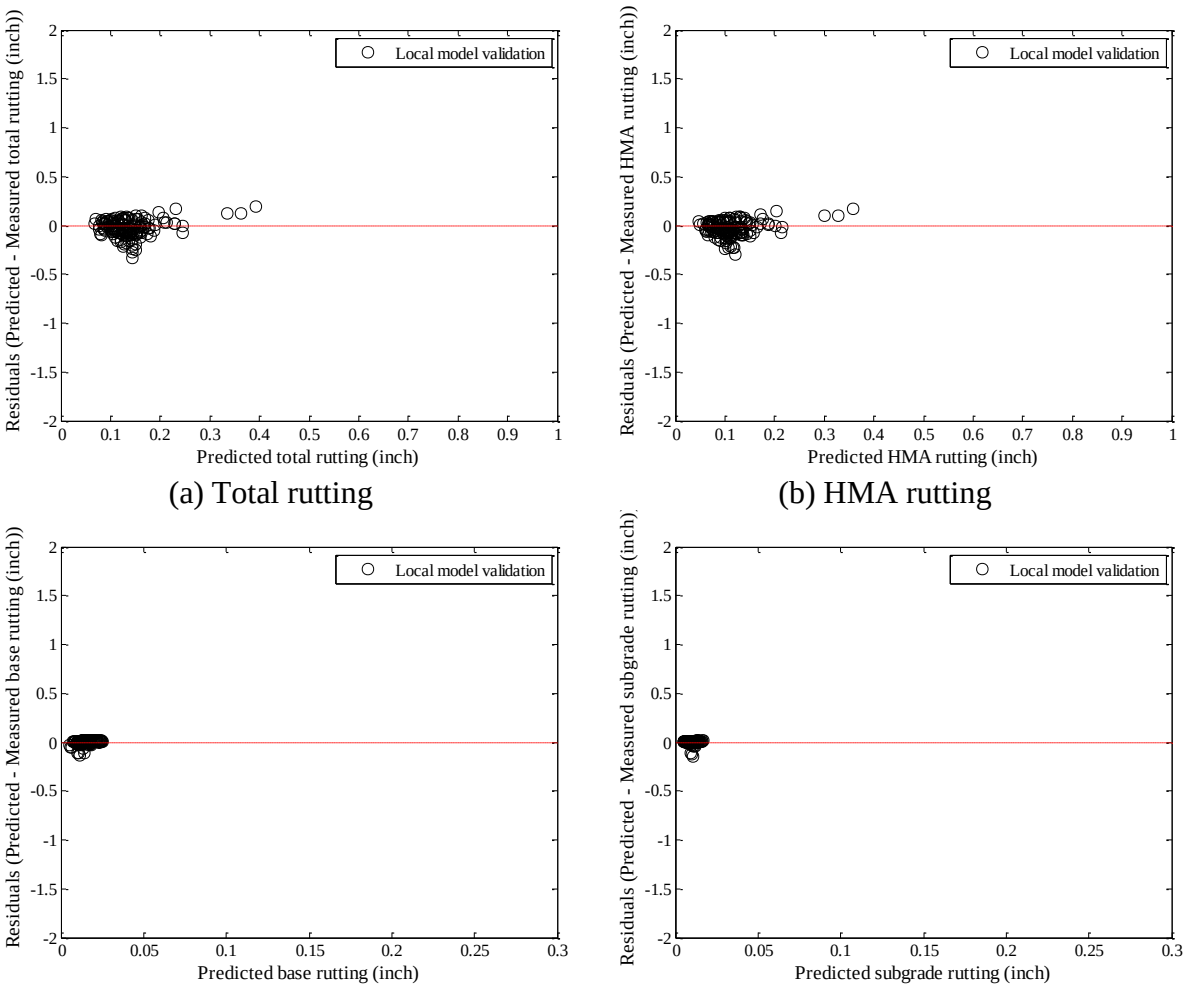


(a) Global model



(b) Local model

Figure B-88 Option 1: Method 1 Subgrade rutting residual plots - split sampling



(a) Total rutting

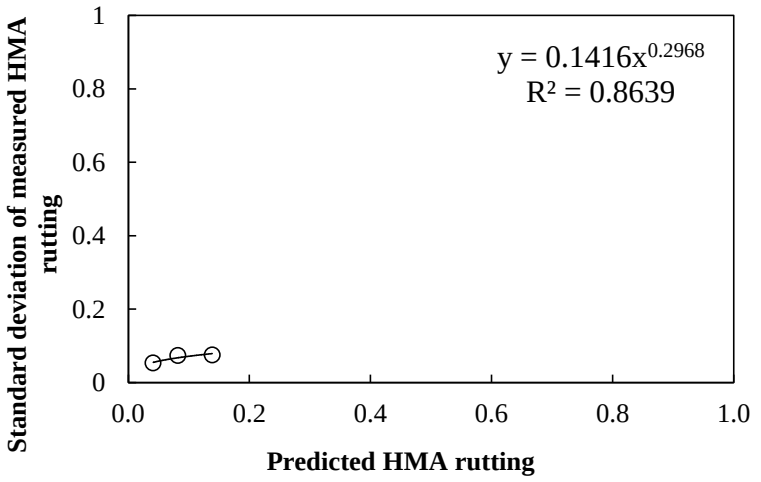
(b) HMA rutting

(c) Base rutting

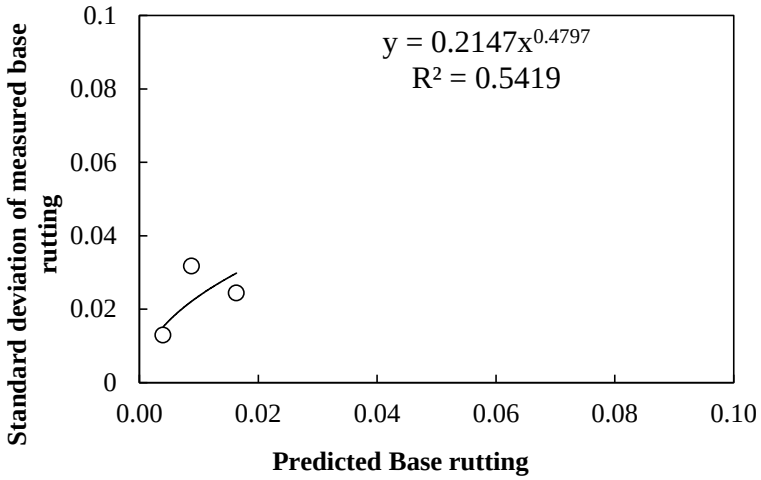
(d) Subgrade rutting

Figure B-89 Option 1: Method 1 Rutting model validation residual plots – split sampling

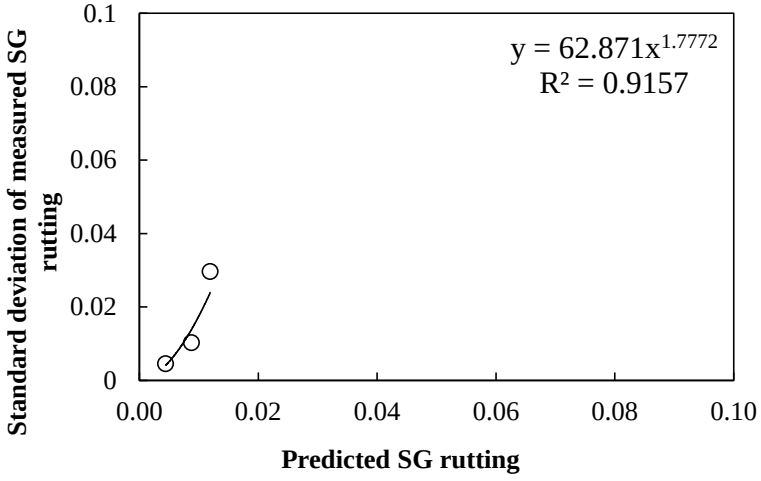
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-90 Rutting model reliability equations – option 1 method 1 – split sampling

Repeated split sampling

Table B-53 Option 1: Method 1 – Global model SEE and bias – repeated split sampling

Global Model	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0785	0.0729	0.0836	-0.0037	-0.0113	0.0037
Base rutting	0.1268	0.1170	0.1342	0.1111	0.1041	0.1182
Subgrade rutting	0.2245	0.2168	0.2318	0.2144	0.2072	0.2216
Total rutting	0.3435	0.3270	0.3573	0.3218	0.3083	0.3339

Table B-54 Option 1: Method 1 – Local model SEE and bias – repeated split sampling

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0781	0.0260	0.0224	0.0867
SEE Lower CI	0.0726	0.0193	0.0133	0.0796
SEE Upper CI	0.0830	0.0298	0.0270	0.0926
Average bias (in.)	-0.0092	-0.0034	-0.0003	-0.0130
Bias Lower CI	-0.0126	-0.0047	-0.0006	-0.0165
Bias Upper CI	-0.0050	-0.0020	0.0000	-0.0087
Average calibration coefficient	0.9603	0.1185	0.0410	N/A
Calibration coefficient Lower CI	0.9049	0.1005	0.0307	N/A
Calibration coefficient Upper CI	1.0346	0.1407	0.0497	N/A

Table B-55 Option 1: Method 1 – Local model validation SEE and bias – repeated split sampling

Validation set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0797	0.0257	0.0216	0.0882
SEE Lower CI	0.0669	0.0151	0.0080	0.0730
SEE Upper CI	0.0920	0.0378	0.0364	0.1032
Average bias (in.)	-0.0090	-0.0033	-0.0004	-0.0127
Bias Lower CI	-0.0331	-0.0120	-0.0083	-0.0377
Bias Upper CI	0.0177	0.0051	0.0060	0.0168
Average calibration coefficient	0.9603	0.1185	0.0410	N/A
Calibration coefficient Lower CI	0.9049	0.1005	0.0307	N/A
Calibration coefficient Upper CI	1.0346	0.1407	0.0497	N/A

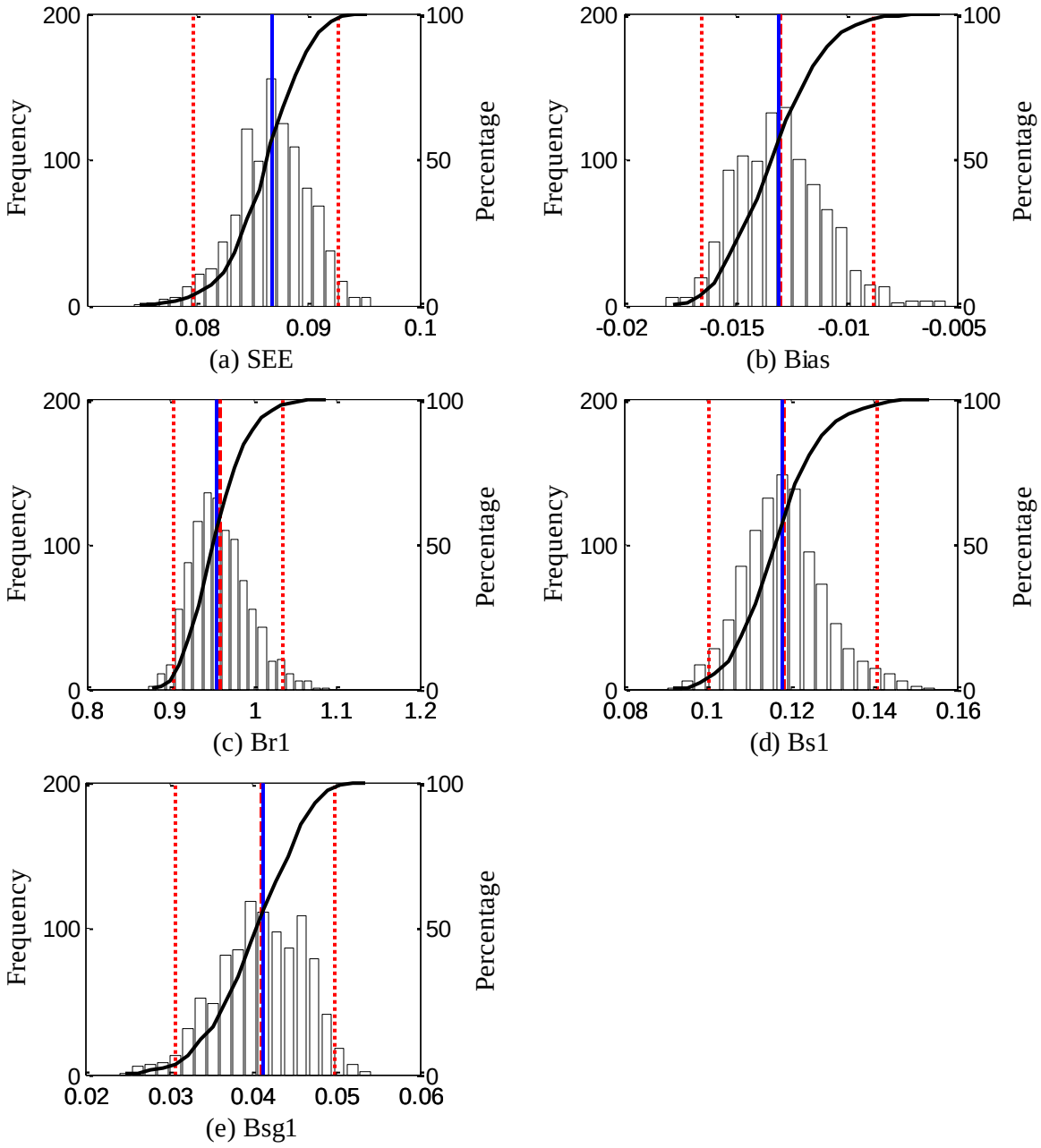


Figure B-91 Option 1: Method 1 repeated split sampling total rutting frequency distributions – calibration

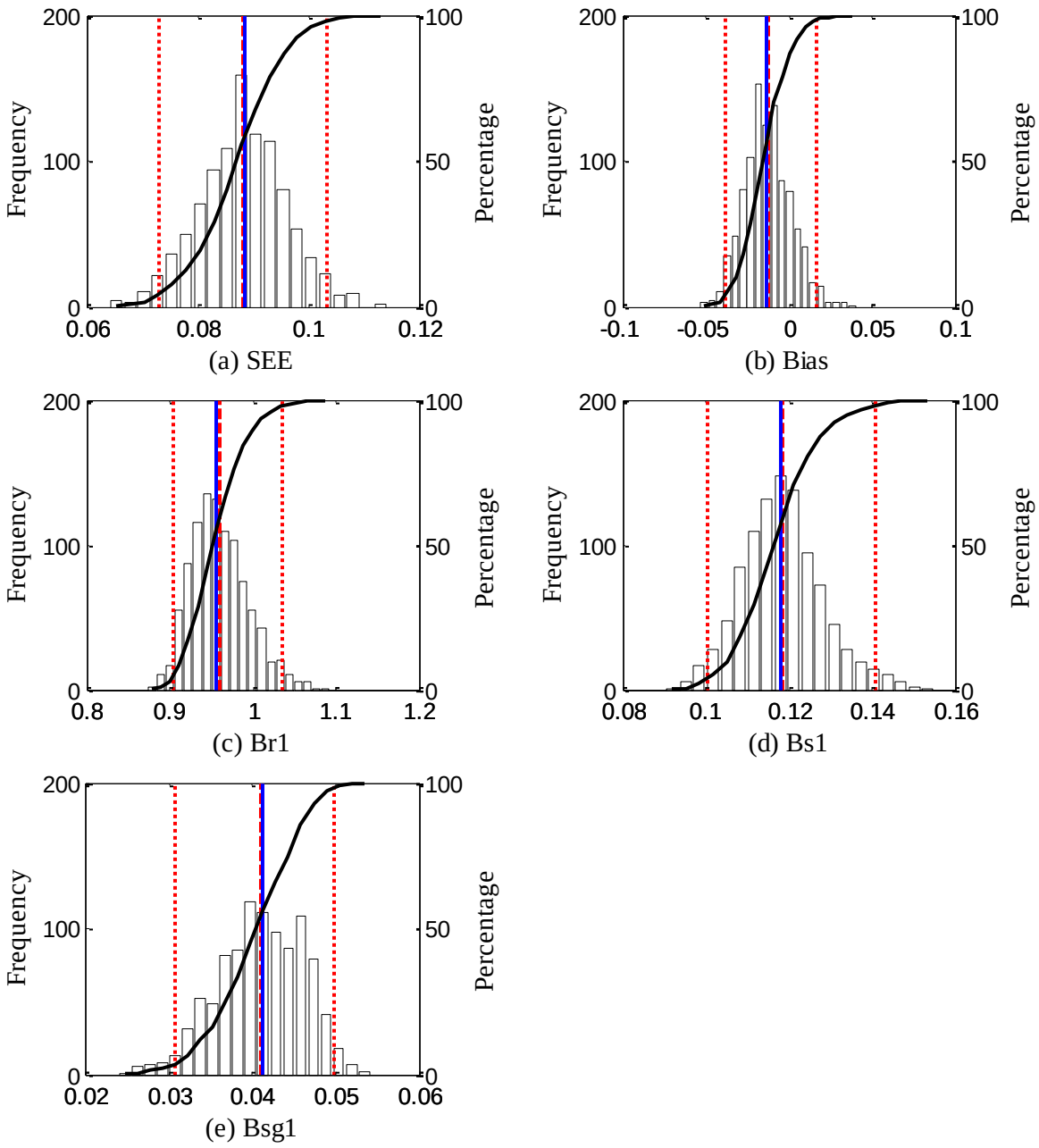
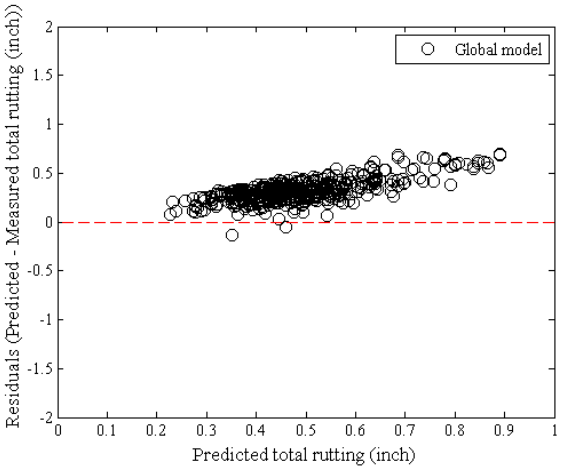
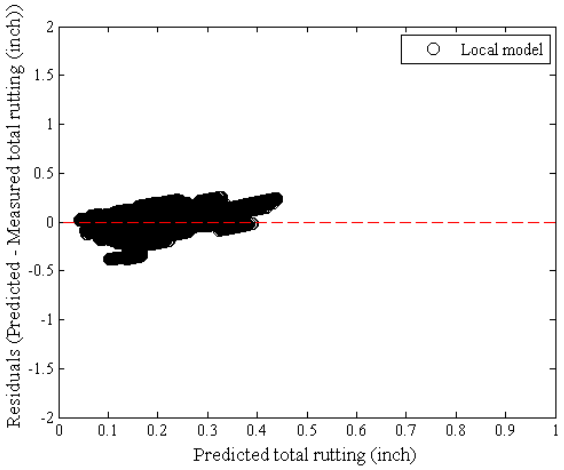


Figure B-92 Option 1: Method 1 repeated split sampling total rutting frequency distributions – validation

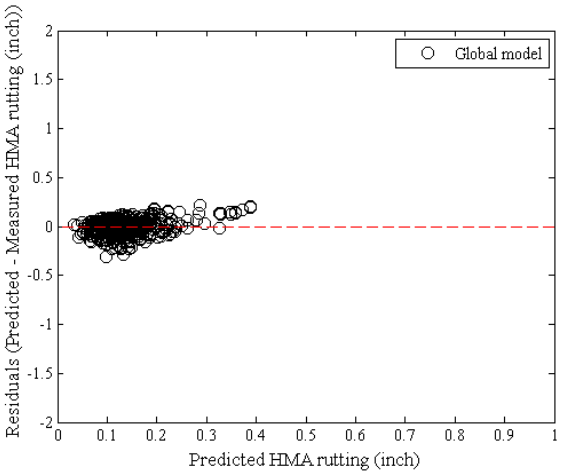


(a) Global model

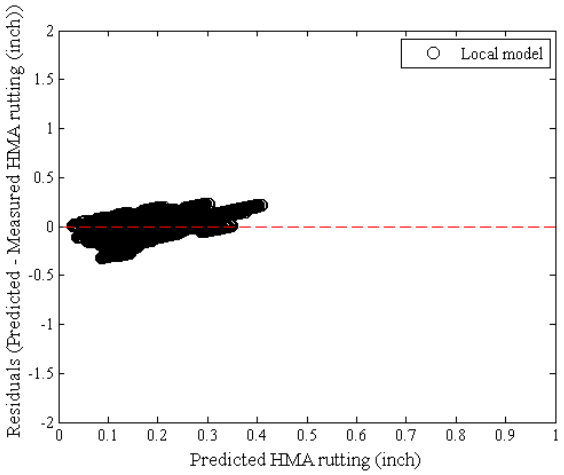


(b) Local model

Figure B-93 Option 1: Method 1 Total rutting residual plots - repeated split sampling

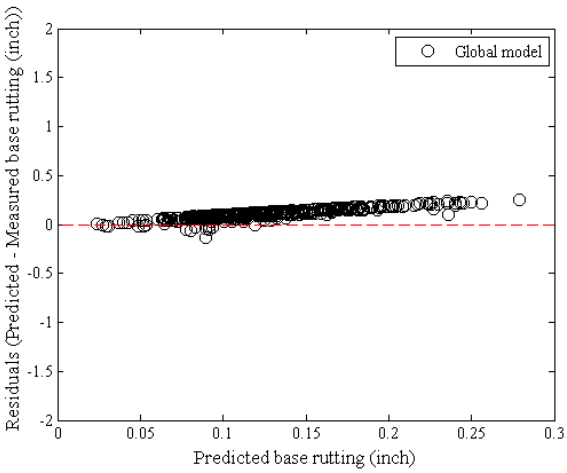


(a) Global model

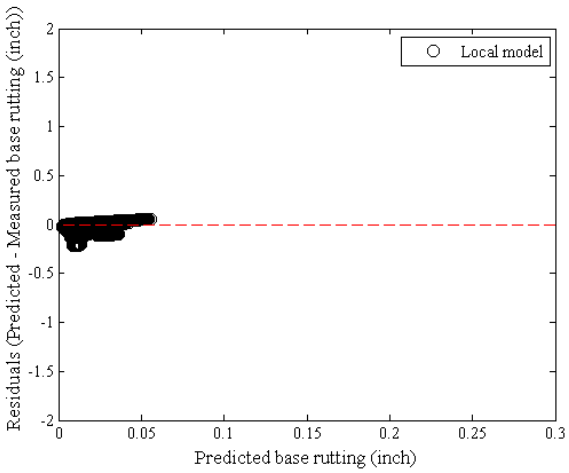


(b) Local model

Figure B-94 Option 1: Method 1 HMA rutting residual plots - repeated split sampling

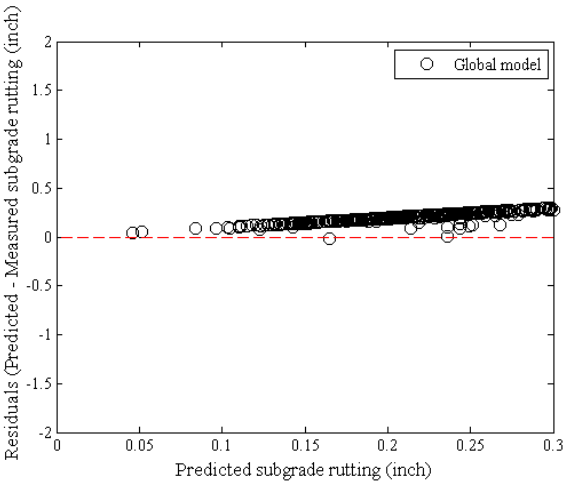


(a) Global model

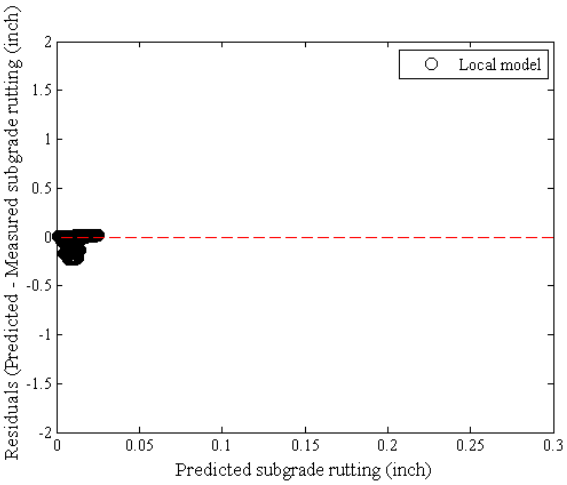


(b) Local model

Figure B-95 Option 1: Method 1 Base rutting residual plots - repeated split sampling

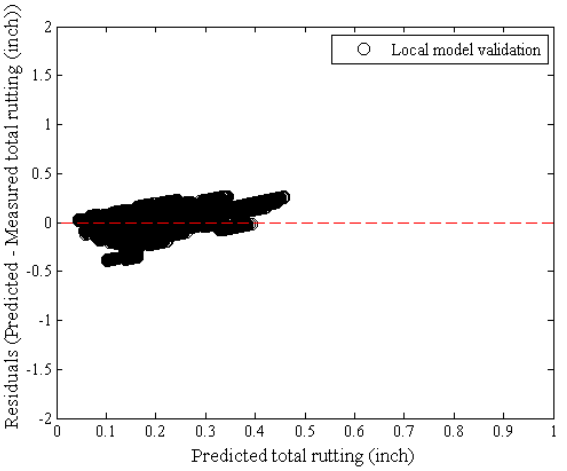


(a) Global model

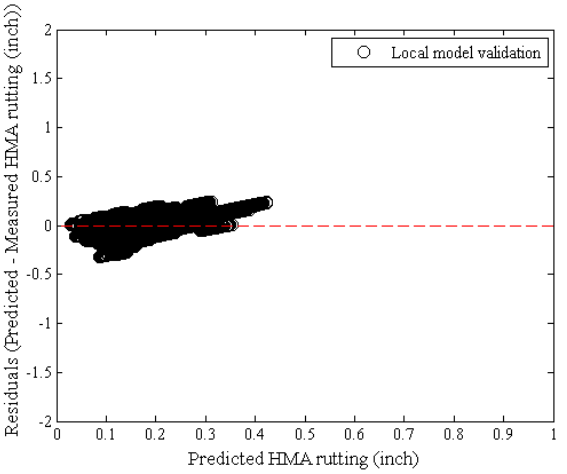


(b) Local model

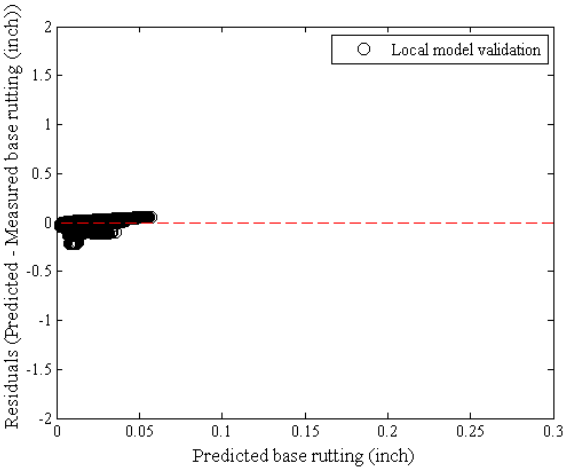
Figure B-96 Option 1: Method 1 Subgrade rutting residual plots - repeated split sampling



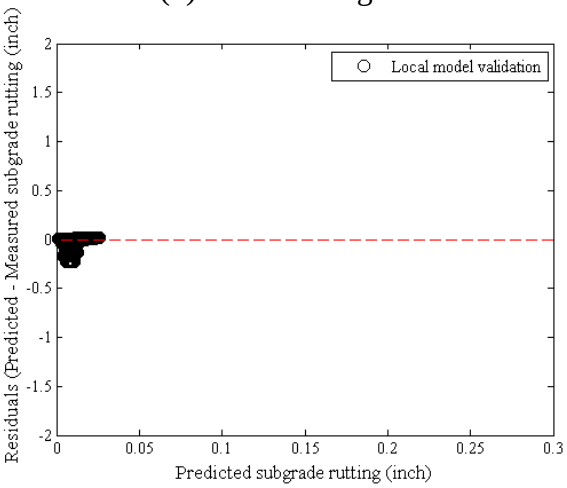
(a) Total rutting



(b) HMA rutting



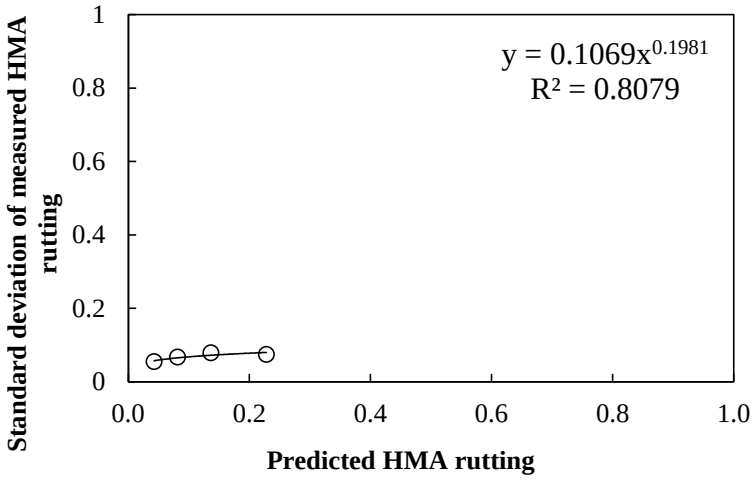
(c) Base rutting



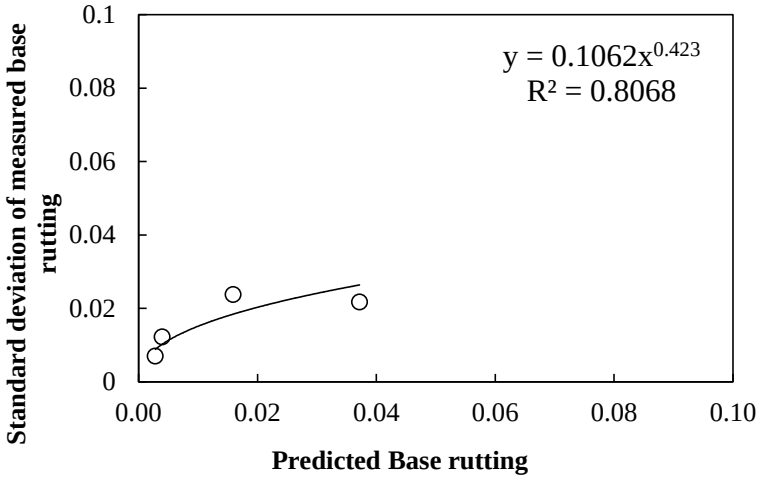
(d) Subgrade rutting

Figure B-97 Option 1: Method 1 Rutting model validation residual plots – repeated split sampling

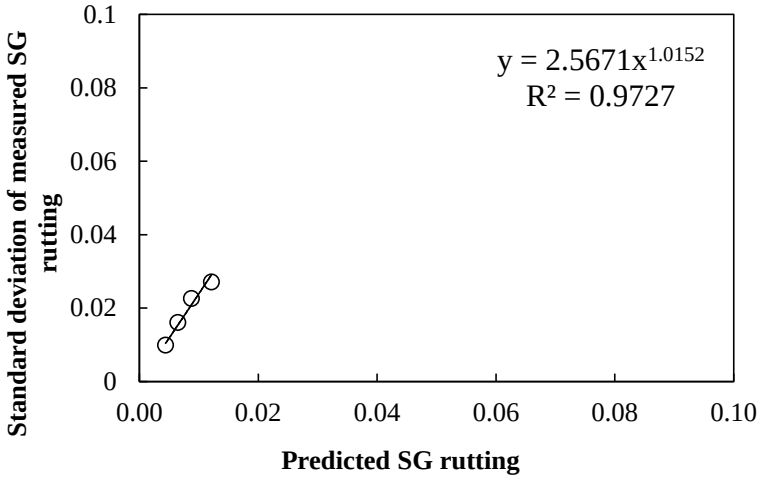
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-98 Rutting model reliability – option 1 method 1 – repeated split sampling

Bootstrapping

Table B-56 Option 1: Method 1 – Global model SEE and bias – bootstrapping

Calibration set	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0785	0.0706	0.0870	-0.0039	-0.0148	0.0068
Base rutting	0.1264	0.1146	0.1401	0.1110	0.1010	0.1219
Subgrade rutting	0.2240	0.2122	0.2360	0.2142	0.2031	0.2253
Total rutting	0.3425	0.3223	0.3654	0.3213	0.3026	0.3417

Table B-57 Option 1: Method 1 – Local model SEE and bias – bootstrapping

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0780	0.0258	0.0221	0.0865
SEE Lower CI	0.0702	0.0187	0.0092	0.0772
SEE Upper CI	0.0865	0.0333	0.0318	0.0962
Average bias (in.)	-0.0091	-0.0034	-0.0003	-0.0128
Bias Lower CI	-0.0152	-0.0056	-0.0008	-0.0188
Bias Upper CI	-0.0038	-0.0015	0.0001	-0.0073
Average calibration coefficient	0.9628	0.1190	0.0411	N/A
Calibration coefficient Lower CI	0.8721	0.0927	0.0277	N/A
Calibration coefficient Upper CI	1.0628	0.1479	0.0577	N/A

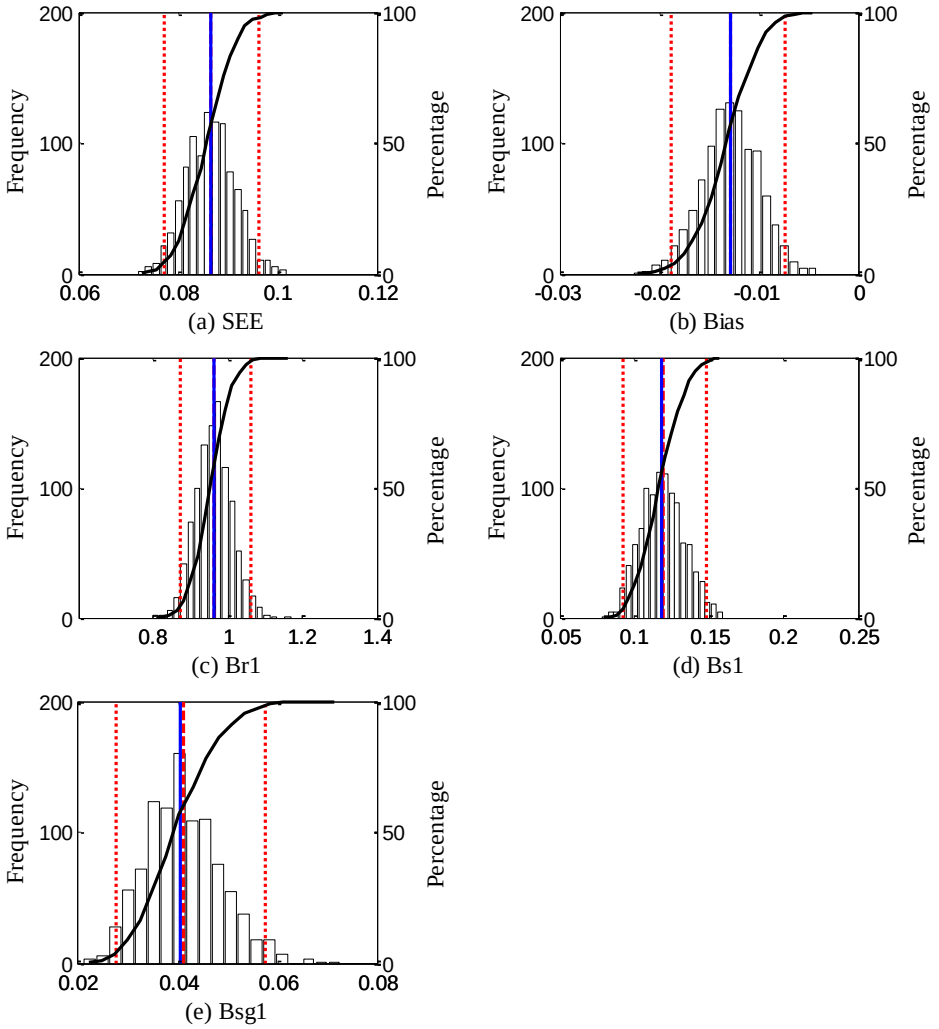


Figure B-99 Option 1: Method 1 bootstrapping total rutting frequency distributions – calibration

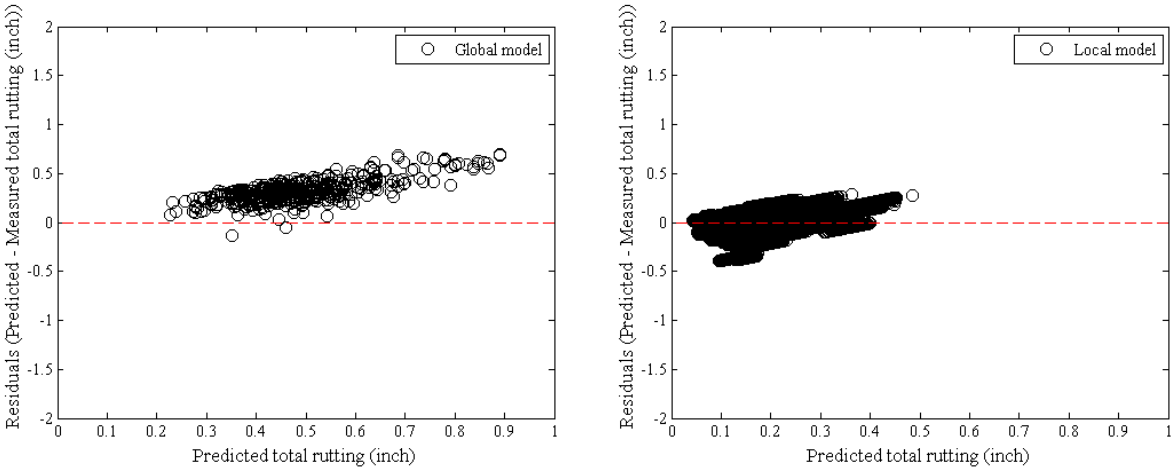
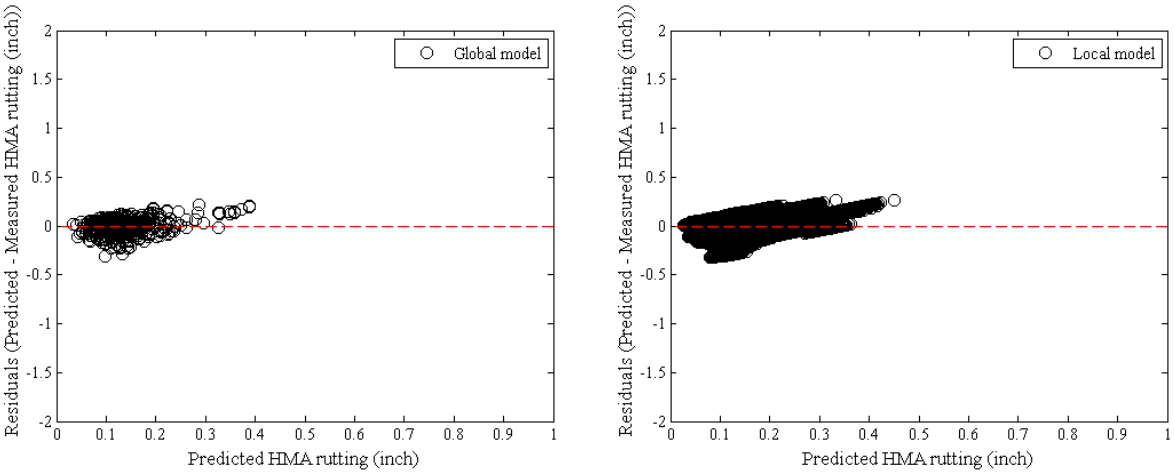
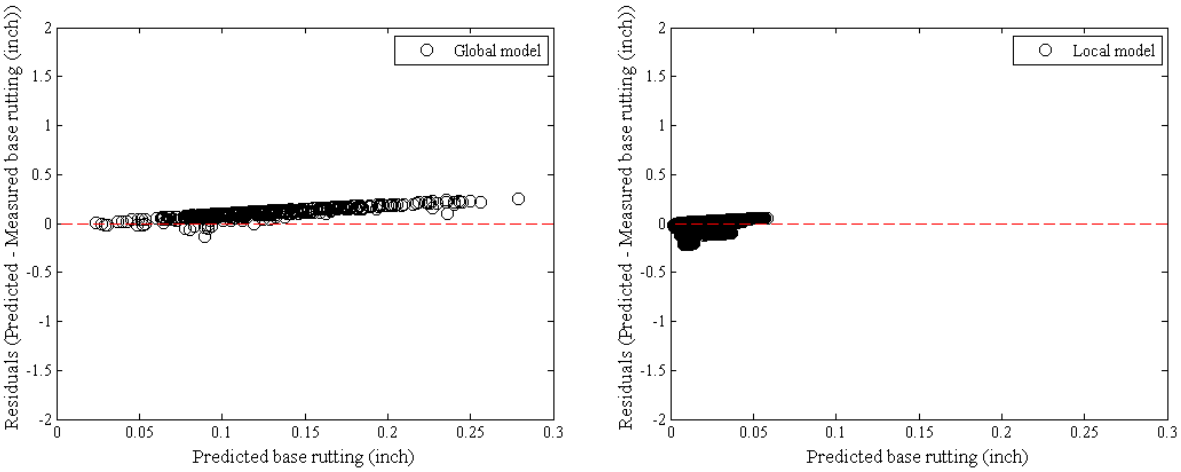


Figure B-100 Option 1: Method 1 Total rutting residual plots - bootstrapping



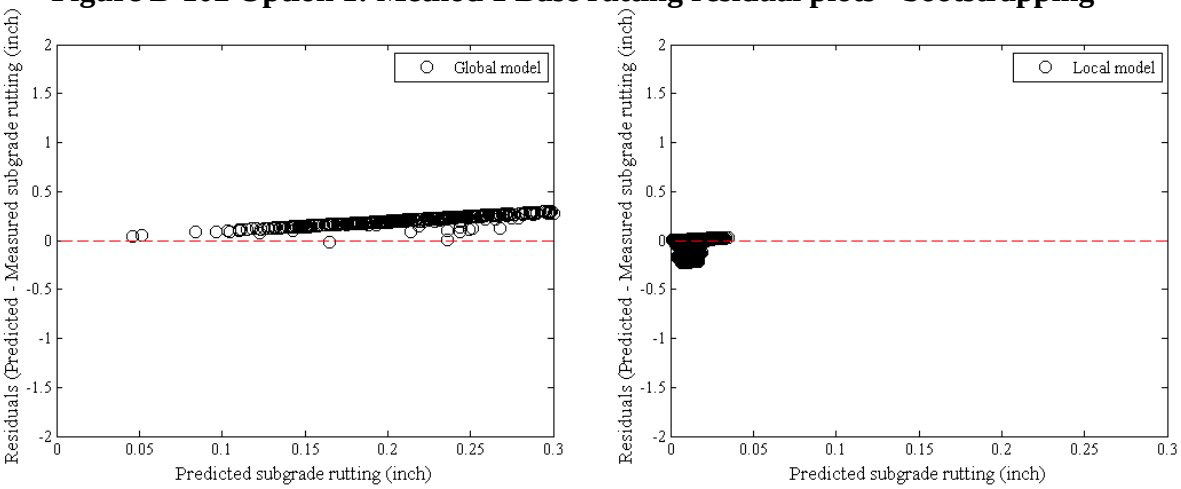
(a) Global model (b) Local model

Figure B-101 Option 1: Method 1 HMA rutting residual plots - bootstrapping



(a) Global model (b) Local model

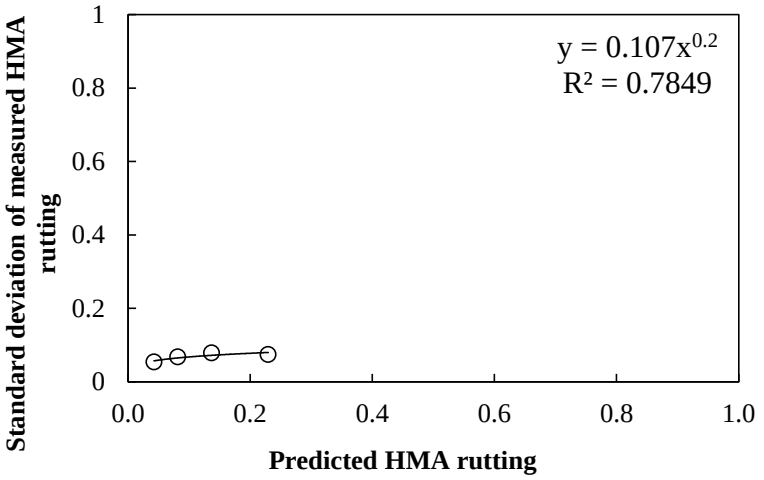
Figure B-102 Option 1: Method 1 Base rutting residual plots - bootstrapping



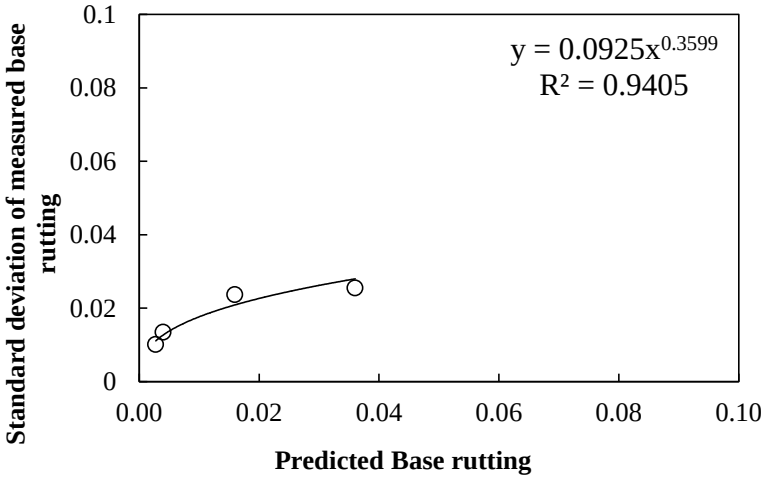
(a) Global model (b) Local model

Figure B-103 Option 1: Method 1 Subgrade rutting residual plots - bootstrapping

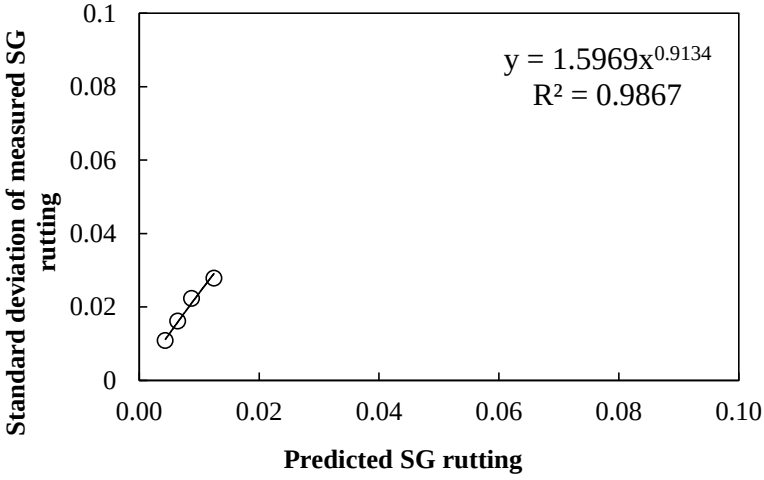
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-104 Rutting model reliability – option 1 method 1 - bootstrapping

B.1.3.2 Option 1 – Method 2

No sampling

Table B-58 Option 1: Method 2 – Global model goodness of fit – no sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0786	-0.0037
Base rut	0.1267	0.1111
Subgrade	0.2242	0.2143
Total rut	0.3431	0.3217

Table B-59 Option 1: Method 2 – Global model *p*-values

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.3220	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0000	0.0000	0.0000

Table B-60 Option 1: Method 2 – Local model goodness of fit– no sampling

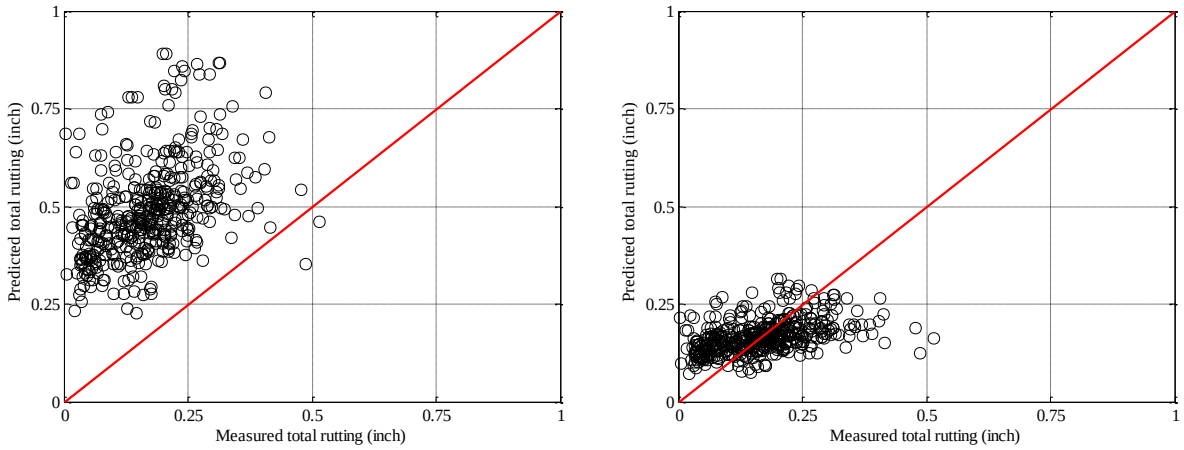
HMA layer	SEE	Bias
AC rut	0.1167	-0.0892
Base rut	0.0304	0.0109
Subgrade	0.0840	0.0775
Total rut	0.0812	-0.0009

Table B-61 Option 1: Method 2 – Local model *p*-values– no sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0000	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.8142	0.0000	0.0000

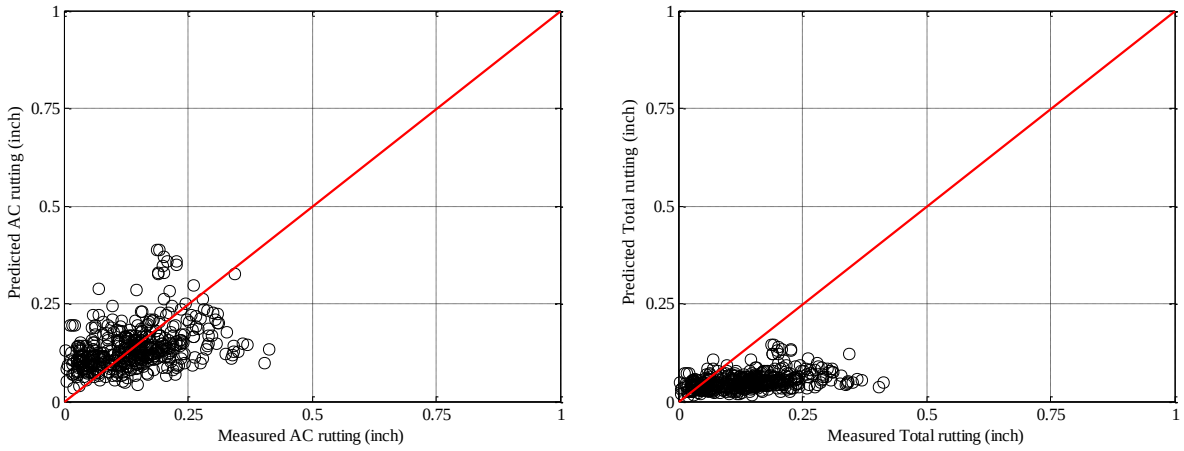
Table B-62 Option 1: Method 2 – Local model *p*-values– no sampling

Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.3738
Base rutting (bs1)	1.0000	0.2283
Subgrade rutting (bsg1)	1.0000	0.3886



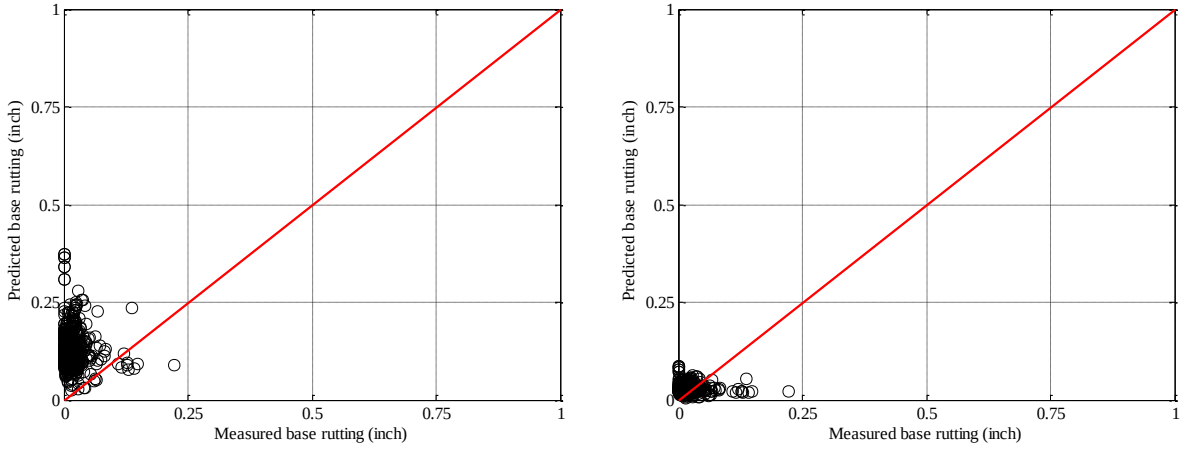
(a) Global model (b) Local model

Figure B-105 Option 1: Method 2 Total rutting local calibration results - no sampling



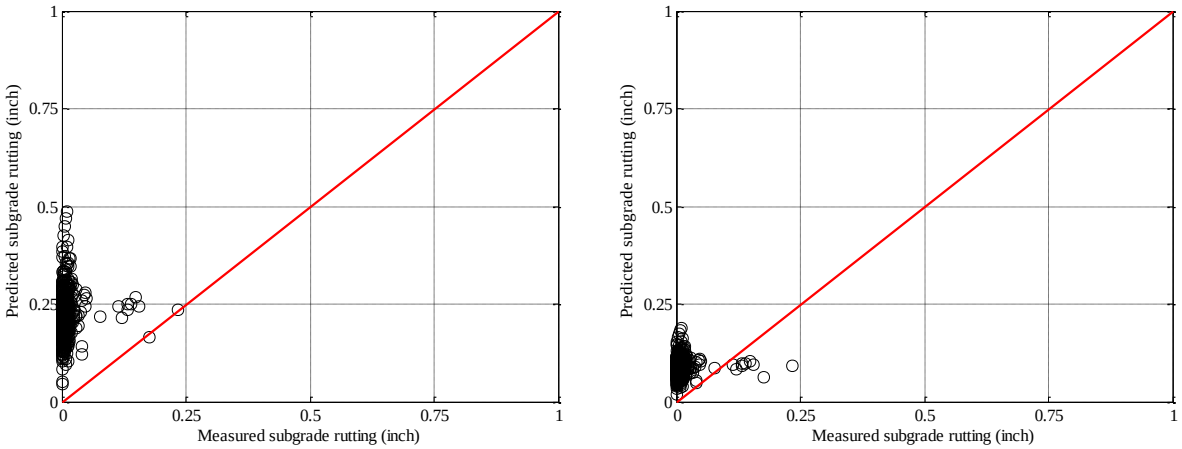
(a) Global model (b) Local model

Figure B-106 Option 1: Method 2 HMA rutting local calibration results - no sampling



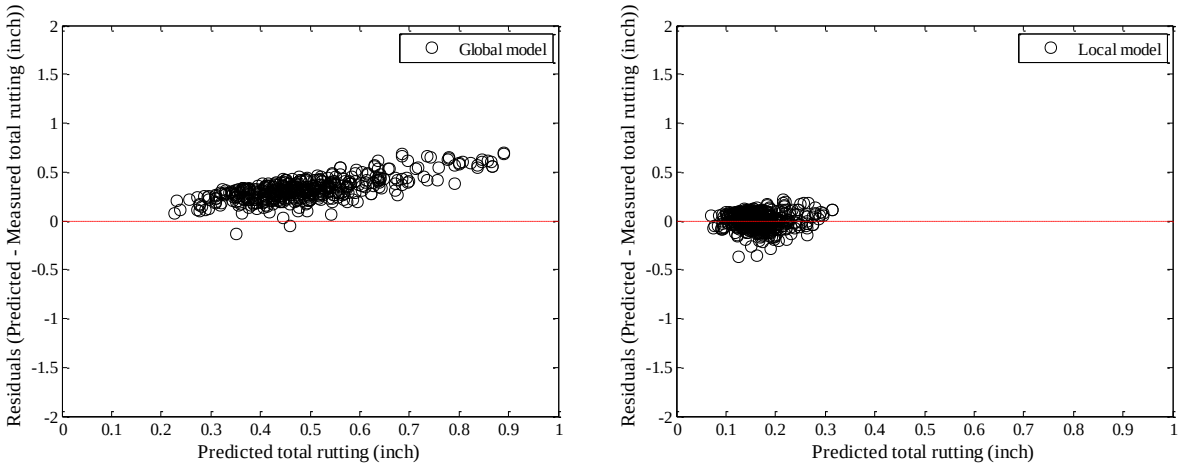
(a) Global model (b) Local model

Figure B-107 Option 1: Method 2 Base rutting local calibration results - no sampling



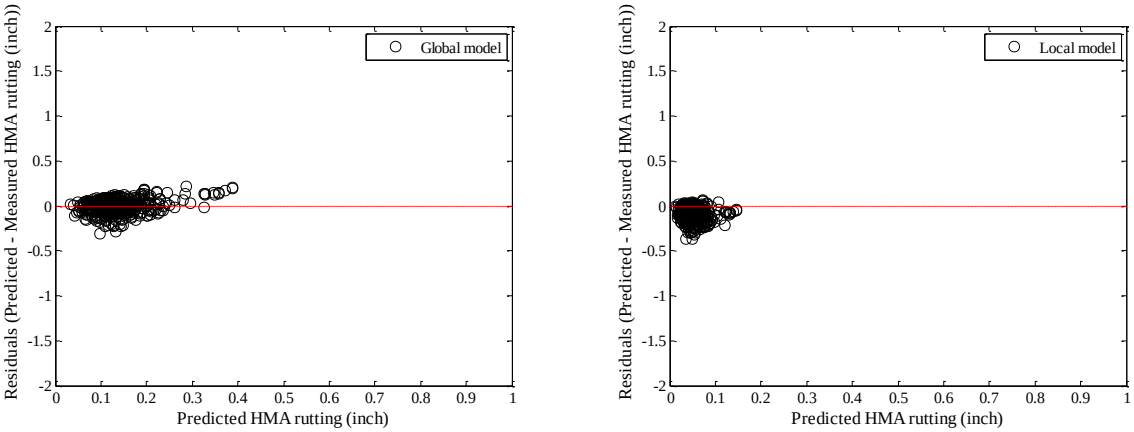
(a) Global model (b) Local model

Figure B-108 Option 1: Method 2 Subgrade rutting local calibration results - no sampling



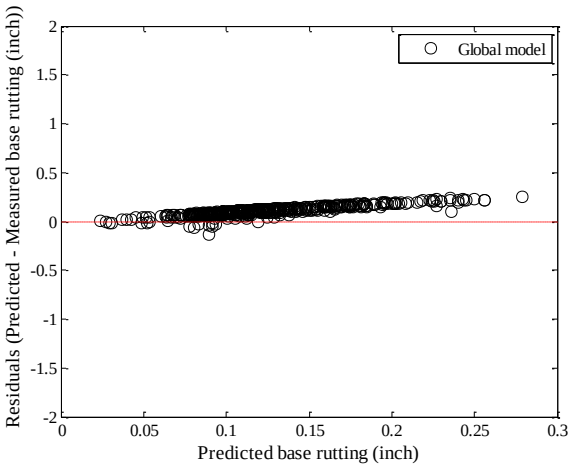
(a) Global model (b) Local model

Figure B-109 Option 1: Method 2 Total rutting residual plots - no sampling

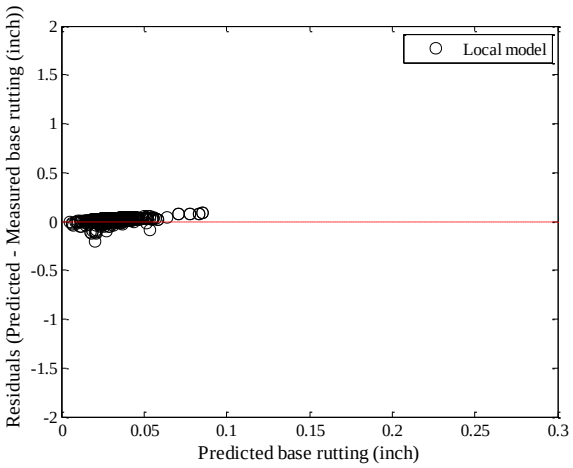


(a) Global model (b) Local model

Figure B-110 Option 1: Method 2 HMA rutting residual plots - no sampling

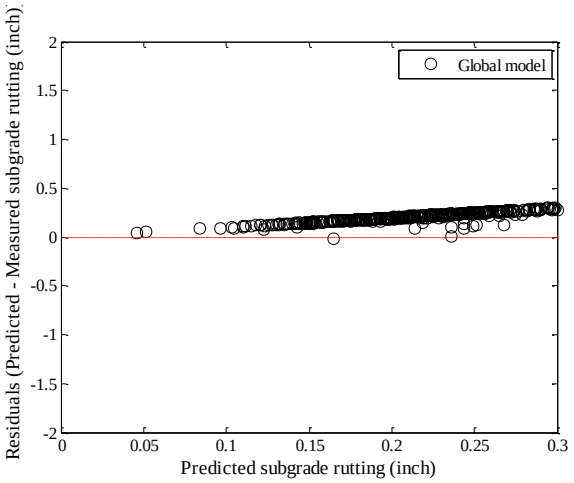


(a) Global model

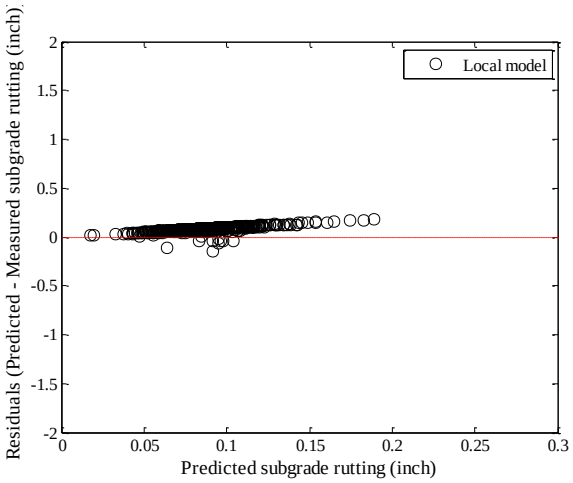


(b) Local model

Figure B-111 Option 1: Method 2 Base rutting residual plots - no sampling



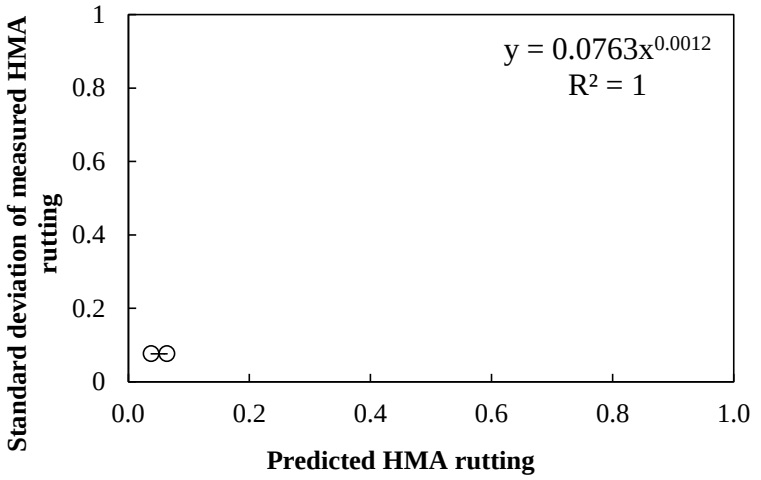
(a) Global model



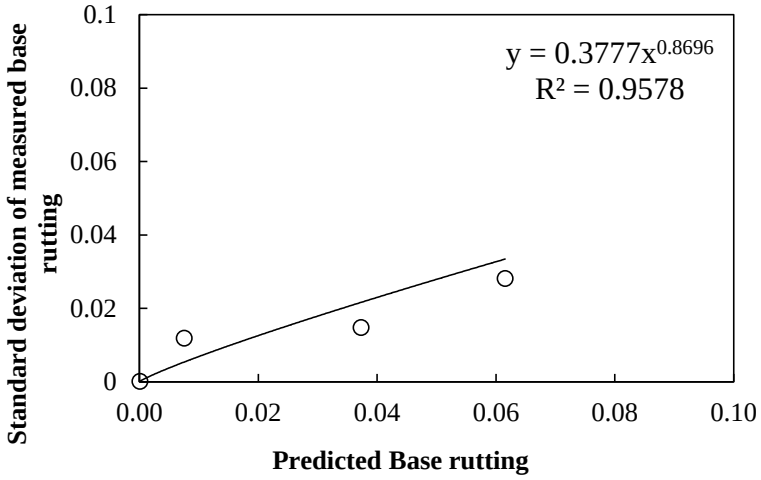
(b) Local model

Figure B-112 Option 1: Method 2 Subgrade rutting residual plots - no sampling

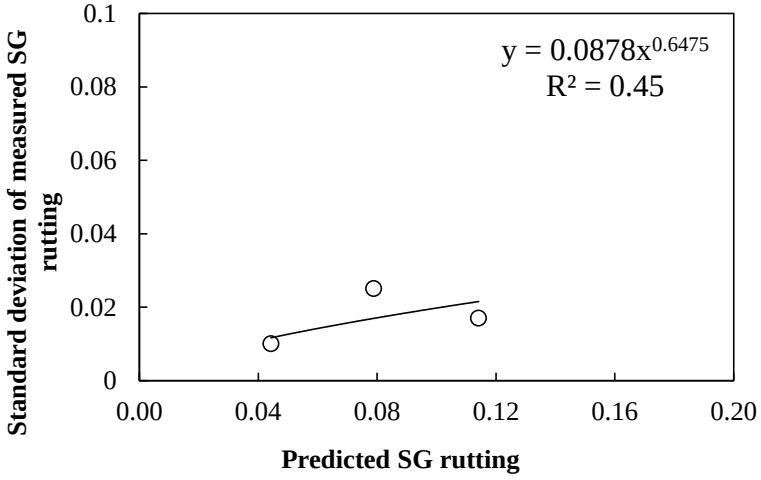
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-113 Rutting model reliability equations – option 1 method 2 – no sampling

Split sampling

Table B-63 Option 1: Method 2 – Global model goodness of fit – split sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0768	0.0003
Base rut	0.1293	0.1150
Subgrade	0.2220	0.2106
Total rut	0.3478	0.3259

Table B-64 Option 1: Method 2 – Global model *p*-values - split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.9481	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0000	0.0000	0.0000

Table B-65 Option 1: Method 2 – Local model goodness of fit– split sampling

HMA layer	SEE	Bias
AC rut	0.1050	-0.0758
Base rut	0.0350	0.0199
Subgrade	0.0630	0.0543
Total rut	0.0806	-0.0016

Table B-66 Option 1: Method 2 – Local model *p*-values– split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0000	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.7277	0.0000	0.0000

Table B-67 Option 1: Method 2 – Local model *p*-values – split sampling

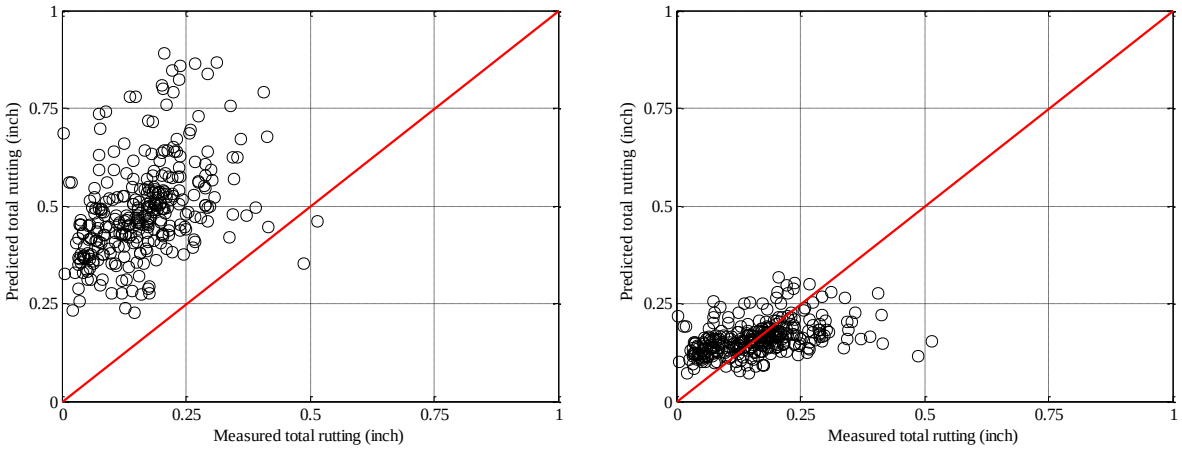
Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.4383
Base rutting (bs1)	1.0000	0.2832
Subgrade rutting (bsg1)	1.0000	0.2930

Table B-68 Option 1: Method 2 – Local model validation p-values – split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0000	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0170	0.0000	0.0000

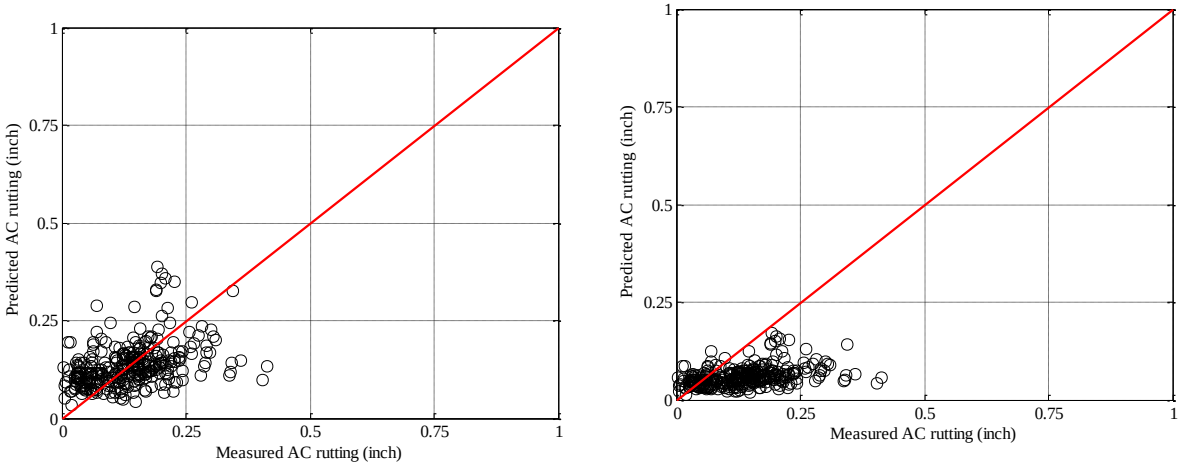
Table B-69 Option 1: Method 2 – Local model validation SEE and bias – split sampling

HMA layer	SEE	Bias
AC rut	0.1210	-0.0908
Base rut	0.0352	0.0135
Subgrade	0.0630	0.0601
Total rut	0.0846	-0.0172



(a) Global model (b) Local model

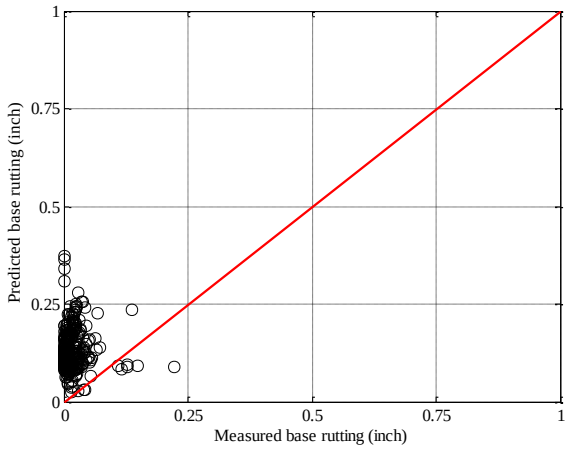
Figure B-114 Option 1: Method 2 Total rutting local calibration results - split sampling



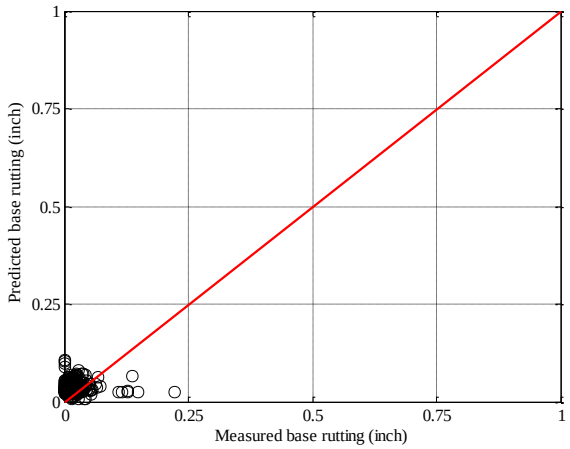
(a) Global model

(b) Local model

Figure B-115 Option 1: Method 2 HMA rutting local calibration results - split sampling

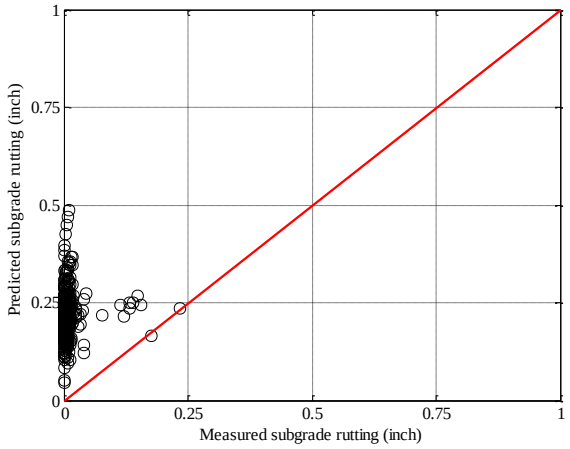


(a) Global model

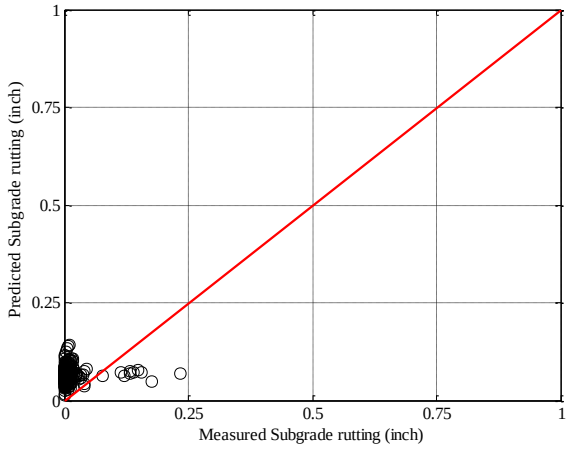


(b) Local model

Figure B-116 Option 1: Method 2 Base rutting local calibration results - split sampling

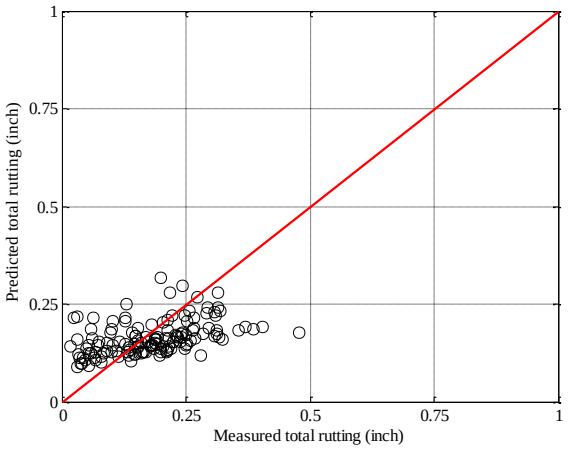


(a) Global model

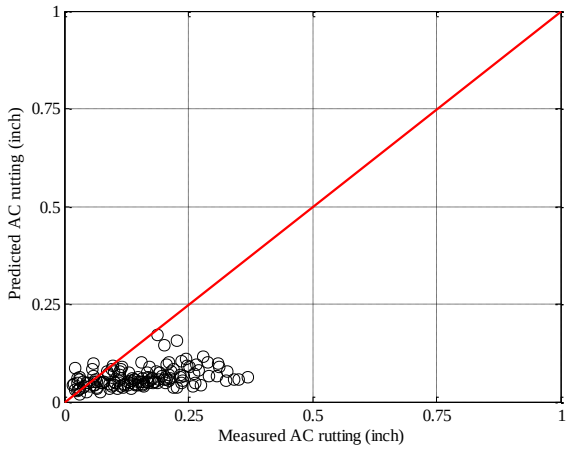


(b) Local model

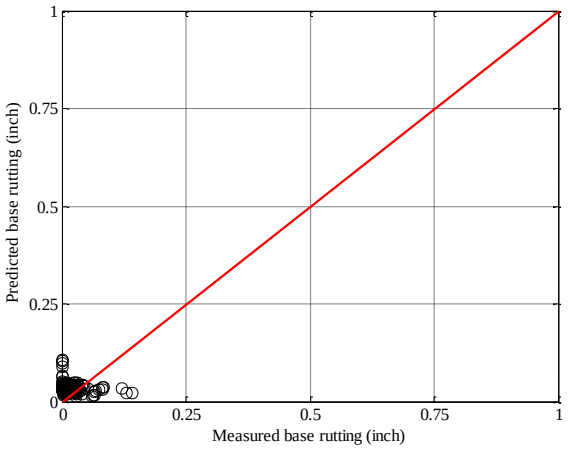
Figure B-117 Option 1: Method 2 Subgrade rutting local calibration results - split sampling



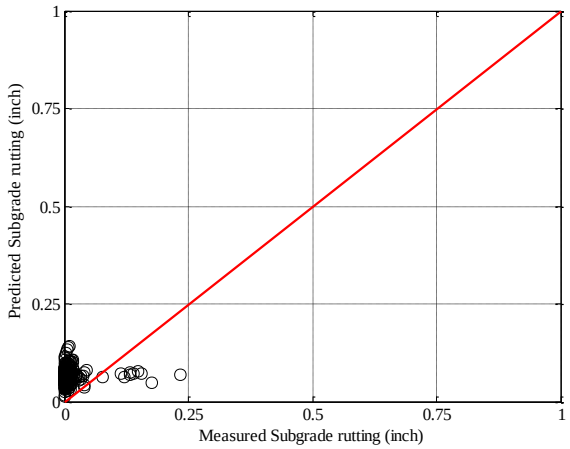
(a) Total rutting



(b) HMA rutting

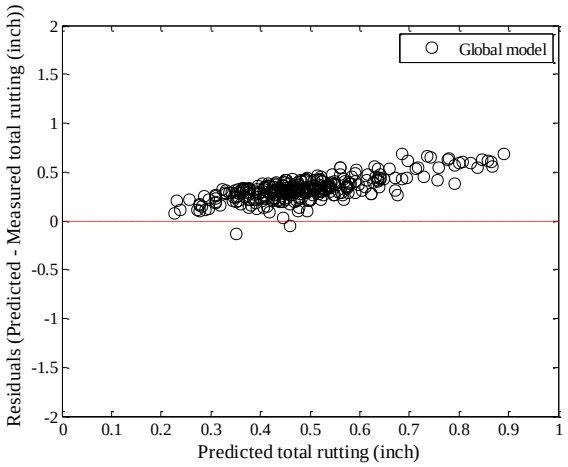


(c) Base rutting

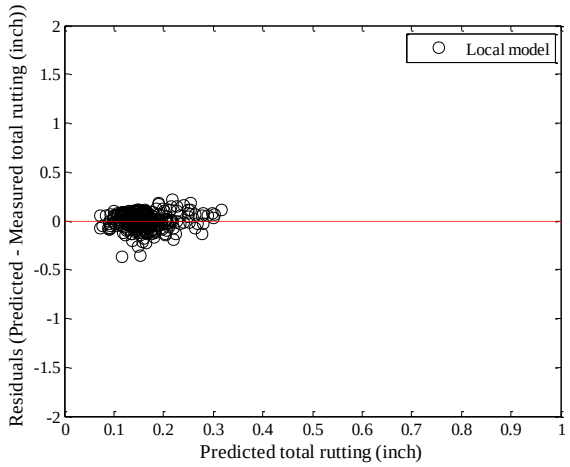


(d) Subgrade rutting

Figure B-118 Option 1: Method 1 Rutting model validation – split sampling

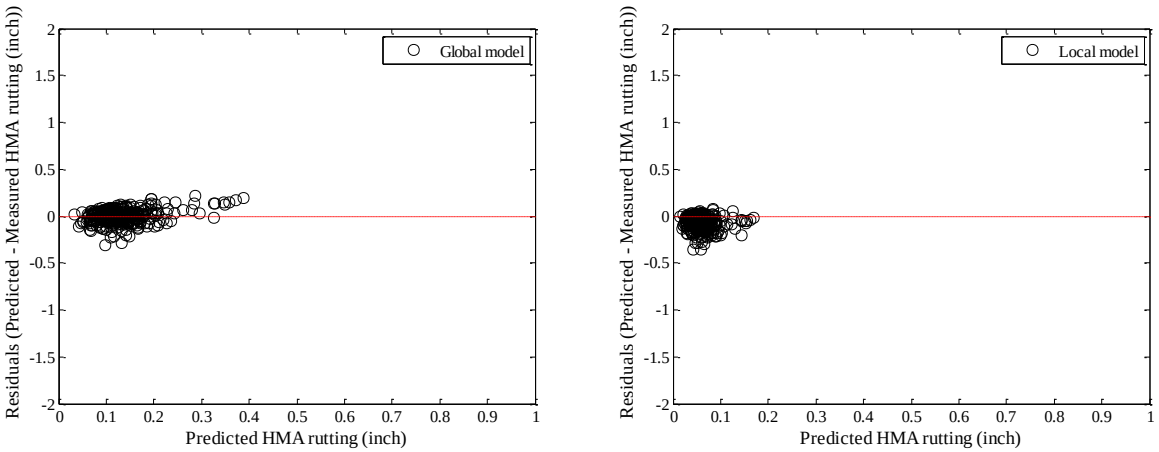


(a) Global model



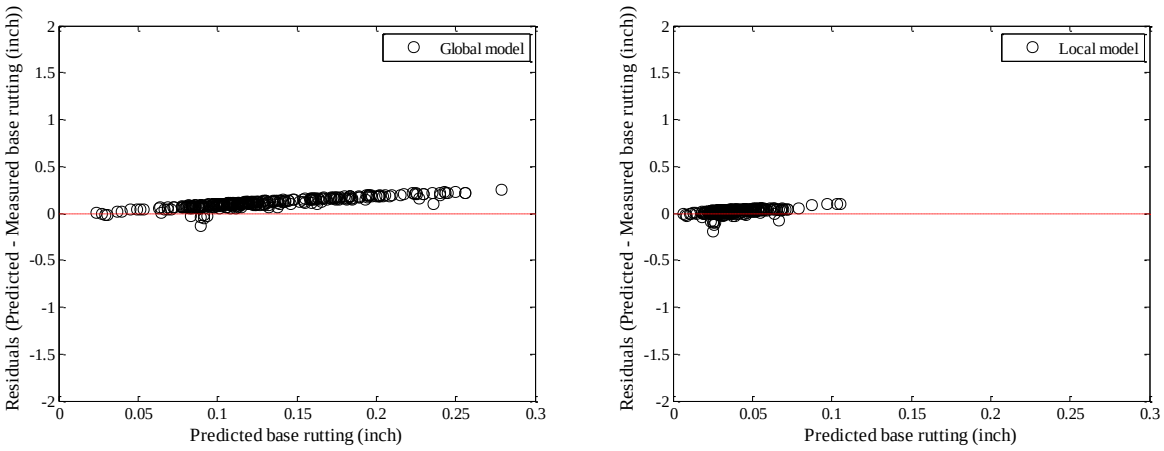
(b) Local model

Figure B-119 Option 1: Method 2 Total rutting local calibration residual plots - split sampling



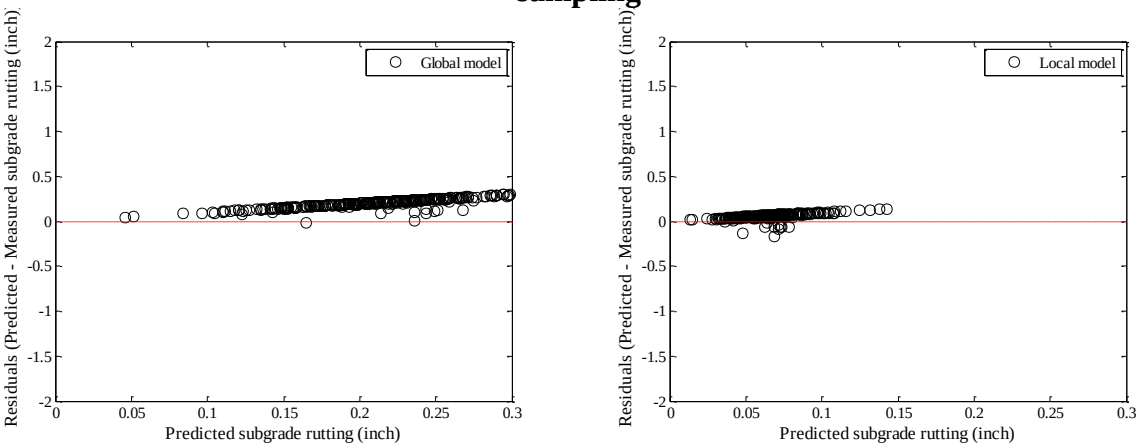
(a) Global model (b) Local model

Figure B-120 Option 1: Method 2 HMA rutting local calibration residual plots - split sampling



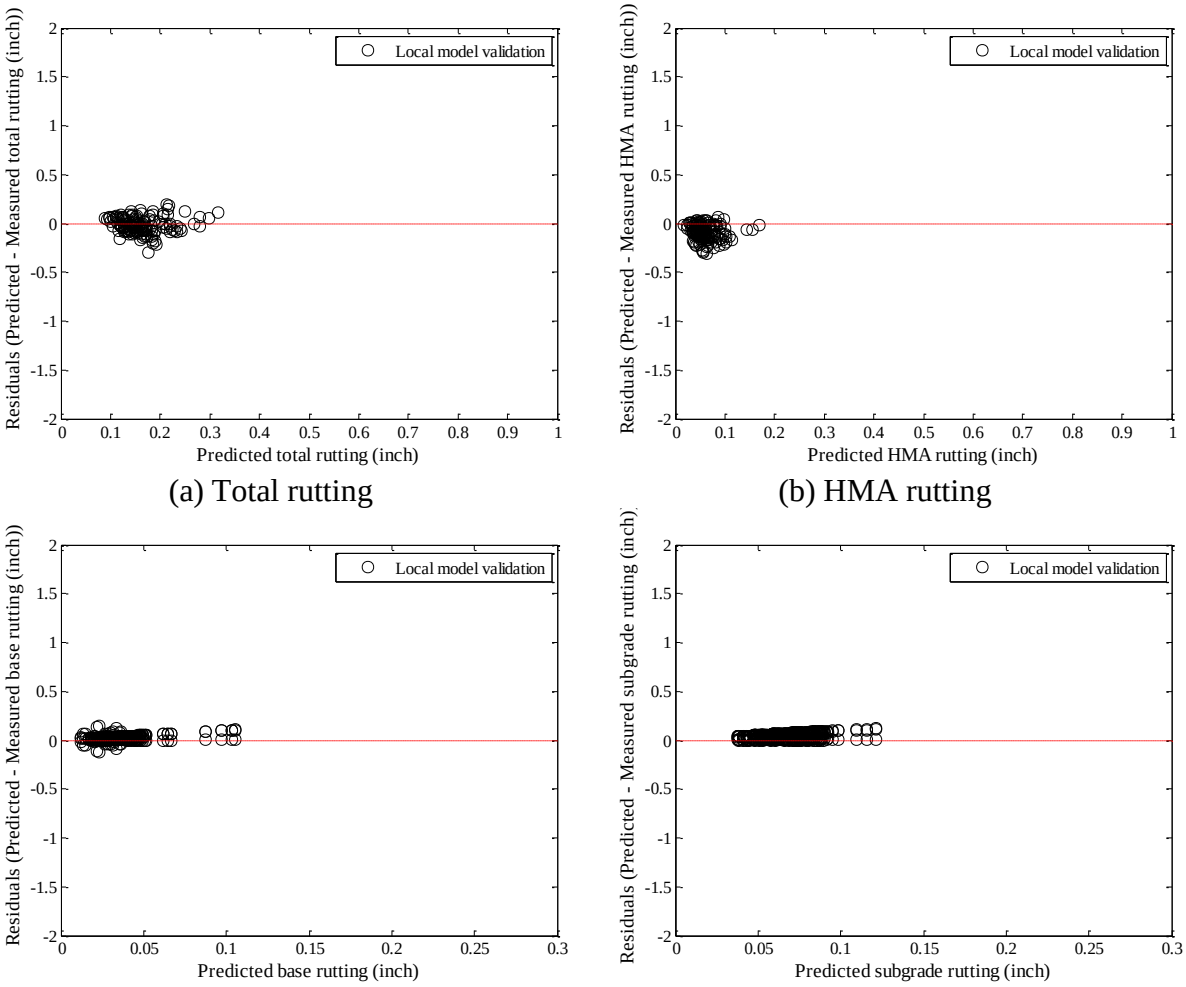
(a) Global model (b) Local model

Figure B-121 Option 1: Method 2 Base rutting local calibration residual plots - split sampling



(a) Global model (b) Local model

Figure B-122 Option 1: Method 2 Subgrade rutting local calibration residual plots - split sampling

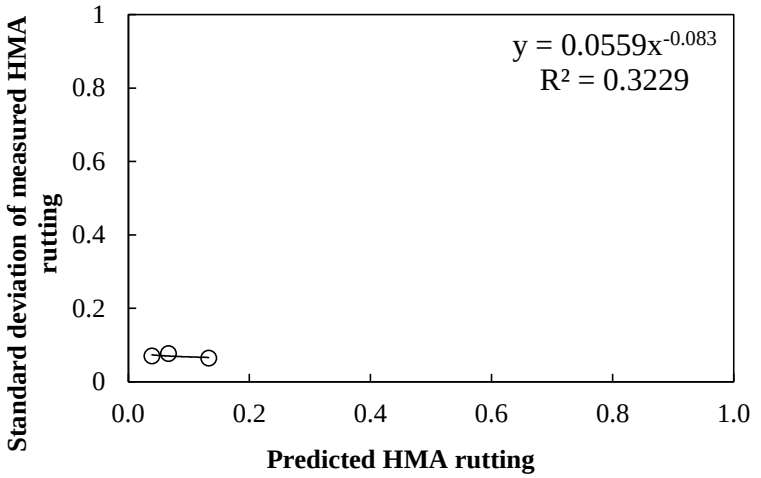


(a) Total rutting (b) HMA rutting

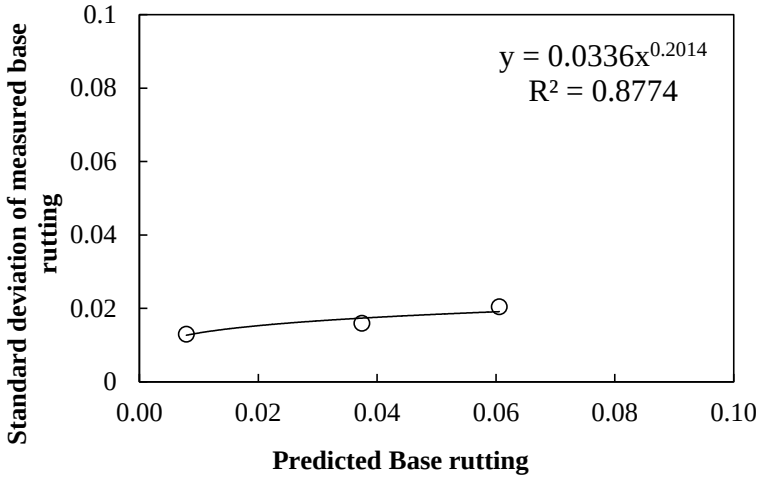
(c) Base rutting (d) Subgrade rutting

Figure B-123 Option 1: Method 2 Rutting model validation residual plots – split sampling

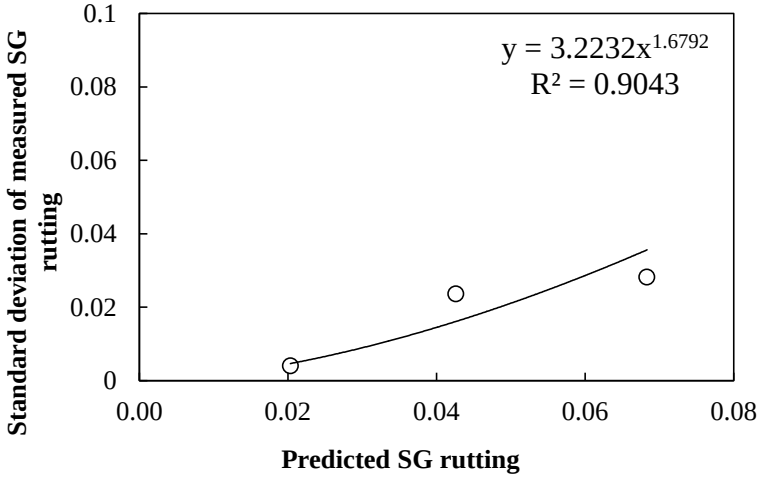
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-124 Rutting model reliability equations – option 1 method 2 – split sampling

Repeated split sampling

Table B-70 Option 1: Method 2 – Global model SEE and bias – repeated split sampling

Global Model	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0785	0.0730	0.0832	-0.0036	-0.0105	0.0033
Base rutting	0.1266	0.1171	0.1340	0.1109	0.1035	0.1181
Subgrade rutting	0.2244	0.2159	0.2311	0.2142	0.2069	0.2206
Total rutting	0.3433	0.3286	0.3567	0.3215	0.3090	0.3343

Table B-71 Option 1: Method 2 – Local model SEE and bias – repeated split sampling

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.1161	0.0314	0.0827	0.0810
SEE Lower CI	0.0947	0.0246	0.0599	0.0751
SEE Upper CI	0.1339	0.0407	0.1065	0.0857
Average bias (in.)	-0.0881	0.0113	0.0760	-0.0008
Bias Lower CI	-0.1088	-0.0042	0.0533	-0.0024
Bias Upper CI	-0.0603	0.0271	0.1010	0.0008
Average calibration coefficient	0.3820	0.2324	0.3824	N/A
Calibration coefficient Lower CI	0.2364	0.1122	0.2795	N/A
Calibration coefficient Upper CI	0.5922	0.3594	0.4970	N/A

Table B-72 Option 1: Method 2 – Local model validation SEE and bias – repeated split sampling

Validation set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.1171	0.0316	0.0832	0.0829
SEE Lower CI	0.0925	0.0173	0.0592	0.0711
SEE Upper CI	0.1380	0.0495	0.1148	0.0960
Average bias (in.)	-0.0881	0.0117	0.0762	-0.0003
Bias Lower CI	-0.1106	-0.0047	0.0516	-0.0217
Bias Upper CI	-0.0547	0.0319	0.1070	0.0206
Average calibration coefficient	0.3820	0.2324	0.3824	N/A
Calibration coefficient Lower CI	0.2364	0.1122	0.2795	N/A
Calibration coefficient Upper CI	0.5922	0.3594	0.4970	N/A

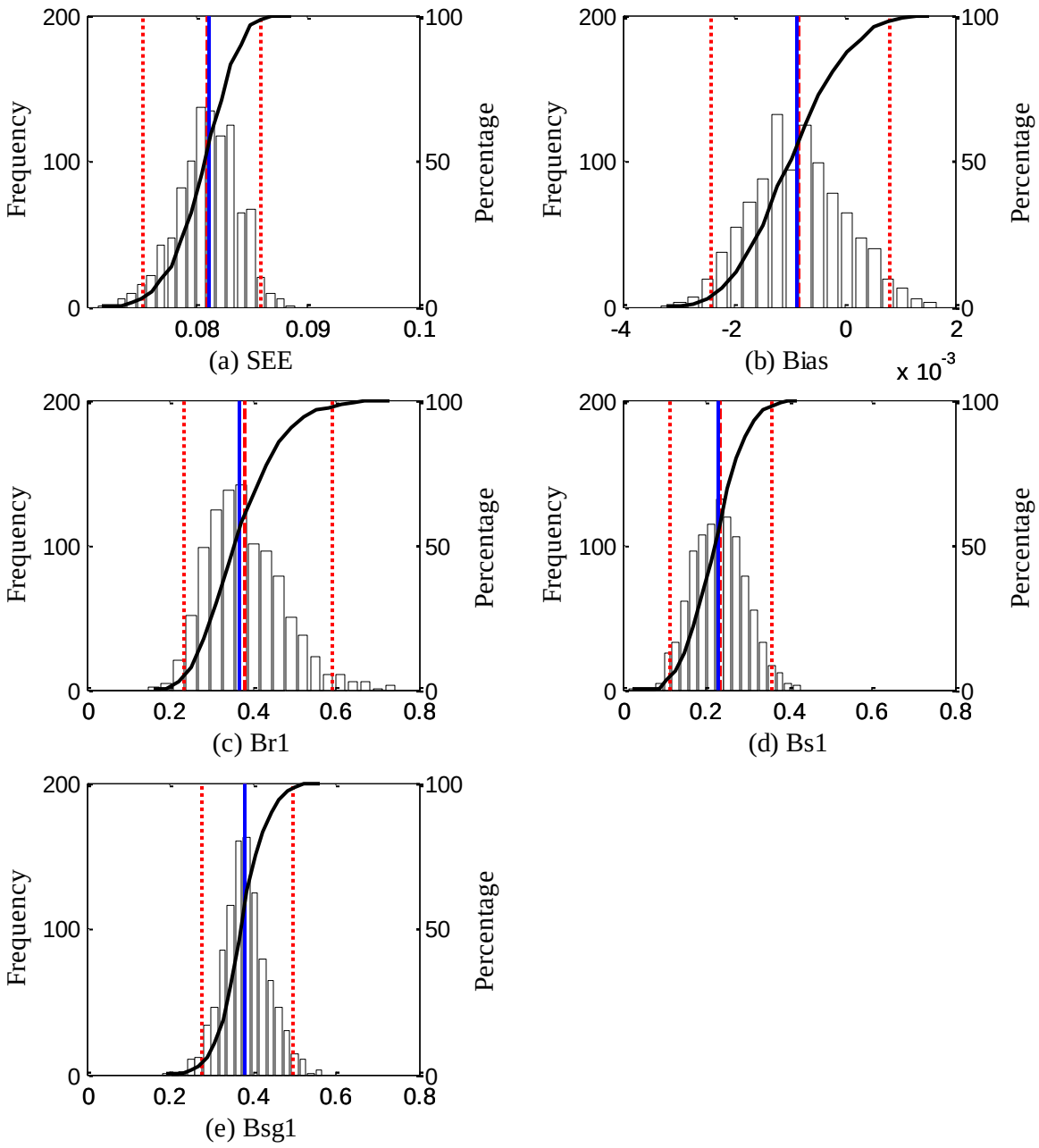


Figure B-125 Option 1: Method 2 repeated split sampling total rutting frequency distributions – calibration

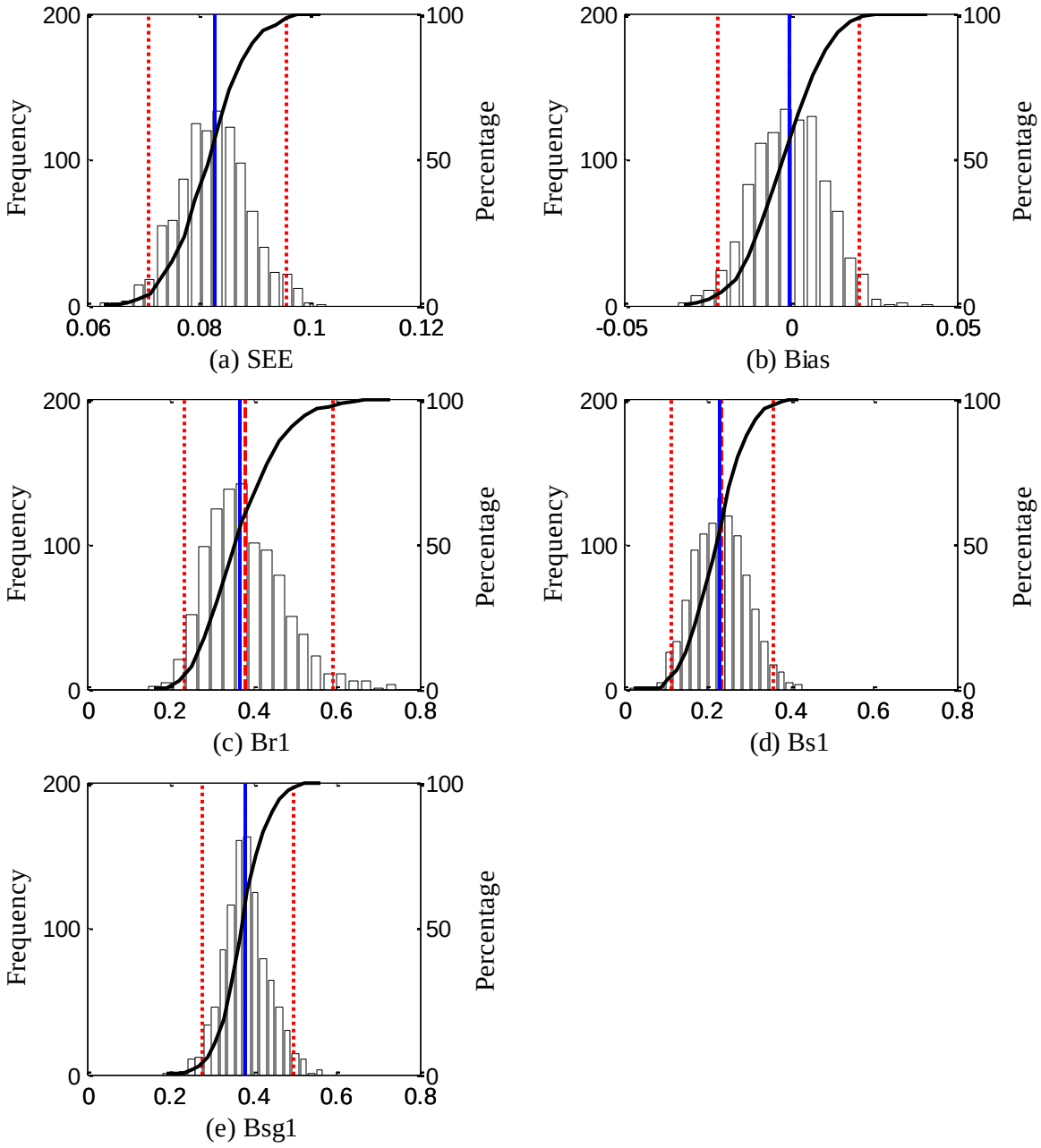
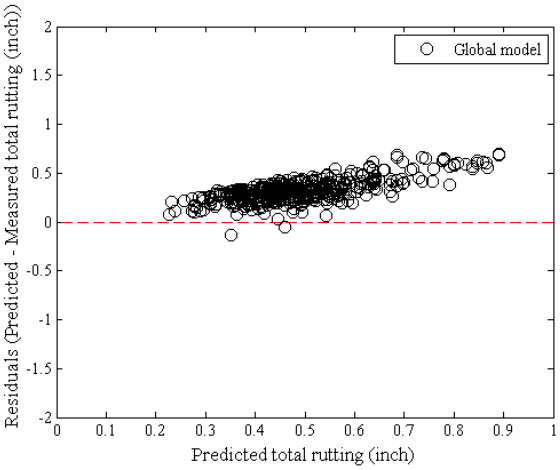
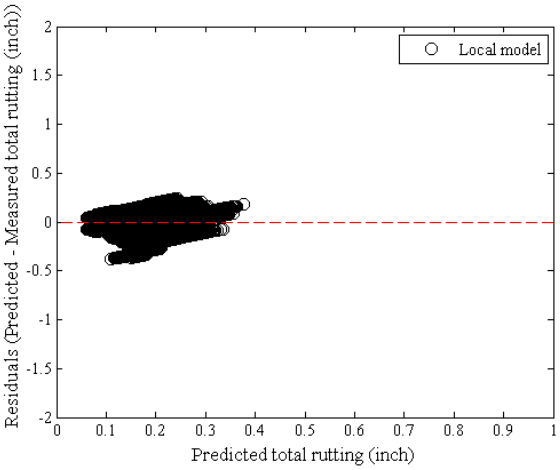


Figure B-126 Option 1: Method 2 repeated split sampling total rutting frequency distributions – validation

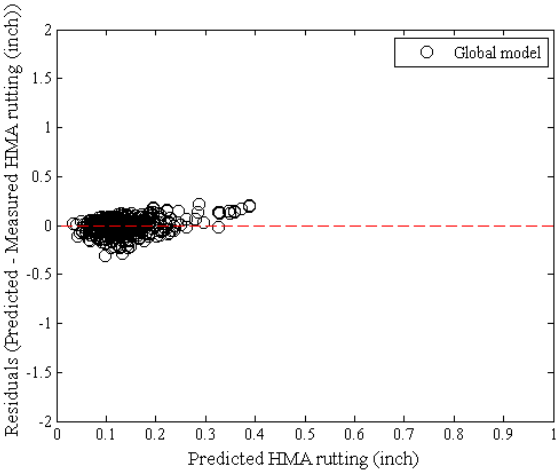


(a) Global model

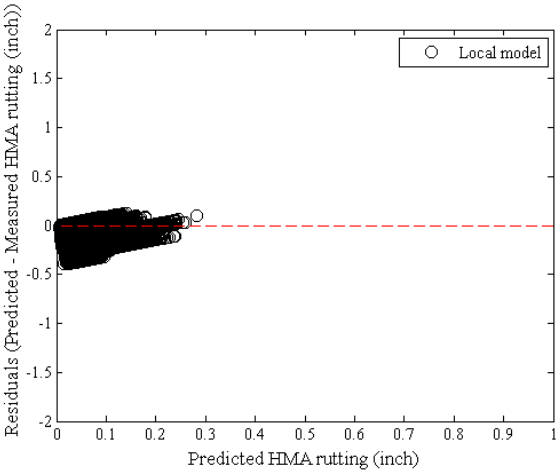


(b) Local model

Figure B-127 Option 1: Method 2 Total rutting local calibration residual plots - repeated split sampling

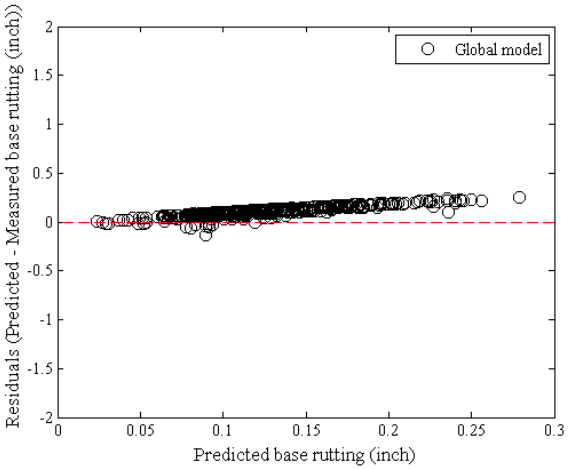


(a) Global model

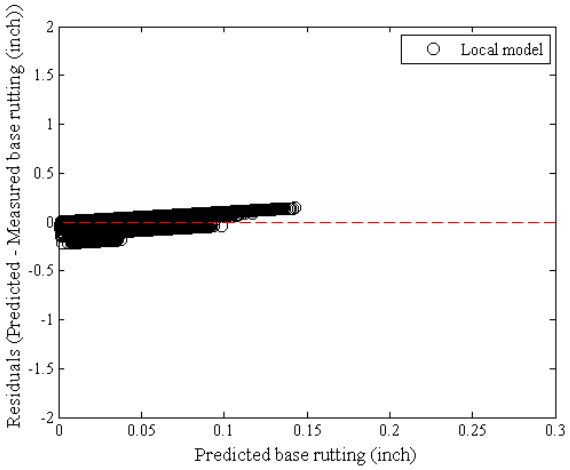


(b) Local model

Figure B-128 Option 1: Method 2 HMA rutting local calibration residual plots - repeated split sampling

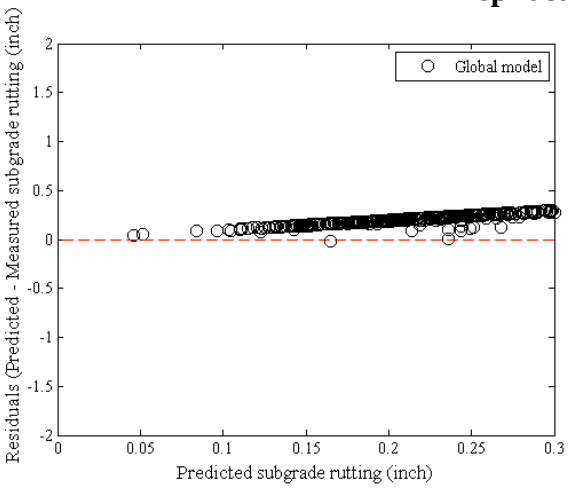


(a) Global model

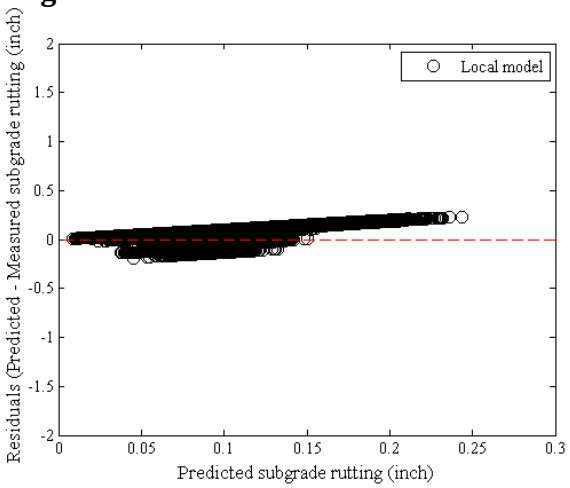


(b) Local model

Figure B-129 Option 1: Method 2 Base rutting local calibration residual plots - repeated split sampling

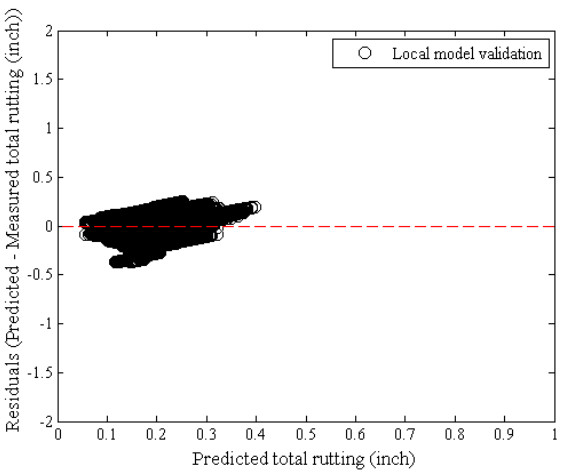


(a) Global model

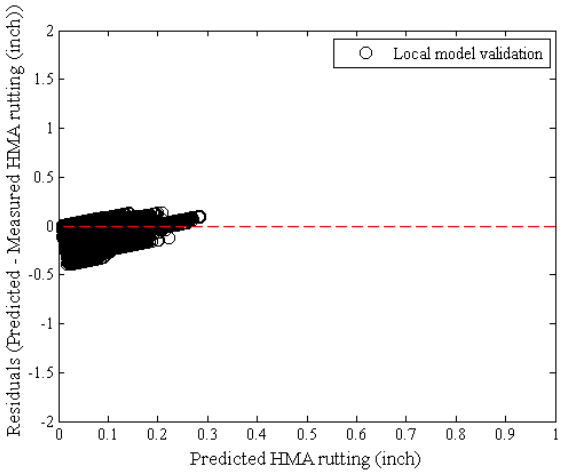


(b) Local model

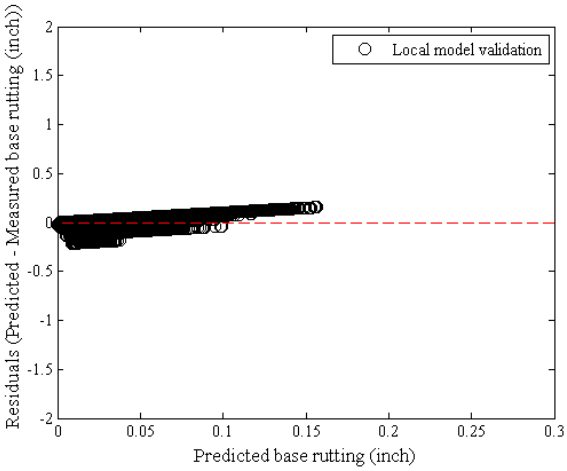
Figure B-130 Option 1: Method 2 Subgrade rutting local calibration residual plots - repeated split sampling



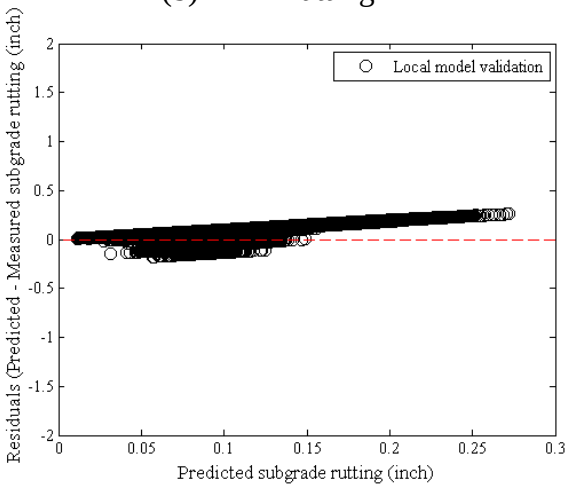
(a) Total rutting



(b) HMA rutting



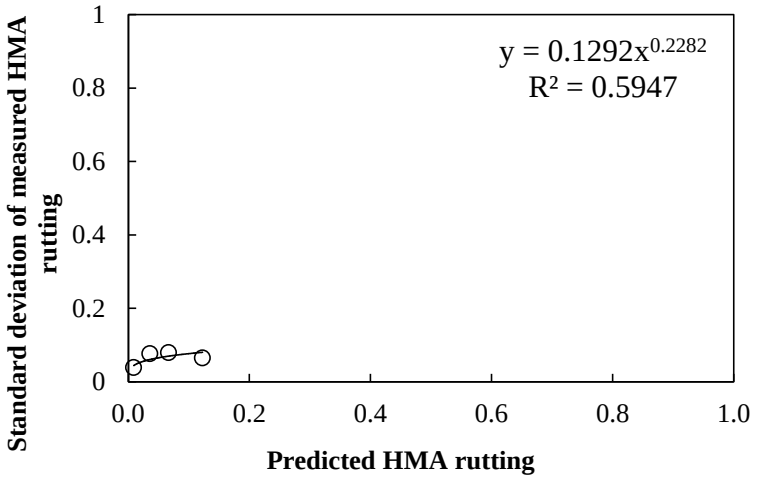
(c) Base rutting



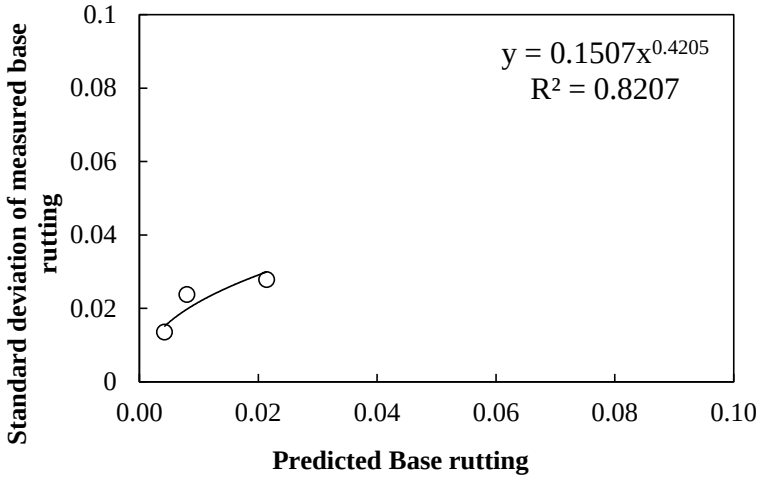
(d) Subgrade rutting

Figure B-131 Option 1: Method 2 Rutting model validation residual plots – repeated split sampling

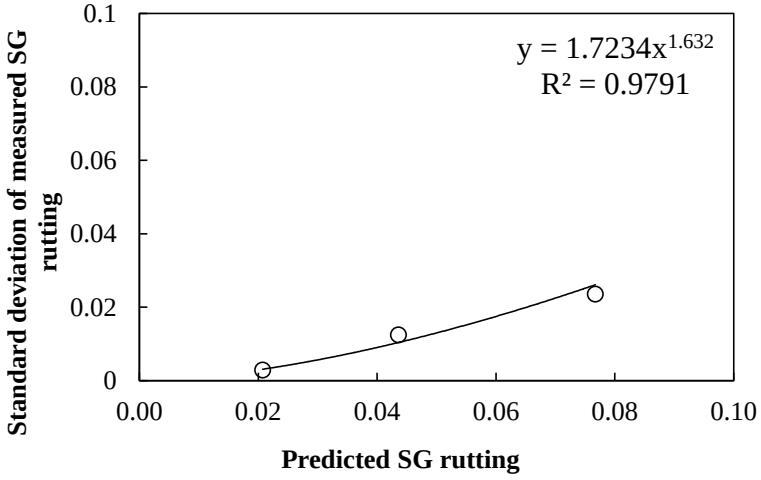
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-132 Rutting model reliability equations – option 1 method 2 – repeated split sampling

Bootstrapping

Table B-73 Option 1: Method 2 – Global model SEE and bias – bootstrapping

Calibration set	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0783	0.0706	0.0870	-0.0035	-0.0148	0.0076
Base rutting	0.1265	0.1146	0.1397	0.1110	0.1008	0.1217
Subgrade rutting	0.2242	0.2130	0.2365	0.2143	0.2040	0.2258
Total rutting	0.3431	0.3211	0.3651	0.3218	0.3029	0.3414

Table B-74 Option 1: Method 2 – Local model SEE and bias – bootstrapping

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.1151	0.0314	0.0828	0.0804
SEE Lower CI	0.0853	0.0218	0.0484	0.0723
SEE Upper CI	0.1442	0.0457	0.1151	0.0890
Average bias (in.)	-0.0866	0.0098	0.0762	-0.0007
Bias Lower CI	-0.1206	-0.0112	0.0414	-0.0031
Bias Upper CI	-0.0458	0.0337	0.1085	0.0015
Average calibration coefficient	0.3932	0.2216	0.3833	N/A
Calibration coefficient Lower CI	0.1510	0.0654	0.2218	N/A
Calibration coefficient Upper CI	0.7001	0.4041	0.5354	N/A

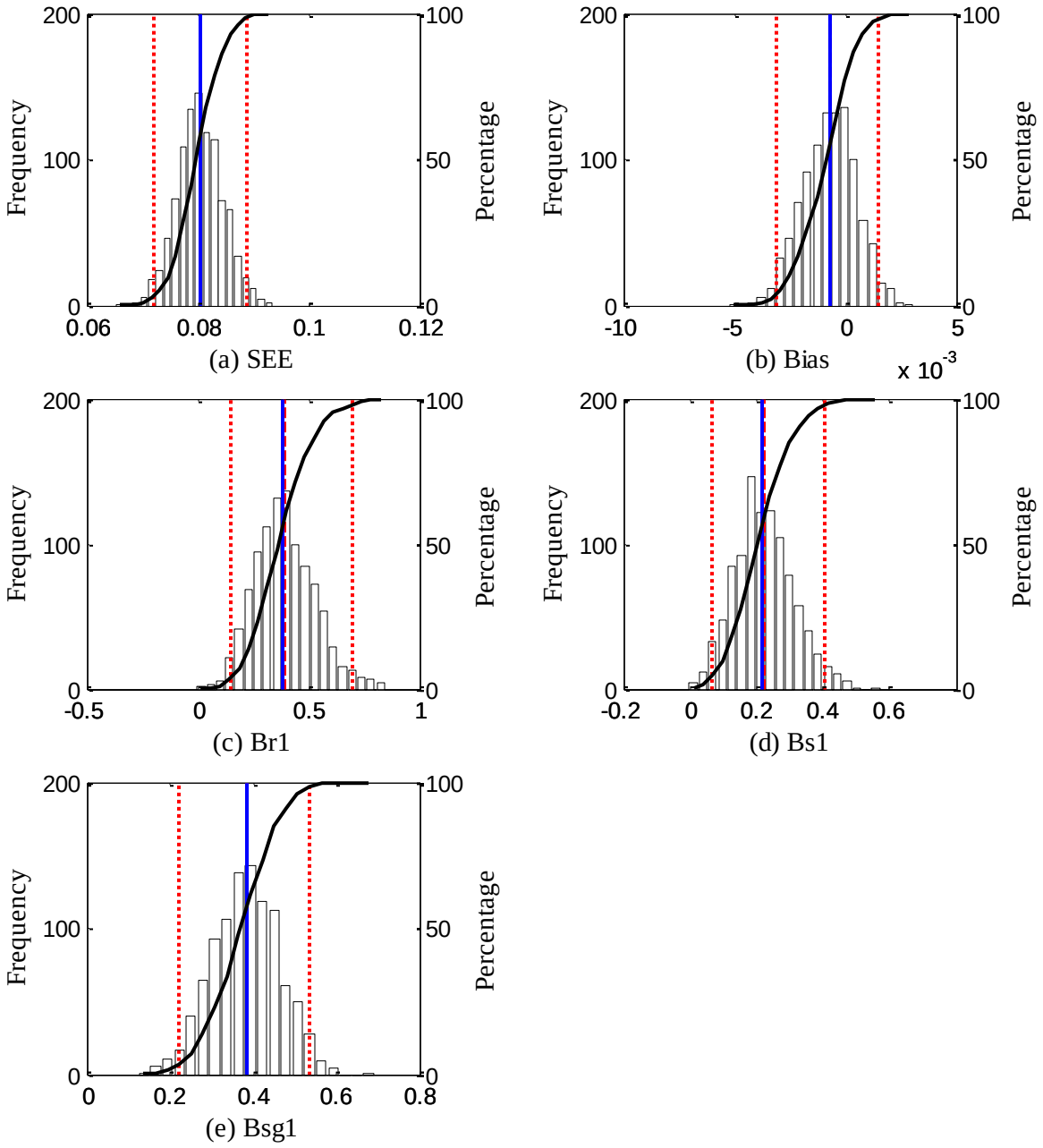
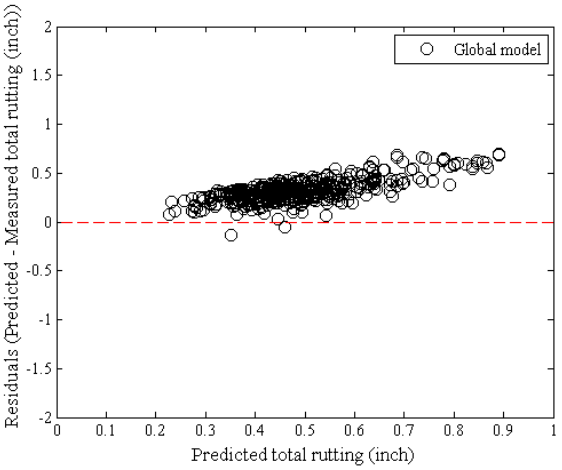
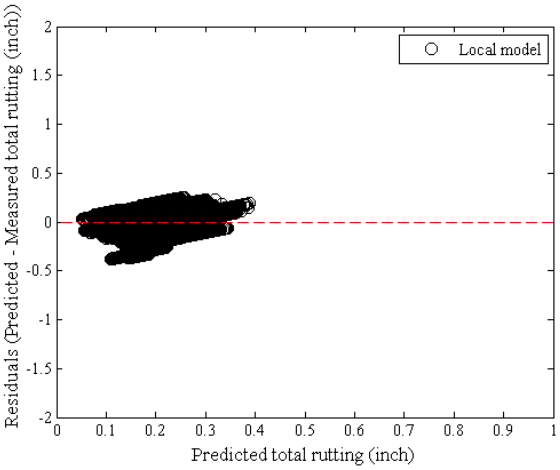


Figure B-133 Option 1: Method 2 bootstrapping total rutting frequency distributions – calibration

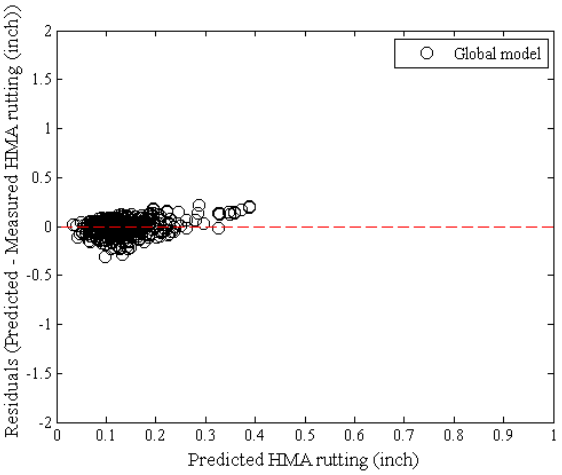


(a) Global model

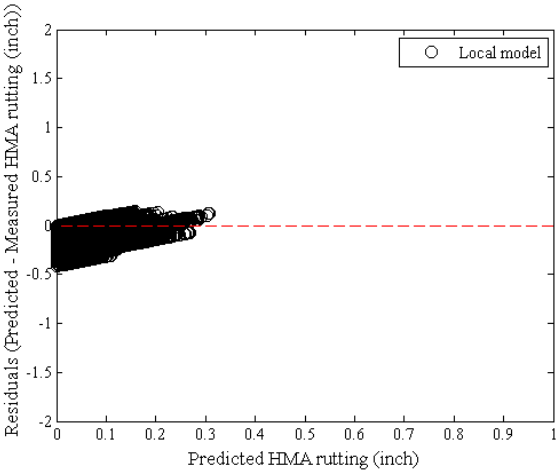


(b) Local model

Figure B-134 Option 1: Method 2 Total rutting local calibration residual plots - bootstrapping

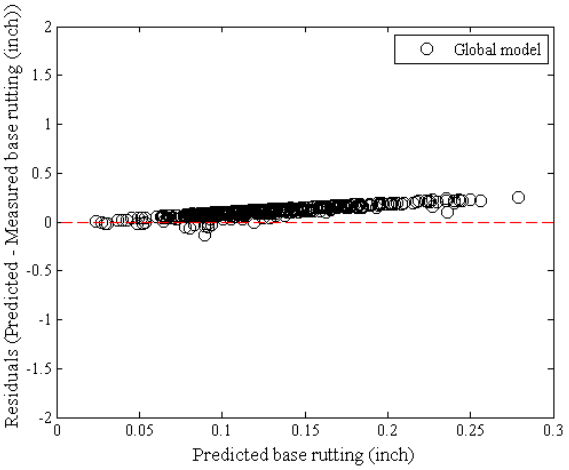


(a) Global model

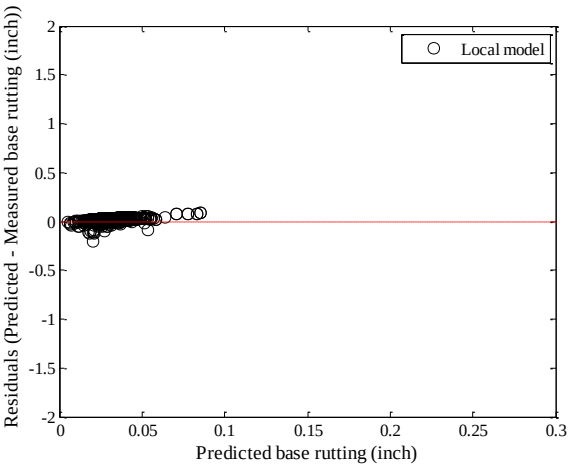


(b) Local model

Figure B-135 Option 1: Method 2 HMA rutting local calibration residual plots - bootstrapping

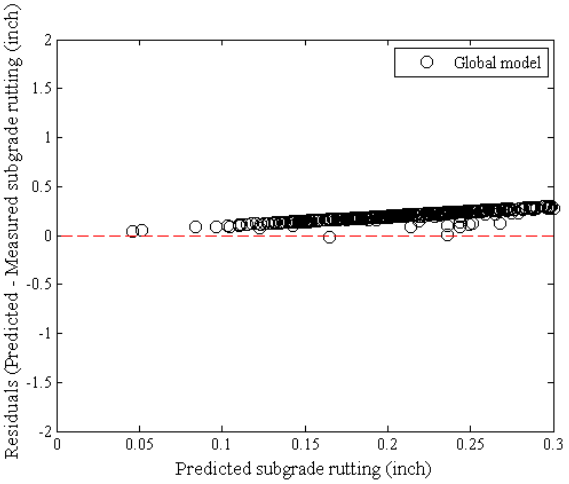


(a) Global model

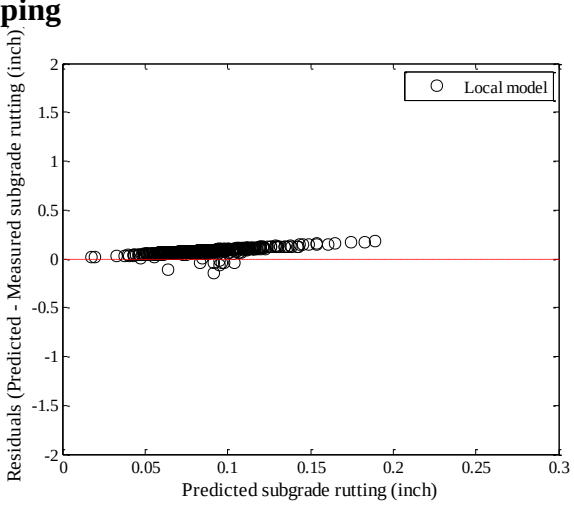


(b) Local model

Figure B-136 Option 1: Method 2 Base rutting local calibration residual plots - bootstrapping



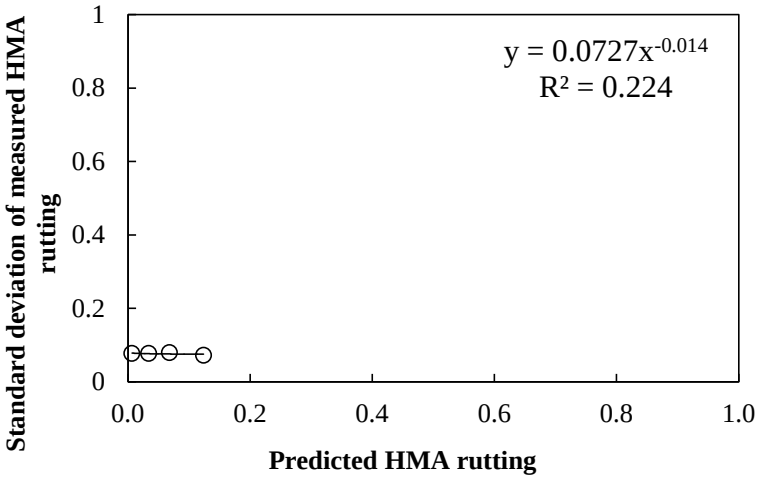
(a) Global model



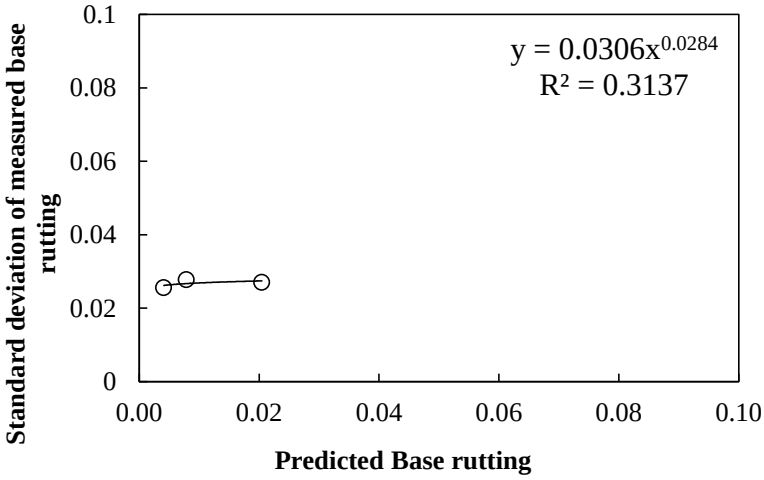
(b) Local model

Figure B-137 Option 1: Method 2 Subgrade rutting local calibration residual plots - bootstrapping

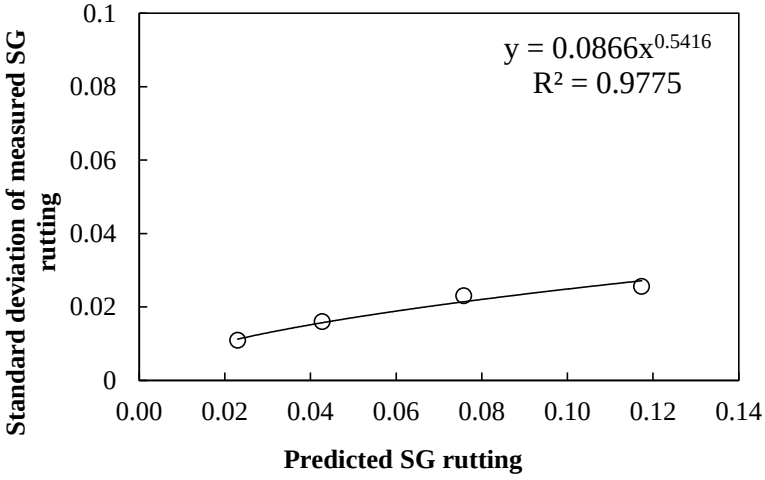
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-138 Rutting model reliability equations – option 1 method 2 – bootstrapping

B.1.3.3 Option 2 – Method 1

No sampling

Table B-75 Option 2: Method 1 – Global model goodness of fit – no sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0779	-0.0019
Base rut	0.1405	0.1160
Subgrade	0.2235	0.2100
Total rut	0.3574	0.3241

Table B-76 Option 2: Method 1 – Global model *p*-values

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.5505	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0000	0.0000	0.0000

Table B-77 Option 2: Method 1 – Local model goodness of fit– no sampling

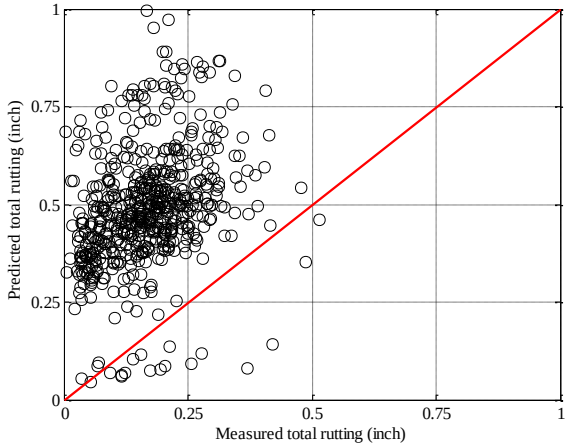
HMA layer	SEE	Bias
AC rut	0.0774	-0.0099
Base rut	0.0258	-0.0051
Subgrade	0.0205	-0.0006
Total rut	0.0865	-0.0155

Table B-78 Option 2: Method 1 – Local model *p*-values– no sampling

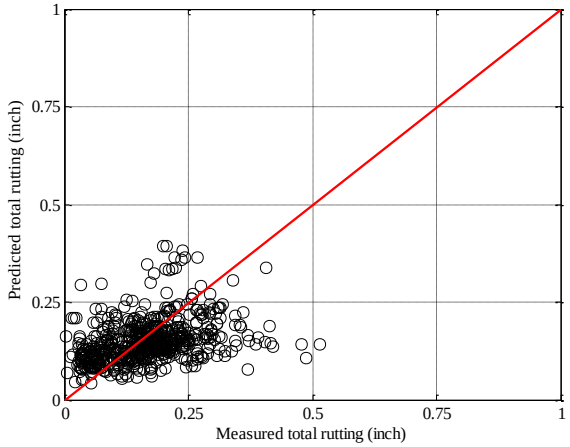
HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0021	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.5188	0.0000	0.0000
Total rut	0.0000	0.0000	0.0000

Table B-79 Option 2: Method 1 – Local model *p*-values– no sampling

Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.9422
Base rutting (bs1)	1.0000	0.0974
Subgrade rutting (bsg1)	1.0000	0.0367

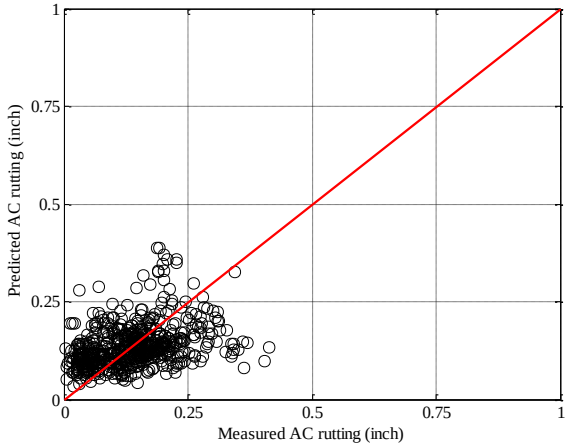


(a) Global model

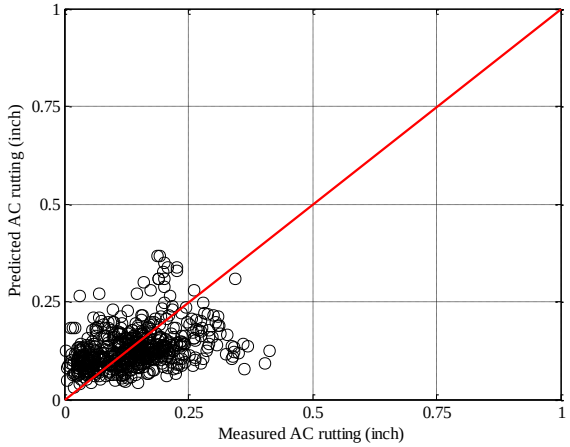


(b) Local model

Figure B-139 Option 2: Method 1 – Total rutting local calibration results - no sampling

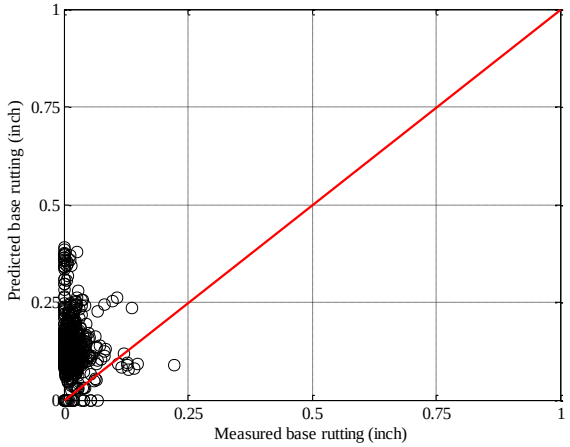


(a) Global model

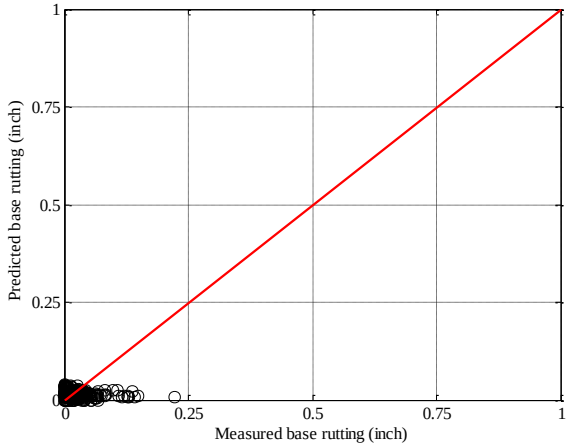


(b) Local model

Figure B-140 Option 2: Method 1 – HMA rutting local calibration results - no sampling

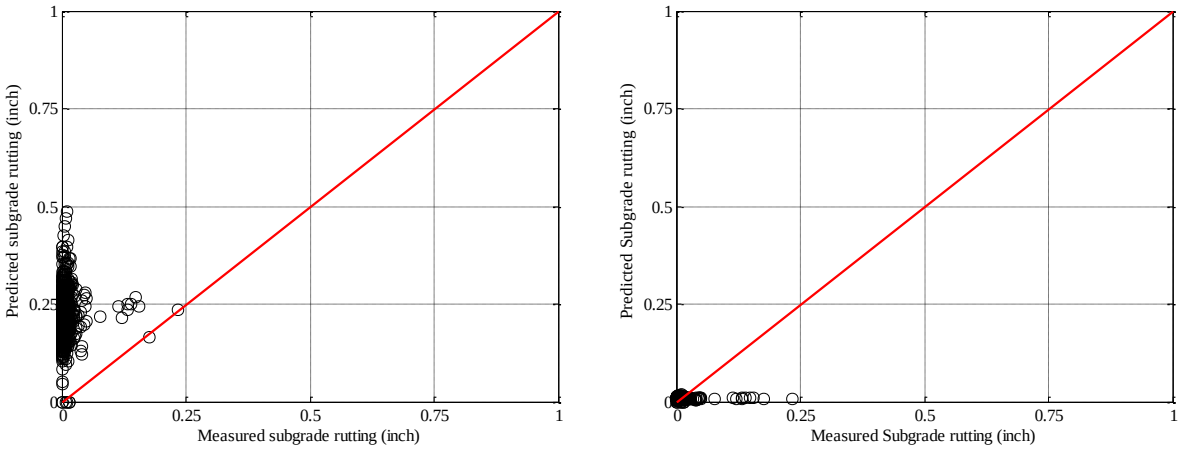


(a) Global model



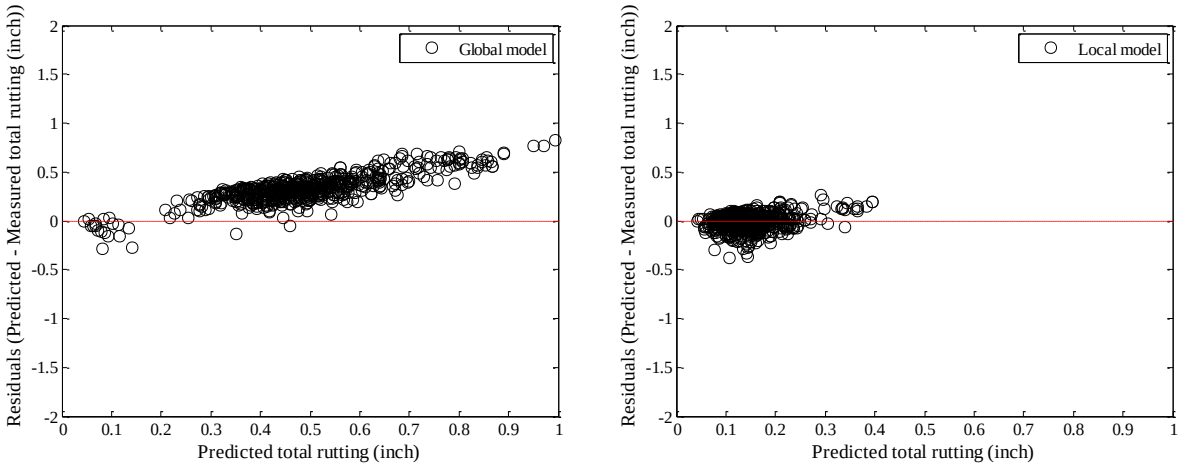
(b) Local model

Figure B-141 Option 2: Method 1 – Base rutting local calibration results - no sampling



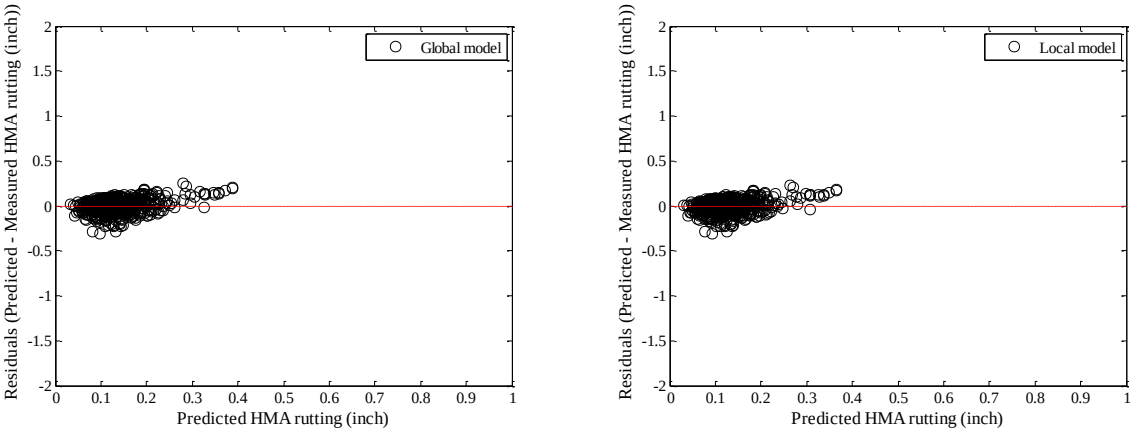
(a) Global model (b) Local model

Figure B-142 Option 2: Method 1 – Subgrade rutting local calibration results - no sampling



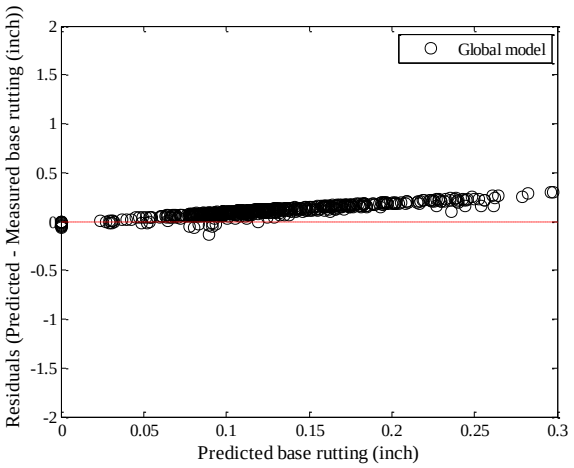
(a) Global model (b) Local model

Figure B-143 Option 2: Method 1 – Total rutting residual plots - no sampling

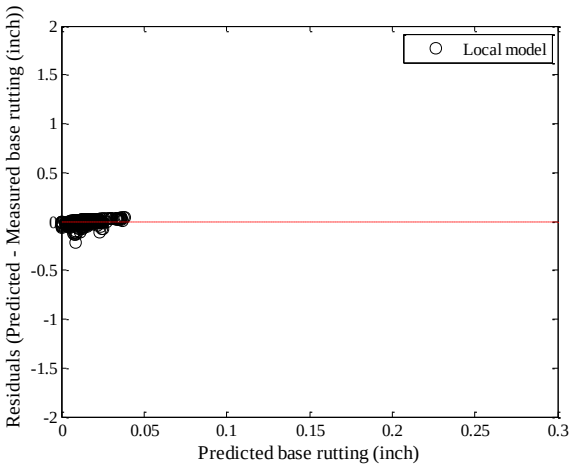


(a) Global model (b) Local model

Figure B-144 Option 2: Method 1 – HMA rutting residual plots - no sampling

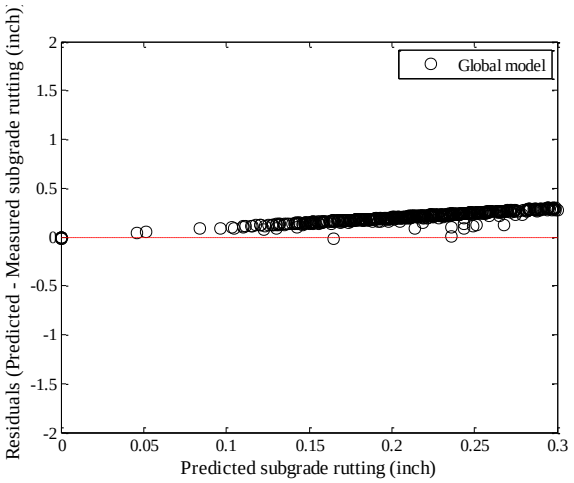


(a) Global model

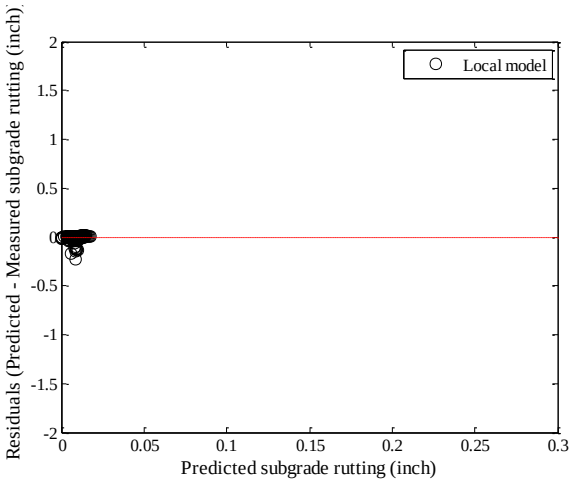


(b) Local model

Figure B-145 Option 2: Method 1 – Base rutting residual plots - no sampling



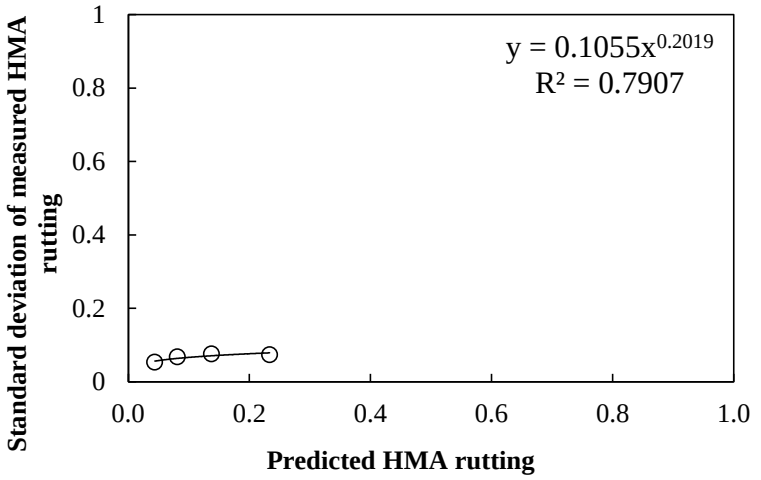
(a) Global model



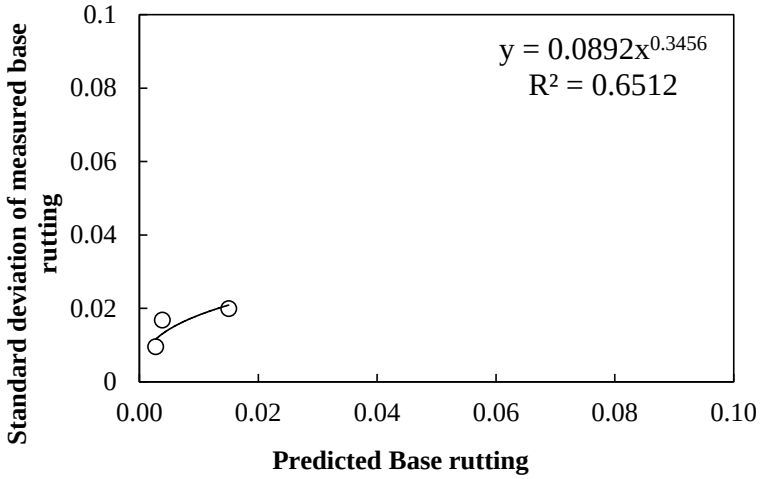
(b) Local model

Figure B-146 Option 2: Method 1 – Subgrade rutting residual plots ts - no sampling

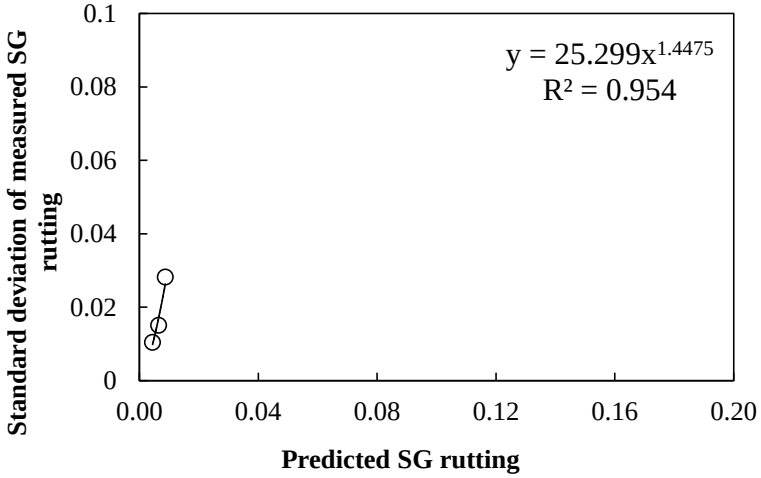
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-147 Rutting model reliability equations – option 2 method 1 – no sampling

Split sampling

Table B-80 Option 2: Method 1 – Global model goodness of fit – split sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0752	0.0002
Base rut	0.1391	0.1140
Subgrade	0.2275	0.2121
Total rut	0.3617	0.3264

Table B-81 Option 2: Method 1 – Global model *p*-values - split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.9510	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0003
Total rut	0.0000	0.0000	0.0000

Table B-82 Option 2: Method 1 – Local model goodness of fit– split sampling

HMA layer	SEE	Bias
AC rut	0.0746	-0.0086
Base rut	0.0277	-0.0049
Subgrade	0.0200	-0.0004
Total rut	0.0843	-0.0140

Table B-83 Option 2: Method 1 – Local model *p*-values– split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0207	0.0000	0.0000
Base rut	0.0003	0.0000	0.0000
Subgrade	0.6594	0.0000	0.0000
Total rut	0.0008	0.0000	0.0000

Table B-84 Option 2: Method 1 – Local model *p*-values – split sampling

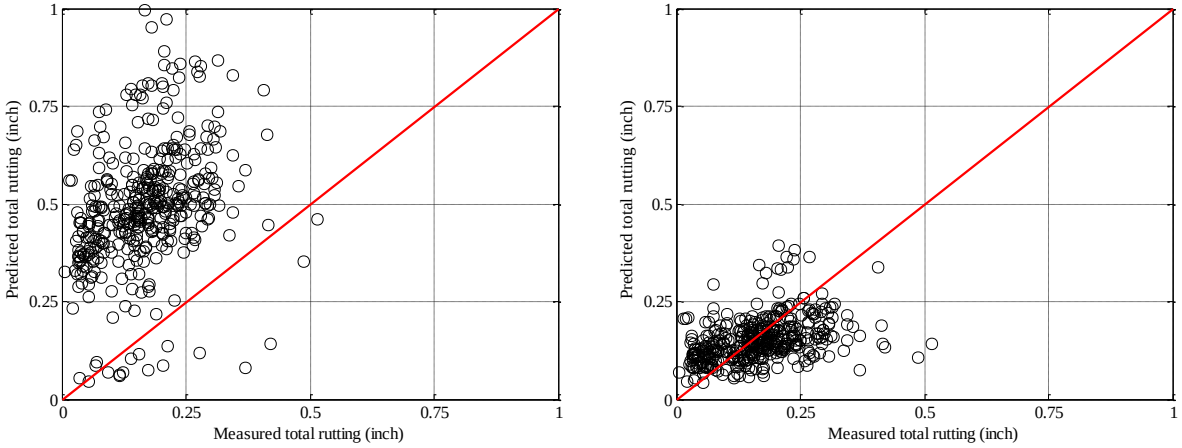
Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.9372
Base rutting (bs1)	1.0000	0.1014
Subgrade rutting (bsg1)	1.0000	0.0348

Table B-85 Option 2: Method 1 – Local model validation p-values – split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0166	0.0000	0.0000
Base rut	0.0200	0.0000	0.0000
Subgrade	0.1916	0.0000	0.0000
Total rut	0.0024	0.0000	0.0000

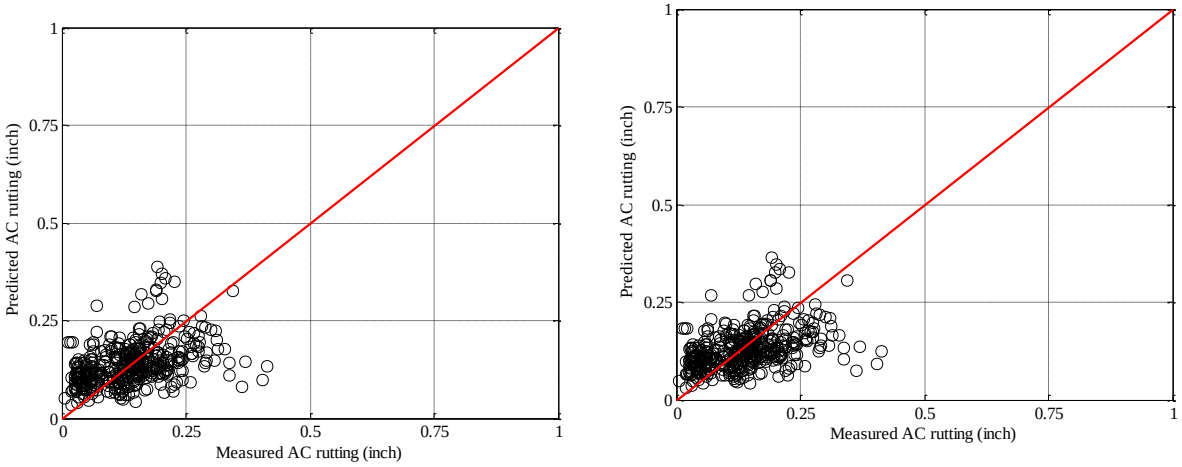
Table B-86 Option 2: Method 1 – Local model validation SEE and bias – split sampling

HMA layer	SEE	Bias
AC rut	0.0842	-0.0151
Base rut	0.0208	-0.0036
Subgrade	0.0219	-0.0021
Total rut	0.0921	-0.0209



(a) Global model (b) Local model

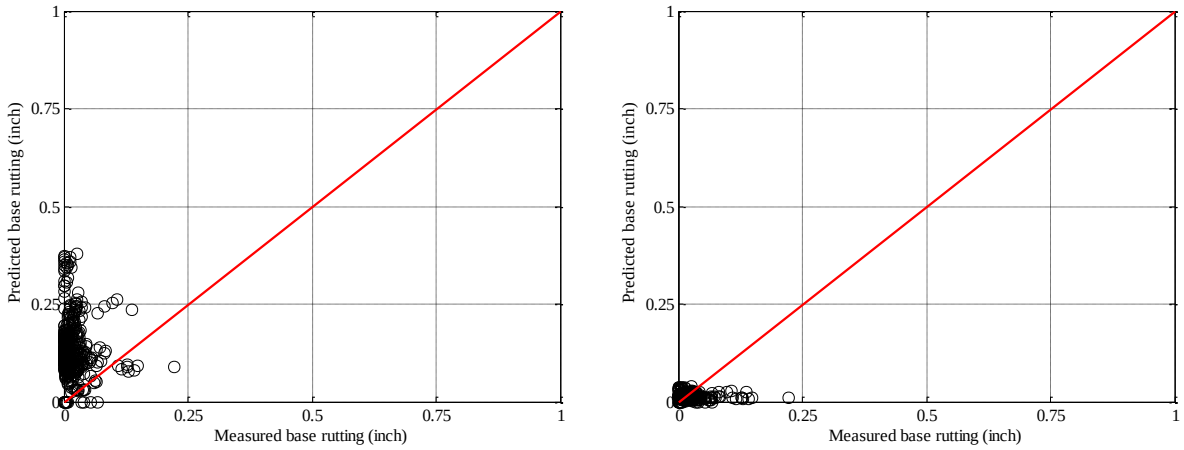
Figure B-148 Option 2 Method 1 Total rutting local calibration results - split sampling



(a) Global model

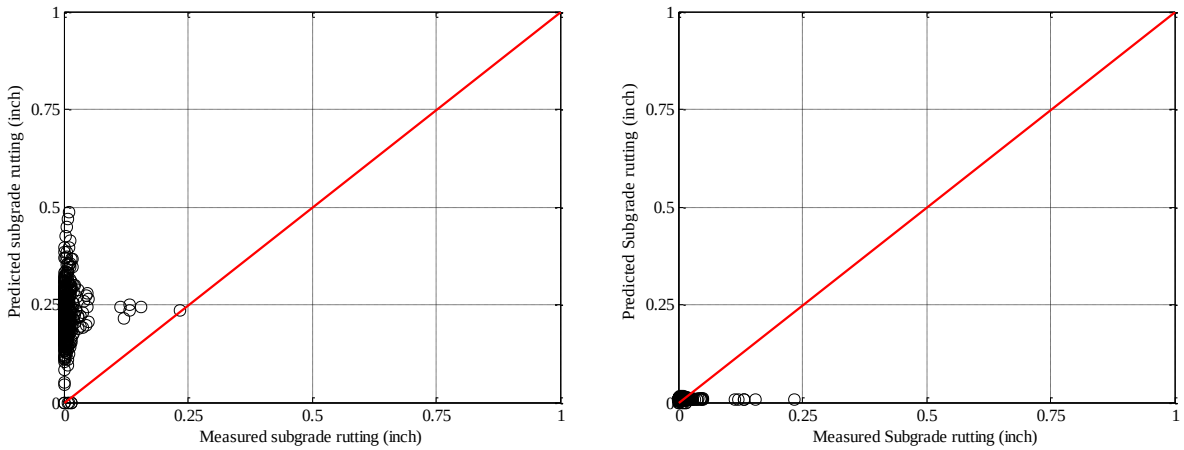
(b) Local model

Figure B-149 Option 2: Method 1 HMA rutting local calibration results - split sampling



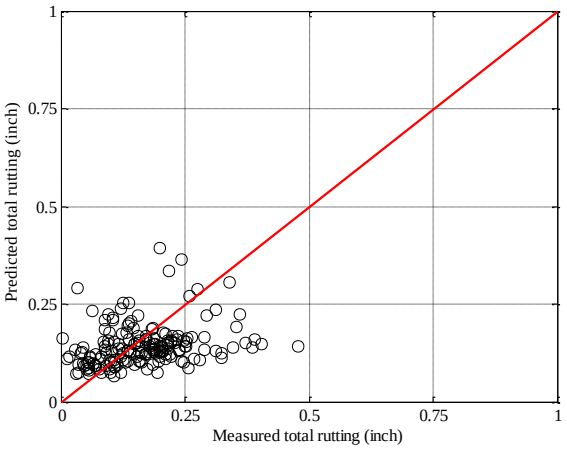
(a) Global model (b) Local model

Figure B-150 Option 2: Method 1 Base rutting local calibration results - split sampling

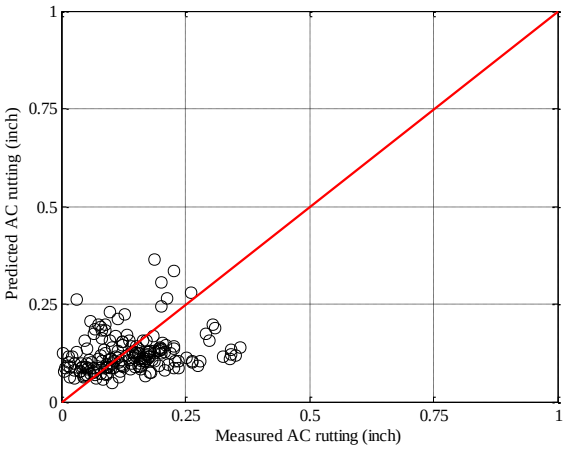


(a) Global model (b) Local model

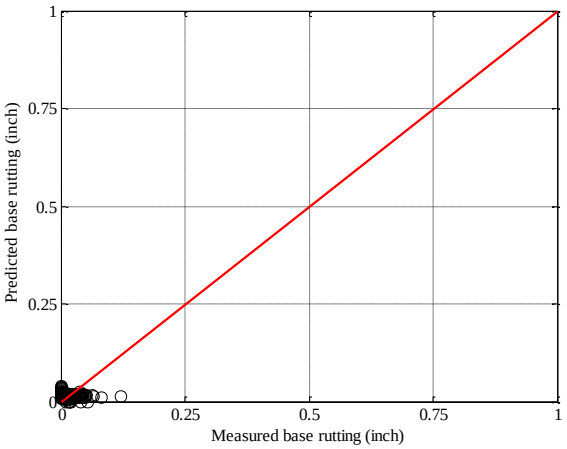
Figure B-151 Option 2 Method 1 Subgrade rutting local calibration results - split sampling



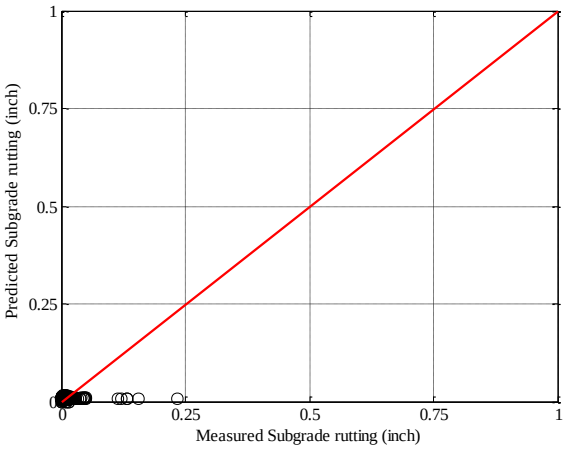
(a) Total rutting



(b) HMA rutting

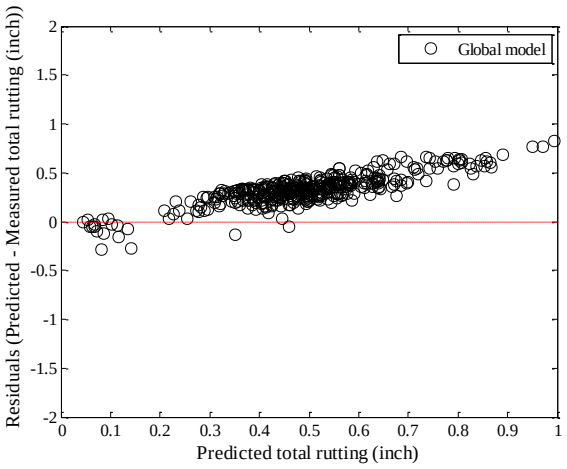


(c) Base rutting

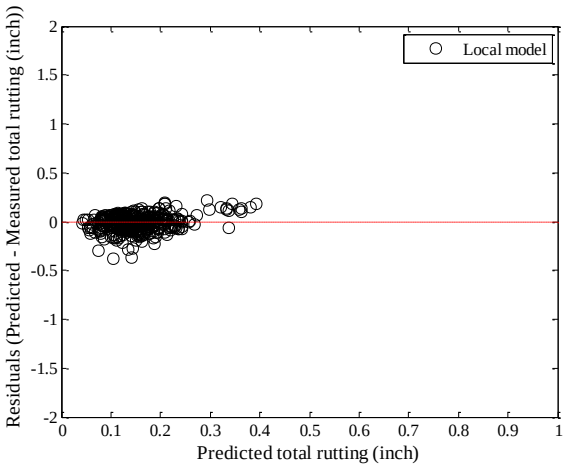


(d) Subgrade rutting

Figure B-152 Option 2: Method 1 – Rutting model validation – split sampling

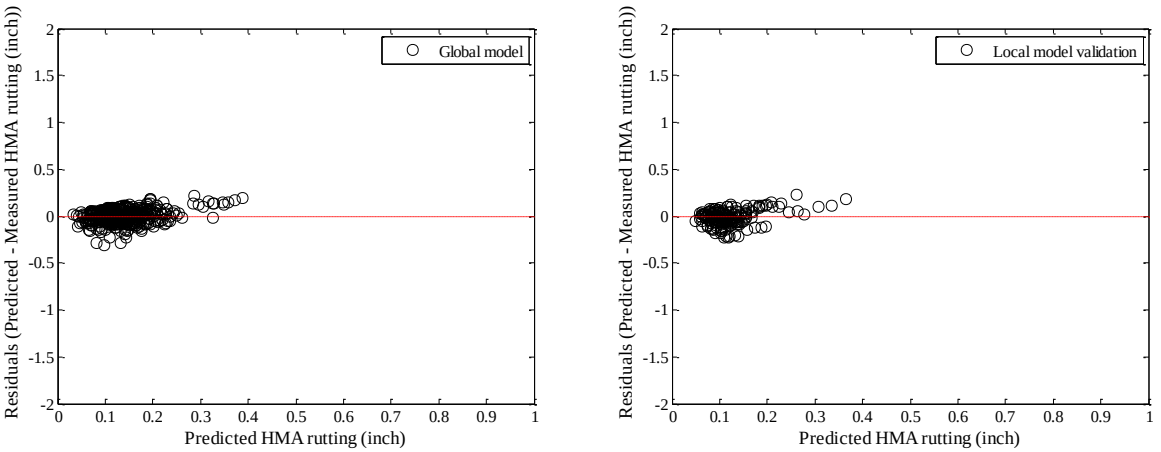


(a) Global model



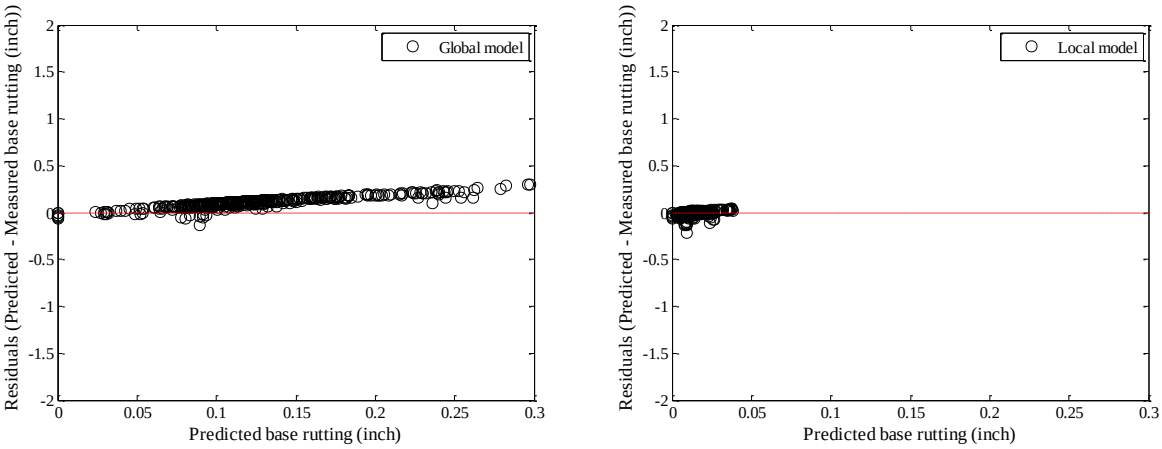
(b) Local model

Figure B-153 Option 2 Method 1 Total rutting residual plots - split sampling



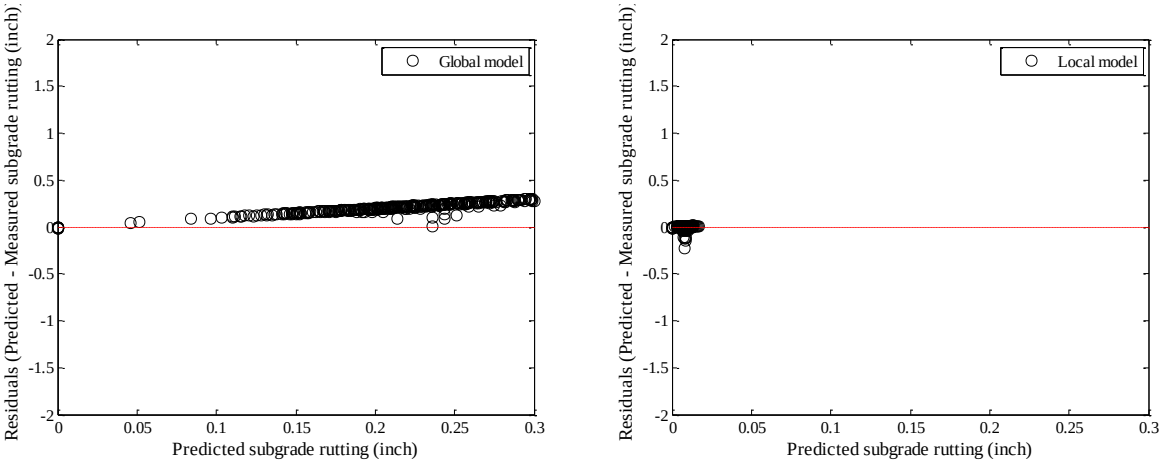
(a) Global model (b) Local model

Figure B-154 Option 2: Method 1 HMA rutting residual plots - split sampling



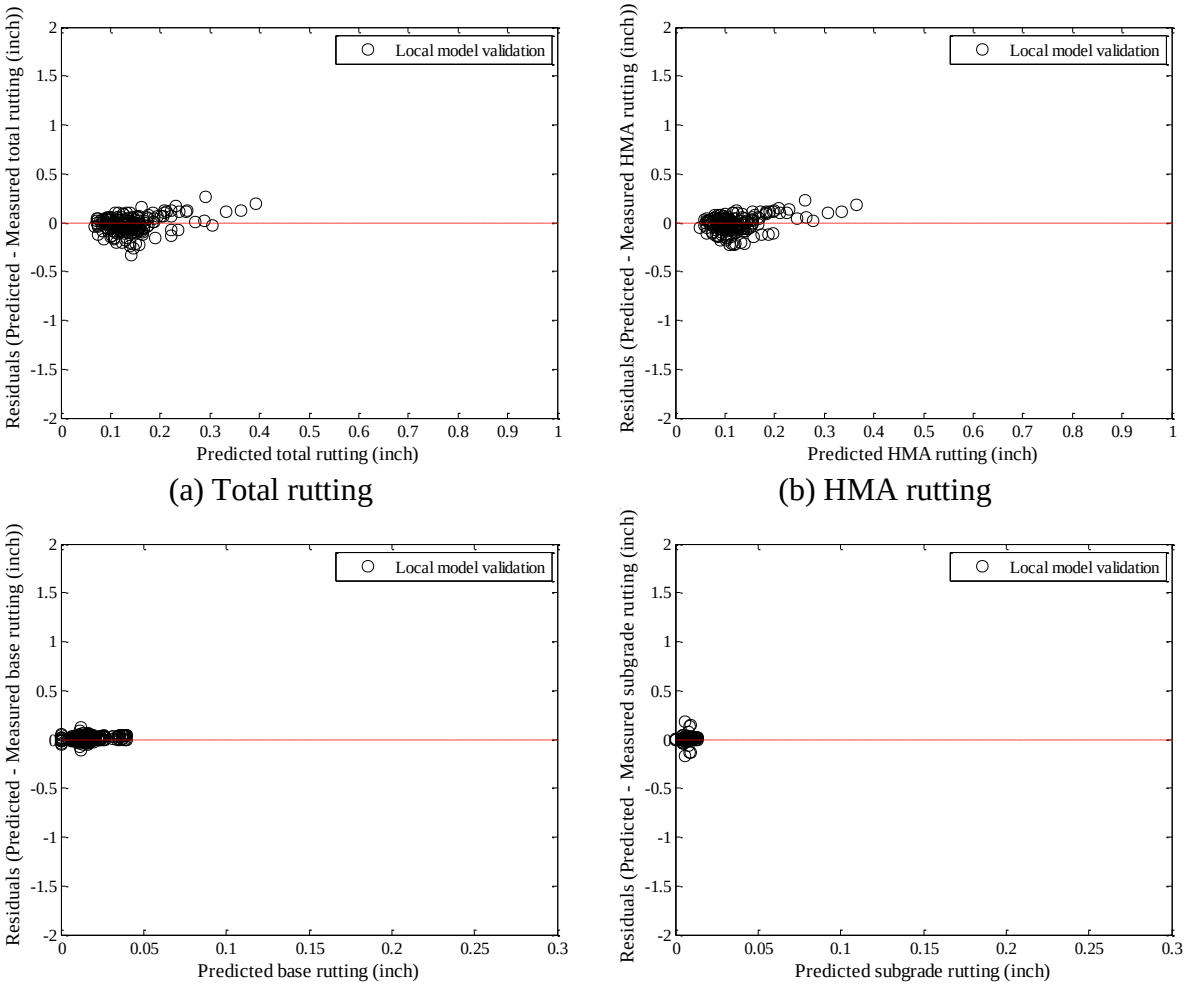
(a) Global model (b) Local model

Figure B-155 Option 2: Method 1 Base rutting residual plots - split sampling



(a) Global model (b) Local model

Figure B-156 Option 2 Method 1 Subgrade rutting residual plots - split sampling

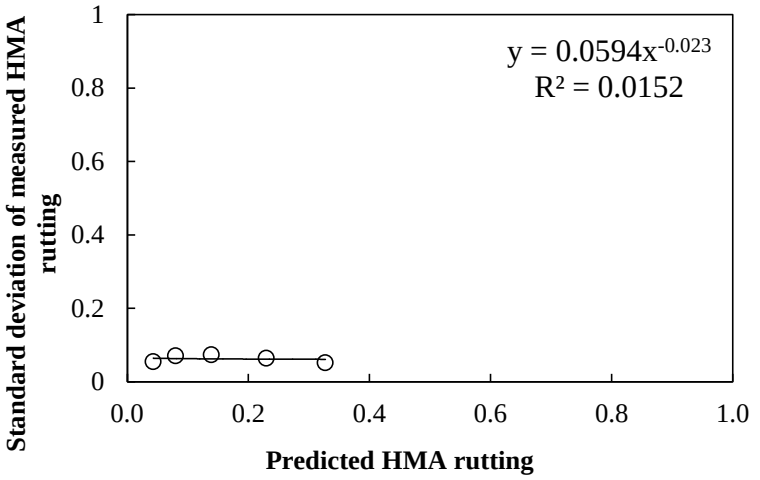


(a) Total rutting (b) HMA rutting

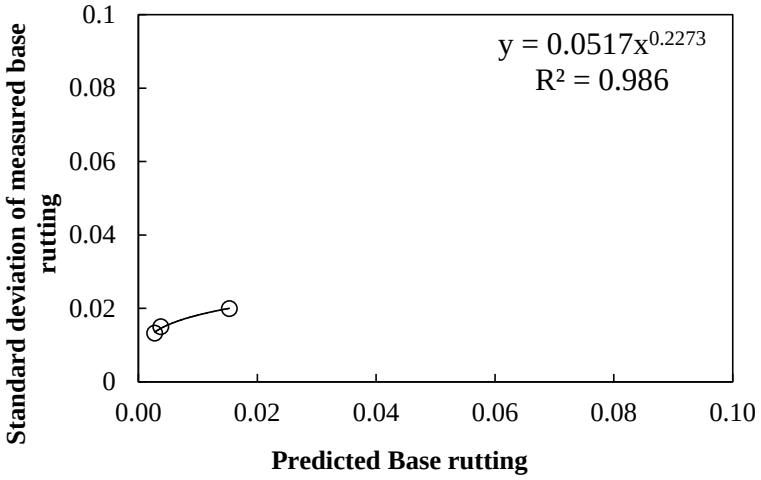
(c) Base rutting (d) Subgrade rutting

Figure B-157 Option 2: Method 1 – Rutting model validation residual plots – split sampling

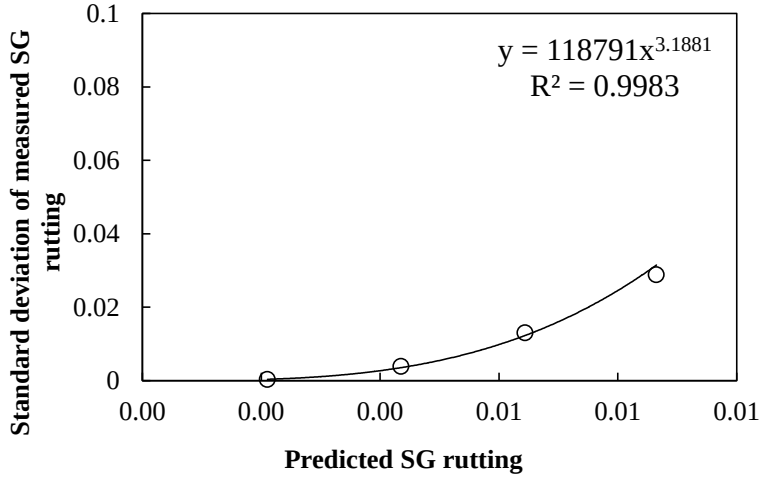
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-158 Rutting model reliability equations – option 2 method 1 – split sampling

Repeated split sampling

Table B-87 Option 2: Method 1 – Global model SEE and bias – repeated split sampling

Global Model	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0779	0.0726	0.0822	-0.0021	-0.0088	0.0046
Base rutting	0.1403	0.1297	0.1499	0.1158	0.1079	0.1243
Subgrade rutting	0.2237	0.2168	0.2303	0.2100	0.2027	0.2174
Total rutting	0.3572	0.3419	0.3713	0.3237	0.3096	0.3382

Table B-88 Option 2: Method 1 – Local model SEE and bias – repeated split sampling

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0773	0.0258	0.0205	0.0864
SEE Lower CI	0.0723	0.0206	0.0132	0.0800
SEE Upper CI	0.0816	0.0290	0.0242	0.0916
Average bias (in.)	-0.0097	-0.0051	-0.0006	-0.0153
Bias Lower CI	-0.0124	-0.0063	-0.0008	-0.0184
Bias Upper CI	-0.0063	-0.0037	-0.0003	-0.0117
Average calibration coefficient	0.9451	0.0982	0.0368	N/A
Calibration coefficient Lower CI	0.8935	0.0822	0.0286	N/A
Calibration coefficient Upper CI	1.0084	0.1159	0.0443	N/A

Table B-89 Option 2: Method 1 – Local model validation SEE and bias – repeated split sampling

Validation set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0783	0.0254	0.0192	0.0872
SEE Lower CI	0.0676	0.0168	0.0082	0.0741
SEE Upper CI	0.0895	0.0352	0.0316	0.1007
Average bias (in.)	-0.0090	-0.0048	-0.0004	-0.0143
Bias Lower CI	-0.0301	-0.0123	-0.0065	-0.0367
Bias Upper CI	0.0135	0.0019	0.0049	0.0109
Average calibration coefficient	0.9451	0.0982	0.0368	N/A
Calibration coefficient Lower CI	0.8935	0.0822	0.0286	N/A
Calibration coefficient Upper CI	1.0084	0.1159	0.0443	N/A

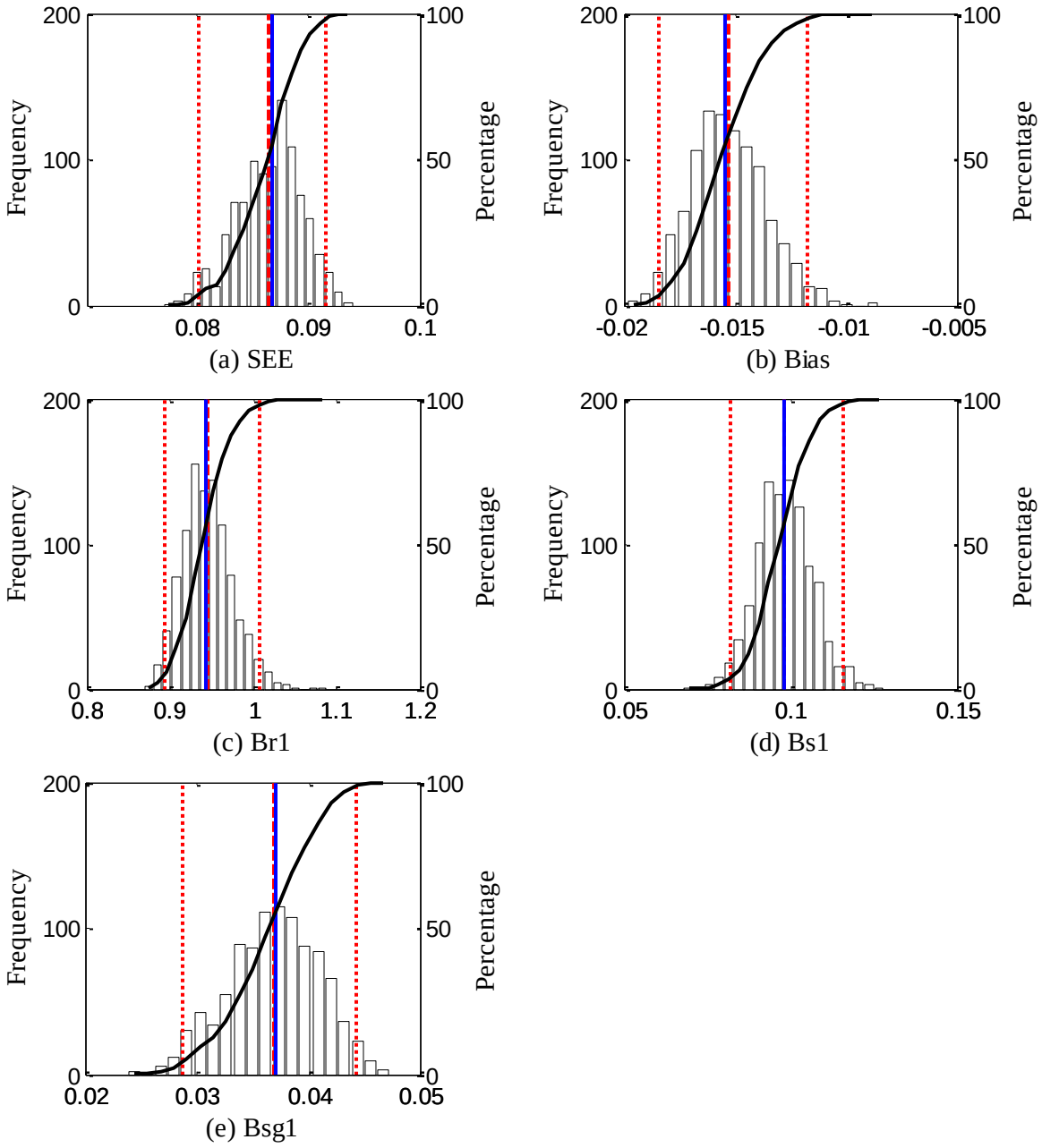


Figure B-159 Option 2: Method 1 – repeated split sampling total rutting frequency distributions – calibration

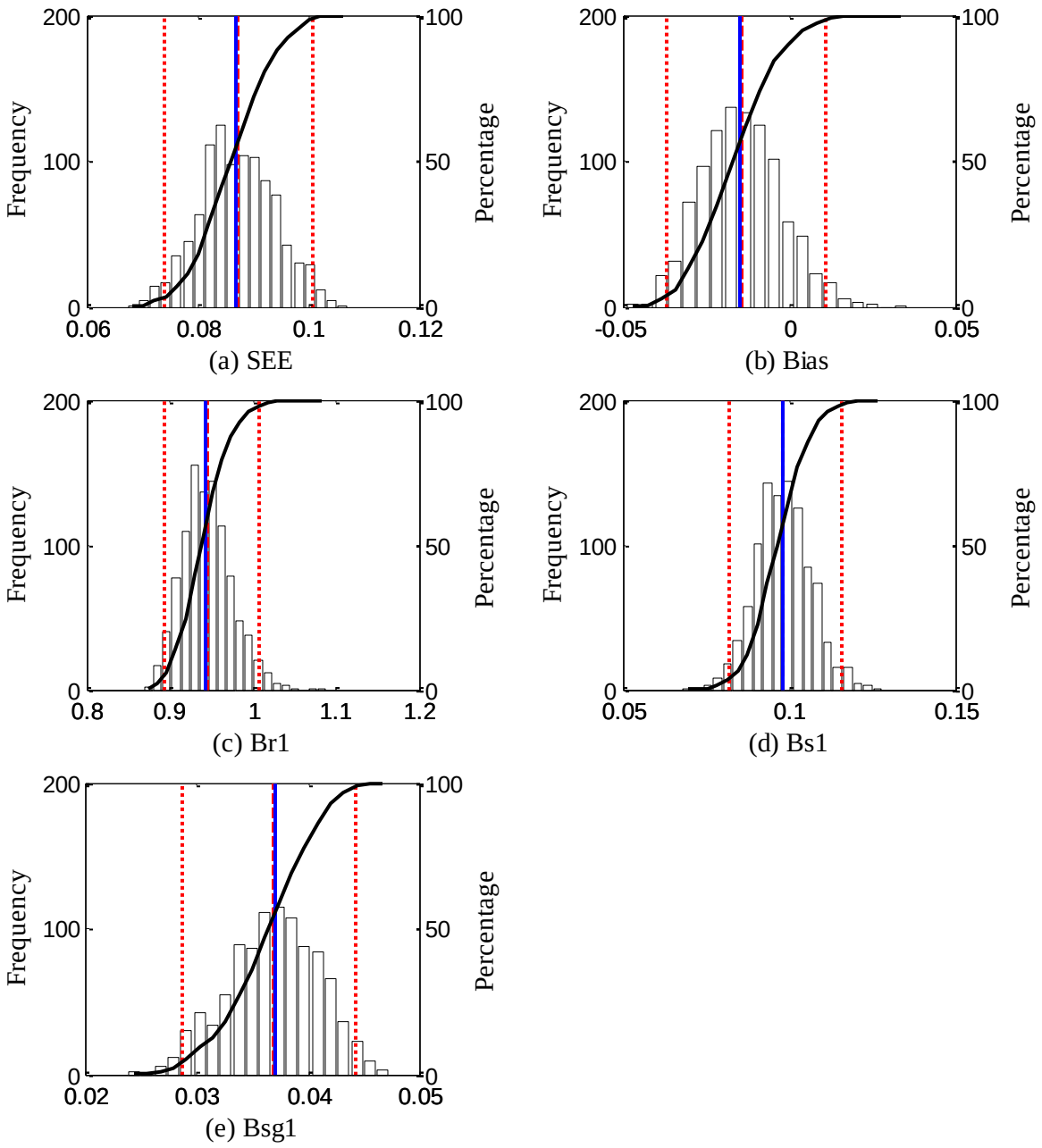
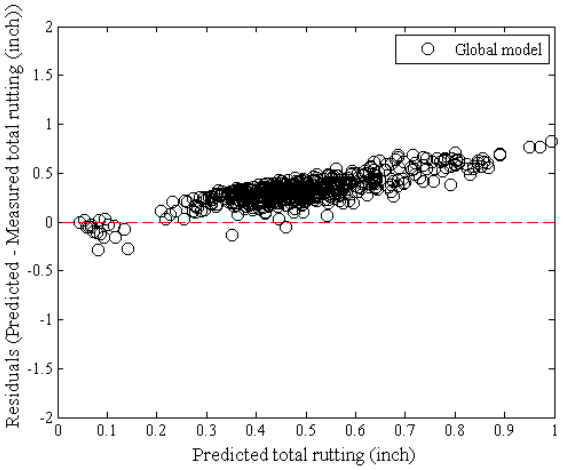
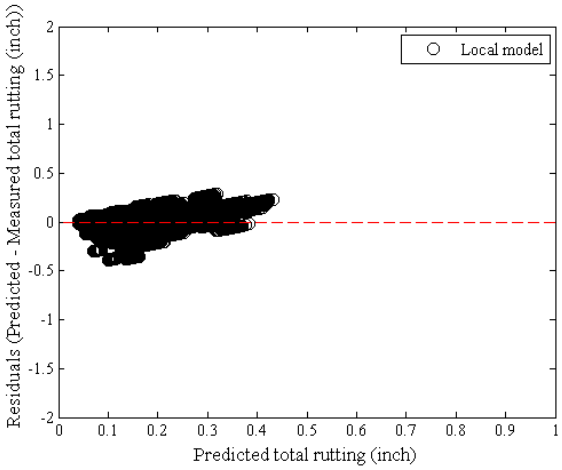


Figure B-160 Option 2: Method 1 – repeated split sampling total rutting frequency distributions – validation

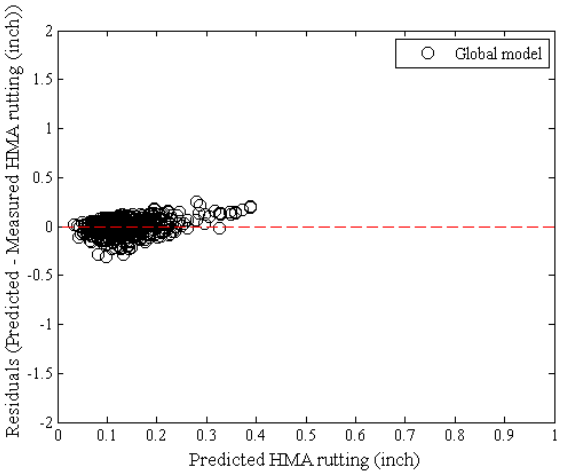


(a) Global model

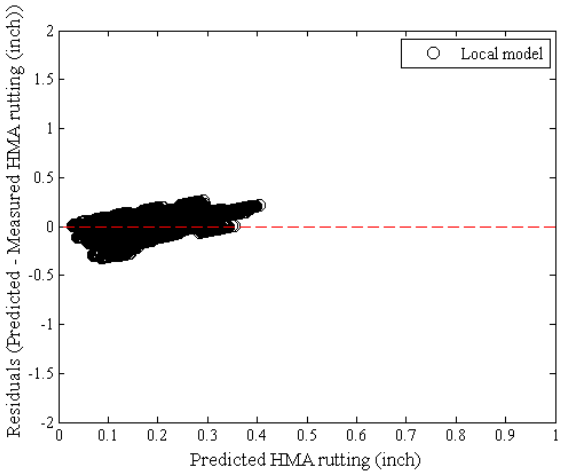


(b) Local model

Figure B-161 Option 2 Method 1 Total rutting residual plots - repeated split sampling

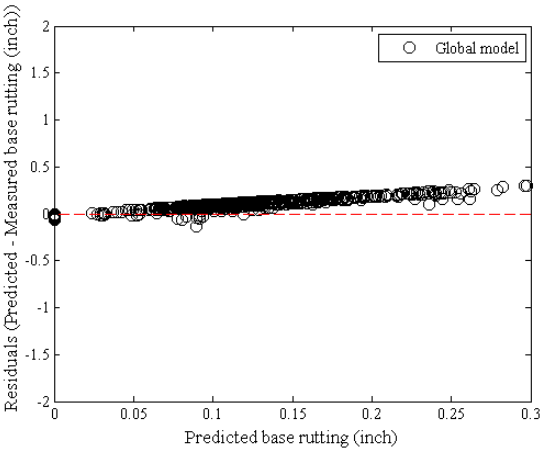


(a) Global model

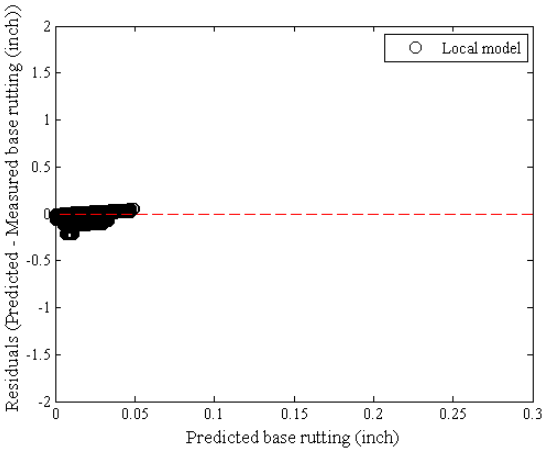


(b) Local model

Figure B-162 Option 2: Method 1 HMA rutting residual plots - repeated split sampling

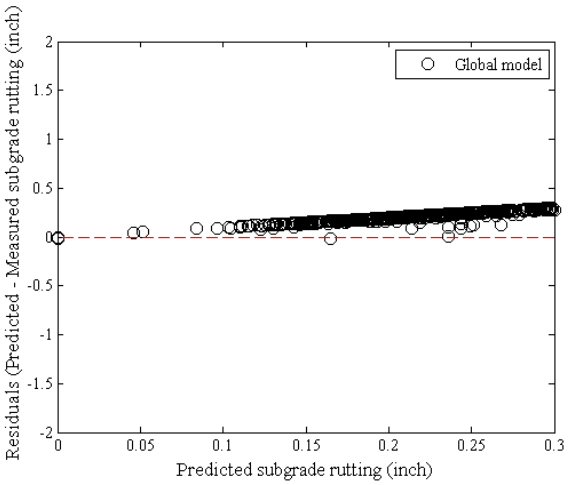


(a) Global model

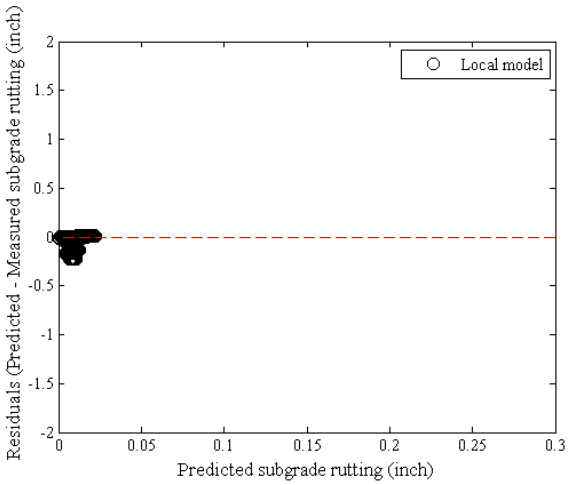


(b) Local model

Figure B-163 Option 2: Method 1 Base rutting residual plots - repeated split sampling

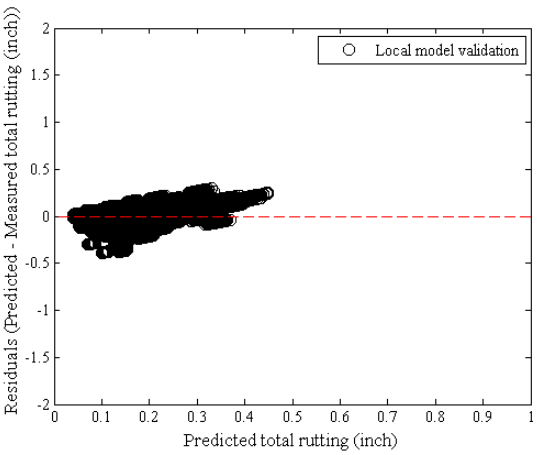


(a) Global model

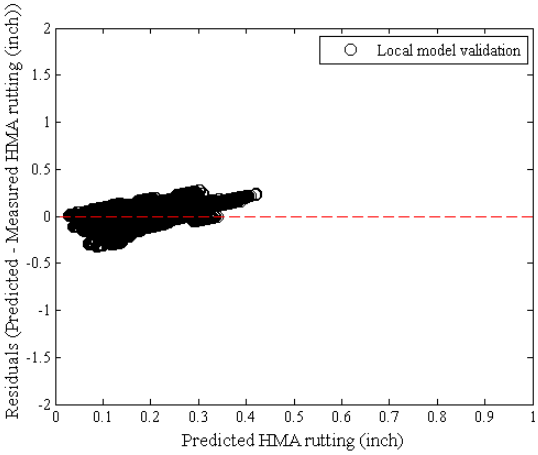


(b) Local model

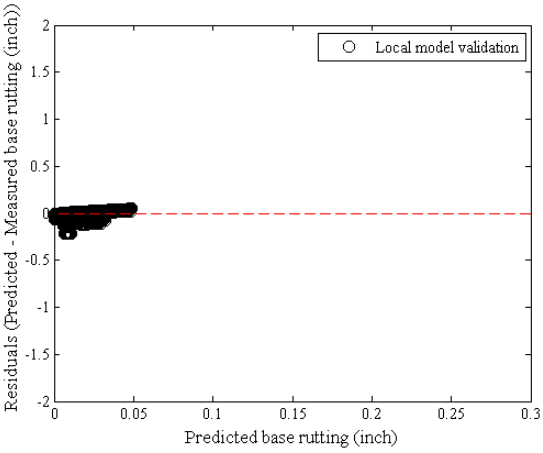
Figure B-164 Option 2 Method 1 Subgrade rutting residual plots - repeated split sampling



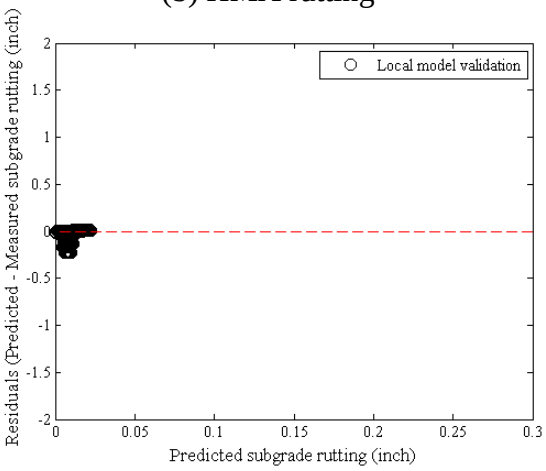
(a) Total rutting



(b) HMA rutting



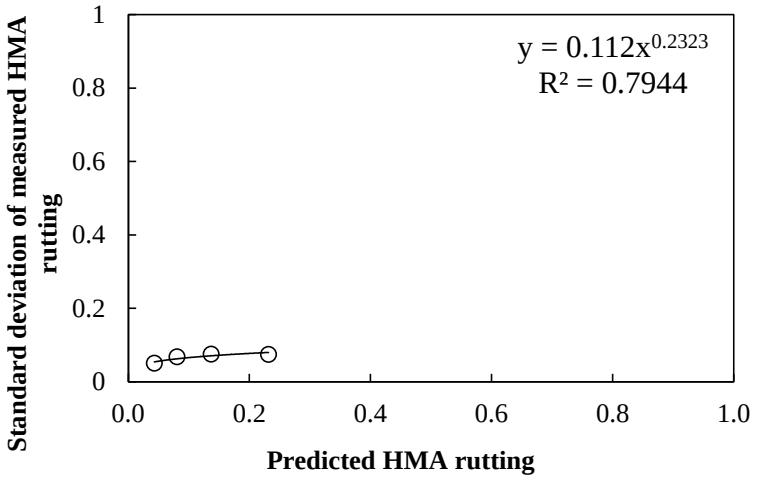
(c) Base rutting



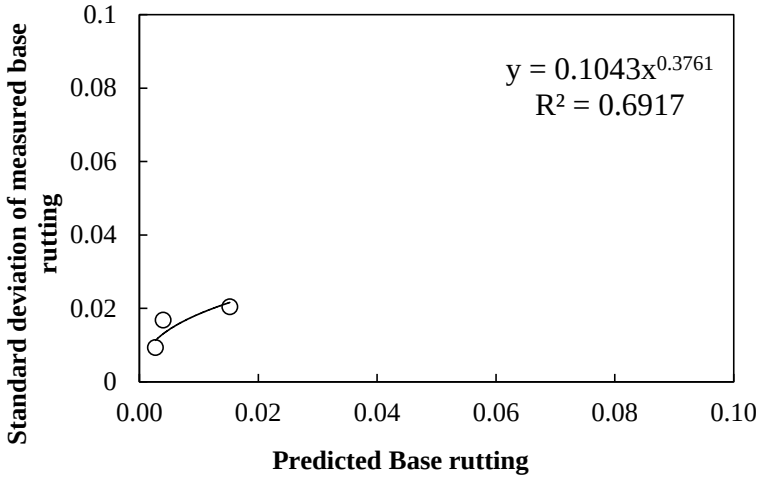
(d) Subgrade rutting

Figure B-165 Option 2: Method 1 – Rutting model validation residual plots – repeated split sampling

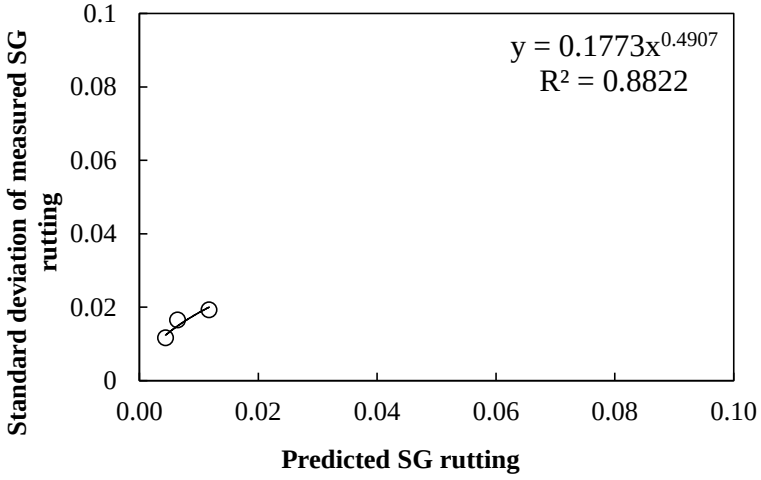
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-166 Rutting model reliability equations – option 2 method 1 – repeated split sampling

Bootstrapping

Table B-90 Option 2: Method 1 – Global model SEE and bias – bootstrapping

Calibration set	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0779	0.0708	0.0855	-0.0020	-0.0113	0.0082
Base rutting	0.1402	0.1253	0.1563	0.1160	0.1027	0.1294
Subgrade rutting	0.2236	0.2127	0.2349	0.2101	0.1981	0.2221
Total rutting	0.3572	0.3338	0.3815	0.3241	0.3010	0.3466

Table B-91 Option 2: Method 1 – Local model SEE and bias – bootstrapping

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0772	0.0256	0.0200	0.0862
SEE Lower CI	0.0703	0.0198	0.0107	0.0774
SEE Upper CI	0.0845	0.0319	0.0287	0.0952
Average bias (in.)	-0.0096	-0.0050	-0.0005	-0.0152
Bias Lower CI	-0.0144	-0.0068	-0.0010	-0.0200
Bias Upper CI	-0.0054	-0.0032	-0.0002	-0.0106
Average calibration coefficient	0.9453	0.0985	0.0367	N/A
Calibration coefficient Lower CI	0.8655	0.0746	0.0252	N/A
Calibration coefficient Upper CI	1.0262	0.1257	0.0506	N/A

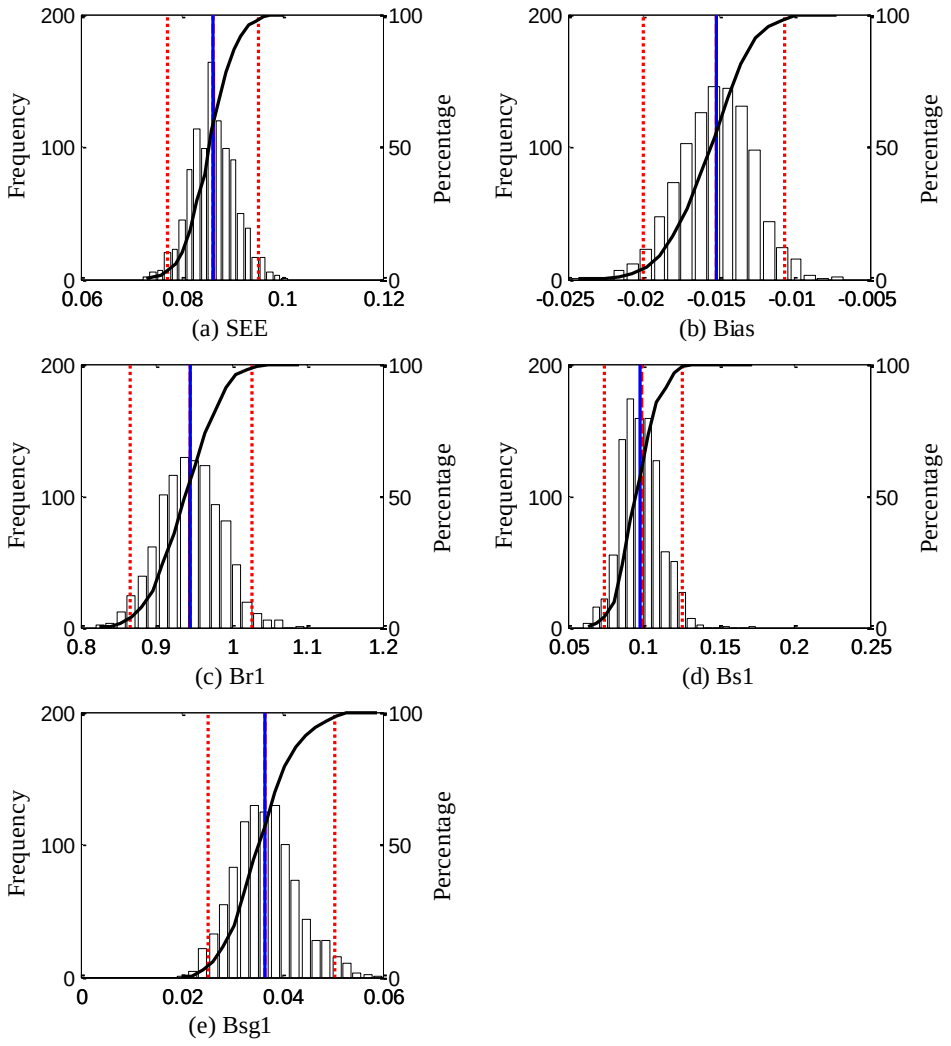
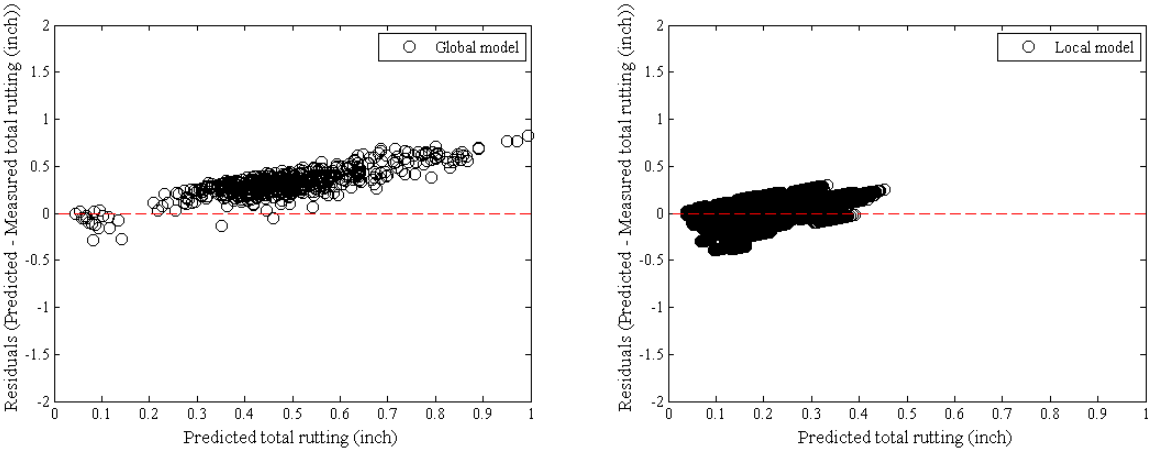
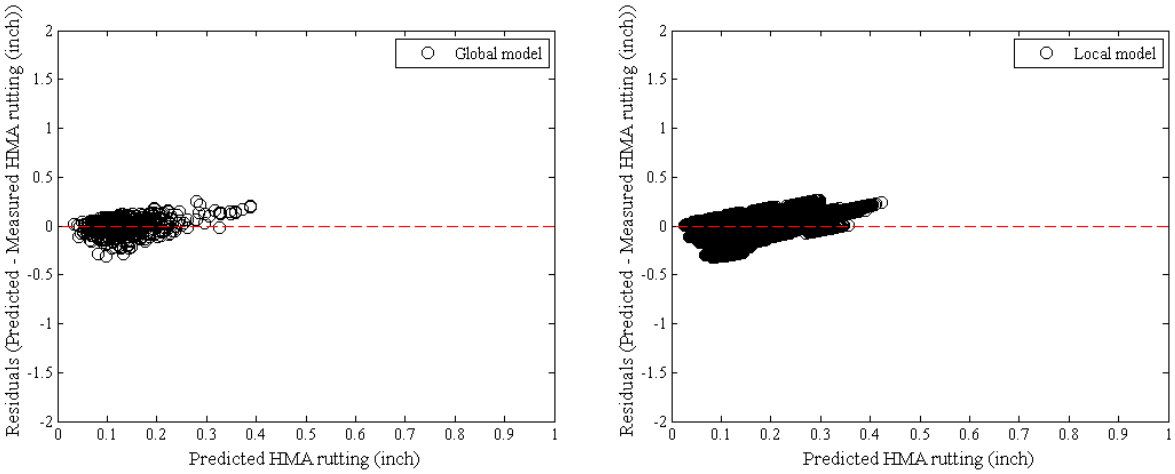


Figure B-167 Option 2: Method 1 – bootstrapping total rutting frequency distributions –calibration



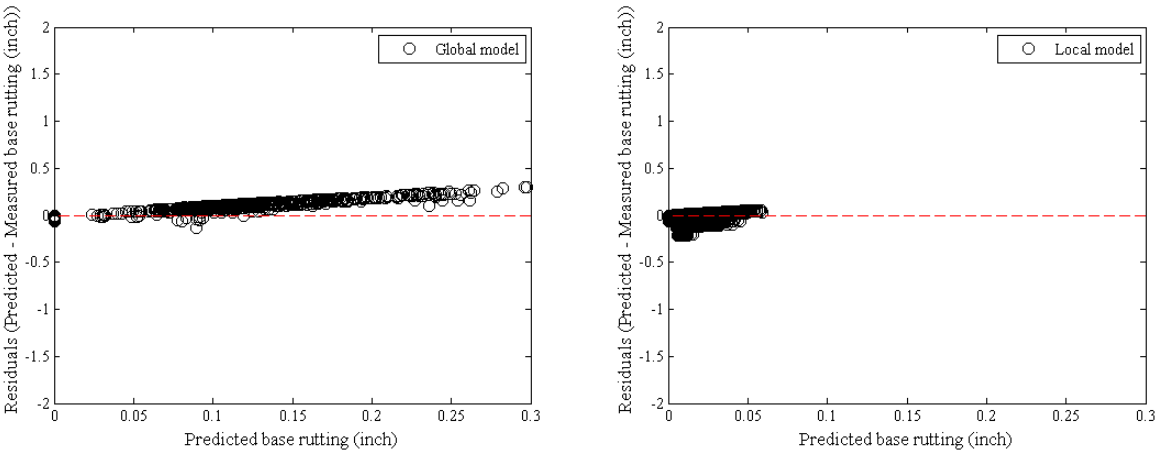
(a) Global model (b) Local model

Figure B-168 Option 2 Method 1 Total rutting residual plots - bootstrapping



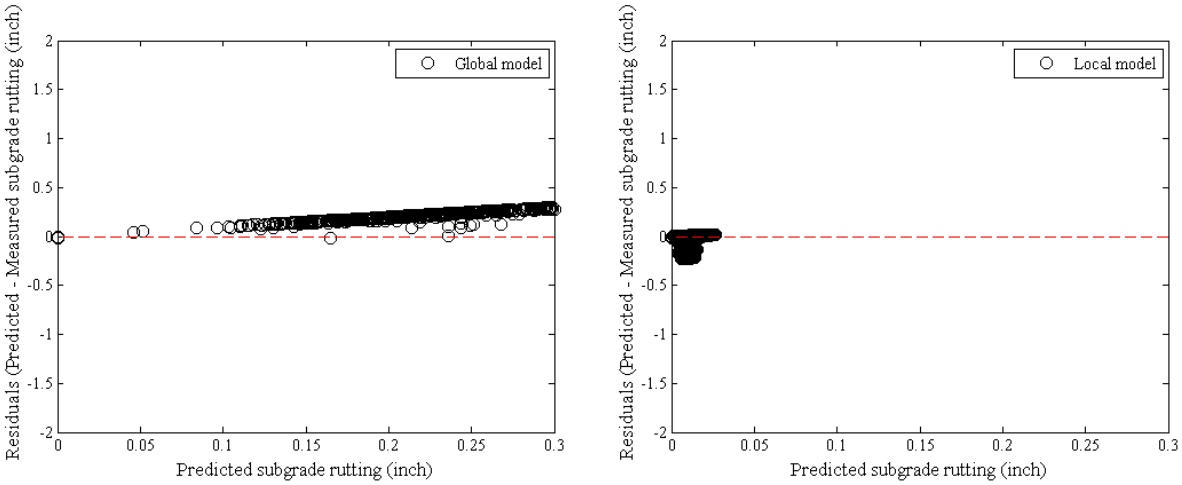
(a) Global model (b) Local model

Figure B-169 Option 2: Method 1 HMA rutting residual plots - bootstrapping



(a) Global model (b) Local model

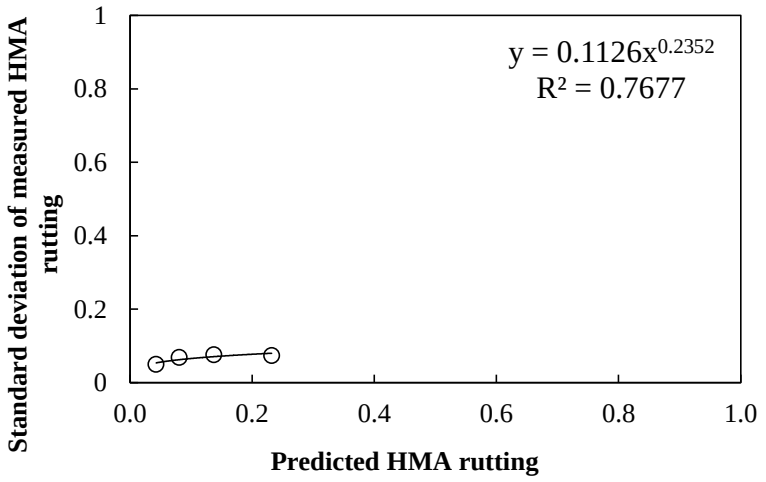
Figure B-170 Option 2: Method 1 Base rutting residual plots - bootstrapping



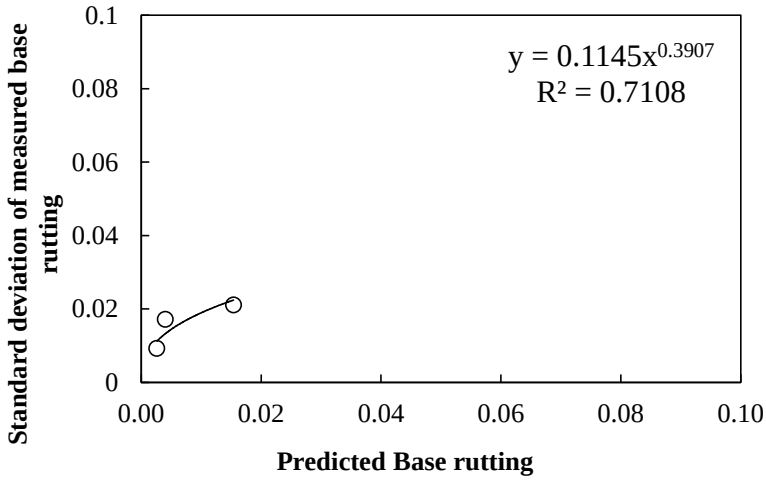
(a) Global model (b) Local model

Figure B-171 Option 2 Method 1 Subgrade rutting residual plots - bootstrapping

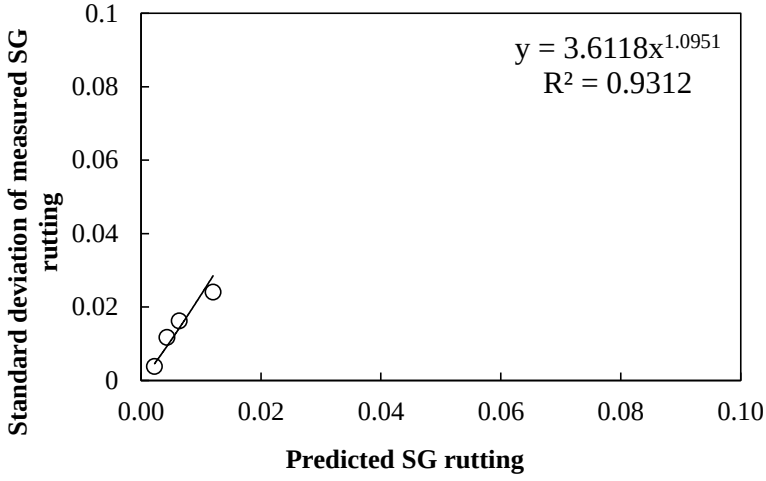
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-172 Rutting model reliability equations – option 2 method 1 – bootstrapping

B.1.3.4 Option 2 – Method 2

No sampling

Table B-92 Option 2: Method 2 – Global model goodness of fit – no sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0779	-0.0019
Base rut	0.1405	0.1160
Subgrade	0.2235	0.2100
Total rut	0.3574	0.3241

Table B-93 Option 2: Method 2 – Global model *p*-values

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.5505	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0000	0.0000	0.0000

Table B-94 Option 2: Method 2 – Local model goodness of fit– no sampling

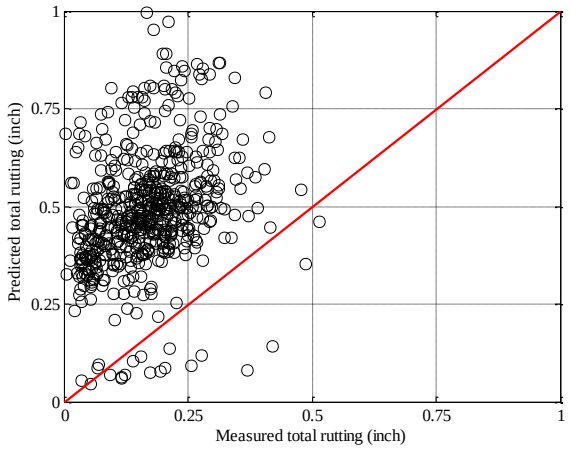
HMA layer	SEE	Bias
AC rut	0.0906	-0.0533
Base rut	0.0279	-0.0144
Subgrade	0.0695	0.0623
Total rut	0.0830	-0.0055

Table B-95 Option 2: Method 2 – Local model *p*-values– no sampling

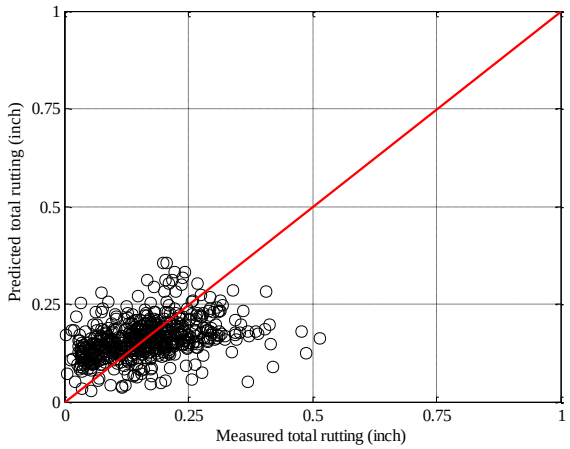
HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0000	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.1103	0.0000	0.0000

Table B-96 Option 2: Method 2 – Local model *p*-values– no sampling

Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.6251
Base rutting (bs1)	1.0000	0.0276
Subgrade rutting (bsg1)	1.0000	0.3241

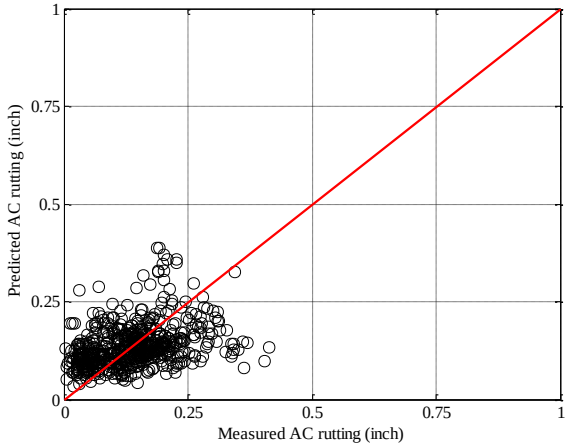


(a) Global model

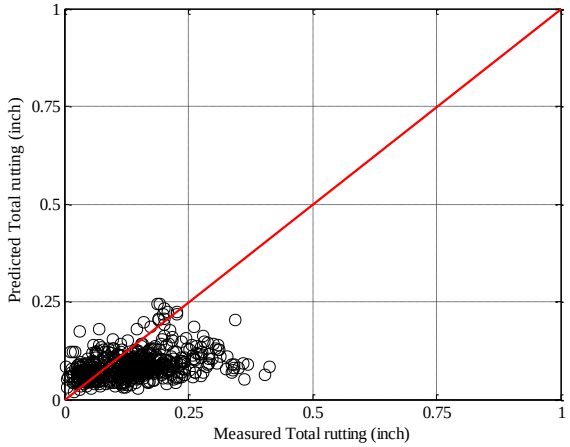


(b) Local model

Figure B-173 Option 2: Method 2 – Total rutting local calibration results - no sampling

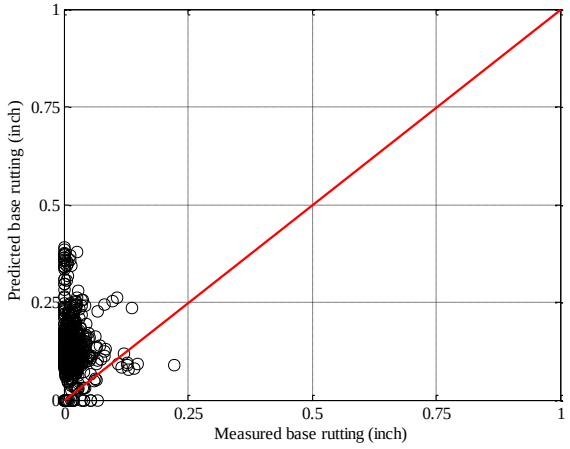


(a) Global model

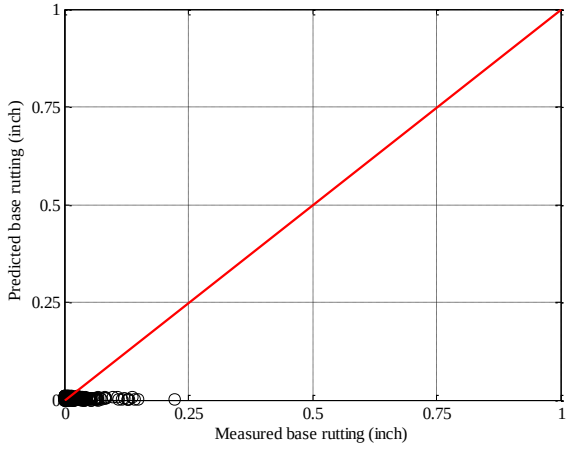


(b) Local model

Figure B-174 Option 2: Method 2 – HMA rutting local calibration results - no sampling

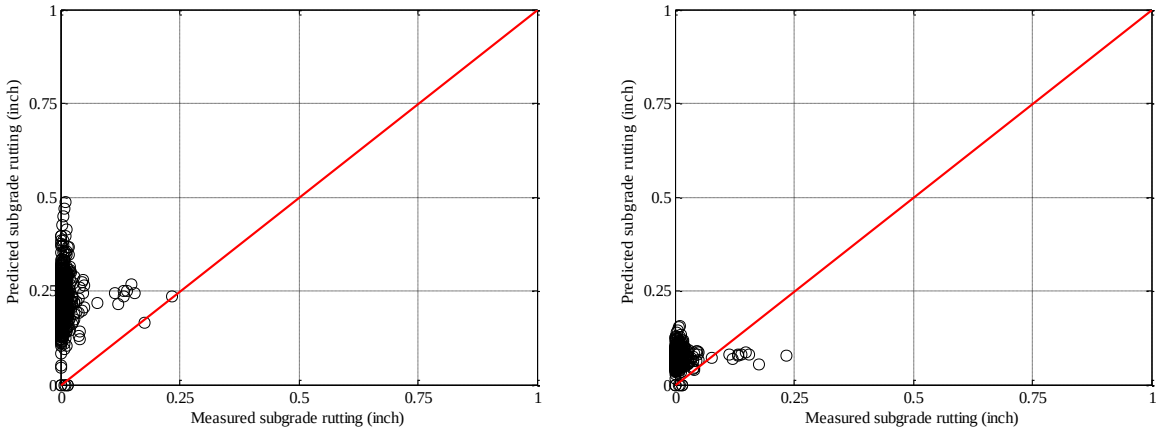


(a) Global model



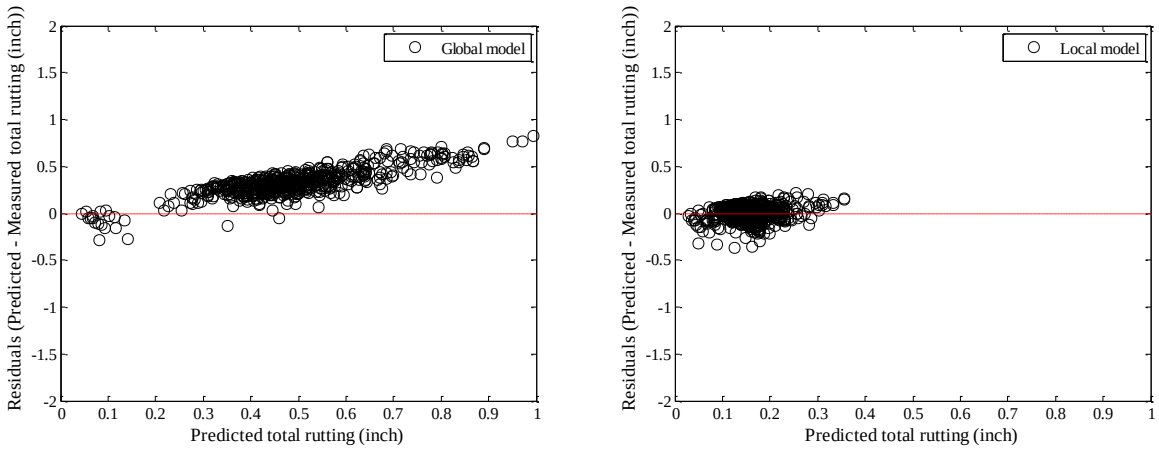
(b) Local model

Figure B-175 Option 2: Method 2 – Base rutting local calibration results - no sampling



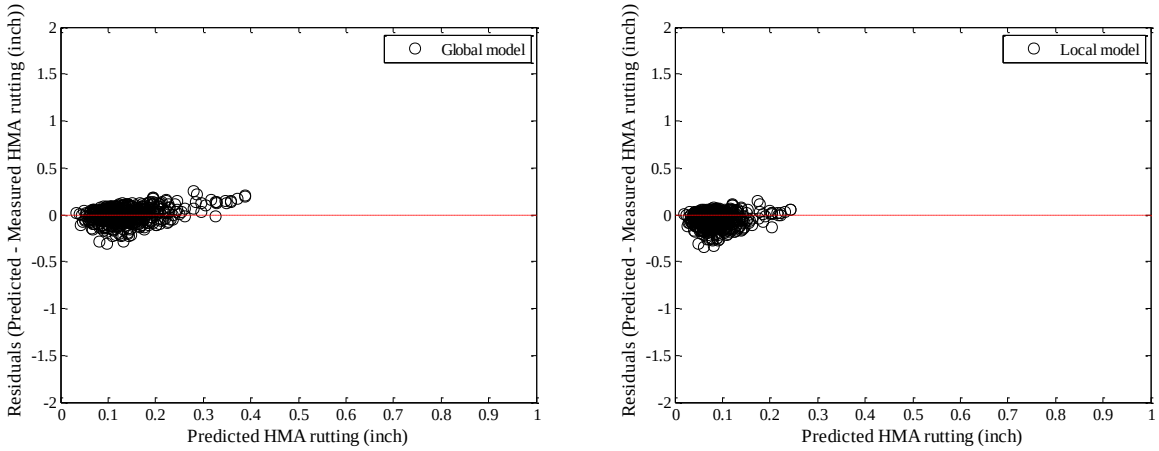
(a) Global model (b) Local model

Figure B-176 Option 2: Method 2 – Subgrade rutting local calibration results - no sampling



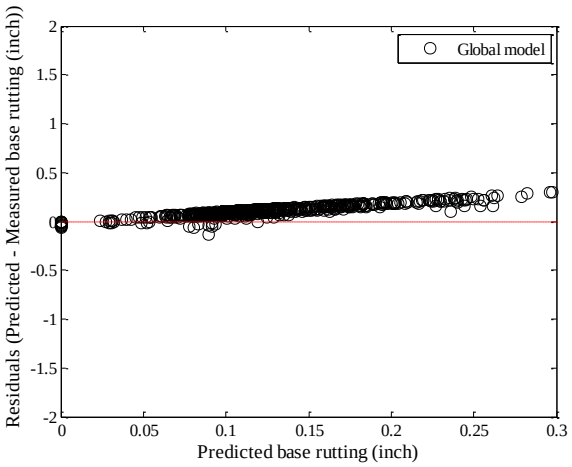
(a) Global model (b) Local model

Figure B-177 Option 2: Method 2 – Total rutting residual plots - no sampling

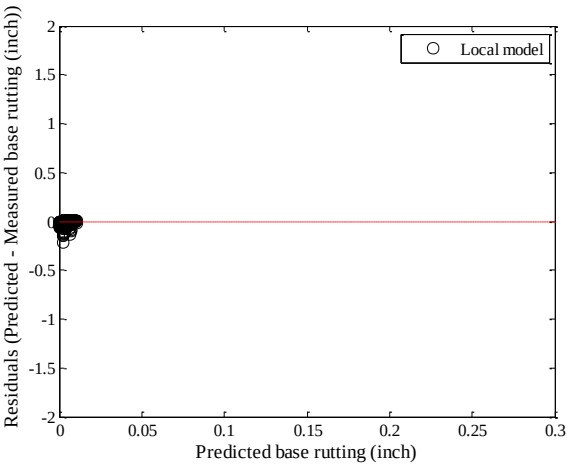


(a) Global model (b) Local model

Figure B-178 Option 2: Method 2 – HMA rutting residual plots - no sampling

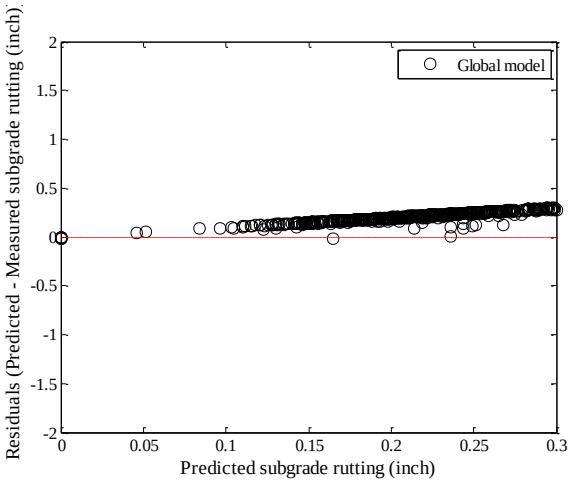


(a) Global model

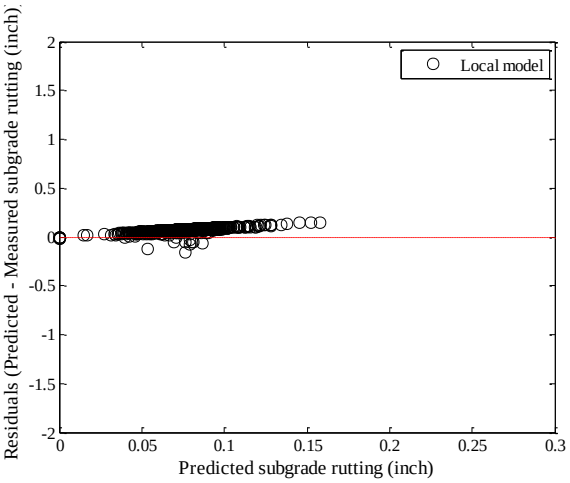


(b) Local model

Figure B-179 Option 2: Method 2 – Base rutting residual plots - no sampling



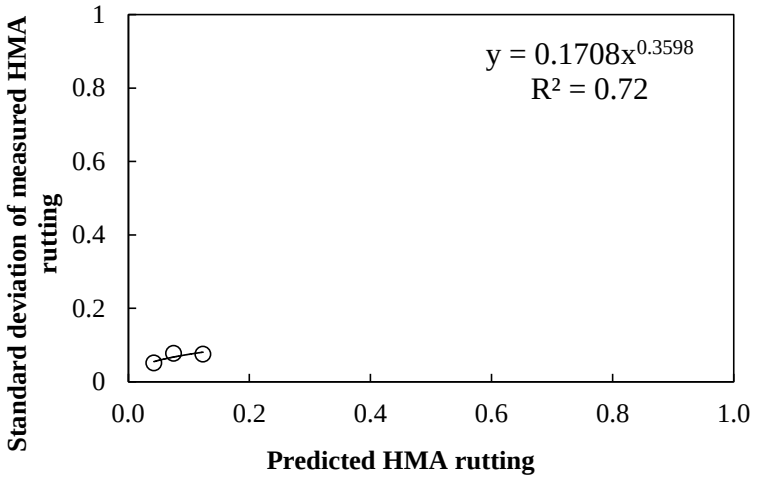
(a) Global model



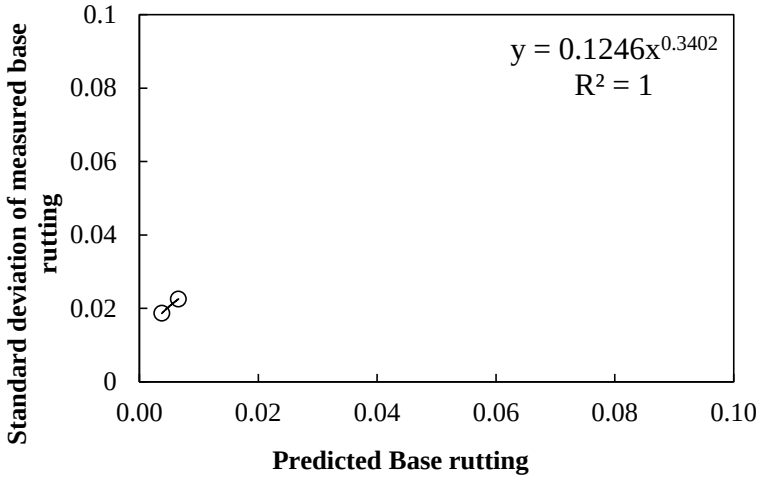
(b) Local model

Figure B-180 Option 2: Method 2 – Subgrade rutting residual plots - no sampling

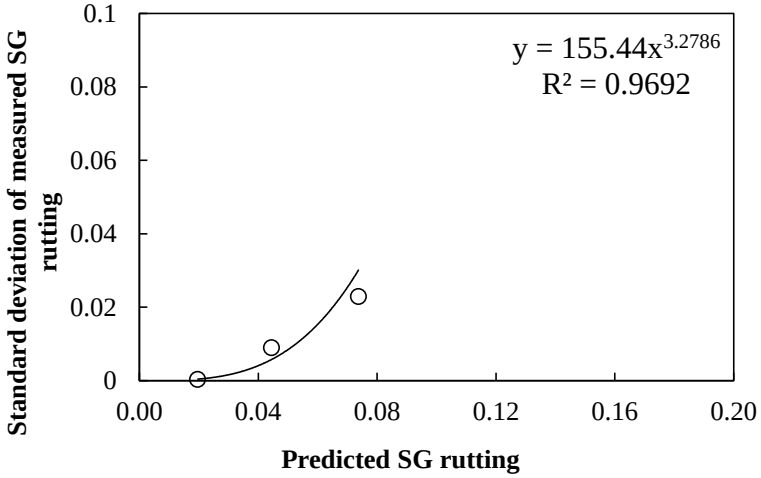
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-181 Rutting model reliability equations – option 2 method 2 – no sampling

Split sampling

Table B-97 Option 2: Method 2 – Global model goodness of fit – split sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0786	0.0028
Base rut	0.1335	0.1111
Subgrade	0.2271	0.2146
Total rut	0.3573	0.3285

Table B-98 Option 2: Method 2 – Global model *p*-values - split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.4768	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0000	0.0000	0.0000

Table B-99 Option 2: Method 2 – Local model goodness of fit– split sampling

HMA layer	SEE	Bias
AC rut	0.0971	-0.0646
Base rut	0.0256	-0.0063
Subgrade	0.0728	0.0666
Total rut	0.0813	-0.0042

Table B-100 Option 2: Method 2 – Local model *p*-values– split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0000	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.2936	0.0000	0.0000

Table B-101 Option 2: Method 2 – Local model *p*-values – split sampling

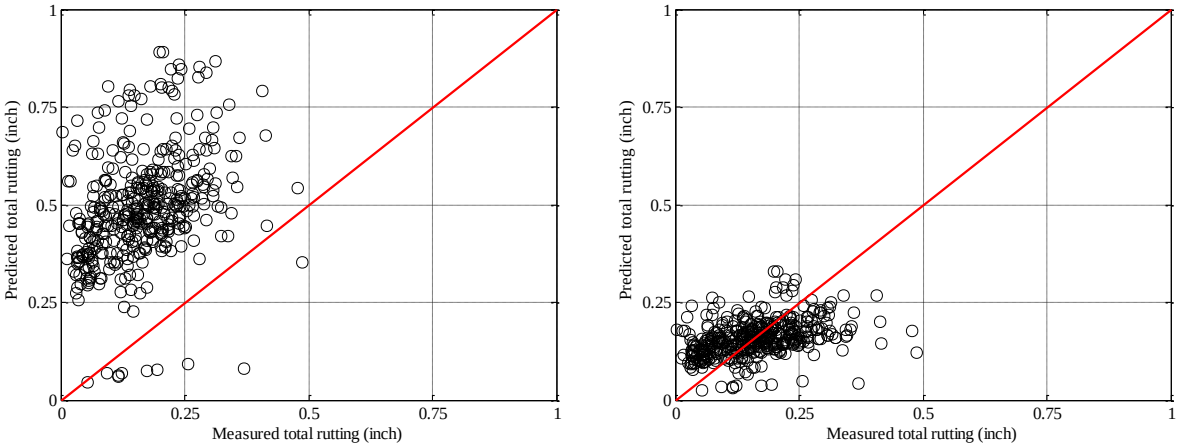
Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.5100
Base rutting (bs1)	1.0000	0.1006
Subgrade rutting (bsg1)	1.0000	0.3367

Table B-102 Option 2: Method 2 – Local model validation p-values – split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0000	0.0000	0.0000
Base rut	0.7072	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0036	0.0000	0.0000

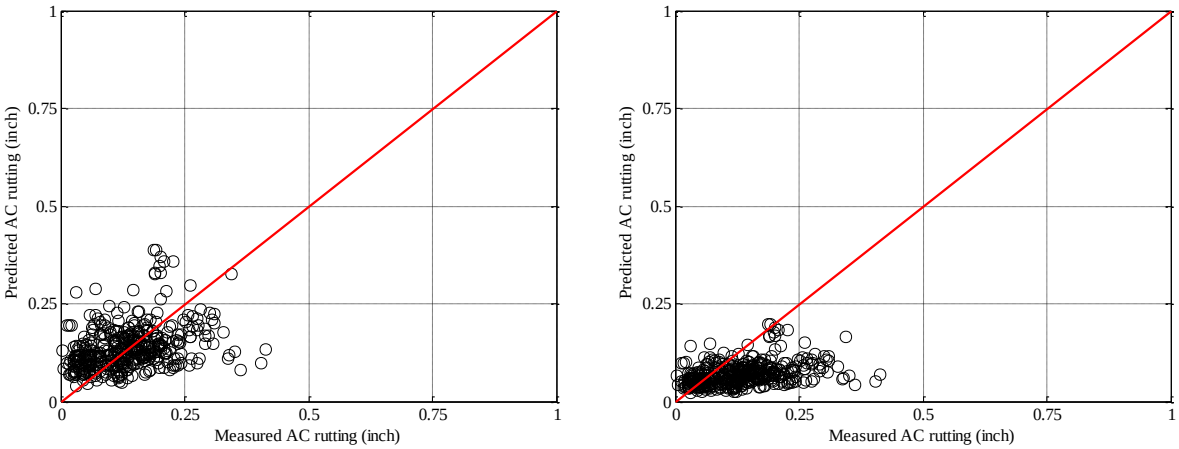
Table B-103 Option 2: Method 2 – Local model validation SEE and bias – split sampling

HMA layer	SEE	Bias
AC rut	0.1086	-0.0798
Base rut	0.0264	-0.0008
Subgrade	0.0716	0.0612
Total rut	0.0886	-0.0194



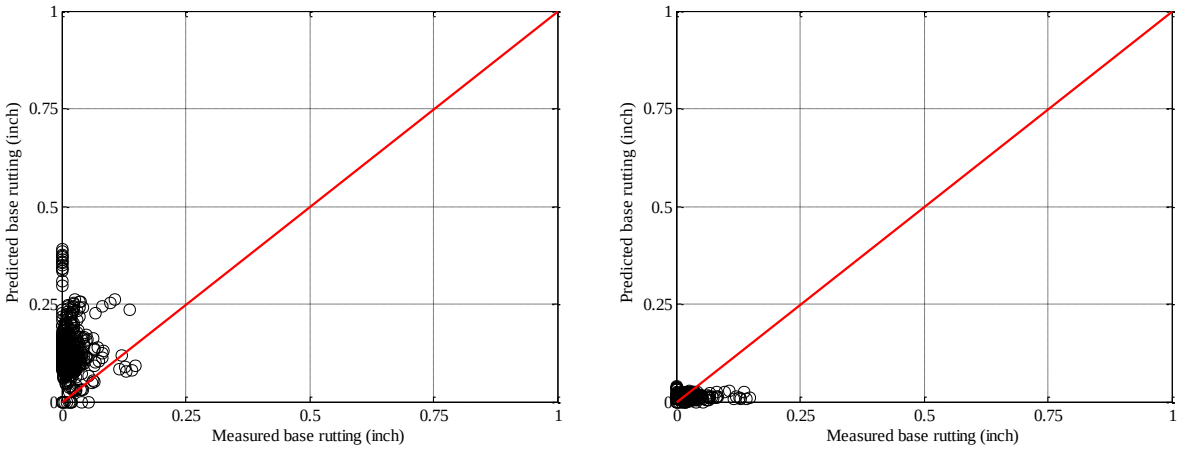
(a) Global model (b) Local model

Figure B-182 Option 2: Method 2 – Total rutting local calibration results - split sampling



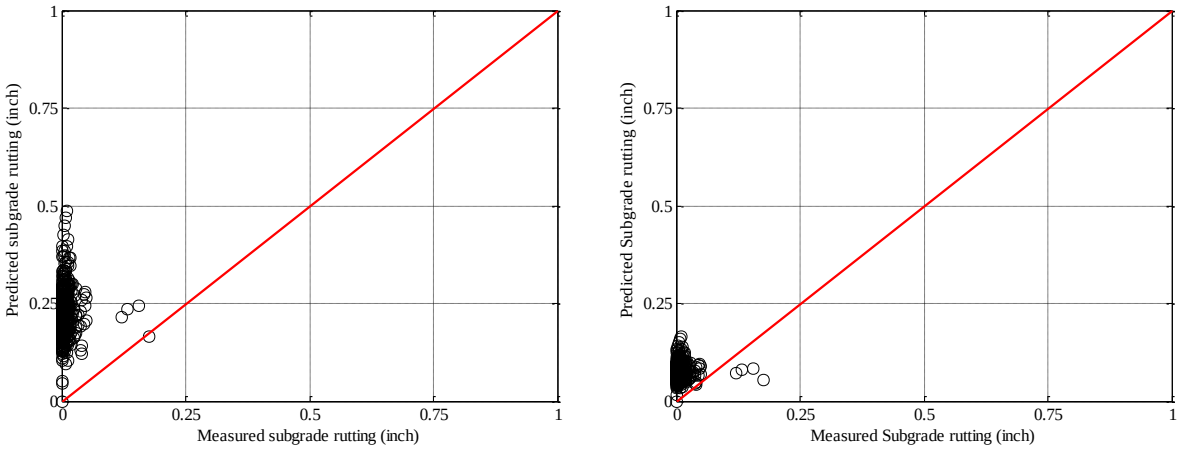
(a) Global model (b) Local model

Figure B-183 Option 2: Method 2 – HMA rutting local calibration results - split sampling



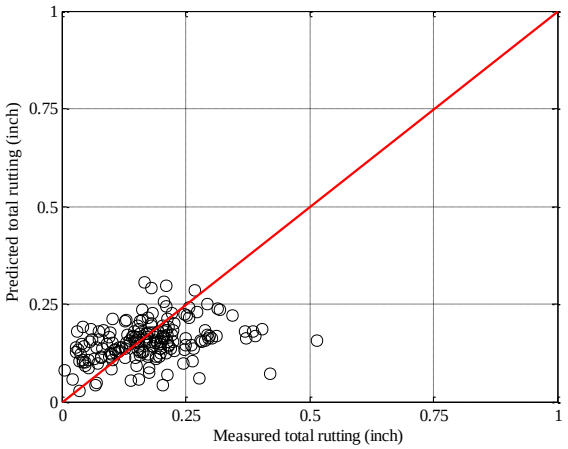
(a) Global model (b) Local model

Figure B-184 Option 2: Method 2 – Base rutting local calibration results - split sampling

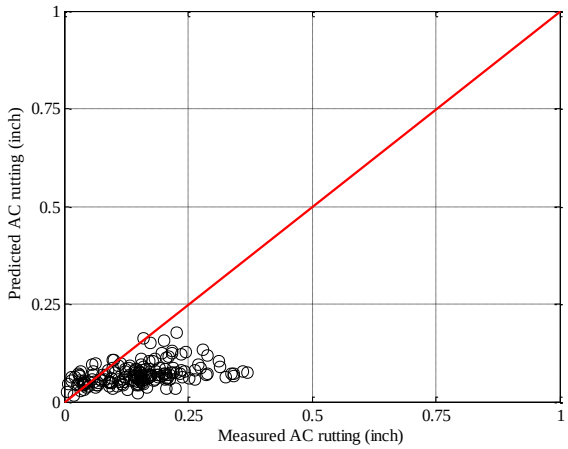


(a) Global model (b) Local model

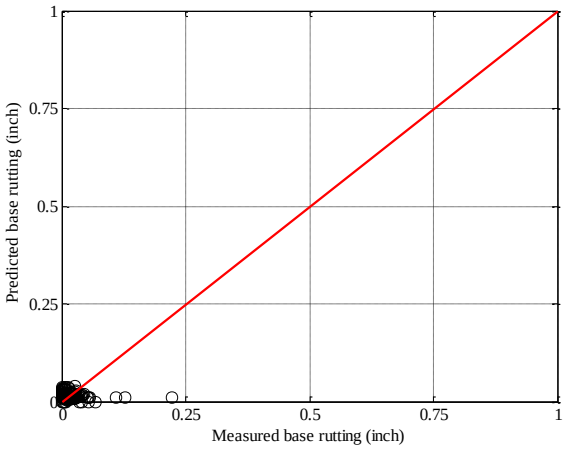
Figure B-185 Option 2: Method 2 – Subgrade rutting local calibration results - split sampling



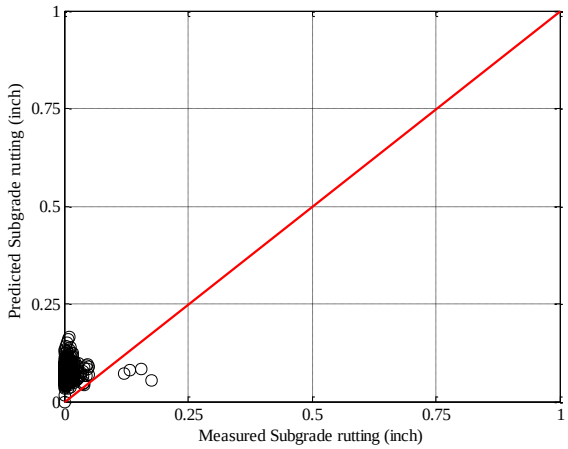
(a) Total rutting



(b) HMA rutting

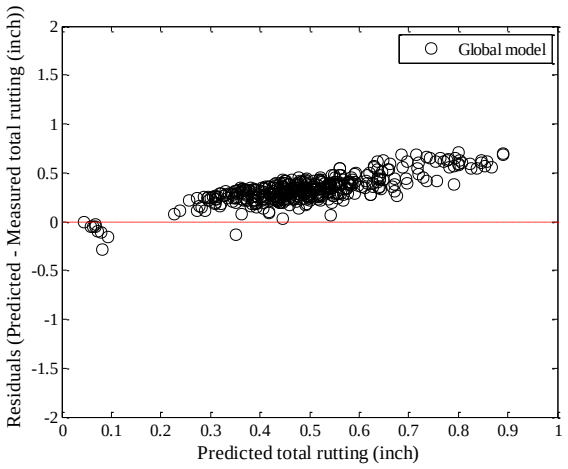


(c) Base rutting

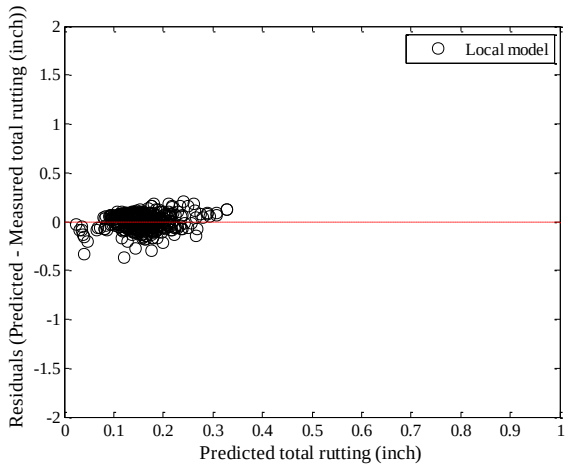


(d) Subgrade rutting

Figure B-186 Option 2: Method 2 – Rutting model validation – split sampling

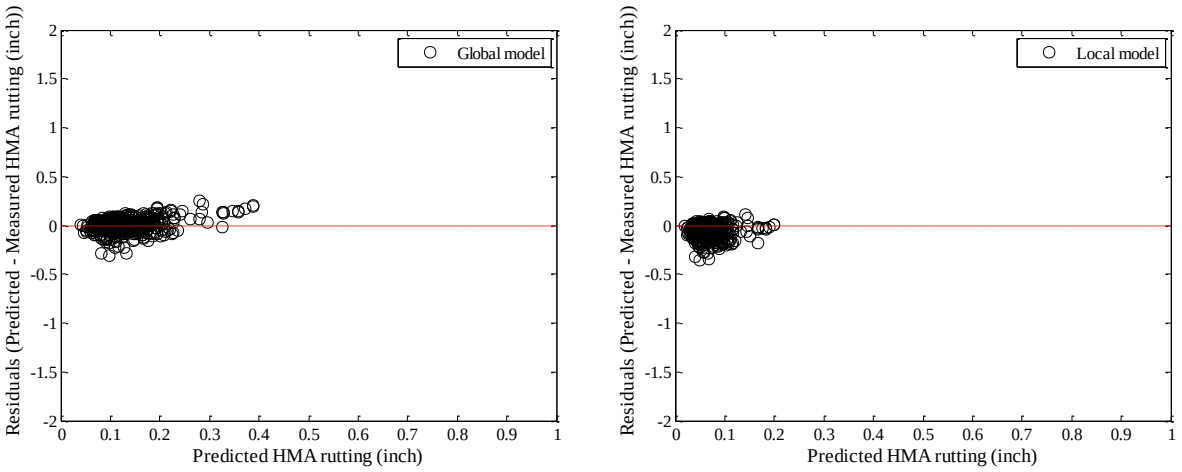


(a) Global model



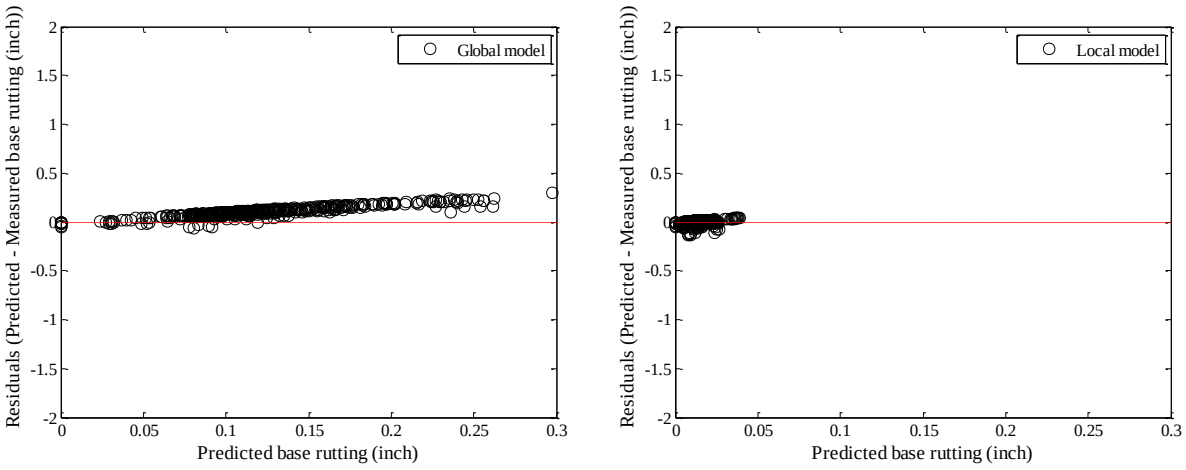
(b) Local model

Figure B-187 Option 2: Method 2 – Total rutting residual plots - split sampling



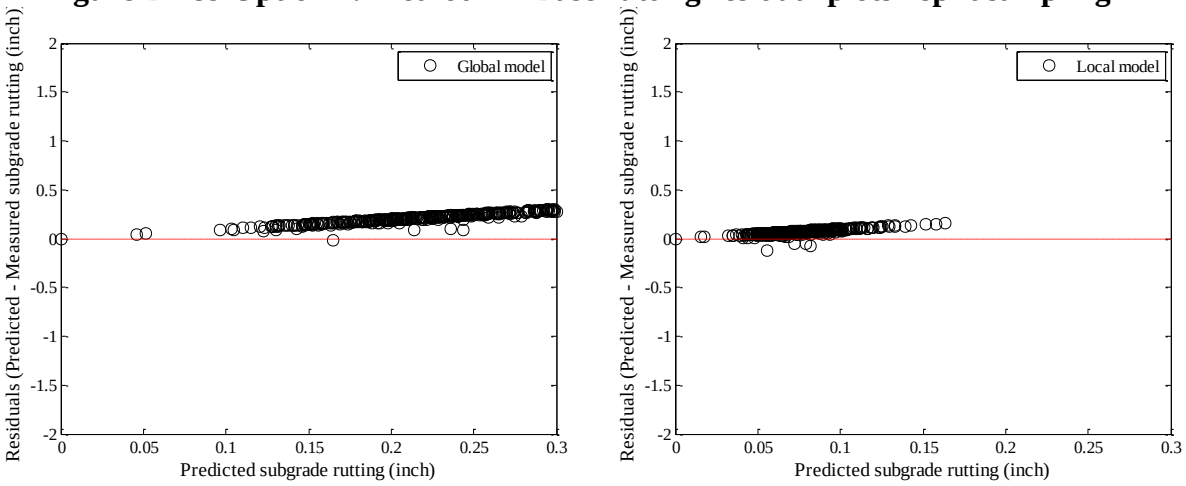
(a) Global model (b) Local model

Figure B-188 Option 2: Method 2 – HMA rutting residual plots - split sampling



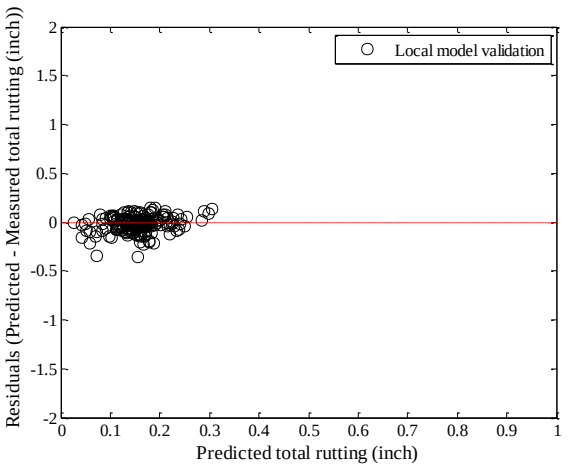
(a) Global model (b) Local model

Figure B-189 Option 2: Method 2 – Base rutting residual plots - split sampling

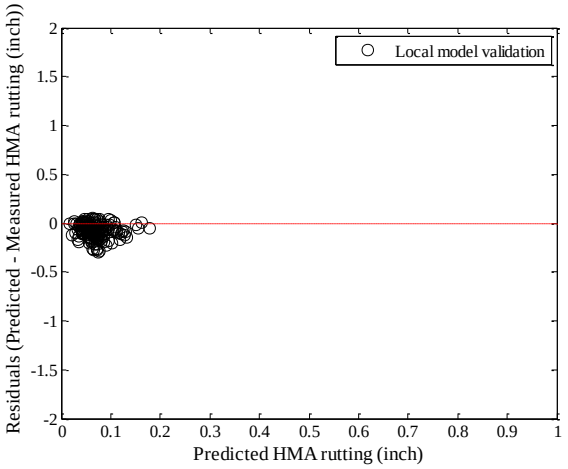


(a) Global model (b) Local model

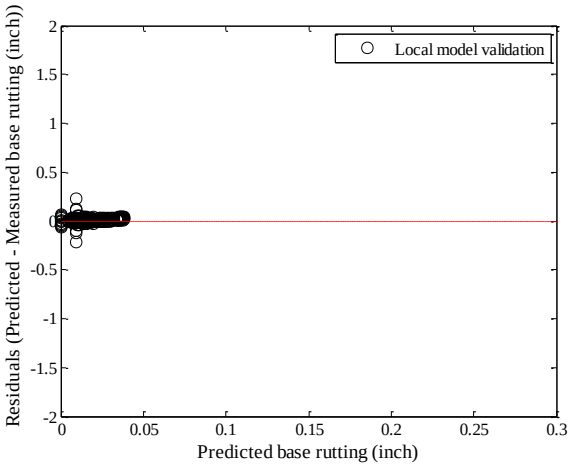
Figure B-190 Option 2: Method 2 – Subgrade rutting residual plots - split sampling



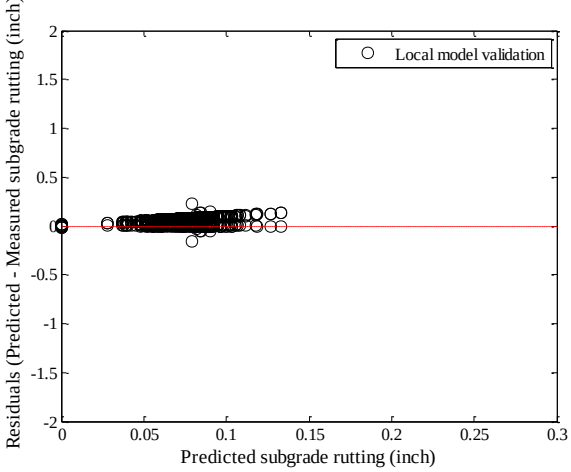
(a) Total rutting



(b) HMA rutting



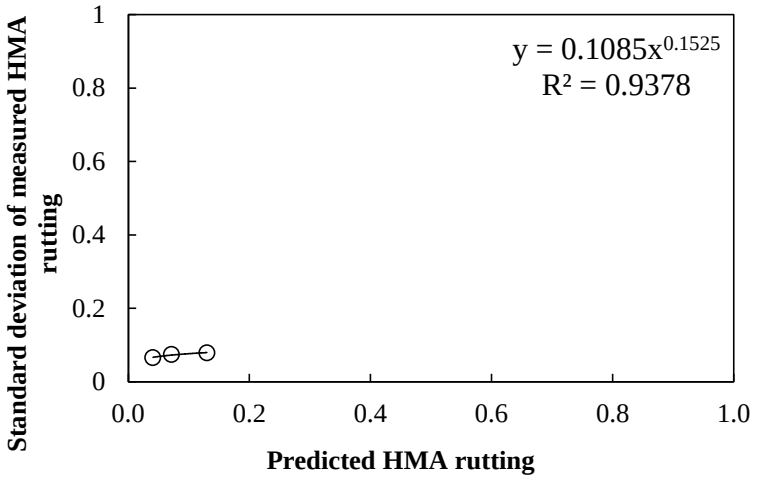
(c) Base rutting



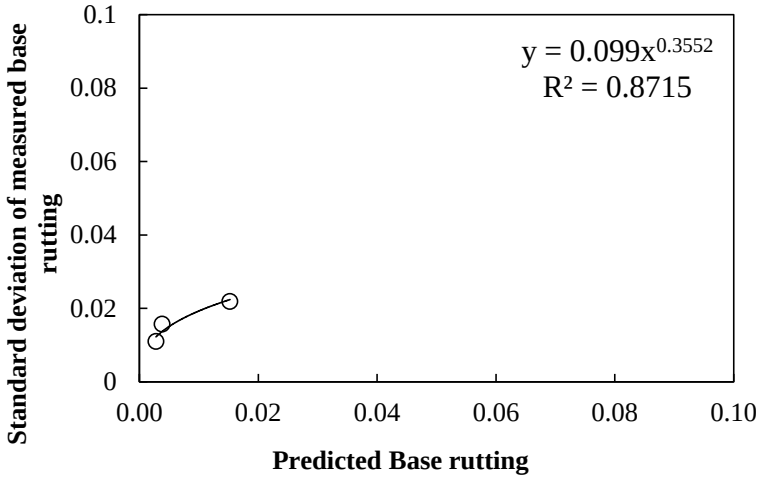
(d) Subgrade rutting

Figure B-191 Option 2: Method 2 – Rutting model validation residual plots – split sampling

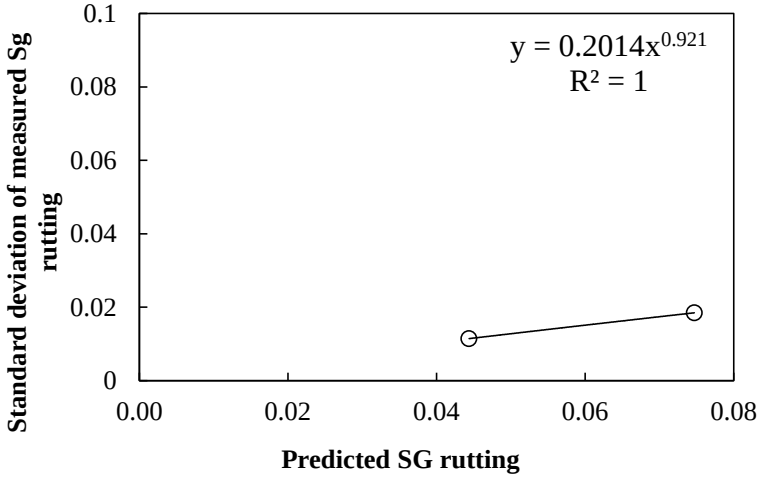
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-192 Rutting model reliability equations – option 2 method 2 – split sampling

Repeated split sampling

Table B-104 Option 2: Method 2 – Global model SEE and bias – repeated split sampling

Global Model	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0781	0.0731	0.0825	-0.0018	-0.0083	0.0048
Base rutting	0.1405	0.1293	0.1498	0.1161	0.1072	0.1242
Subgrade rutting	0.2237	0.2162	0.2307	0.2100	0.2026	0.2178
Total rutting	0.3578	0.3420	0.3726	0.3243	0.3088	0.3392

Table B-105 Option 2: Method 2 – Local model SEE and bias – repeated split sampling

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0915	0.0275	0.0693	0.0829
SEE Lower CI	0.0789	0.0215	0.0476	0.0776
SEE Upper CI	0.1055	0.0320	0.0904	0.0876
Average bias (in.)	-0.0542	-0.0131	0.0619	-0.0054
Bias Lower CI	-0.0746	-0.0184	0.0387	-0.0075
Bias Upper CI	-0.0308	-0.0033	0.0832	-0.0030
Average calibration coefficient	0.6193	0.0377	0.3224	N/A
Calibration coefficient Lower CI	0.4725	0.0100	0.2204	N/A
Calibration coefficient Upper CI	0.8116	0.1068	0.4164	N/A

Table B-106 Option 2: Method 2 – Local model validation SEE and bias – repeated split sampling

Validation set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0923	0.0276	0.0695	0.0844
SEE Lower CI	0.0770	0.0185	0.0467	0.0725
SEE Upper CI	0.1096	0.0374	0.0936	0.0964
Average bias (in.)	-0.0540	-0.0131	0.0618	-0.0054
Bias Lower CI	-0.0793	-0.0209	0.0398	-0.0259
Bias Upper CI	-0.0197	-0.0020	0.0843	0.0161
Average calibration coefficient	0.6193	0.0377	0.3224	N/A
Calibration coefficient Lower CI	0.4725	0.0100	0.2204	N/A
Calibration coefficient Upper CI	0.8116	0.1068	0.4164	N/A

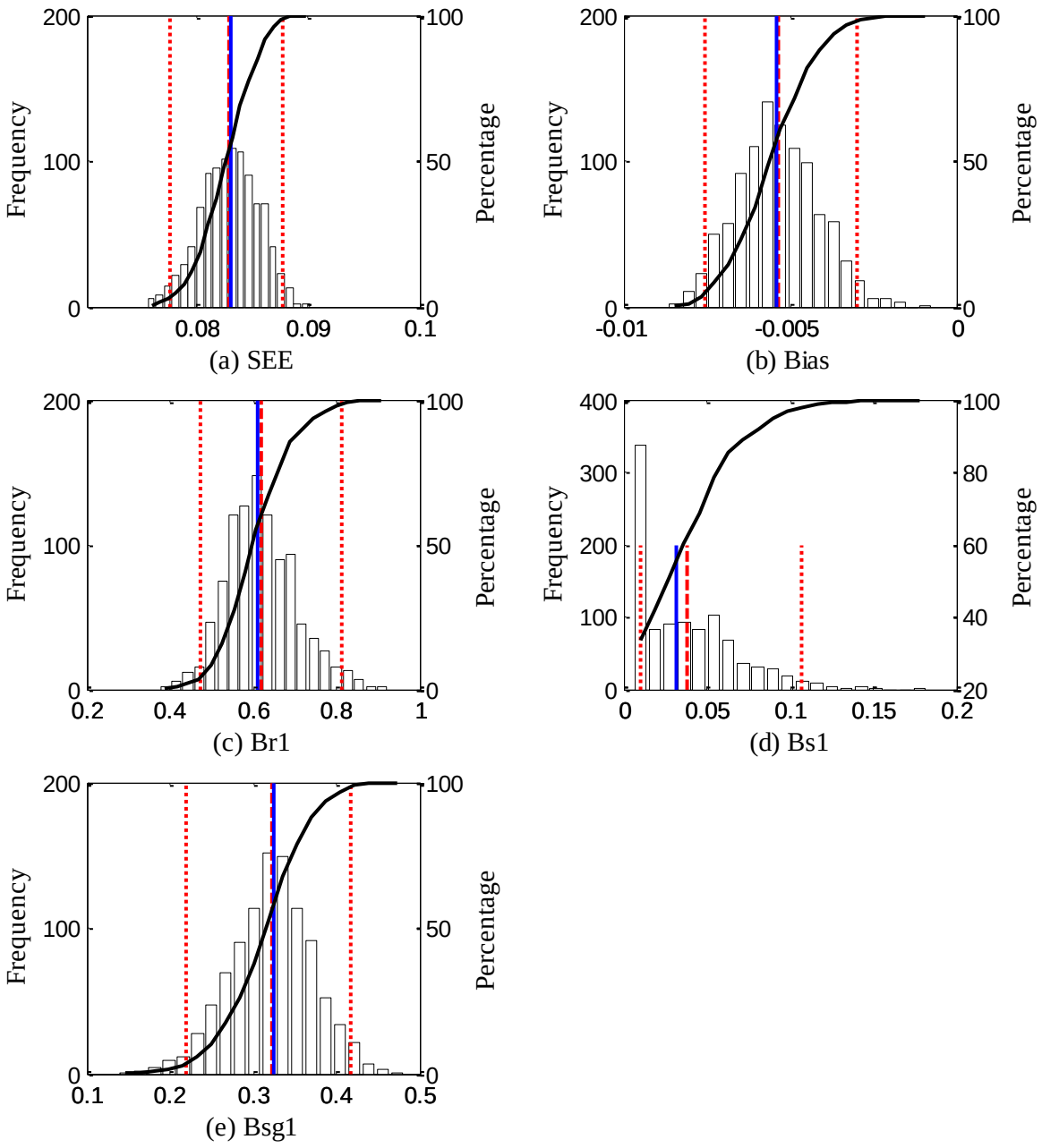


Figure B-193 Option 2: Method 2 – repeated split sampling total rutting frequency distributions – calibration

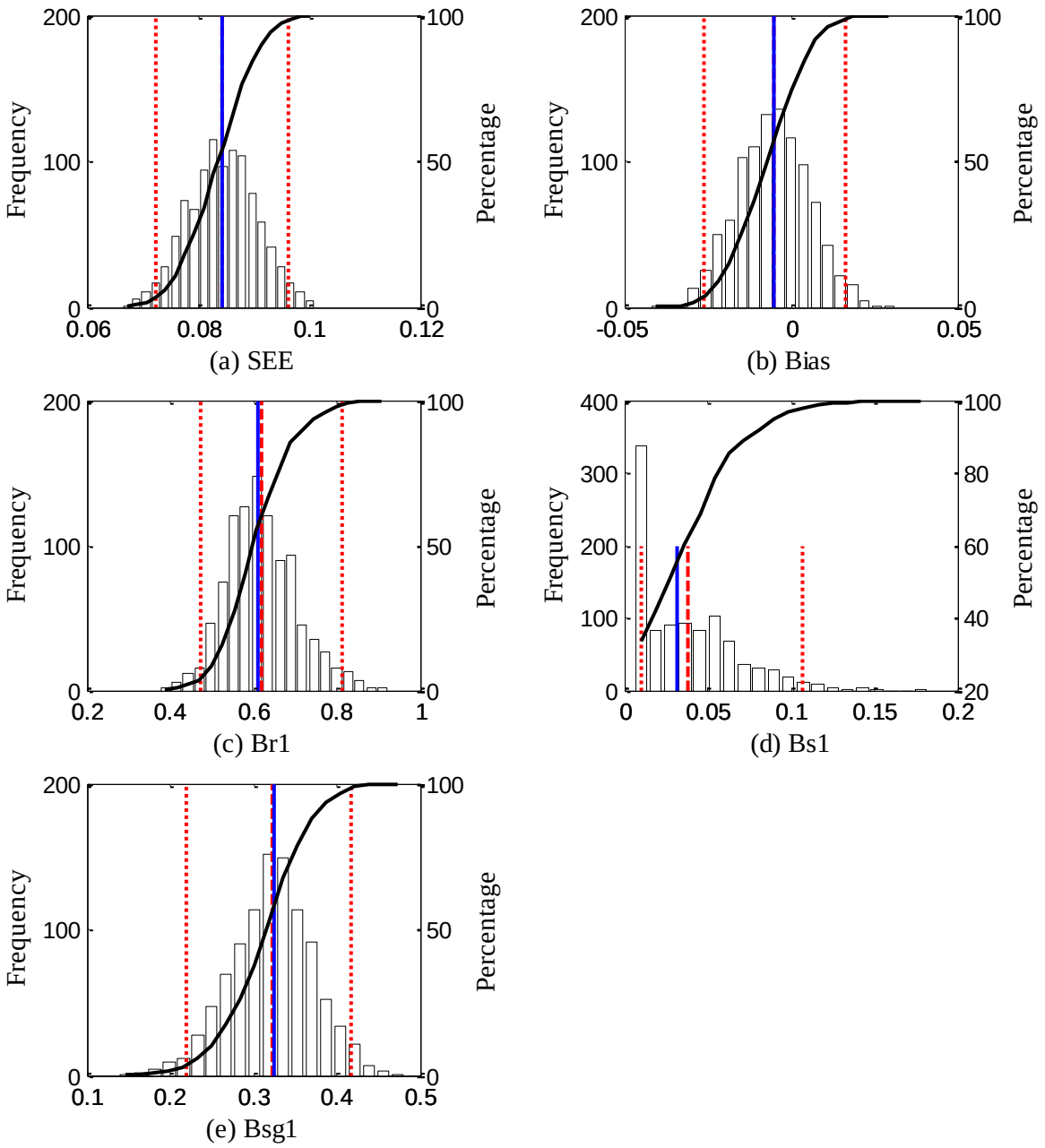
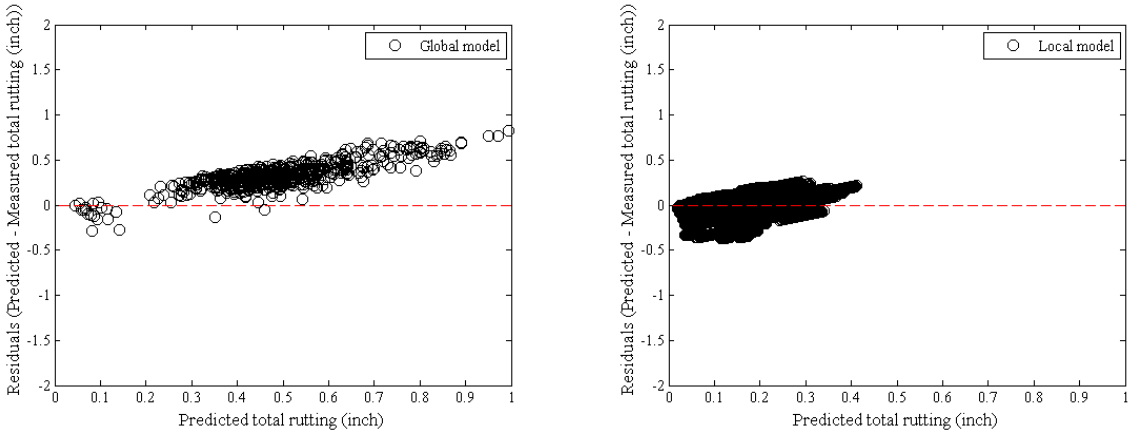
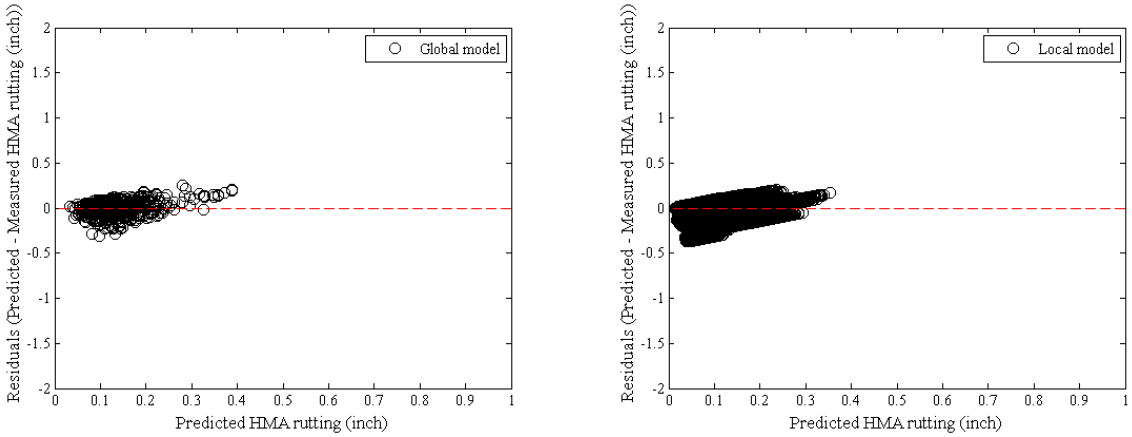


Figure B-194 Option 2: Method 2 – repeated split sampling total rutting frequency distributions – validation



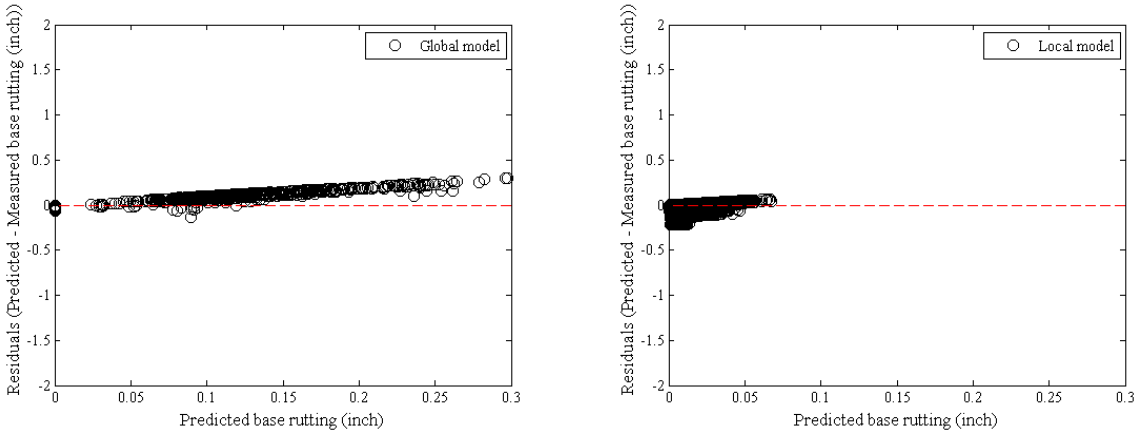
(a) Global model (b) Local model

Figure B-195 Option 2: Method 2 – Total rutting residual plots – repeated split sampling



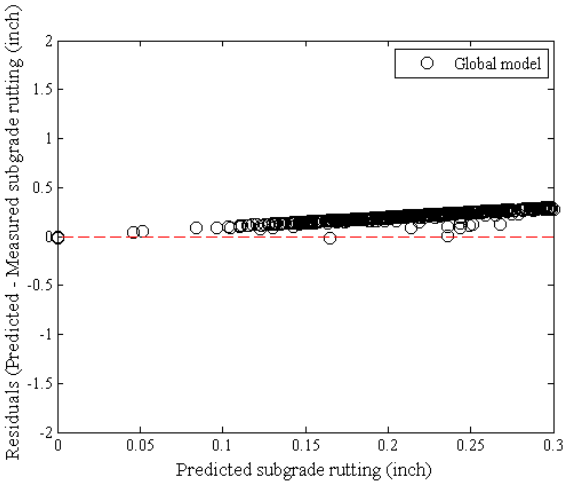
(a) Global model (b) Local model

Figure B-196 Option 2: Method 2 – HMA rutting residual plots - repeated split sampling

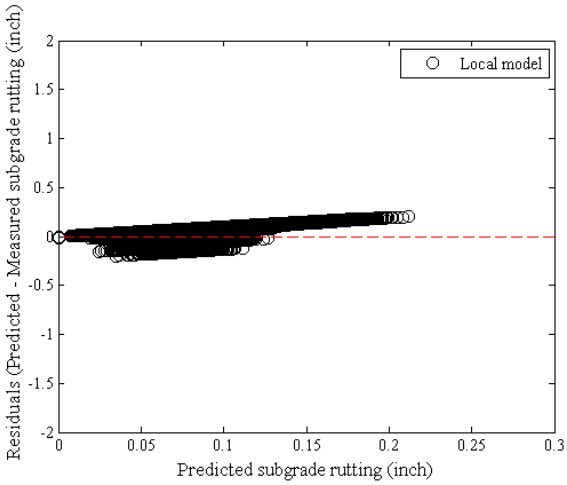


(a) Global model (b) Local model

Figure B-197 Option 2: Method 2 – Base rutting residual plots - repeated split sampling

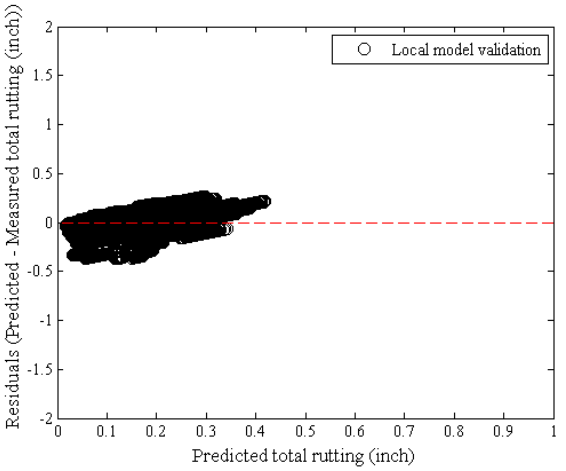


(a) Global model

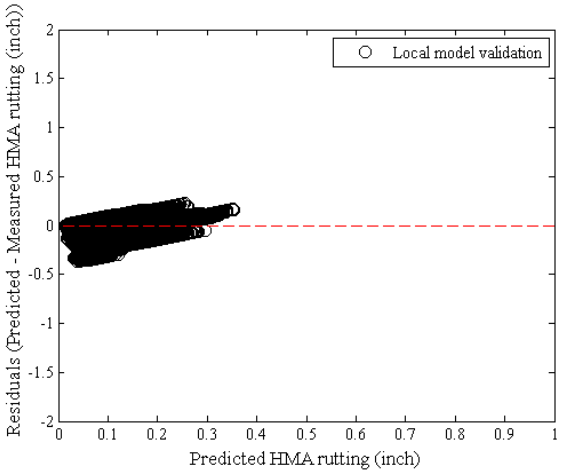


(b) Local model

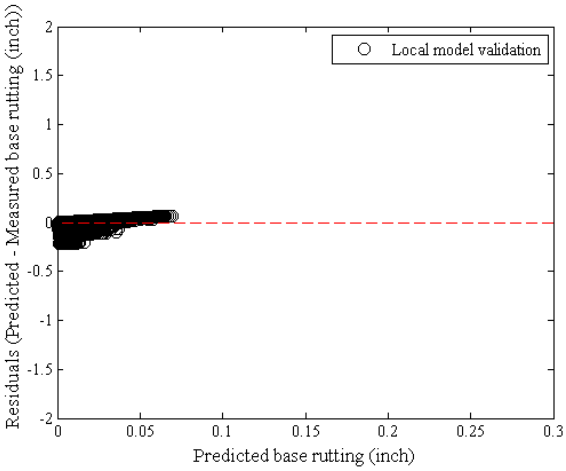
Figure B-198 Option 2: Method 2 – Subgrade rutting residual plots - repeated split sampling



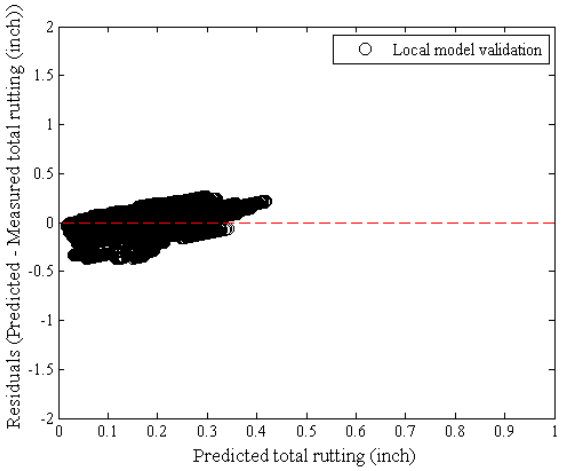
(a) Total rutting



(b) HMA rutting



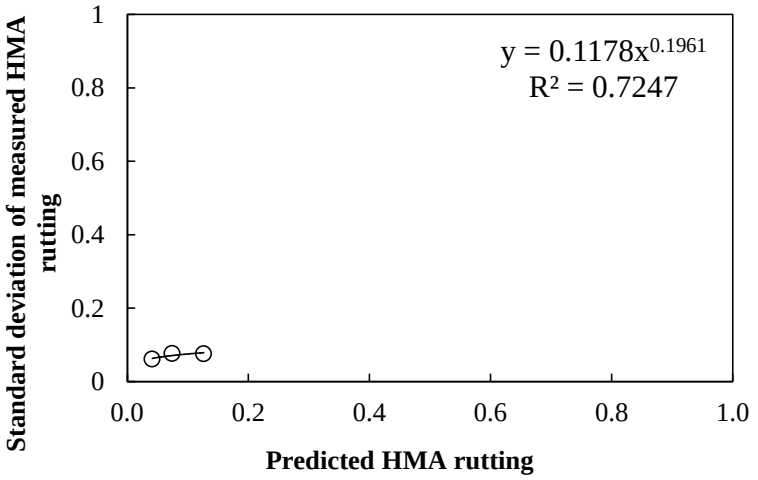
(c) Base rutting



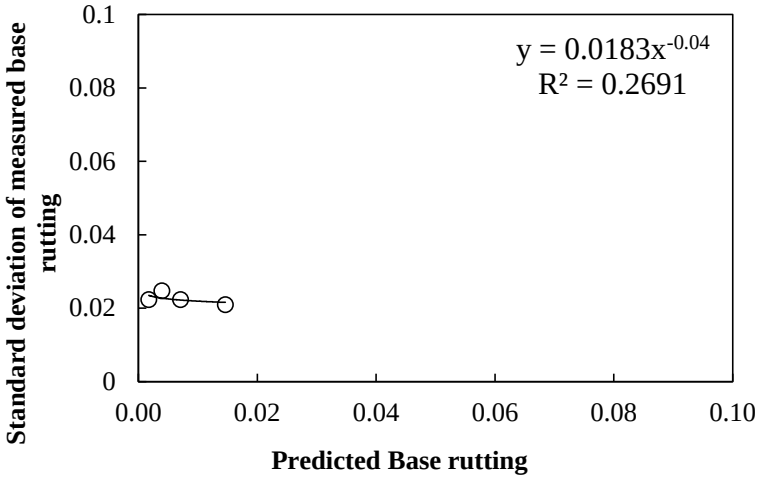
(d) Subgrade rutting

Figure B-199 Option 2: Method 2 – Rutting model validation residual plots – repeated split sampling

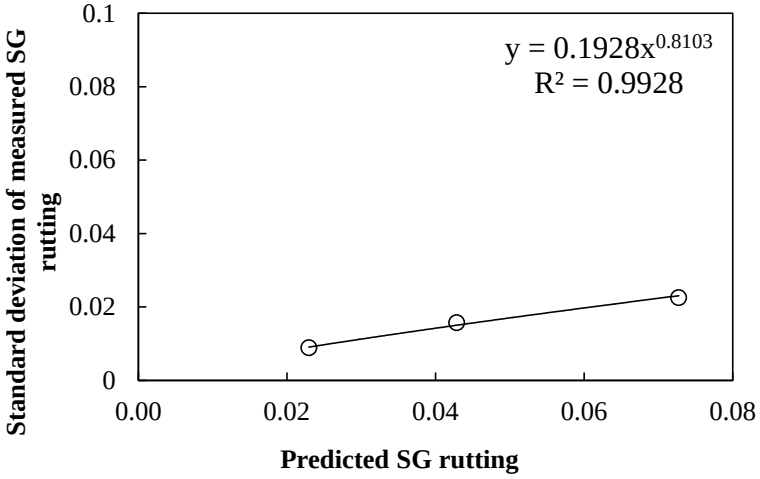
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-200 Rutting model reliability equations – option 2 method 2 – repeated split sampling

Bootstrapping

Table B-107 Option 2: Method 2 – Global model SEE and bias – bootstrapping

Calibration set	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0779	0.0709	0.0852	-0.0019	-0.0116	0.0079
Base rutting	0.1403	0.1241	0.1577	0.1163	0.1034	0.1305
Subgrade rutting	0.2234	0.2125	0.2351	0.2100	0.1982	0.2220
Total rutting	0.3574	0.3344	0.3799	0.3244	0.3011	0.3479

Table B-108 Option 2: Method 2 – Local model SEE and bias – bootstrapping

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0919	0.0271	0.0684	0.0823
SEE Lower CI	0.0743	0.0205	0.0364	0.0749
SEE Upper CI	0.1125	0.0344	0.0959	0.0902
Average bias (in.)	-0.0543	-0.0120	0.0611	-0.0051
Bias Lower CI	-0.0838	-0.0195	0.0289	-0.0086
Bias Upper CI	-0.0204	0.0025	0.0885	-0.0021
Average calibration coefficient	0.6201	0.0449	0.3184	N/A
Calibration coefficient Lower CI	0.4031	0.0100	0.1729	N/A
Calibration coefficient Upper CI	0.8857	0.1538	0.4424	N/A

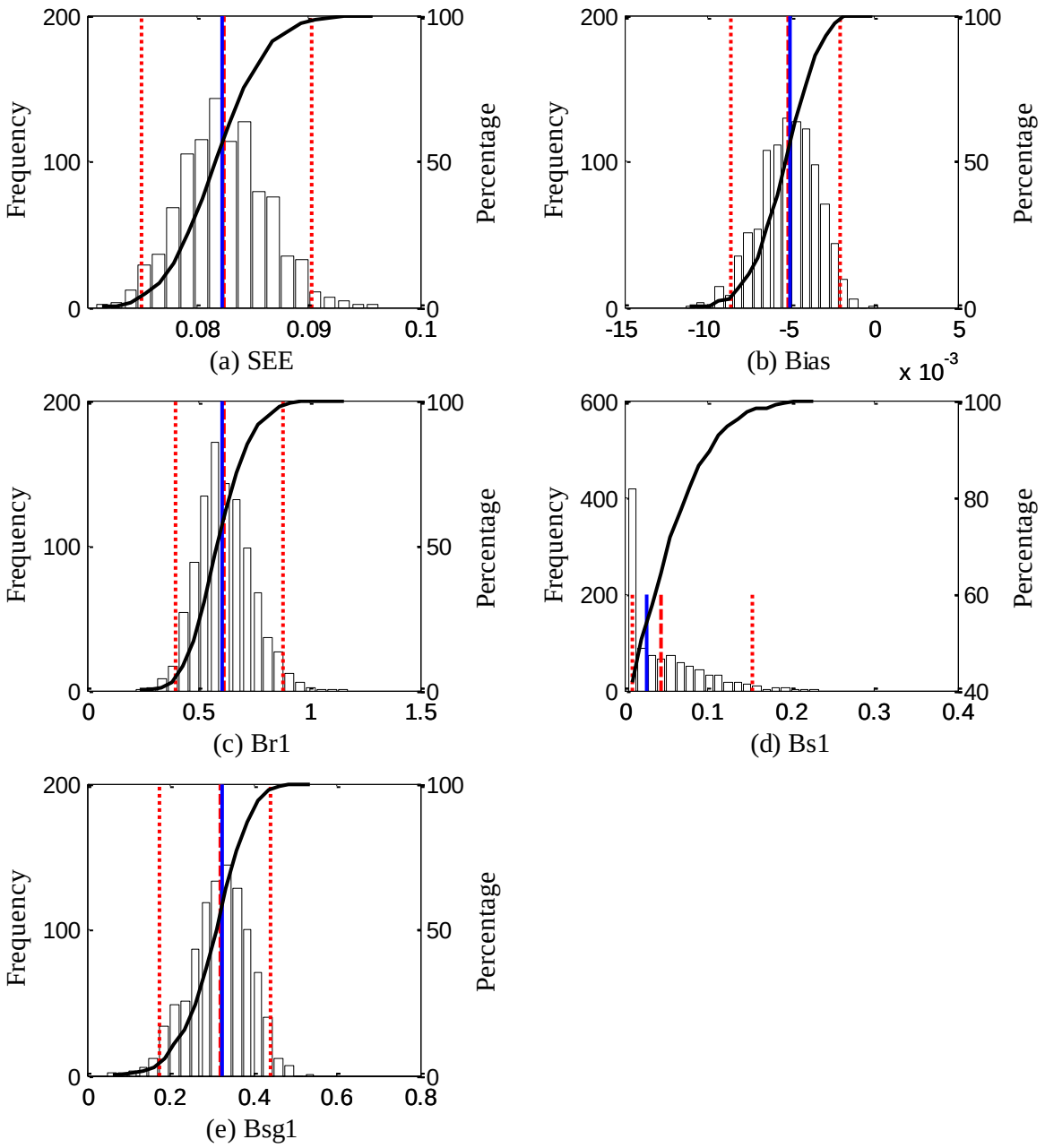
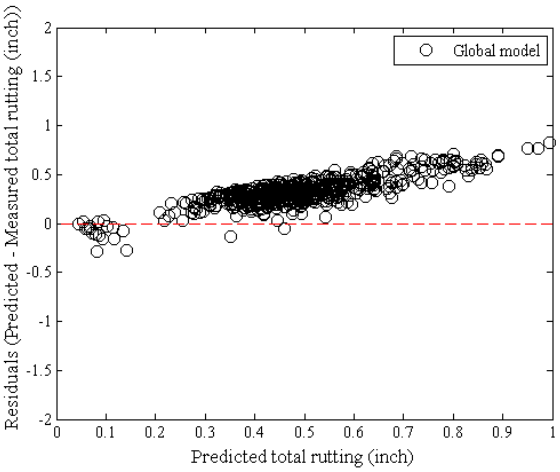
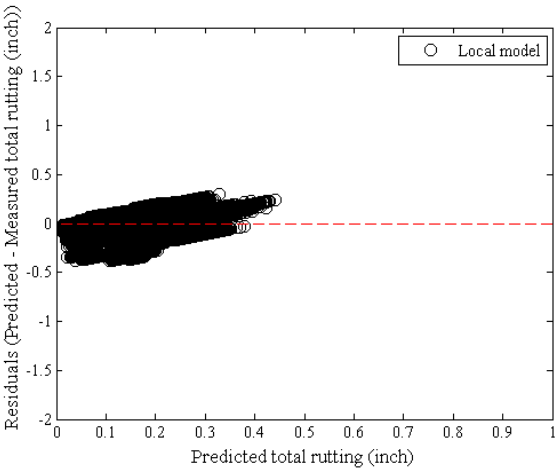


Figure B-201 Option 2: Method 2 – bootstrapping total rutting frequency distributions –calibration

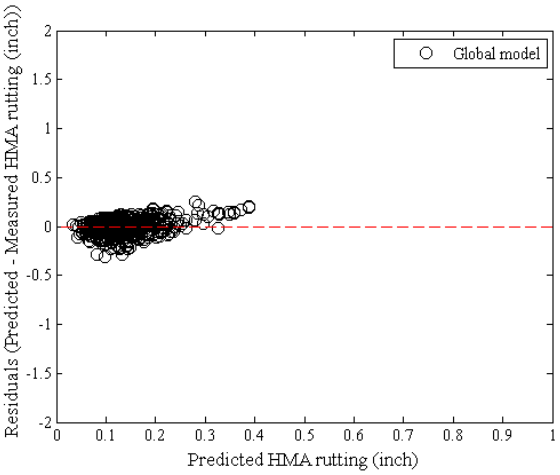


(a) Global model

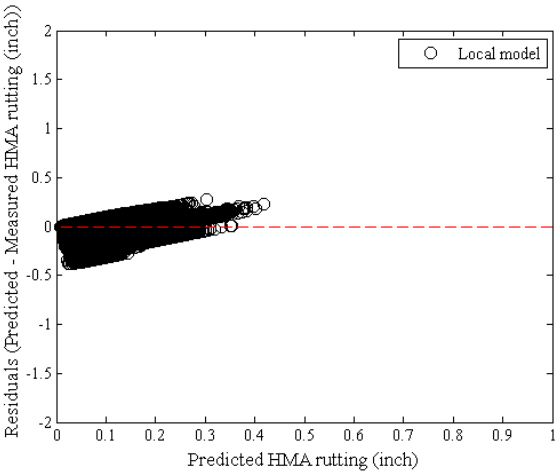


(b) Local model

Figure B-202 Option 2: Method 2 – Total rutting residual plots – bootstrapping

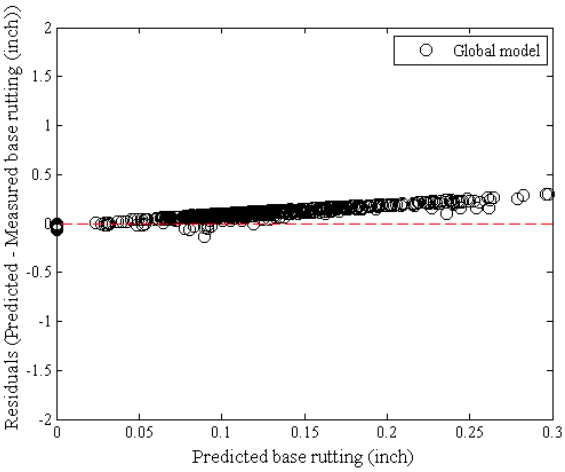


(a) Global model

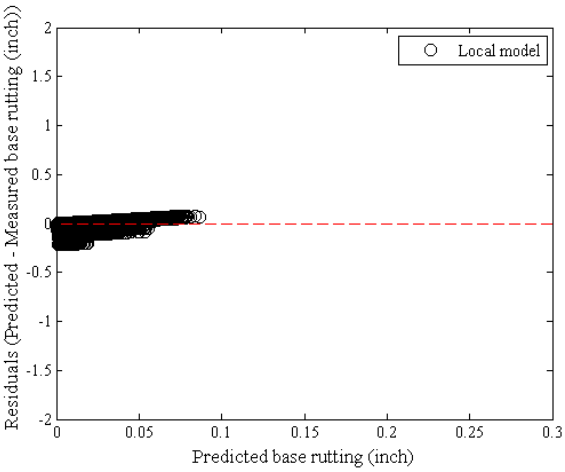


(b) Local model

Figure B-203 Option 2: Method 2 – HMA rutting residual plots - bootstrapping

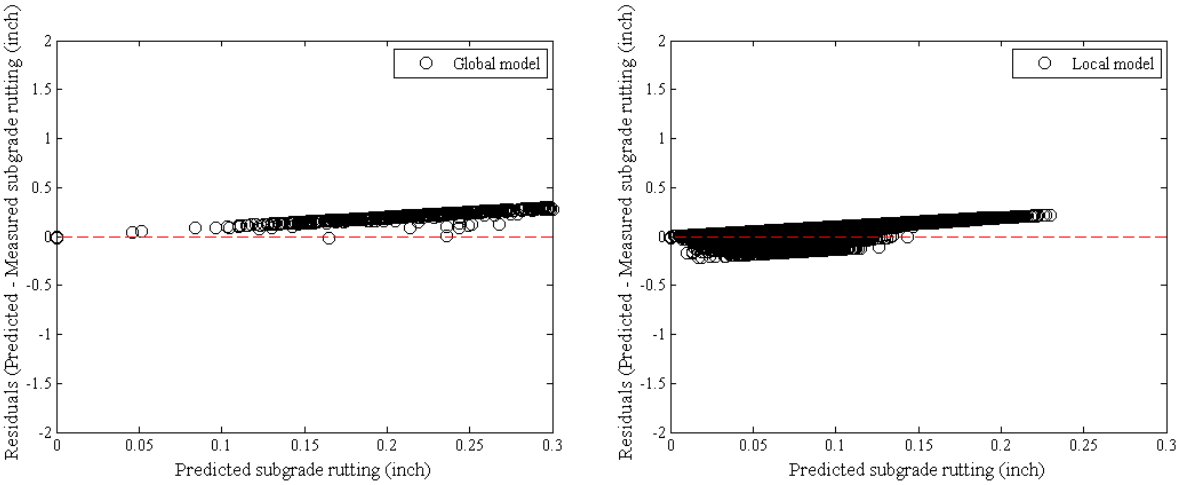


(a) Global model



(b) Local model

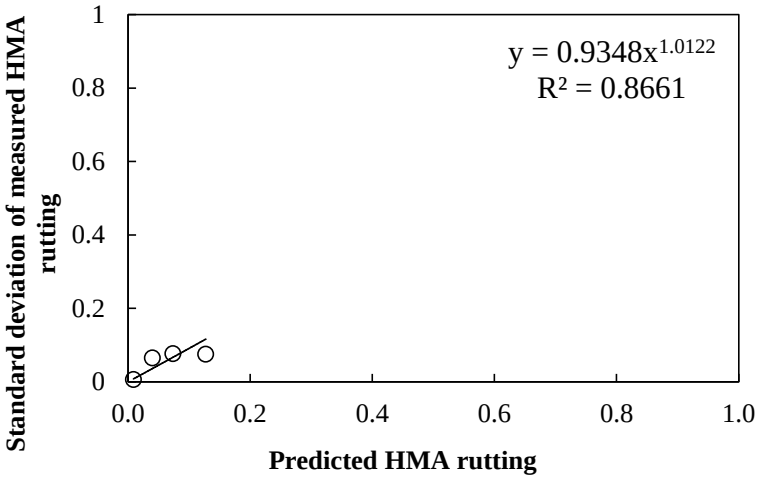
Figure B-204 Option 2: Method 2 – Base rutting residual plots - bootstrapping



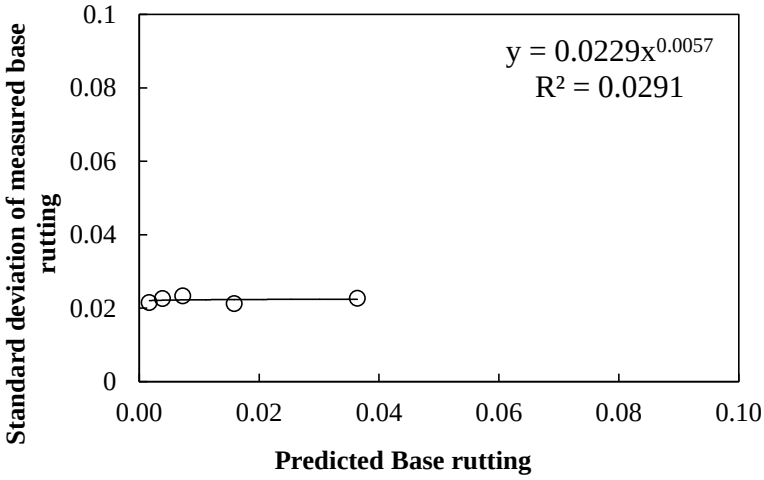
(a) Global model (b) Local model

Figure B-205 Option 2: Method 2 – Subgrade rutting residual plots - bootstrapping

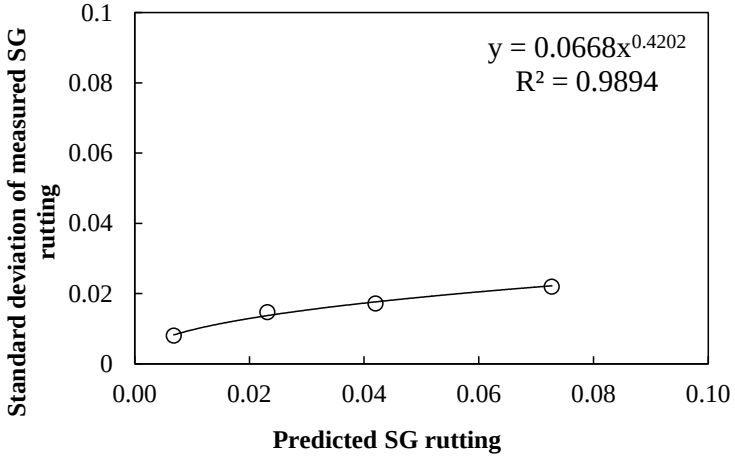
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-206 Rutting model reliability equations – option 2 method 2 – bootstrapping

B.1.3.5 Option 4 – Method 1

No sampling

Table B-109 Option 4: Method 1 – Global model goodness of fit – no sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0763	0.0038
Base rut	0.1797	0.1323
Subgrade	0.2230	0.1959
Total rut	0.4035	0.3320

Table B-110 Option 4: Method 1 – Global model *p*-values

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.5589	0.0000	0.0000
Base rut	0.0000	0.0000	0.0005
Subgrade	0.0000	0.0000	0.1369
Total rut	0.0000	0.0000	0.0039

Table B-111 Option 4: Method 1 – Local model goodness of fit– no sampling

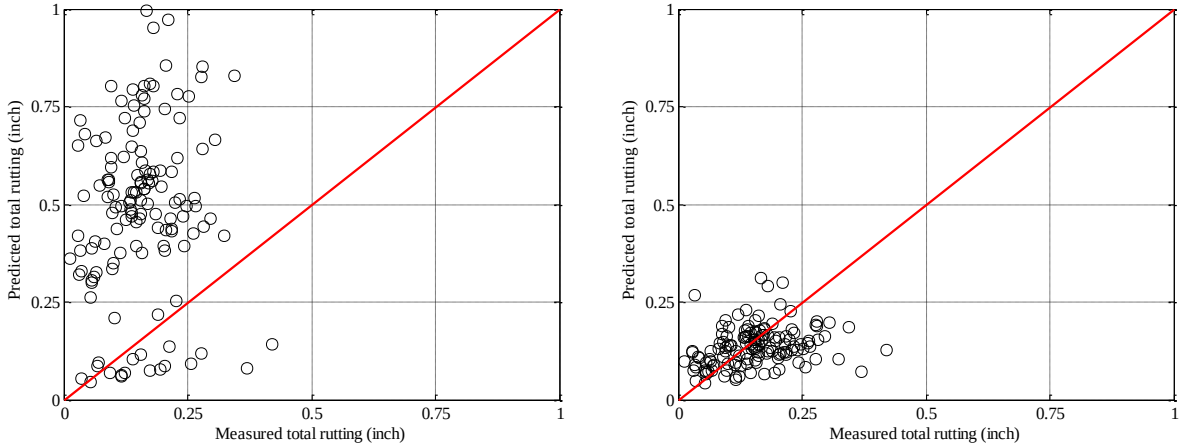
HMA layer	SEE	Bias
AC rut	0.0746	-0.0113
Base rut	0.0231	-0.0072
Subgrade	0.0096	-0.0012
Total rut	0.0828	-0.0197

Table B-112 Option 4: Method 1 – Local model *p*-values– no sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0756	0.0000	0.0000
Base rut	0.0002	0.0000	0.0000
Subgrade	0.1610	0.0000	0.0000
Total rut	0.0050	0.0000	0.0000

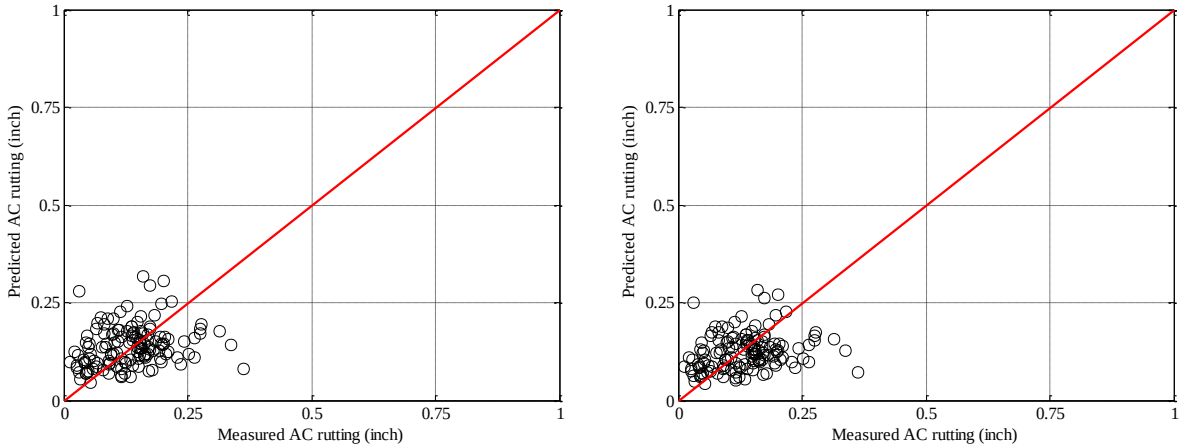
Table B-113 Option 4: Method 1 – Local model *p*-values– no sampling

Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.8909
Base rutting (bs1)	1.0000	0.0597
Subgrade rutting (bsg1)	1.0000	0.0216



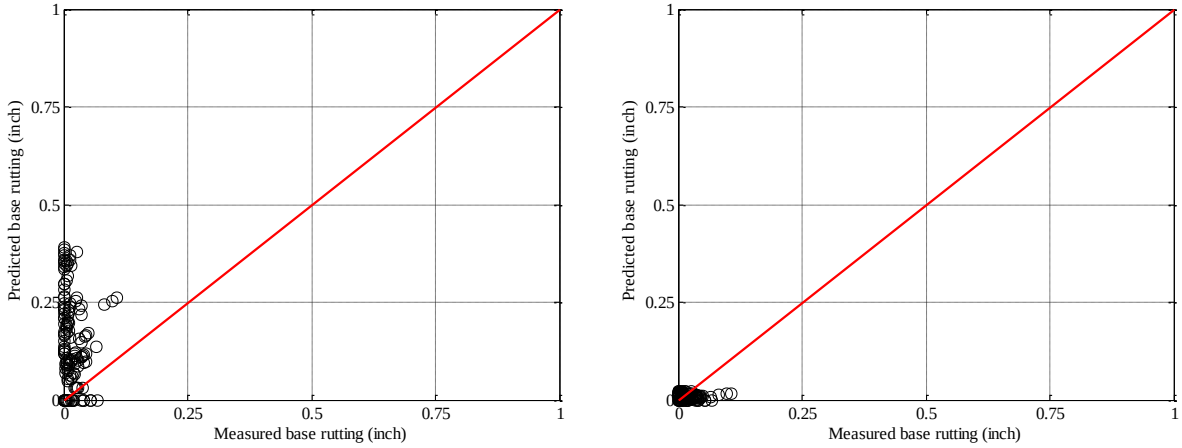
(a) Global model (b) Local model

Figure B-207 Option 4: Method 1 – Total rutting local calibration results - no sampling



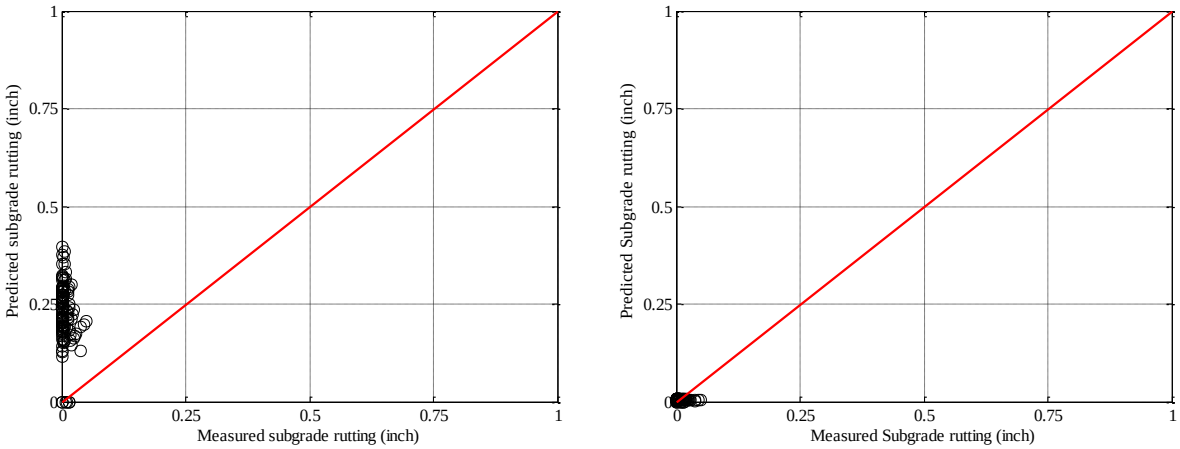
(a) Global model (b) Local model

Figure B-208 Option 4: Method 1 – HMA rutting local calibration results - no sampling



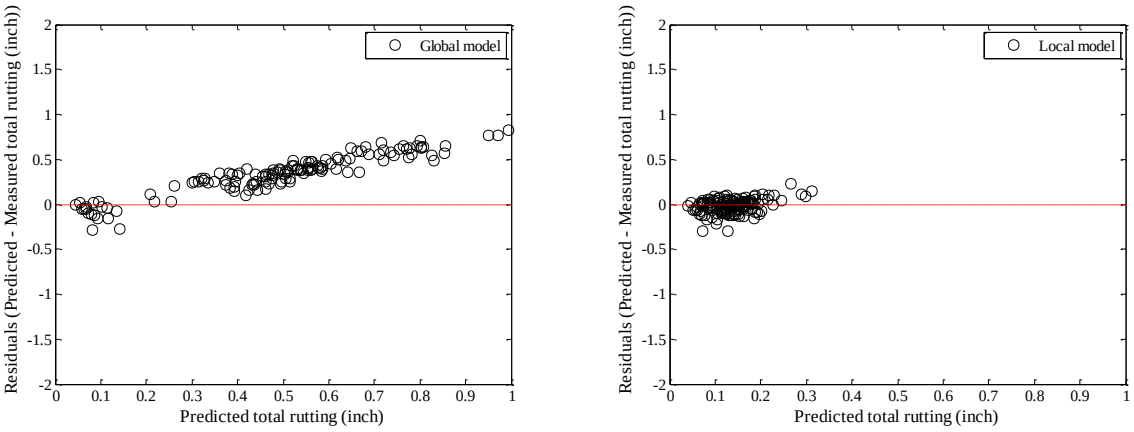
(a) Global model (b) Local model

Figure B-209 Option 4: Method 1 – Base rutting local calibration results - no sampling



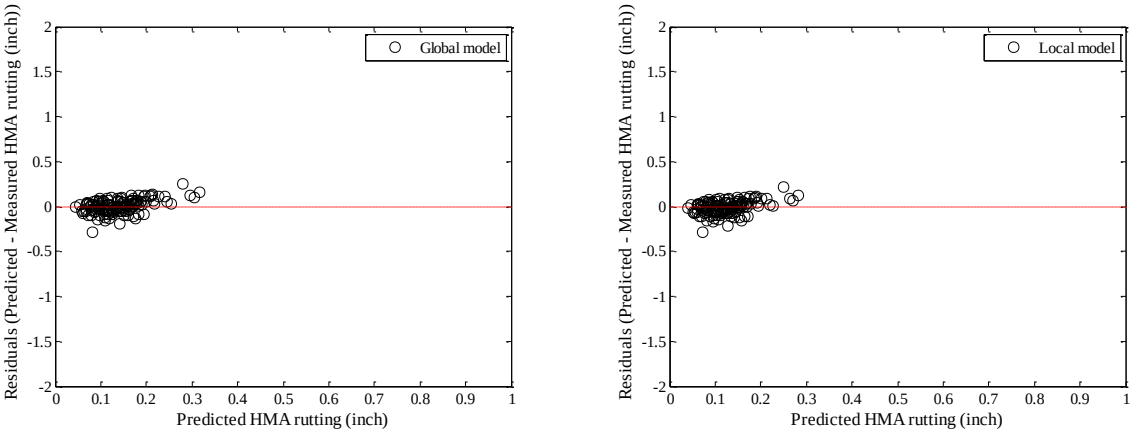
(a) Global model (b) Local model

Figure B-210 Option 4: Method 1 – Subgrade rutting local calibration results - no sampling



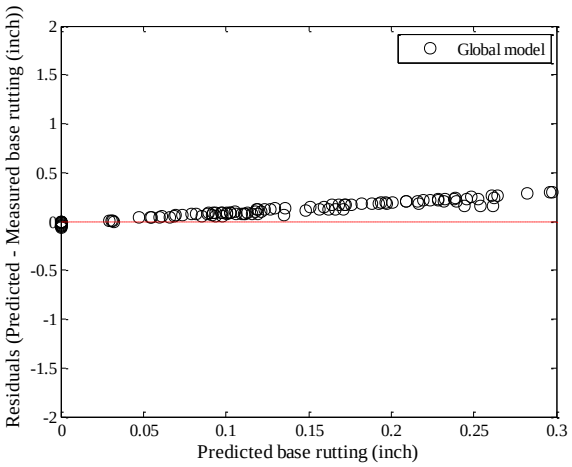
(a) Global model (b) Local model

Figure B-211 Option 4: Method 1 – Total rutting residual plots - no sampling

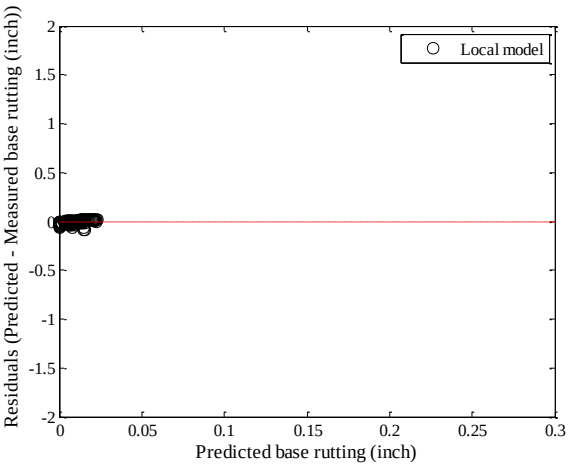


(a) Global model (b) Local model

Figure B-212 Option 4: Method 1 – HMA rutting residual plots - no sampling

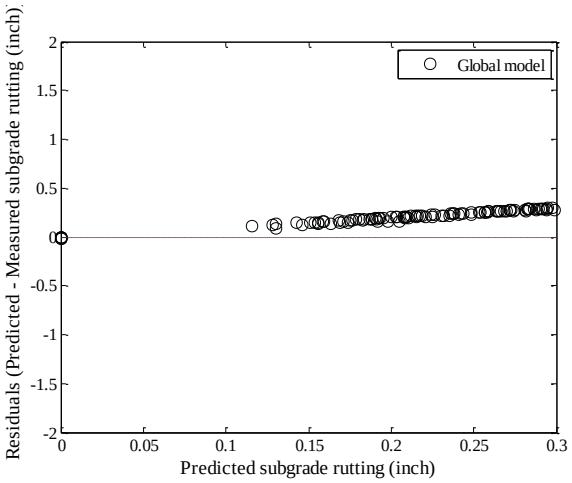


(a) Global model

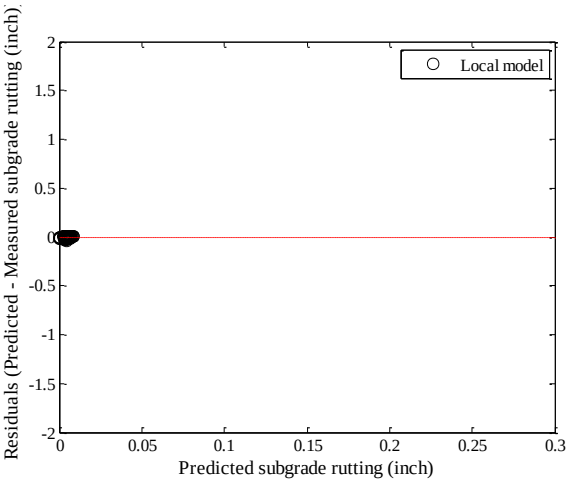


(b) Local model

Figure B-213 Option 4: Method 1 – Base rutting residual plots - no sampling



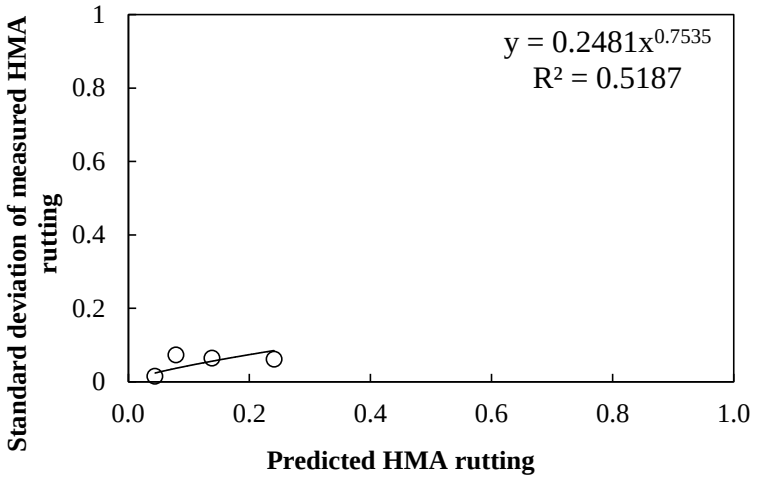
(a) Global model



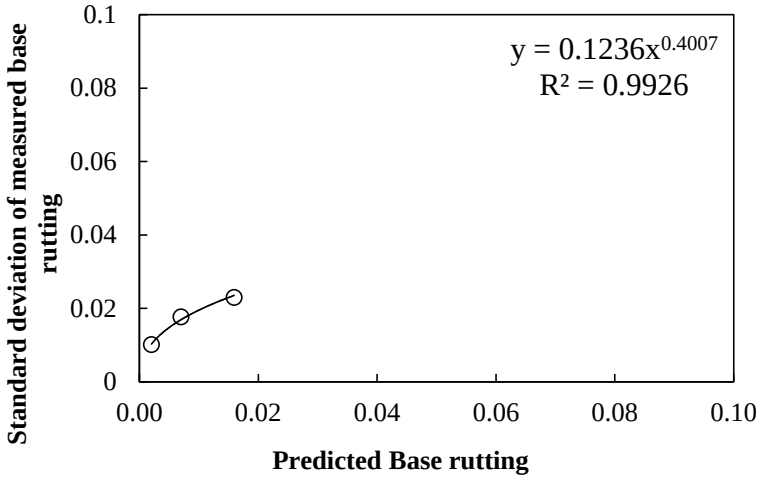
(b) Local model

Figure B-214 Option 4: Method 1 – Subgrade rutting residual plots - no sampling

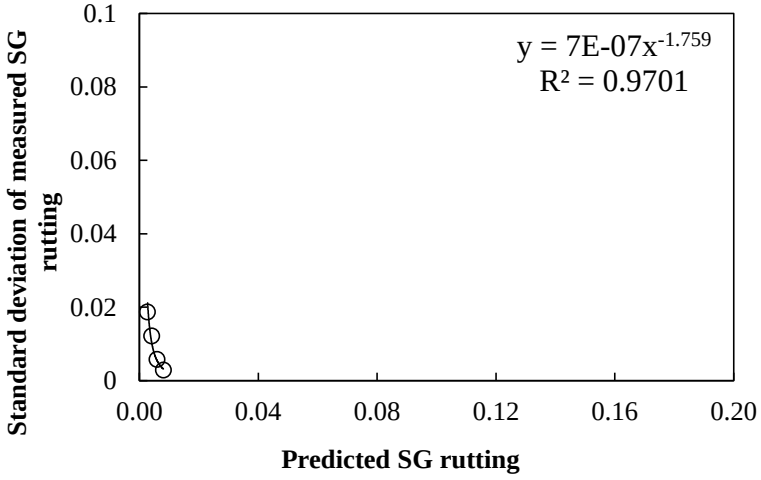
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-215 Rutting model reliability equations – option 4 method 1 – no sampling

Split sampling

Table B-114 Option 4: Method 1 – Global model goodness of fit – split sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0791	0.0004
Base rut	0.1873	0.1356
Subgrade	0.2236	0.1915
Total rut	0.4145	0.3275

Table B-115 Option 4: Method 1 – Global model *p*-values - split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.9591	0.0000	0.0000
Base rut	0.0000	0.0000	0.0056
Subgrade	0.0000	0.0000	0.0446
Total rut	0.0000	0.0000	0.0030

Table B-116 Option 4: Method 1 – Local model goodness of fit– split sampling

HMA layer	SEE	Bias
AC rut	0.0780	-0.0118
Base rut	0.0263	-0.0082
Subgrade	0.0112	-0.0018
Total rut	0.0877	-0.0218

Table B-117 Option 4: Method 1 – Local model *p*-values– split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.1472	0.0000	0.0000
Base rut	0.0025	0.0000	0.0000
Subgrade	0.1161	0.0000	0.0000
Total rut	0.0161	0.0000	0.0000

Table B-118 Option 4: Method 1 – Local model *p*-values – split sampling

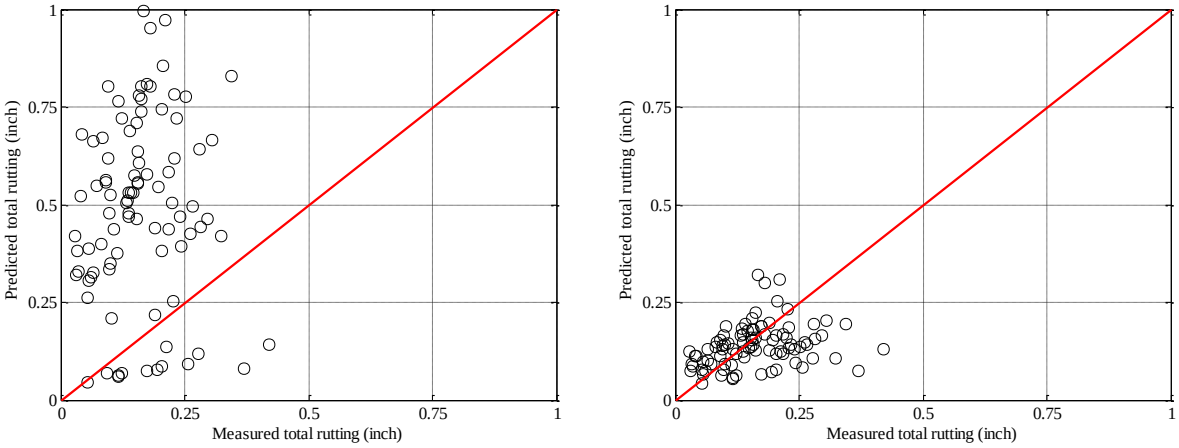
Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.9108
Base rutting (bs1)	1.0000	0.0678
Subgrade rutting (bsg1)	1.0000	0.0223

Table B-119 Option 4: Method 1 – Local model validation p-values – split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.8408	0.0000	0.0000
Base rut	0.4581	0.0000	0.0000
Subgrade	0.4242	0.0000	0.0000
Total rut	0.7720	0.0000	0.0000

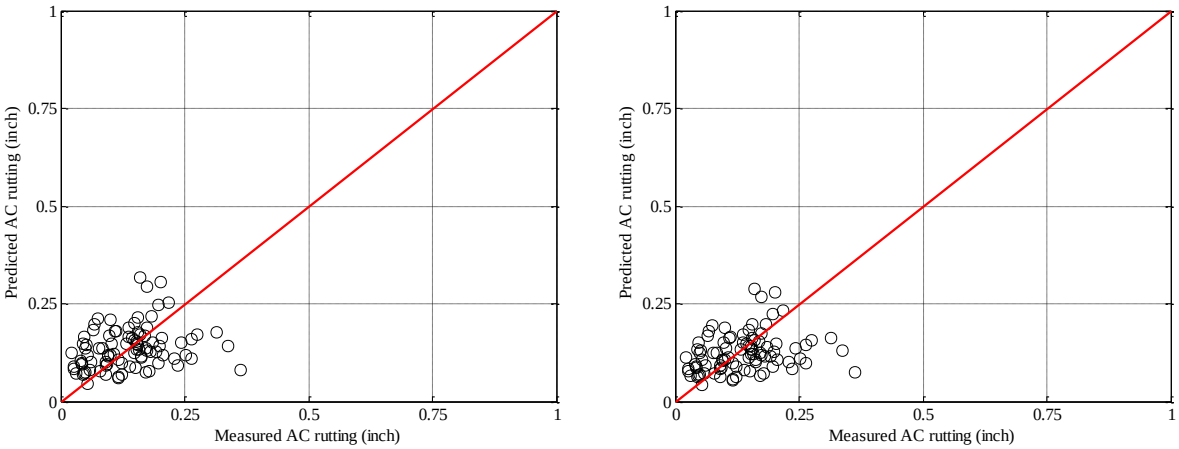
Table B-120 Option 4: Method 1 – Local model validation SEE and bias – split sampling

HMA layer	SEE	Bias
AC rut	0.0691	-0.0021
Base rut	0.0156	-0.0017
Subgrade	0.0053	0.0006
Total rut	0.0731	-0.0031



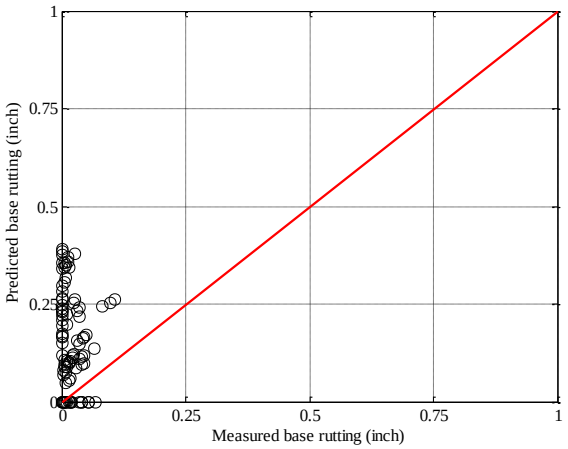
(a) Global model (b) Local model

Figure B-216 Option 4: Method 1 – Total rutting local calibration results - split sampling

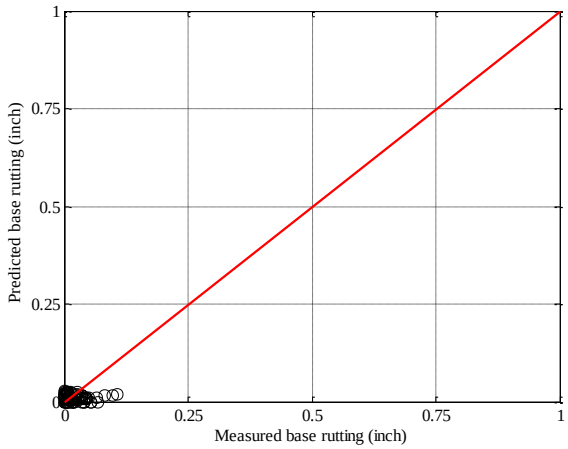


(a) Global model (b) Local model

Figure B-217 Option 4: Method 1 – HMA rutting local calibration results - split sampling

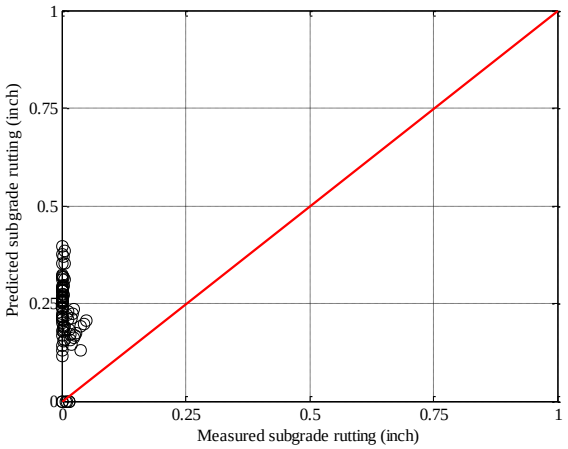


(a) Global model

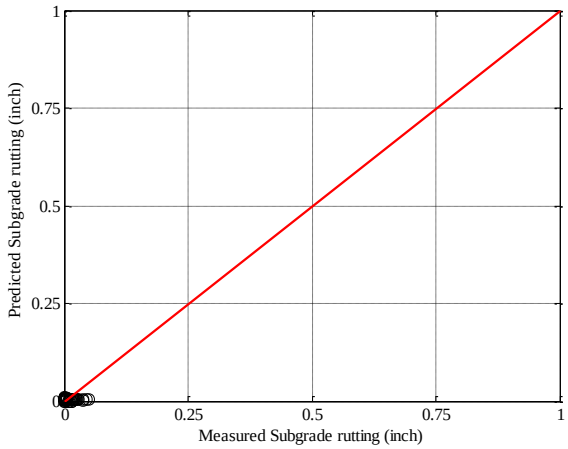


(b) Local model

Figure B-218 Option 4: Method 1 – Base rutting local calibration results - split sampling

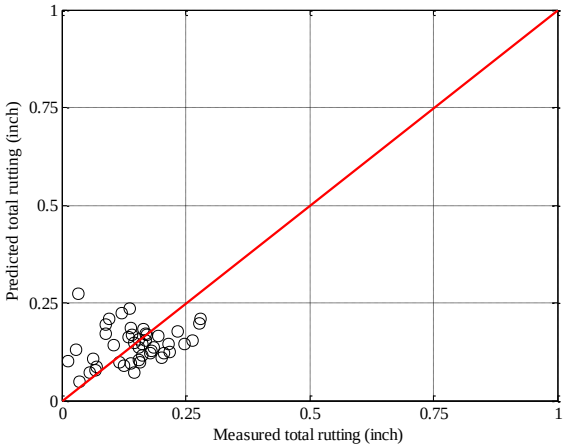


(a) Global model

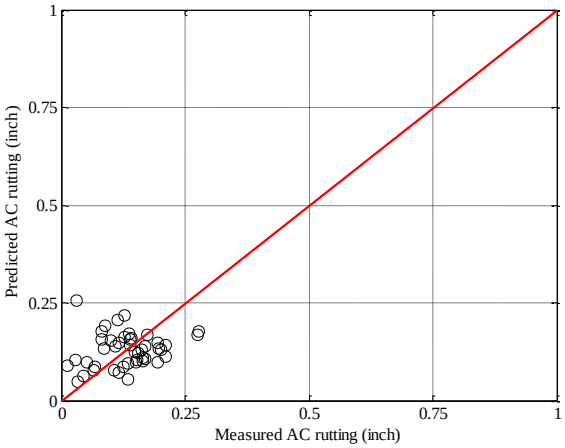


(b) Local model

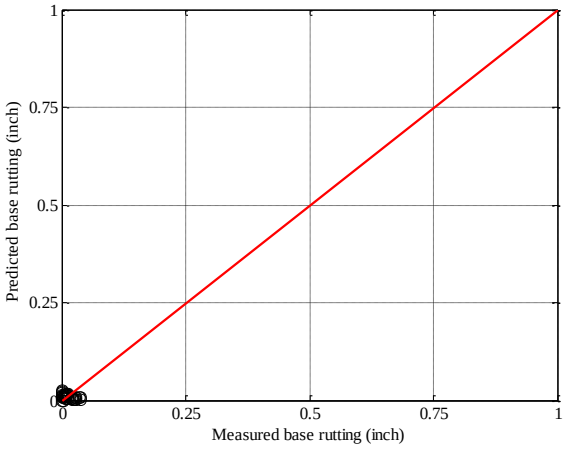
Figure B-219 Option 4: Method 1 – Subgrade rutting local calibration results - split sampling



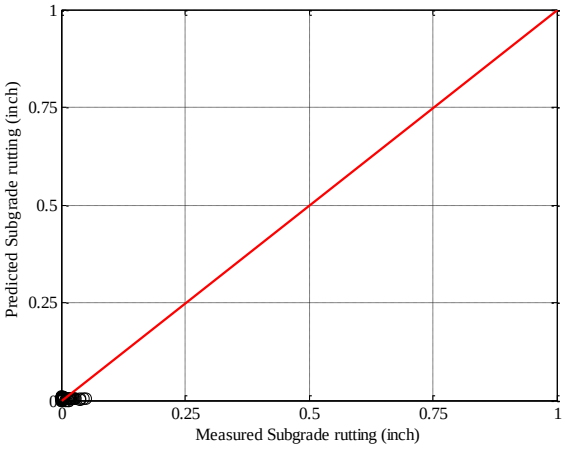
(a) Total rutting



(b) HMA rutting

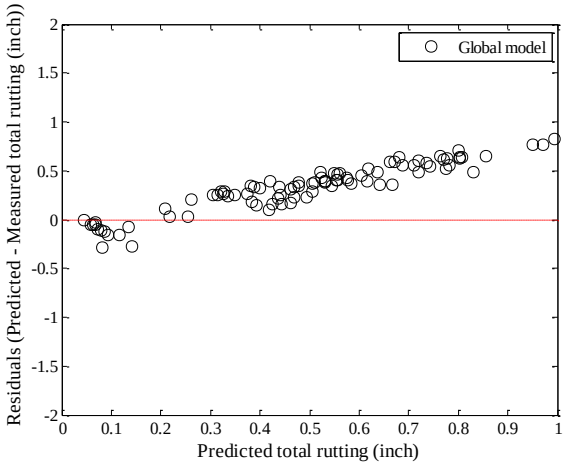


(c) Base rutting

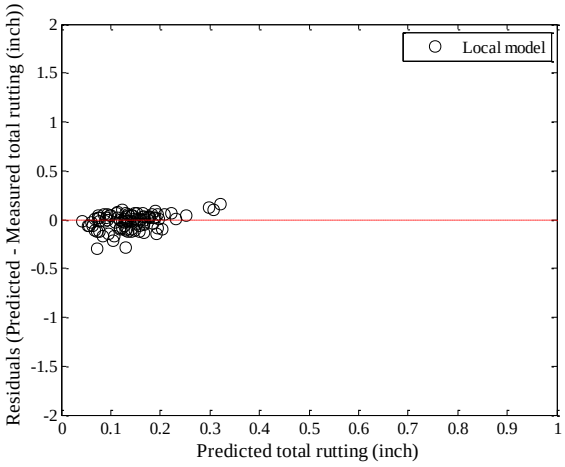


(d) Subgrade rutting

Figure B-220 Option 4: Method 1 – Rutting model validation – split sampling

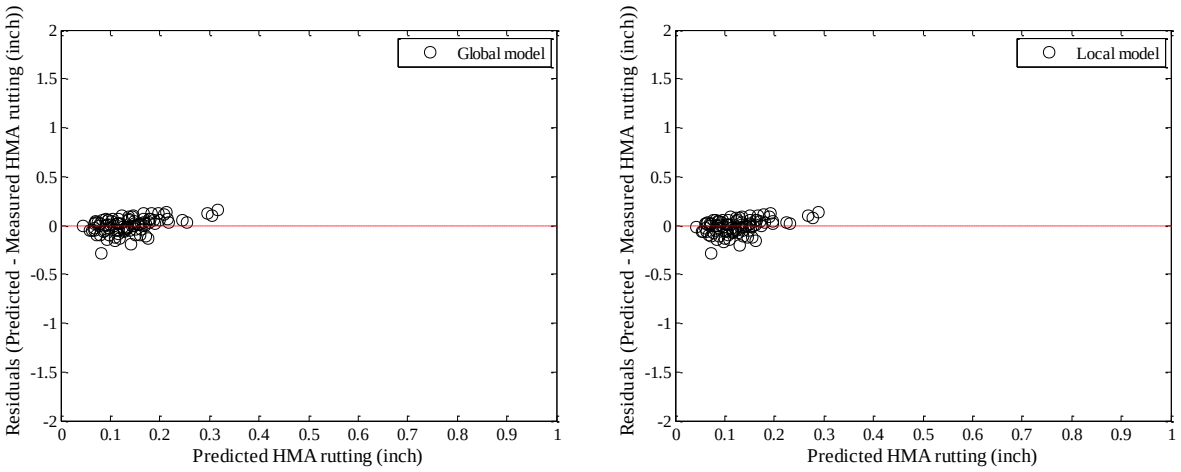


(a) Global model



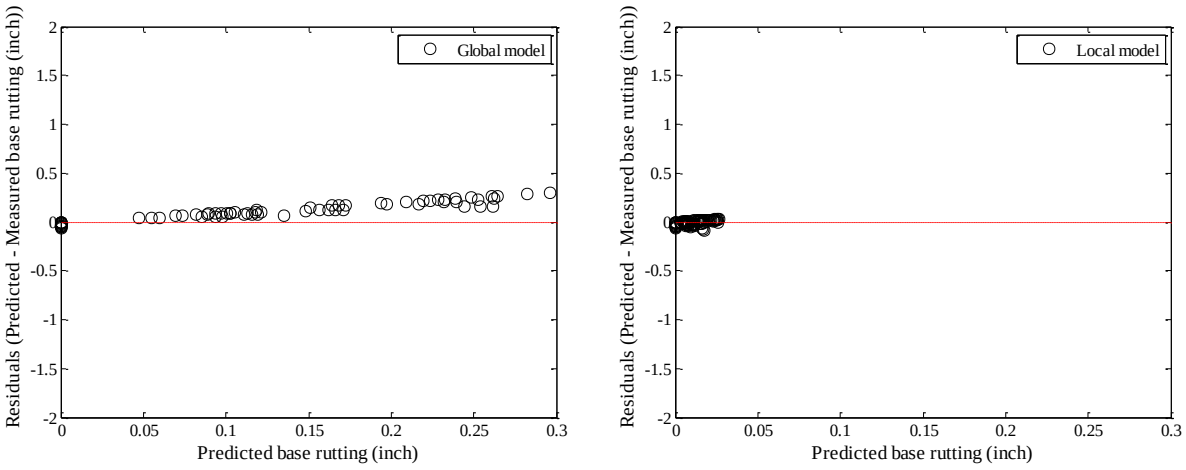
(b) Local model

Figure B-221 Option 4: Method 1 – Total rutting residual plots - split sampling



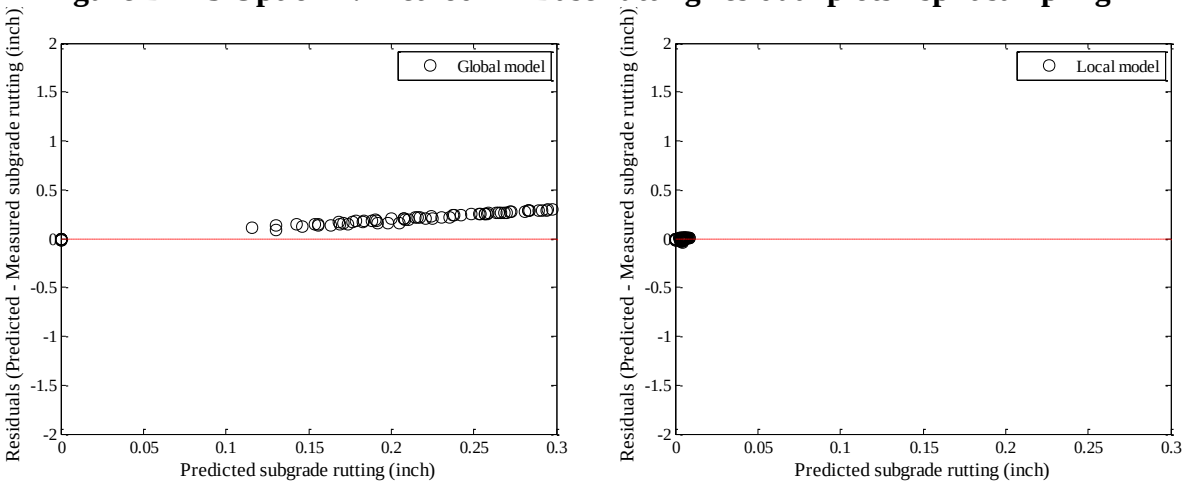
(a) Global model (b) Local model

Figure B-222 Option 4: Method 1 – HMA rutting residual plots - split sampling



(a) Global model (b) Local model

Figure B-223 Option 4: Method 1 – Base rutting residual plots - split sampling



(a) Global model (b) Local model

Figure B-224 Option 4: Method 1 – Subgrade rutting residual plots - split sampling

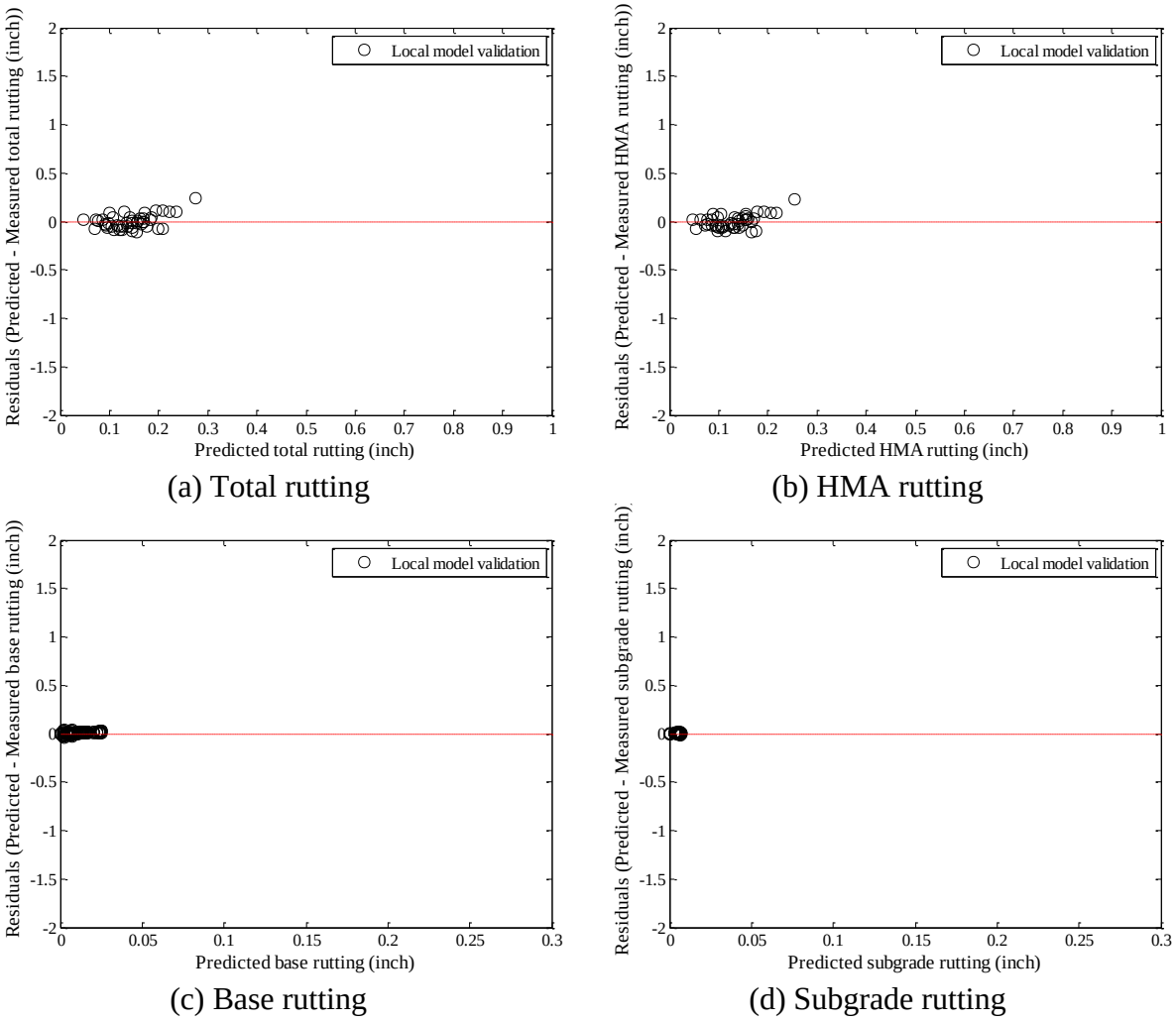
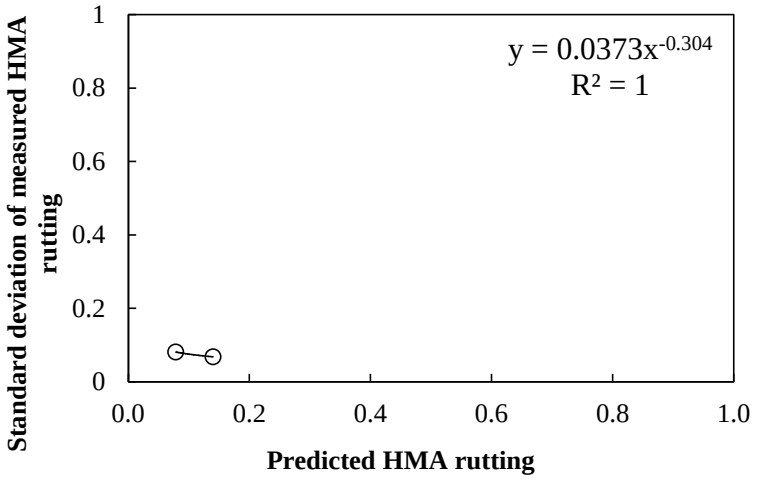
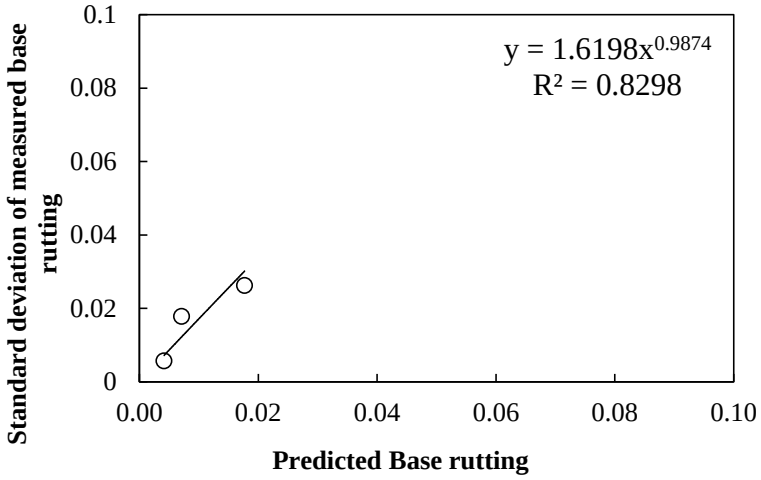


Figure B-225 Option 4: Method 1 – Rutting model validation residual plots – split sampling

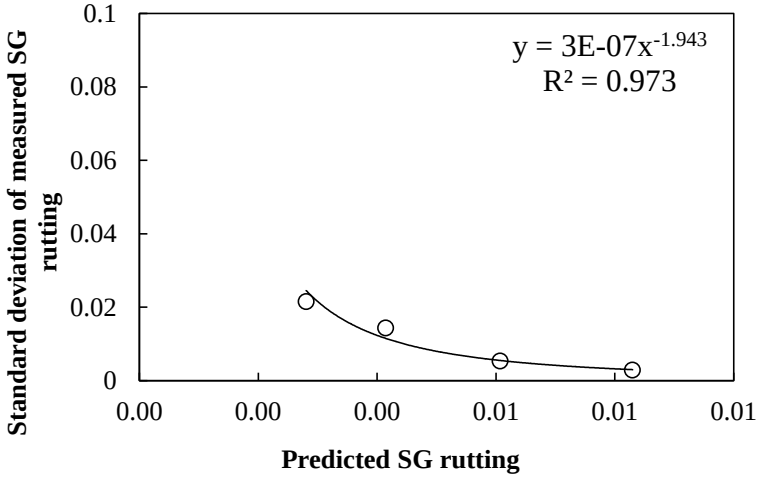
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-226 Rutting model reliability equations – option 4 method 1 – split sampling

Repeated split sampling

Table B-121 Option 4: Method 1 – Global model SEE and bias – repeated split sampling

Global Model	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0764	0.0657	0.0850	0.0034	-0.0117	0.0163
Base rutting	0.1801	0.1485	0.2054	0.1325	0.1027	0.1600
Subgrade rutting	0.2234	0.2053	0.2401	0.1957	0.1744	0.2180
Total rutting	0.4042	0.3560	0.4415	0.3317	0.2811	0.3808

Table B-122 Option 4: Method 1 – Local model SEE and bias – repeated split sampling

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0742	0.0228	0.0094	0.0823
SEE Lower CI	0.0650	0.0170	0.0052	0.0708
SEE Upper CI	0.0821	0.0265	0.0114	0.0921
Average bias (in.)	-0.0110	-0.0072	-0.0011	-0.0193
Bias Lower CI	-0.0155	-0.0095	-0.0018	-0.0247
Bias Upper CI	-0.0050	-0.0048	-0.0004	-0.0135
Average calibration coefficient	0.8979	0.0601	0.0217	N/A
Calibration coefficient Lower CI	0.8091	0.0313	0.0121	N/A
Calibration coefficient Upper CI	1.0260	0.0909	0.0299	N/A

Table B-123 Option 4: Method 1 – Local model validation SEE and bias – repeated split sampling

Validation set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0780	0.0239	0.0094	0.0862
SEE Lower CI	0.0559	0.0133	0.0047	0.0604
SEE Upper CI	0.0991	0.0350	0.0163	0.1109
Average bias (in.)	-0.0099	-0.0072	-0.0011	-0.0183
Bias Lower CI	-0.0532	-0.0222	-0.0083	-0.0614
Bias Upper CI	0.0391	0.0085	0.0049	0.0321
Average calibration coefficient	0.8979	0.0601	0.0217	N/A
Calibration coefficient Lower CI	0.8091	0.0313	0.0121	N/A
Calibration coefficient Upper CI	1.0260	0.0909	0.0299	N/A

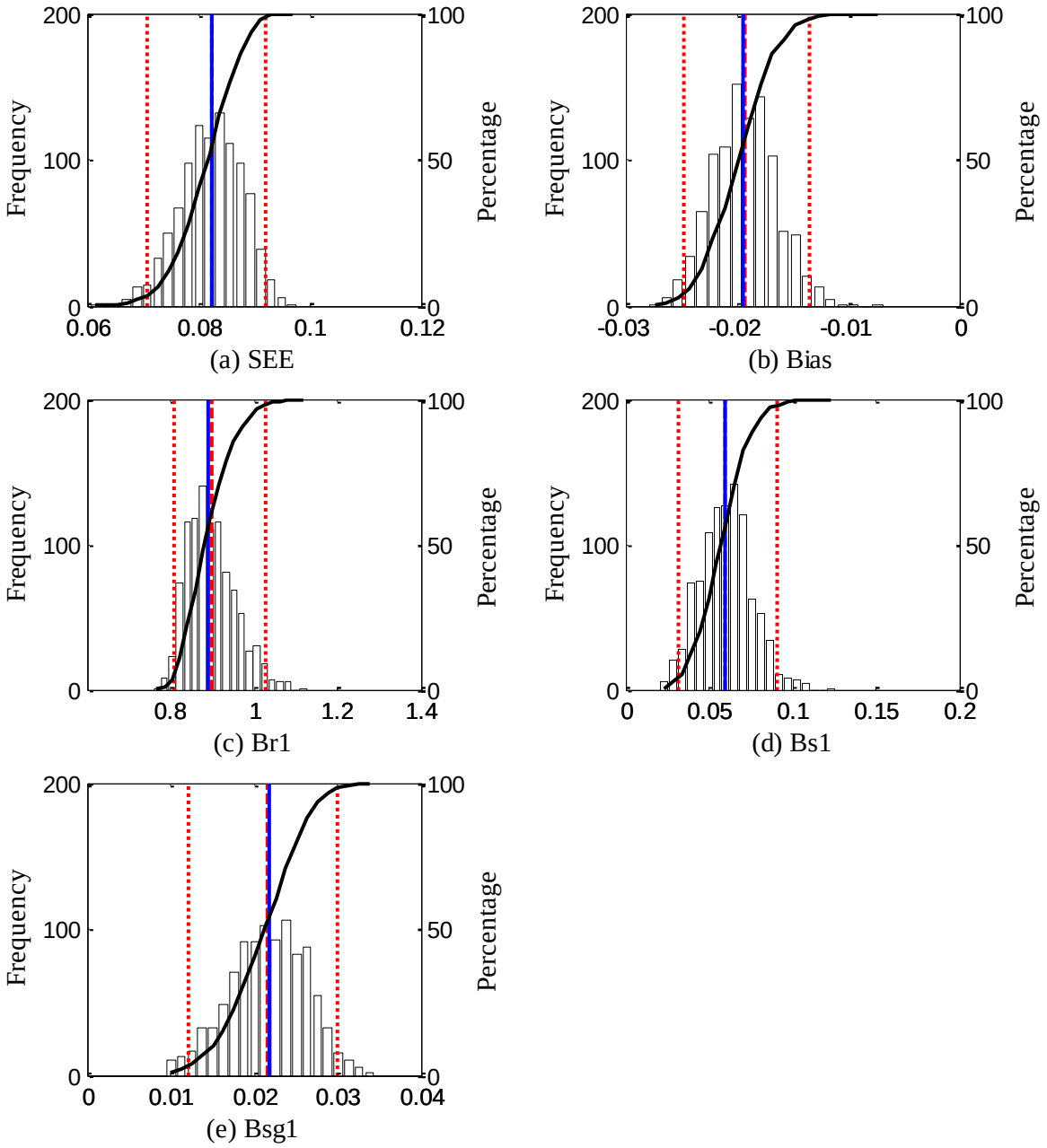


Figure B-227 Option 4: Method 1 – repeated split sampling total rutting frequency distributions – calibration

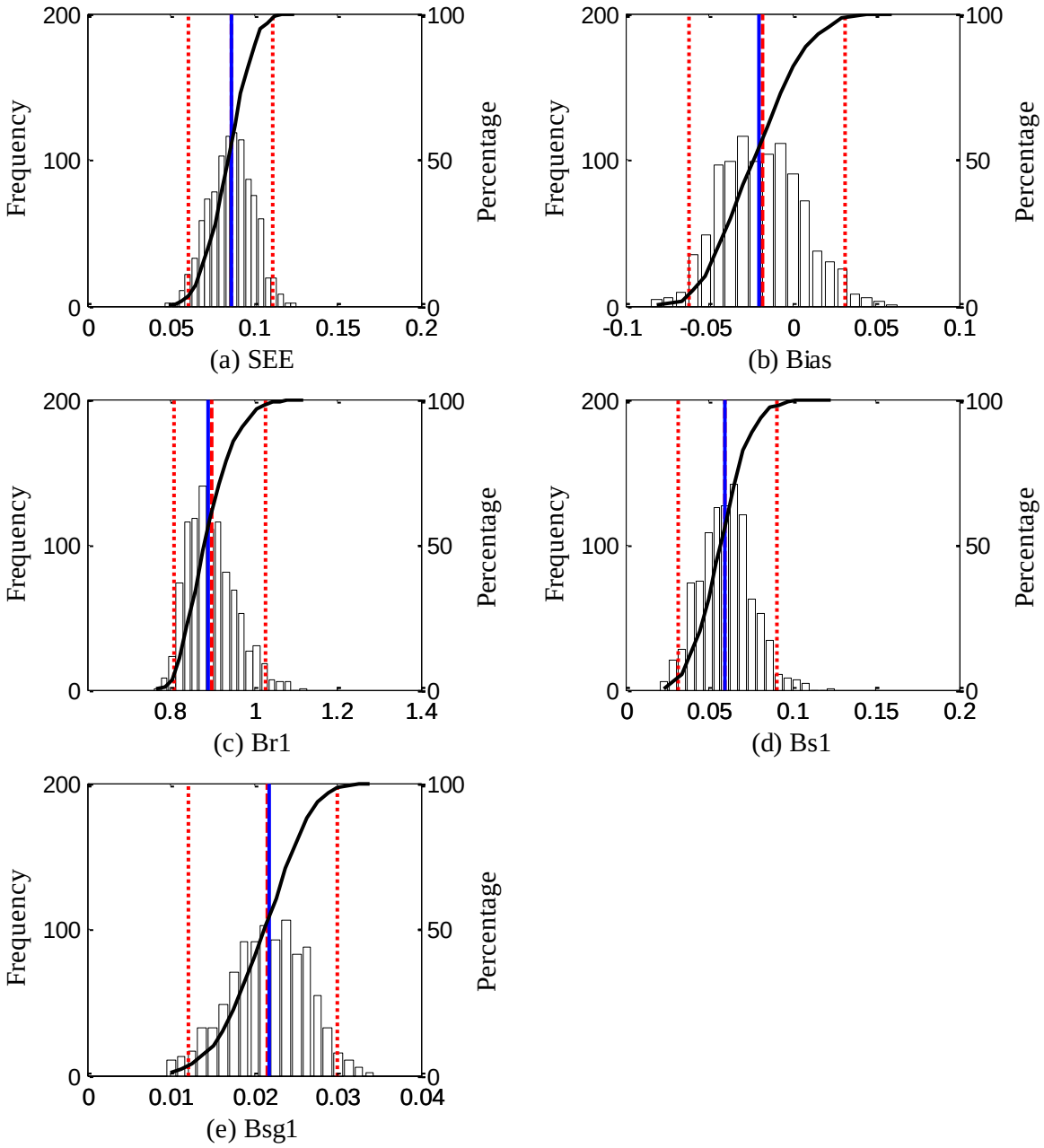
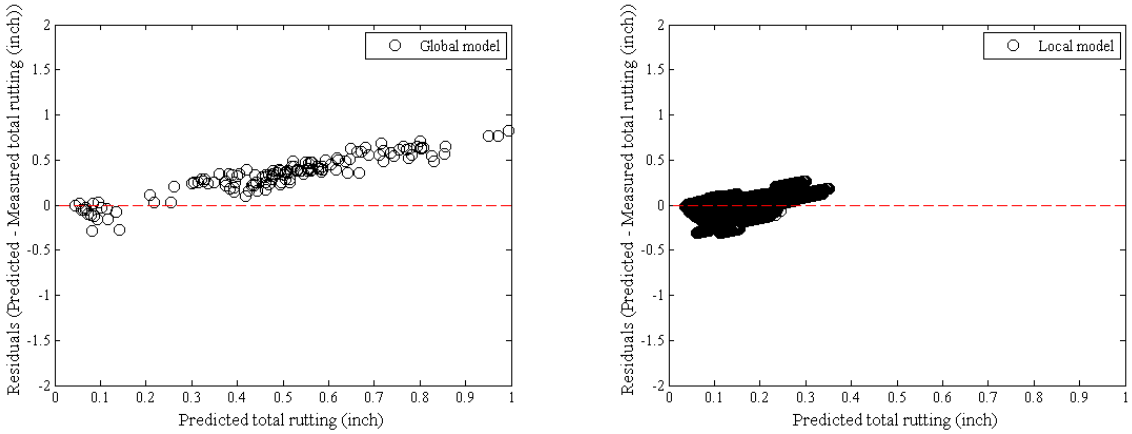
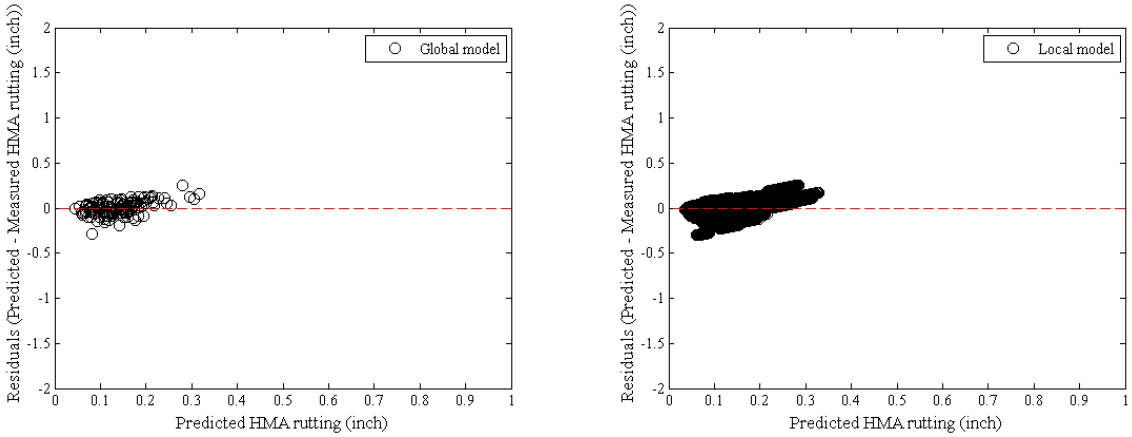


Figure B-228 Option 4: Method 1 – repeated split sampling total rutting frequency distributions – validation



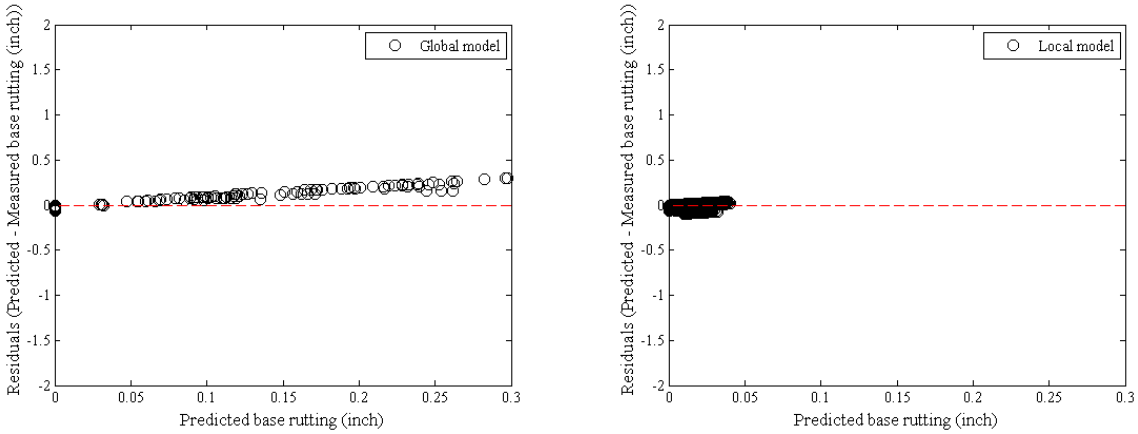
(a) Global model (b) Local model

Figure B-229 Option 4: Method 1 – Total rutting residual plots – repeated split sampling



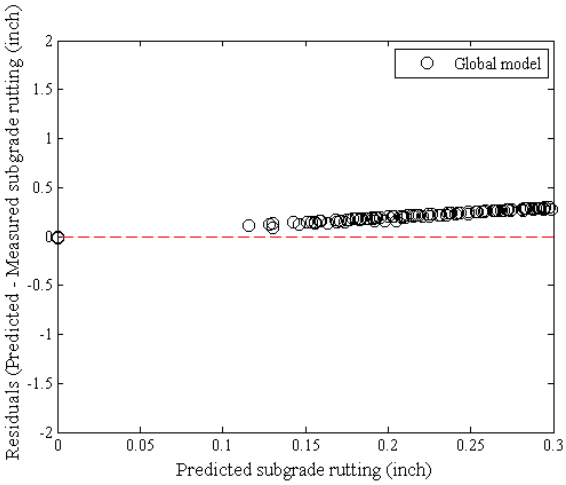
(a) Global model (b) Local model

Figure B-230 Option 4: Method 1 – HMA rutting residual plots - repeated split sampling

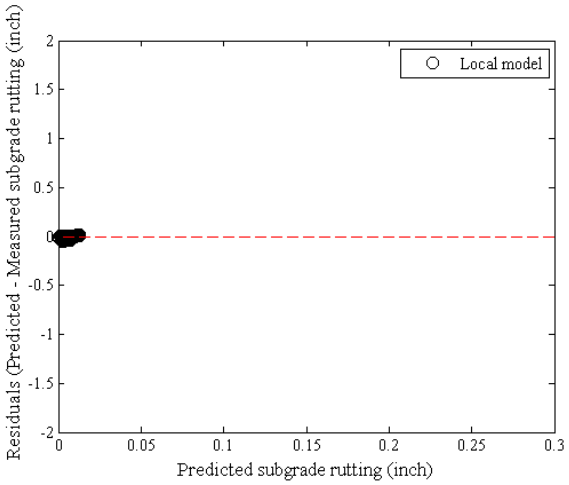


(a) Global model (b) Local model

Figure B-231 Option 4: Method 1 – Base rutting residual plots - repeated split sampling

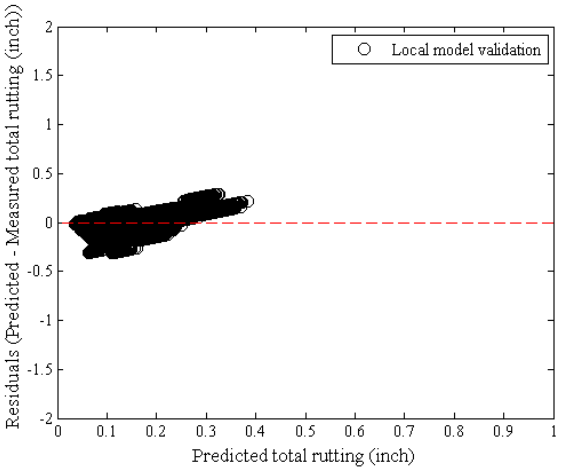


(a) Global model

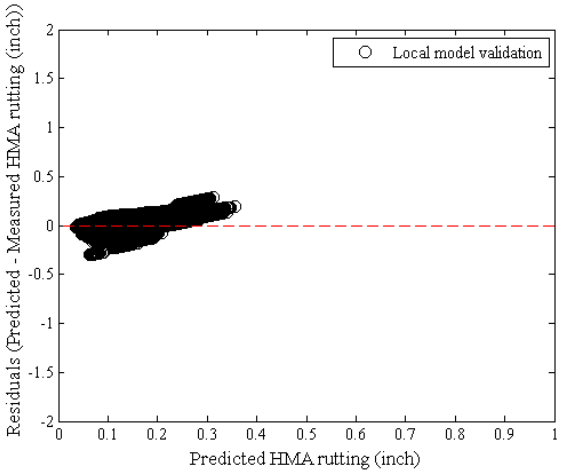


(b) Local model

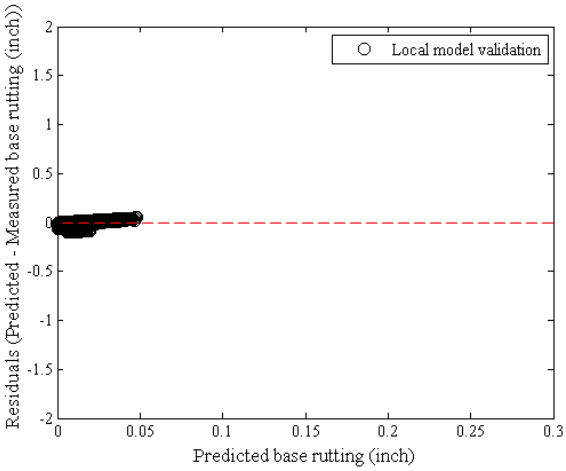
Figure B-232 Option 4: Method 1 – Subgrade rutting residual plots - repeated split sampling



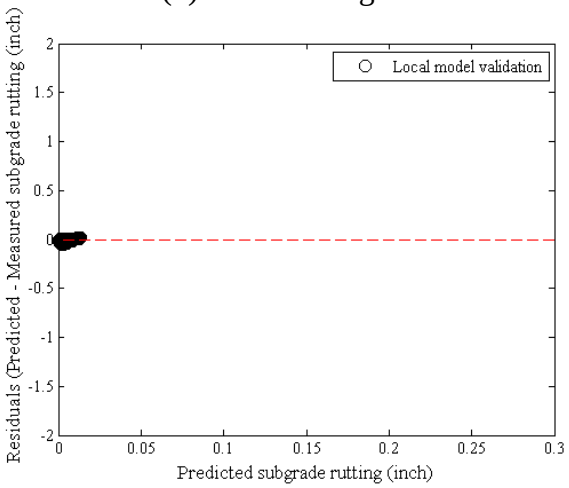
(a) Total rutting



(b) HMA rutting



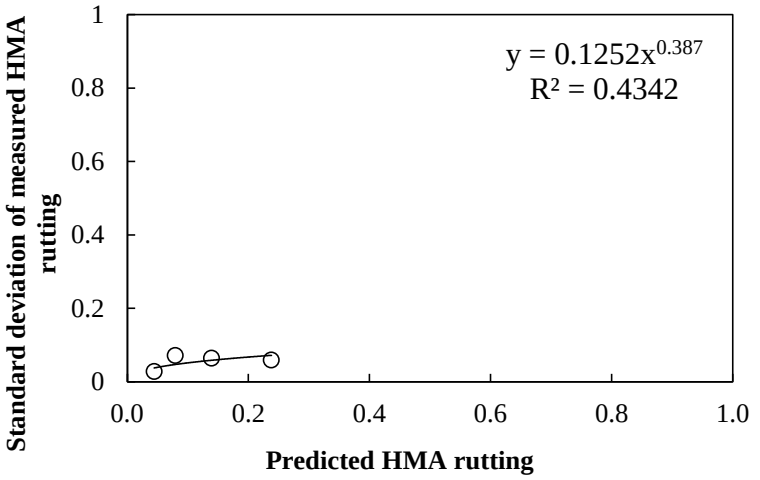
(c) Base rutting



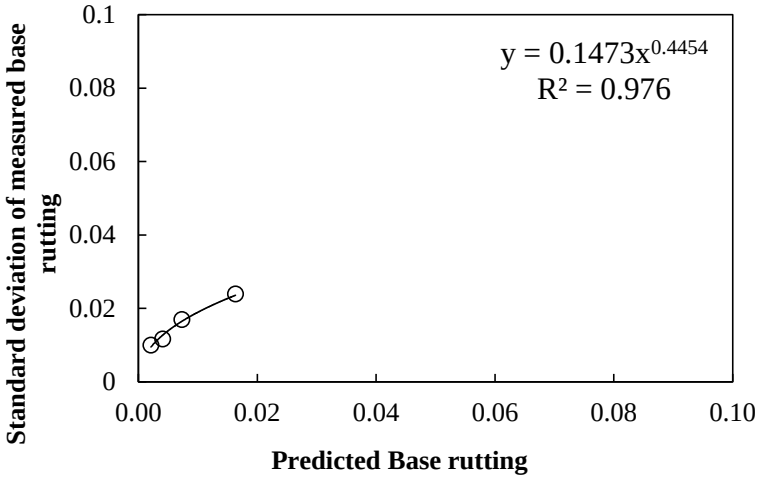
(d) Subgrade rutting

Figure B-233 Option 4: Method 1 – Rutting model validation residual plots – repeated split sampling

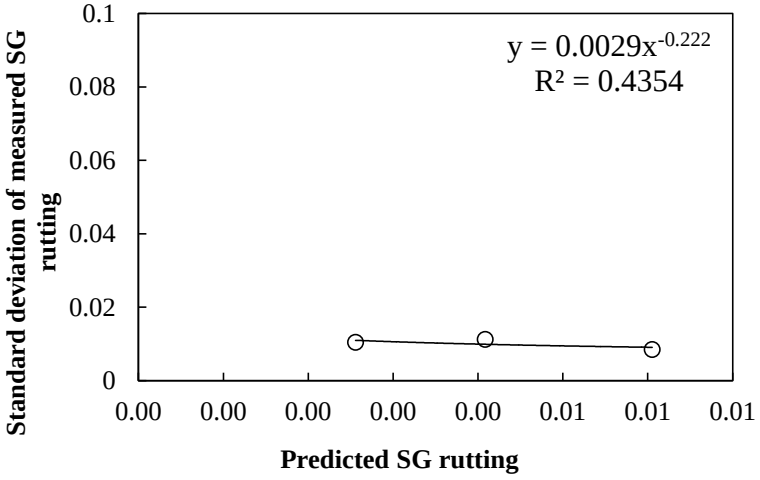
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-234 Rutting model reliability equations – option 4 method 1 – repeated split sampling

Bootstrapping

Table B-124 Option 4: Method 1 – Global model SEE and bias – bootstrapping

Calibration set	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0762	0.0624	0.0912	0.0030	-0.0176	0.0253
Base rutting	0.1789	0.1350	0.2213	0.1324	0.0886	0.1766
Subgrade rutting	0.2228	0.1964	0.2502	0.1958	0.1635	0.2305
Total rutting	0.4029	0.3402	0.4669	0.3313	0.2559	0.4090

Table B-125 Option 4: Method 1 – Local model SEE and bias – bootstrapping

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0737	0.0225	0.0092	0.0817
SEE Lower CI	0.0609	0.0157	0.0046	0.0657
SEE Upper CI	0.0885	0.0293	0.0134	0.0979
Average bias (in.)	-0.0109	-0.0071	-0.0011	-0.0191
Bias Lower CI	-0.0179	-0.0109	-0.0021	-0.0276
Bias Upper CI	-0.0032	-0.0037	-0.0002	-0.0110
Average calibration coefficient	0.9032	0.0612	0.0216	N/A
Calibration coefficient Lower CI	0.7529	0.0273	0.0107	N/A
Calibration coefficient Upper CI	1.0876	0.1114	0.0352	N/A

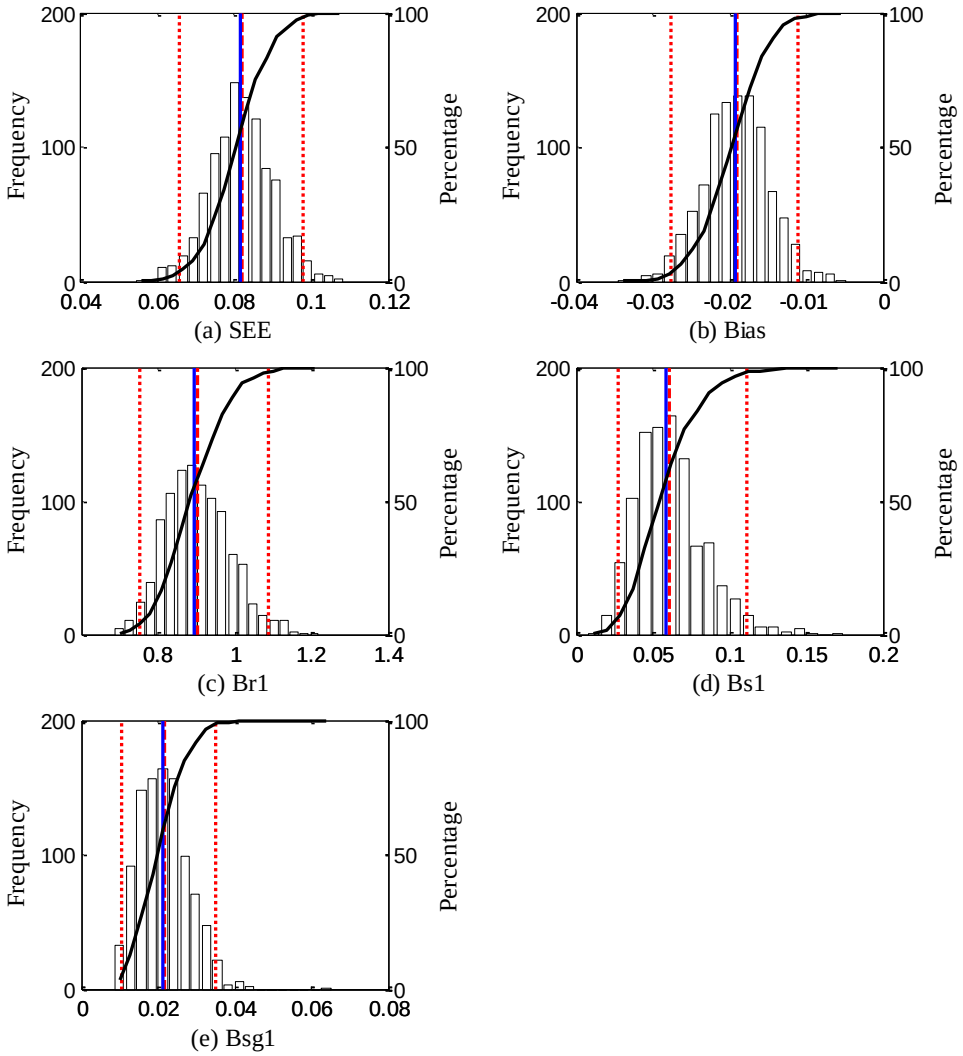


Figure B-235 Option 4: Method 1 – bootstrapping total rutting frequency distributions –calibration

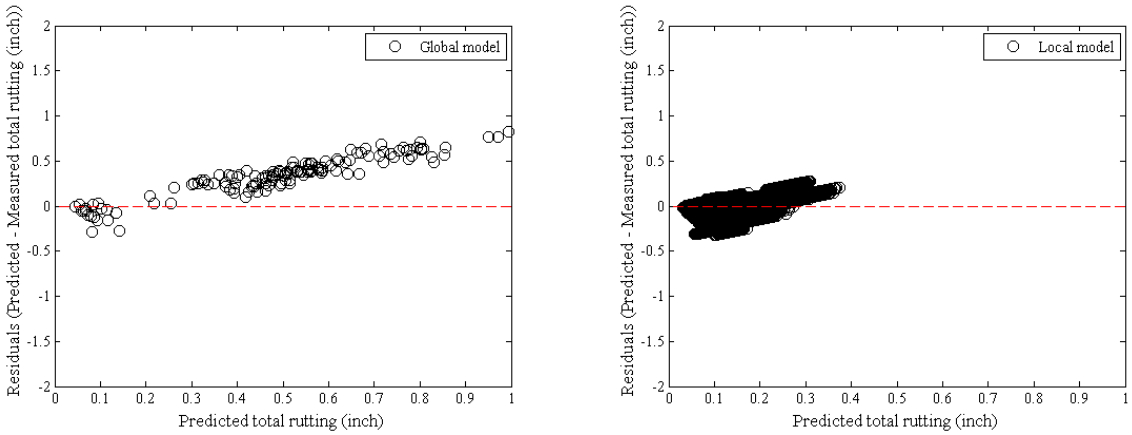
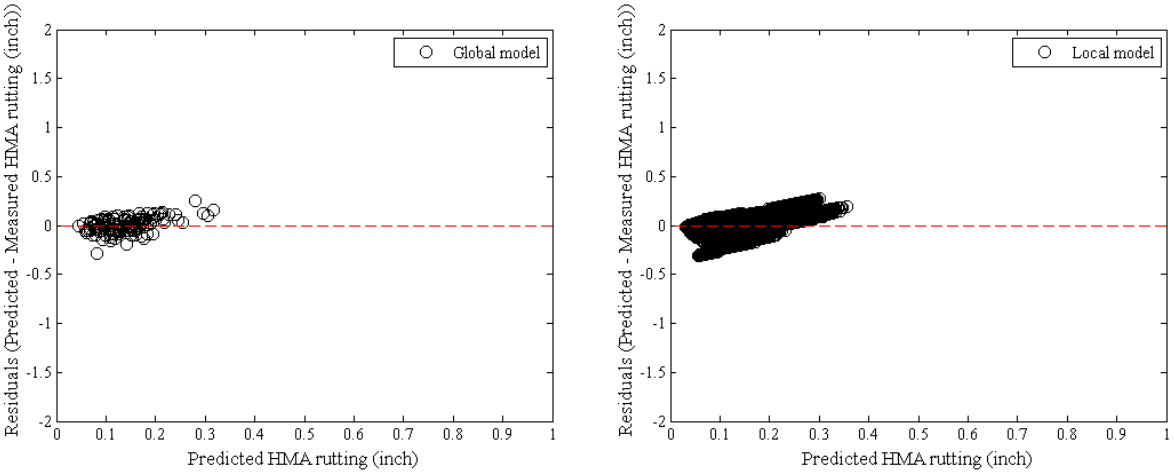
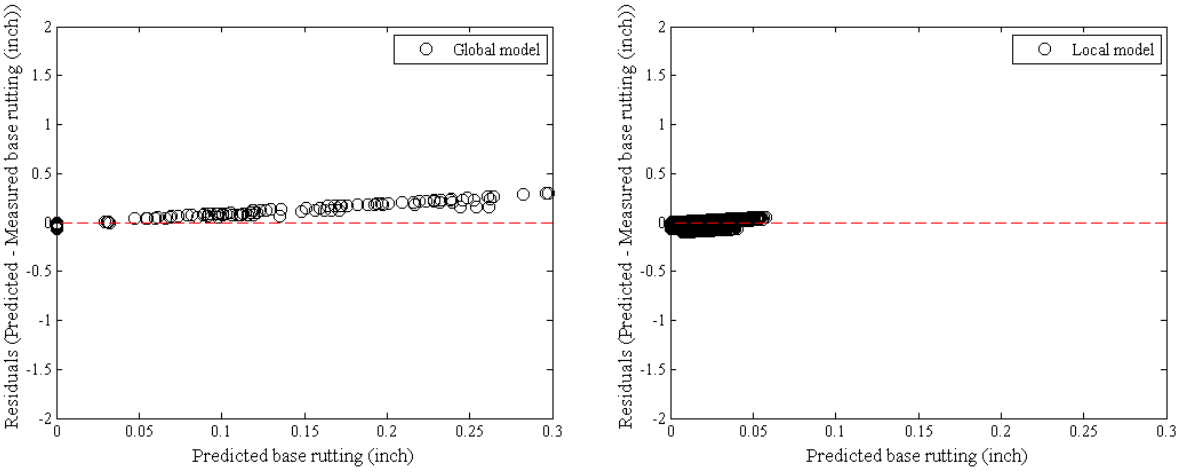


Figure B-236 Option 4: Method 1 – Total rutting residual plots – bootstrapping



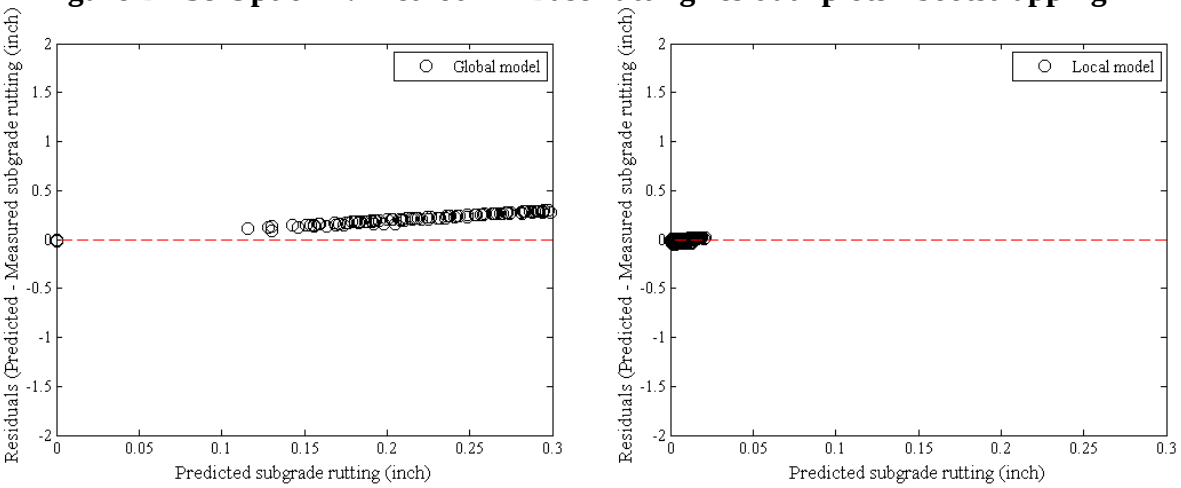
(a) Global model (b) Local model

Figure B-237 Option 4: Method 1 – HMA rutting residual plots - bootstrapping



(a) Global model (b) Local model

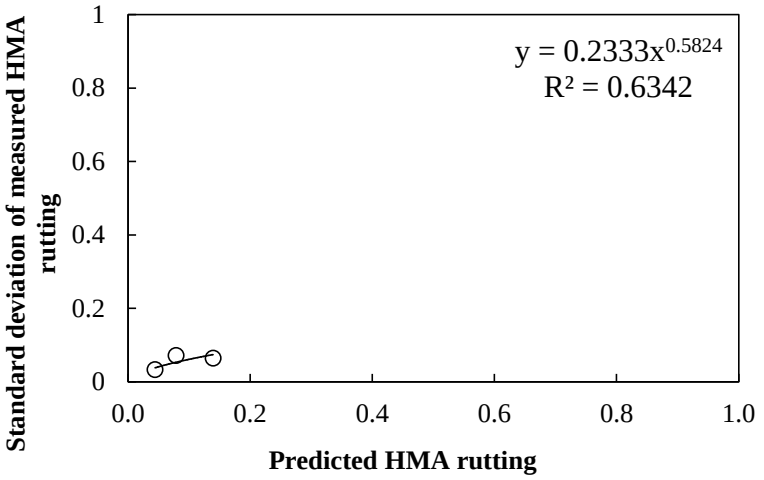
Figure B-238 Option 4: Method 1 – Base rutting residual plots - bootstrapping



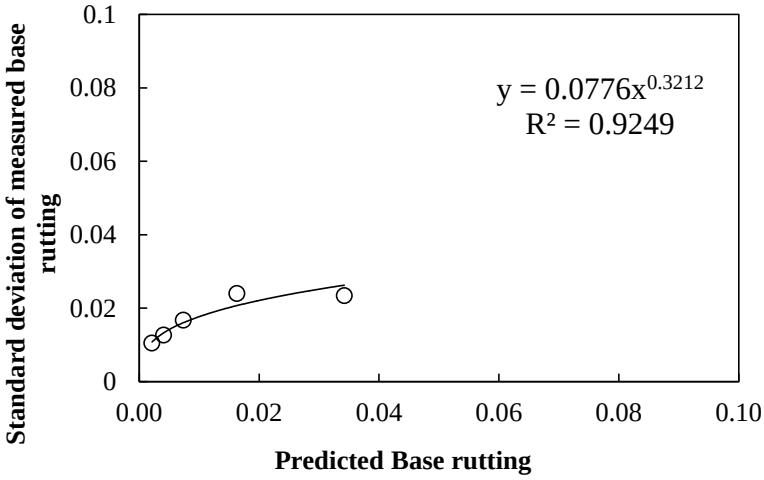
(a) Global model (b) Local model

Figure B-239 Option 4: Method 1 – Subgrade rutting residual plots - bootstrapping

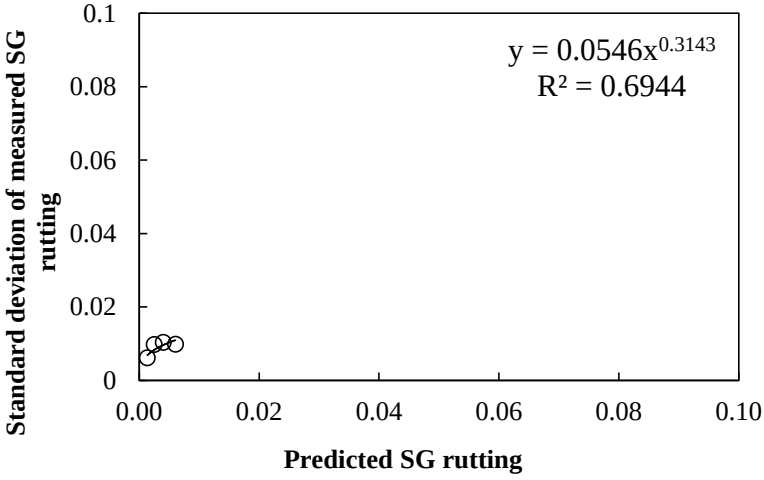
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-240 Rutting model reliability equations – option 4 method 1 – bootstrapping

B.1.3.6 Option 4 – Method 2

No sampling

Table B-126 Option 4: Method 2 – Global model goodness of fit – no sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0763	0.0038
Base rut	0.1797	0.1323
Subgrade	0.2230	0.1959
Total rut	0.4035	0.3320

Table B-127 Option 4: Method 2 – Global model *p*-values

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.5589	0.0000	0.0000
Base rut	0.0000	0.0000	0.0005
Subgrade	0.0000	0.0000	0.1369
Total rut	0.0000	0.0000	0.0039

Table B-128 Option 4: Method 2 – Local model goodness of fit– no sampling

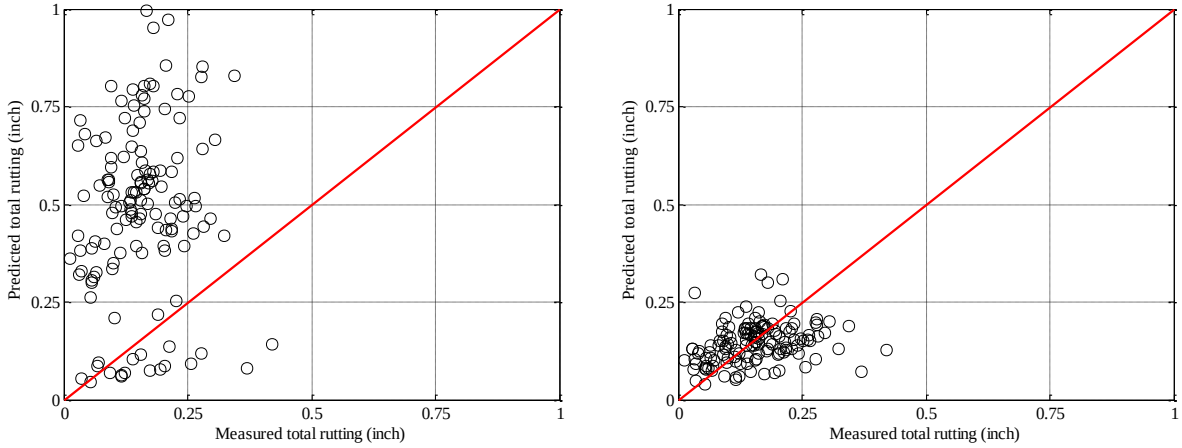
HMA layer	SEE	Bias
AC rut	0.0746	-0.0116
Base rut	0.0249	-0.0146
Subgrade	0.0211	0.0154
Total rut	0.0814	-0.0108

Table B-129 Option 4: Method 2 – Local model *p*-values– no sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0684	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.1225	0.0000	0.0000

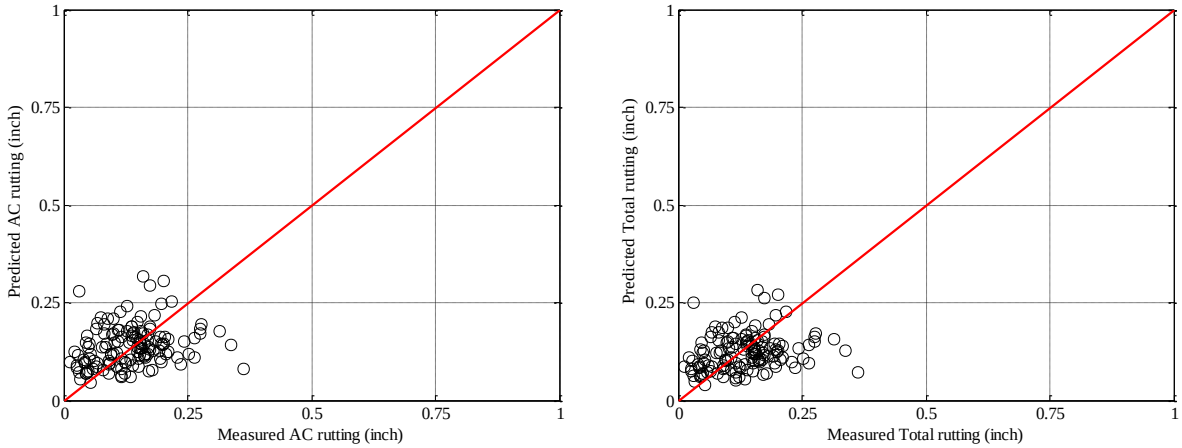
Table B-130 Option 4: Method 2 – Local model *p*-values– no sampling

Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.8888
Base rutting (bs1)	1.0000	0.0100
Subgrade rutting (bsg1)	1.0000	0.1040



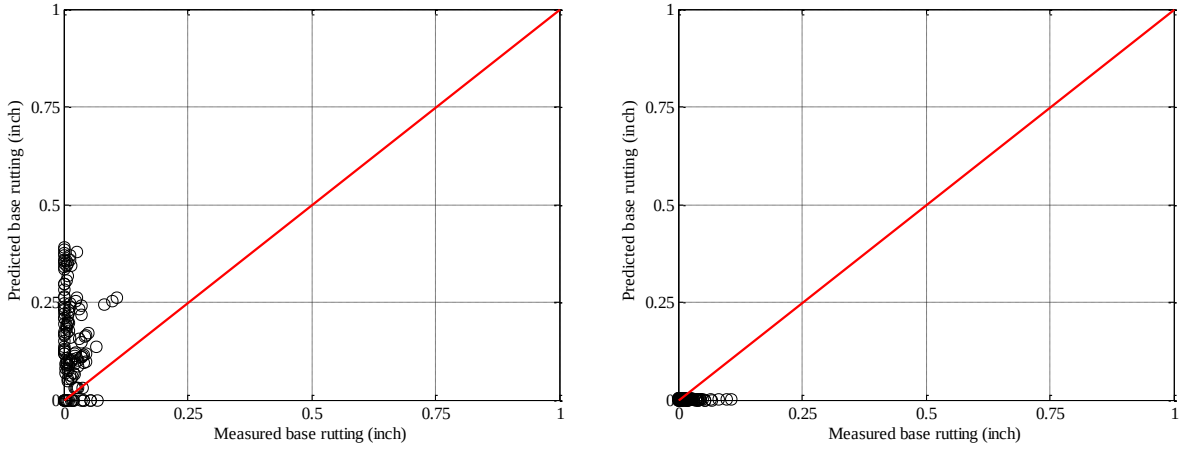
(a) Global model (b) Local model

Figure B-241 Option 4: Method 2 – Total rutting local calibration results - no sampling



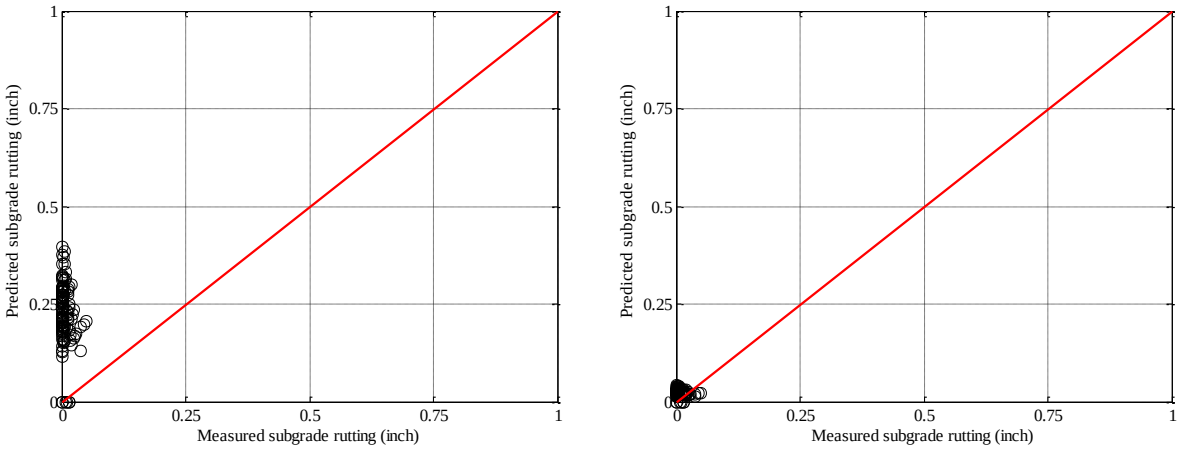
(a) Global model (b) Local model

Figure B-242 Option 4: Method 2 – HMA rutting local calibration results - no sampling



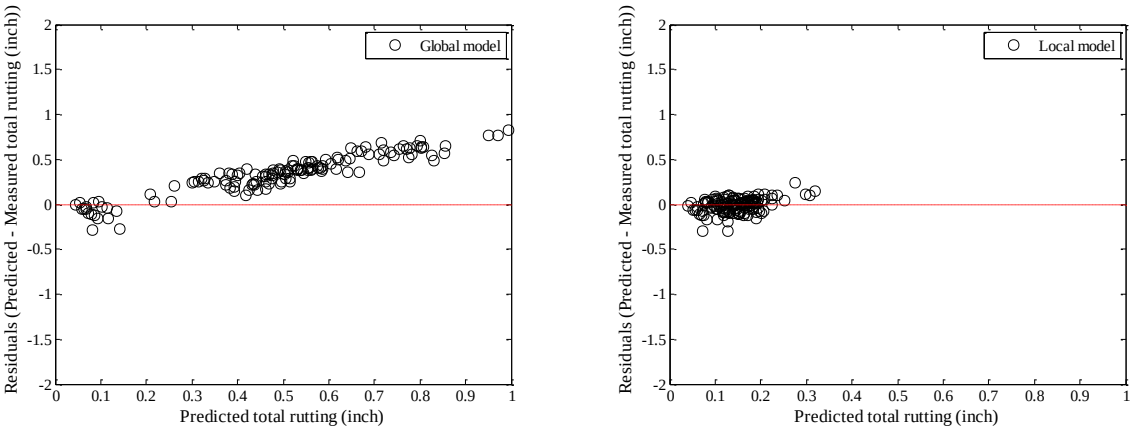
(a) Global model (b) Local model

Figure B-243 Option 4: Method 2 – Base rutting local calibration results - no sampling



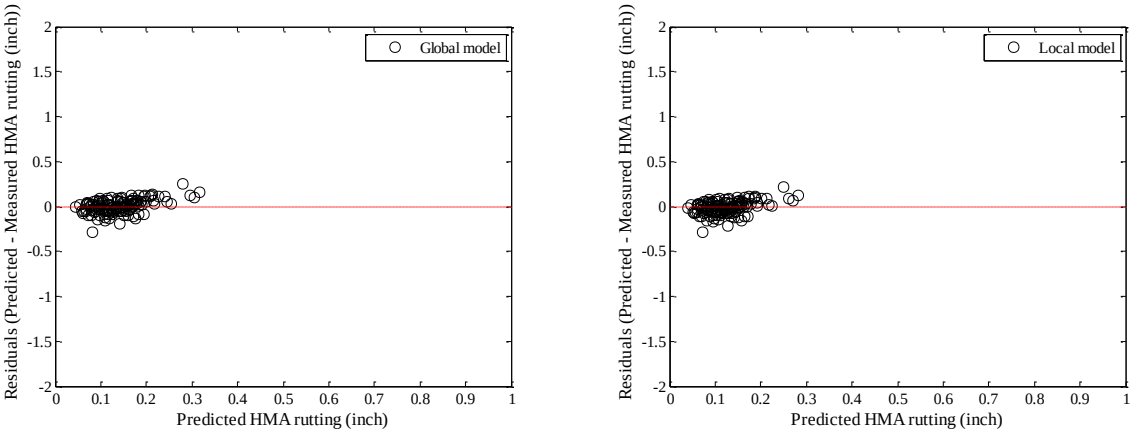
(a) Global model (b) Local model

Figure B-244 Option 4: Method 2 – Subgrade rutting local calibration results - no sampling



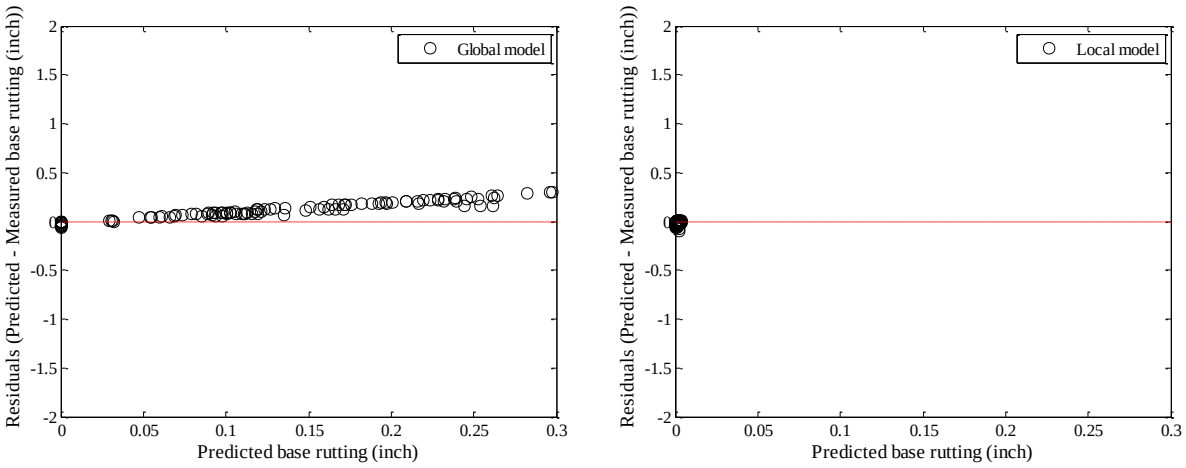
(a) Global model (b) Local model

Figure B-245 Option 4: Method 2 – Total rutting residual plots - no sampling



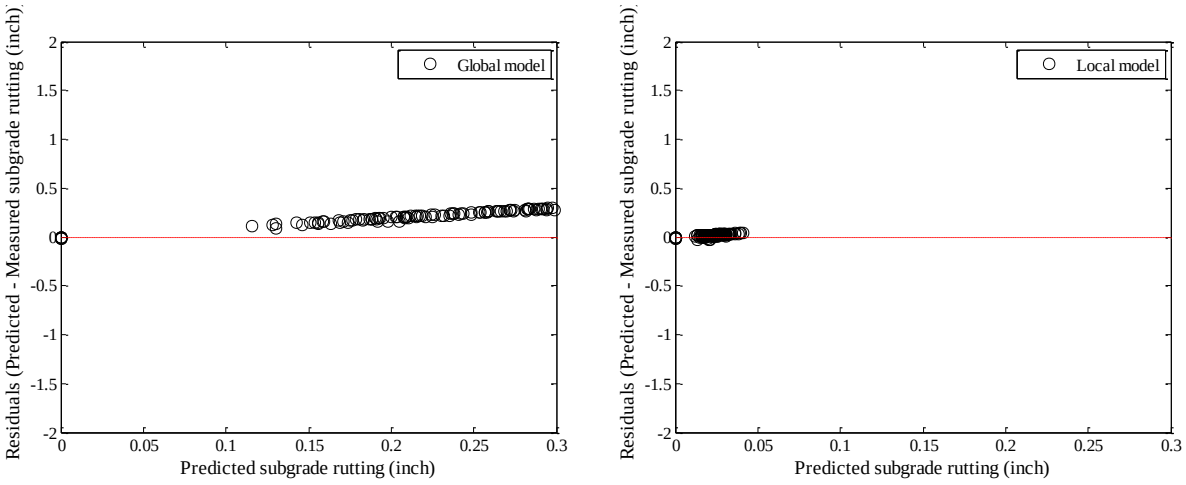
(a) Global model (b) Local model

Figure B-246 Option 4: Method 2 – HMA rutting residual plots - no sampling



(a) Global model (b) Local model

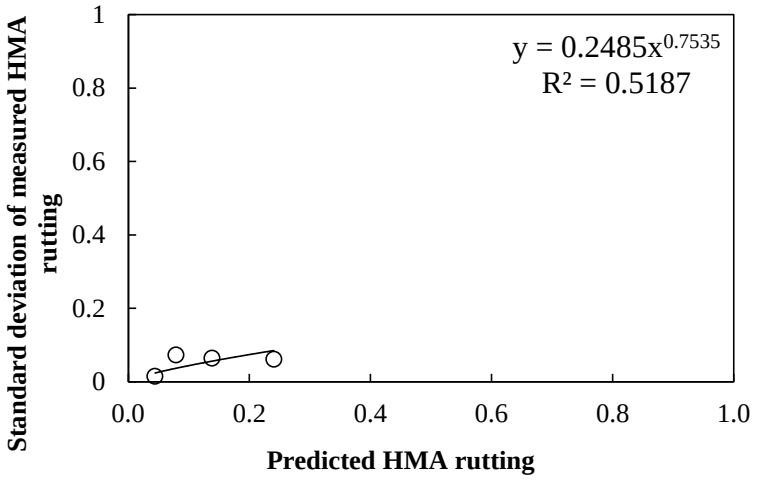
Figure B-247 Option 4: Method 2 – Base rutting residual plots - no sampling



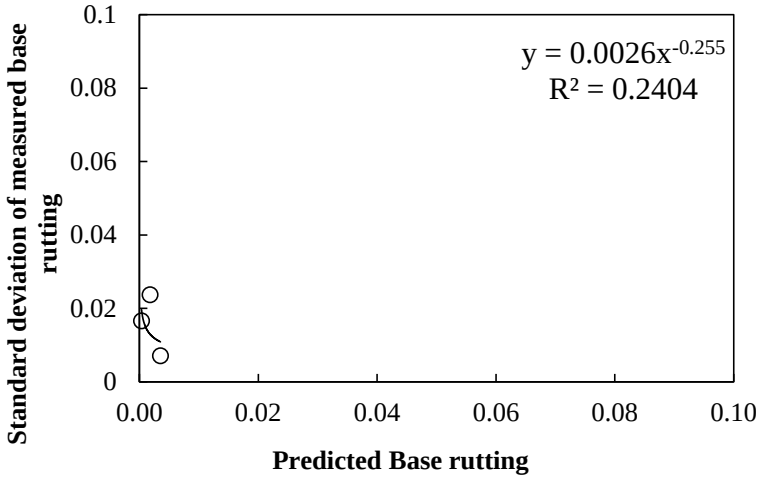
(a) Global model (b) Local model

Figure B-248 Option 4: Method 2 – Subgrade rutting residual plots - no sampling

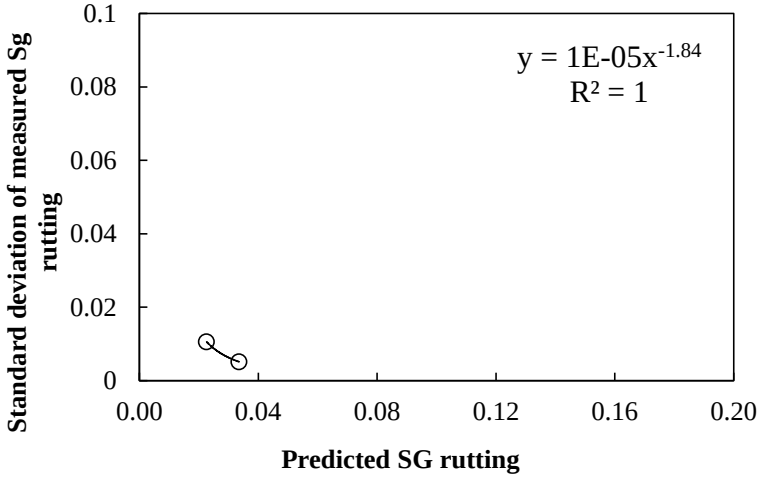
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-249 Rutting model reliability equations – option 4 method 2 – no sampling

Split sampling

Table B-131 Option 4: Method 2 – Global model goodness of fit – split sampling

HMA layer	SEE (in.)	Bias (in.)
AC rut	0.0793	0.0109
Base rut	0.1691	0.1240
Subgrade	0.2055	0.1730
Total rut	0.3852	0.3079

Table B-132 Option 4: Method 2 – Global model *p*-values - split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.1860	0.0000	0.0000
Base rut	0.0000	0.0000	0.0377
Subgrade	0.0000	0.0000	0.2417
Total rut	0.0000	0.0000	0.0127

Table B-133 Option 4: Method 2 – Local model goodness of fit– split sampling

HMA layer	SEE	Bias
AC rut	0.0769	0.0010
Base rut	0.0258	-0.0134
Subgrade	0.0123	0.0032
Total rut	0.0800	-0.0092

Table B-134 Option 4: Method 2 – Local model *p*-values– split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.9021	0.0000	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0109	0.0000	0.0000
Total rut	0.2707	0.0000	0.0000

Table B-135 Option 4: Method 2 – Local model *p*-values – split sampling

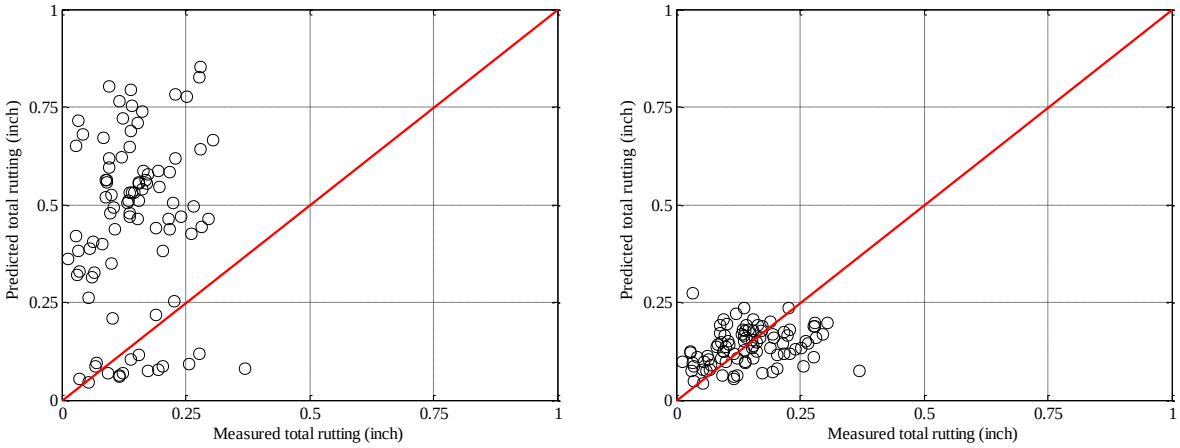
Calibration Coefficient	Global model	Local model
HMA rutting (br1)	1.0000	0.9277
Base rutting (bs1)	1.0000	0.0100
Subgrade rutting (bsg1)	1.0000	0.0506

Table B-136 Option 4: Method 2 – Local model validation p-values – split sampling

HMA layer	t-test p-value	Intercept p-value	Slope = 1 p-value
AC rut	0.0448	0.0002	0.0000
Base rut	0.0000	0.0000	0.0000
Subgrade	0.0000	0.0000	0.0000
Total rut	0.0160	0.0000	0.0000

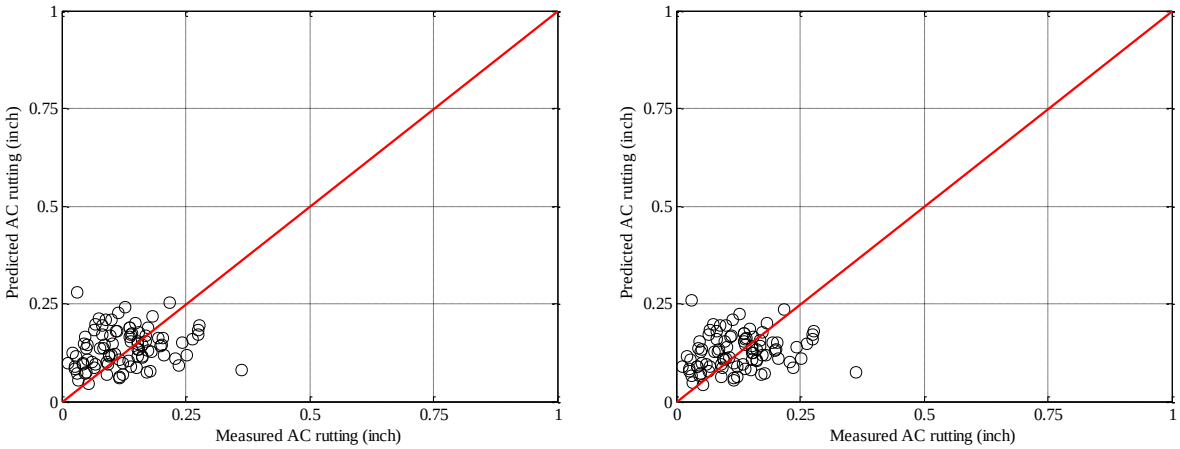
Table B-137 Option 4: Method 2 – Local model validation SEE and bias – split sampling

HMA layer	SEE	Bias
AC rut	0.0718	-0.0211
Base rut	0.0237	-0.0171
Subgrade	0.0106	0.0077
Total rut	0.0873	-0.0305



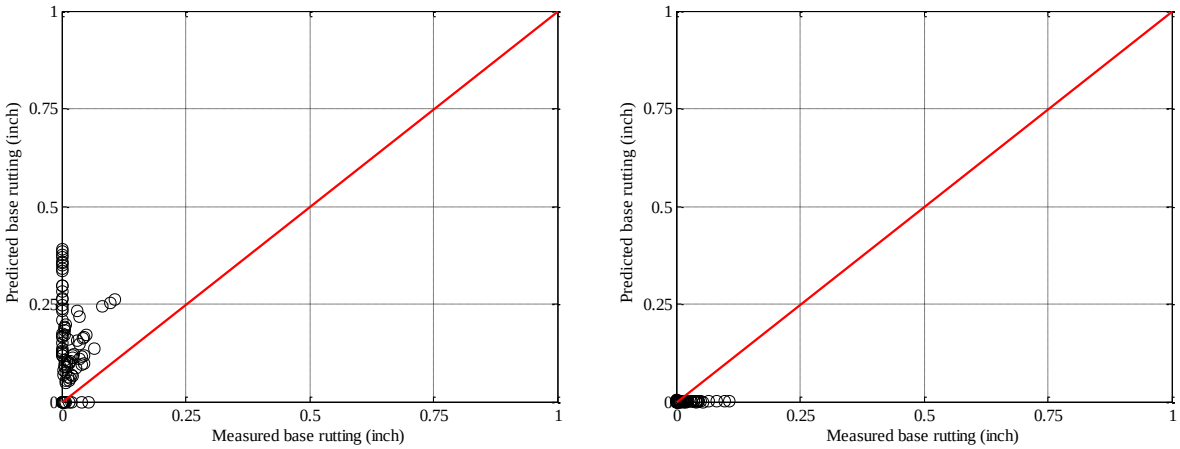
(a) Global model (b) Local model

Figure B-250 Option 4: Method 2 – Total rutting local calibration results - split sampling



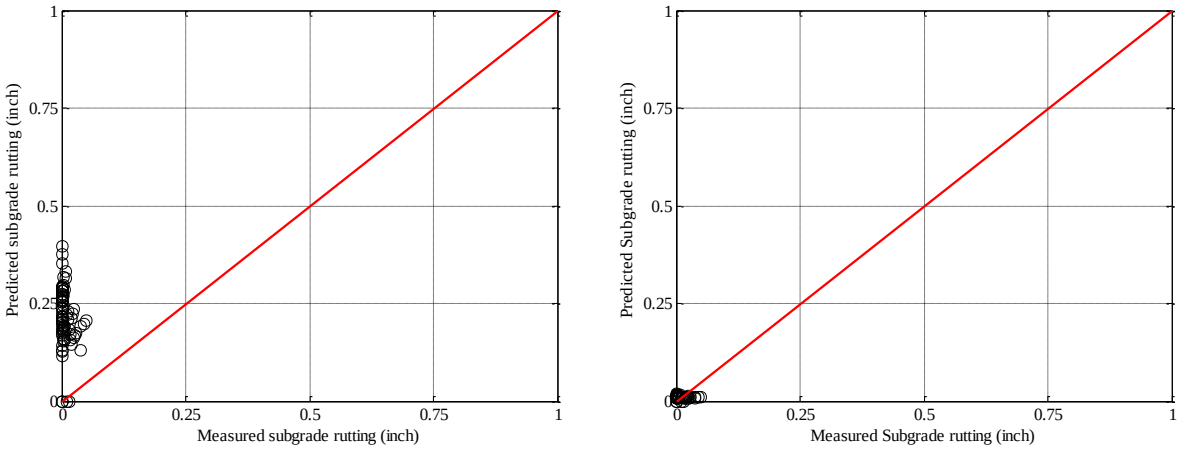
(a) Global model (b) Local model

Figure B-251 Option 4: Method 2 – HMA rutting local calibration results - split sampling



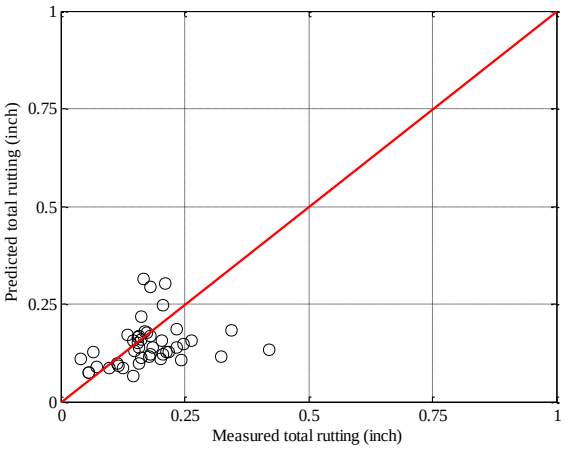
(a) Global model (b) Local model

Figure B-252 Option 4: Method 2 – Base rutting local calibration results - split sampling

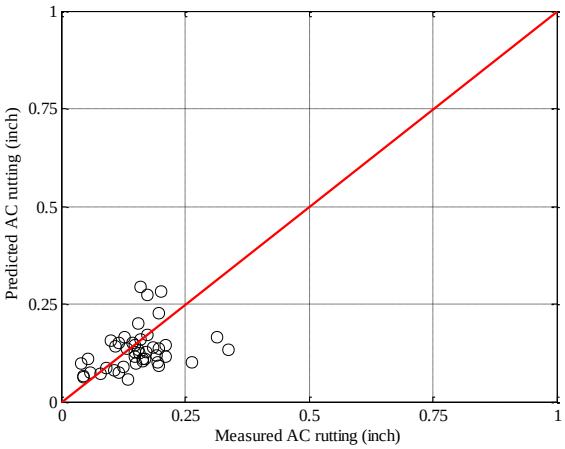


(a) Global model (b) Local model

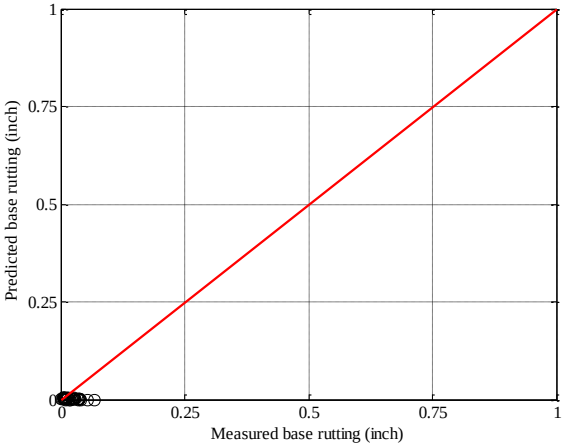
Figure B-253 Option 4: Method 2 – Subgrade rutting local calibration results - split sampling



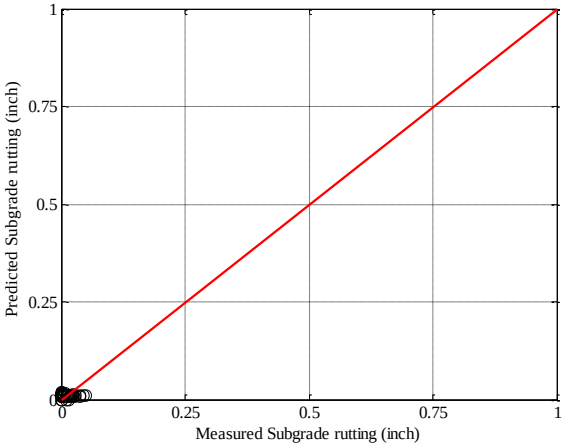
(a) Total rutting



(b) HMA rutting

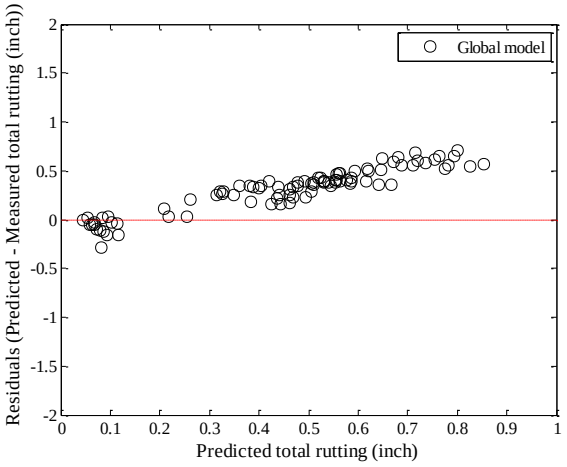


(c) Base rutting

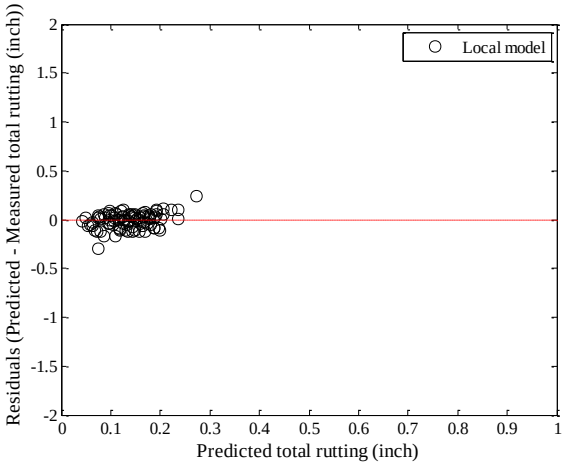


(d) Subgrade rutting

Figure B-254 Option 4: Method 2 – Rutting model validation – split sampling

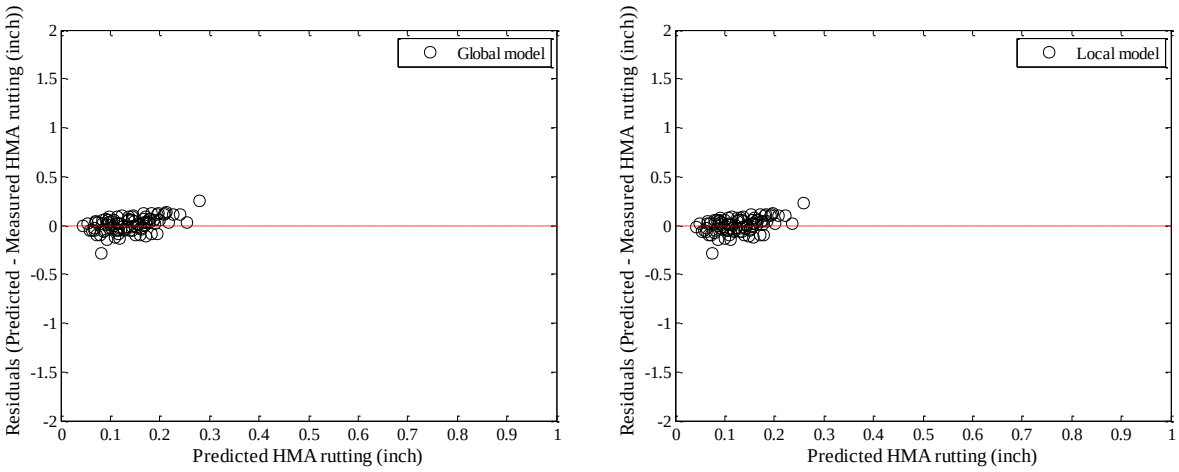


(a) Global model



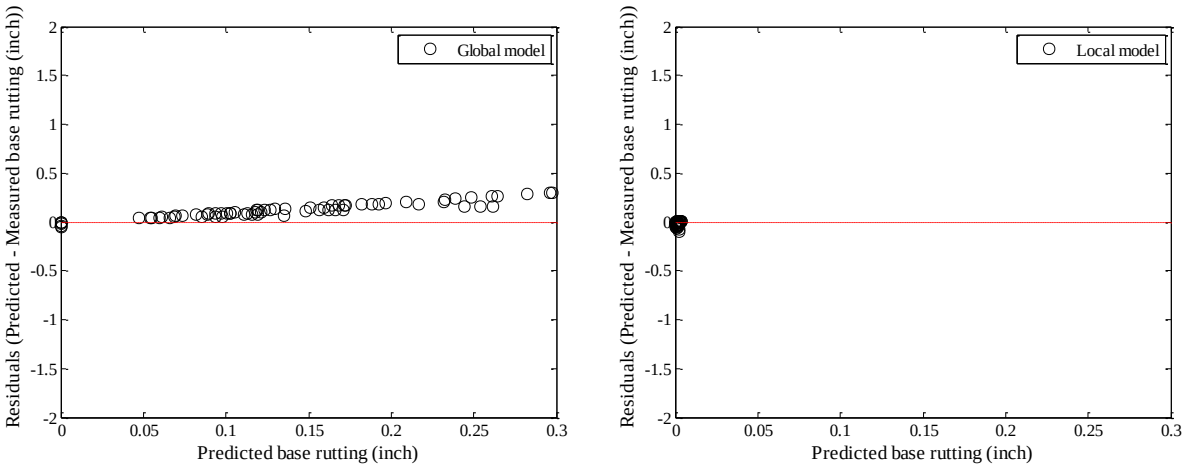
(b) Local model

Figure B-255 Option 4: Method 2 – Total rutting residual plots - split sampling



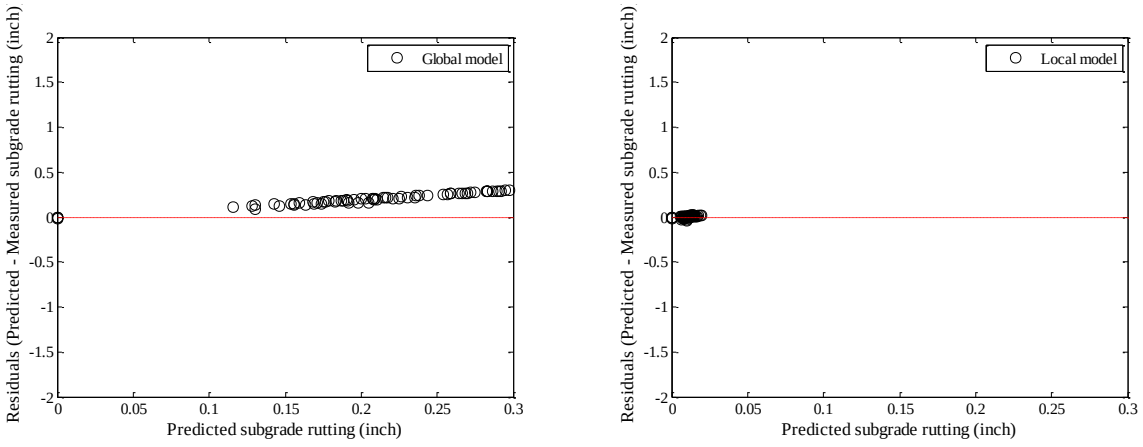
(a) Global model (b) Local model

Figure B-256 Option 4: Method 2 – HMA rutting residual plots - split sampling



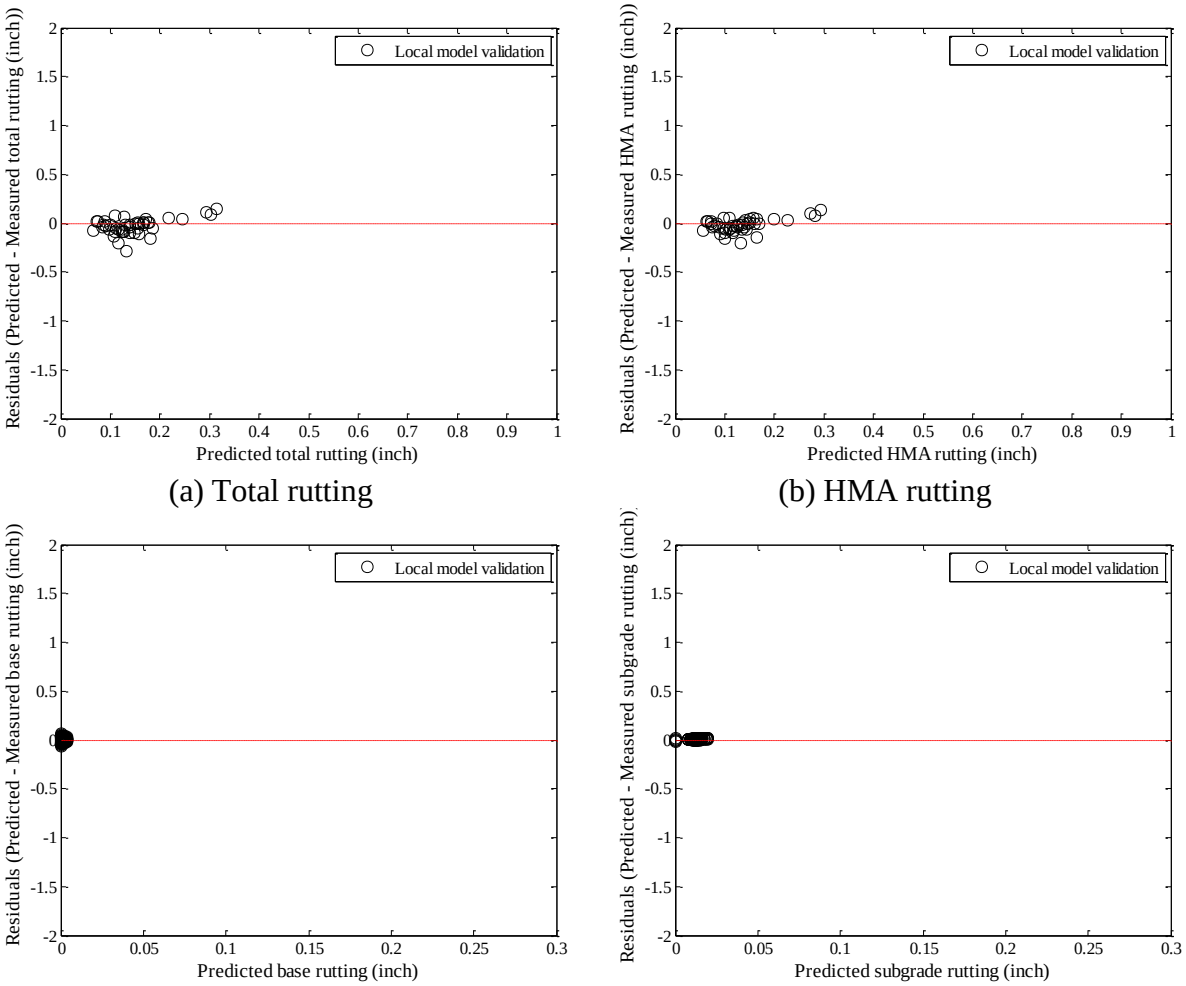
(a) Global model (b) Local model

Figure B-257 Option 4: Method 2 – Base rutting residual plots - split sampling



(a) Global model (b) Local model

Figure B-258 Option 4: Method 2 – Subgrade rutting residual plots - split sampling

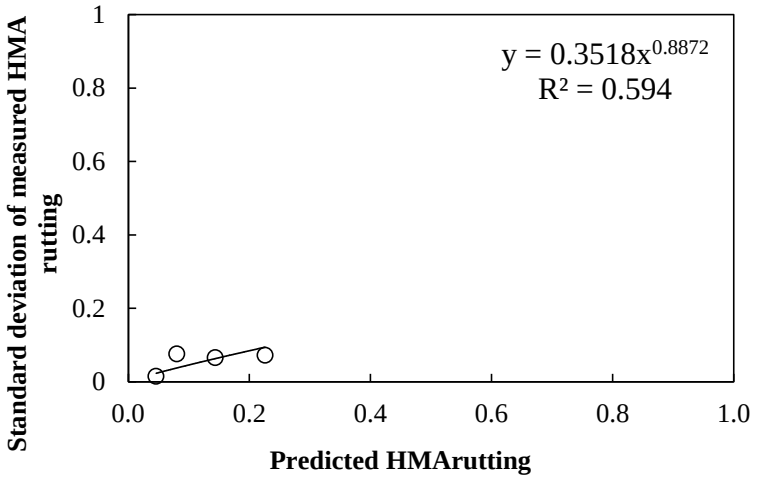


(a) Total rutting (b) HMA rutting

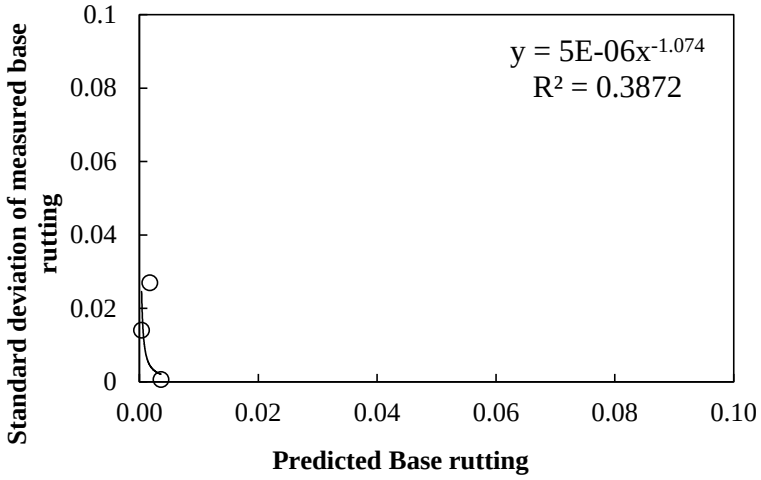
(c) Base rutting (d) Subgrade rutting

Figure B-259 Option 4: Method 2 – Rutting model validation residual plots – split sampling

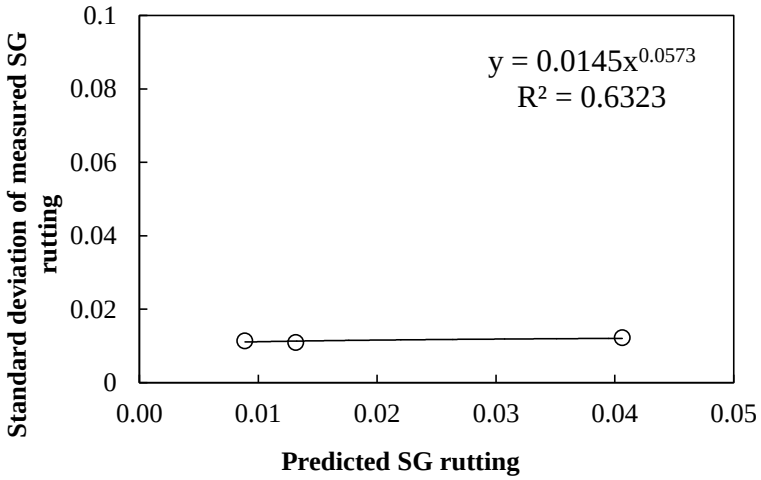
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-260 Rutting model reliability equations – option 4 method 2 – split sampling

Repeated split sampling

Table B-138 Option 4: Method 2 – Global model SEE and bias – repeated split sampling

Global Model	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0767	0.0651	0.0849	0.0038	-0.0123	0.0171
Base rutting	0.1802	0.1475	0.2045	0.1325	0.1027	0.1588
Subgrade rutting	0.2236	0.2060	0.2408	0.1959	0.1745	0.2192
Total rutting	0.4047	0.3592	0.4422	0.3322	0.2838	0.3802

Table B-139 Option 4: Method 2 – Local model SEE and bias – repeated split sampling

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0760	0.0247	0.0237	0.0807
SEE Lower CI	0.0660	0.0177	0.0084	0.0683
SEE Upper CI	0.0832	0.0293	0.0500	0.0908
Average bias (in.)	-0.0120	-0.0144	0.0162	-0.0102
Bias Lower CI	-0.0410	-0.0186	-0.0050	-0.0160
Bias Upper CI	0.0164	-0.0095	0.0440	-0.0034
Average calibration coefficient	0.8898	0.0105	0.1065	N/A
Calibration coefficient Lower CI	0.6397	0.0100	0.0100	N/A
Calibration coefficient Upper CI	1.1789	0.0133	0.2331	N/A

Table B-140 Option 4: Method 2 – Local model validation SEE and bias – repeated split sampling

Validation set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0810	0.0244	0.0231	0.0865
SEE Lower CI	0.0566	0.0120	0.0040	0.0580
SEE Upper CI	0.1121	0.0375	0.0499	0.1150
Average bias (in.)	-0.0112	-0.0147	0.0152	-0.0106
Bias Lower CI	-0.0649	-0.0250	-0.0053	-0.0538
Bias Upper CI	0.0599	-0.0055	0.0390	0.0484
Average calibration coefficient	0.8898	0.0105	0.1065	N/A
Calibration coefficient Lower CI	0.6397	0.0100	0.0100	N/A
Calibration coefficient Upper CI	1.1789	0.0133	0.2331	N/A

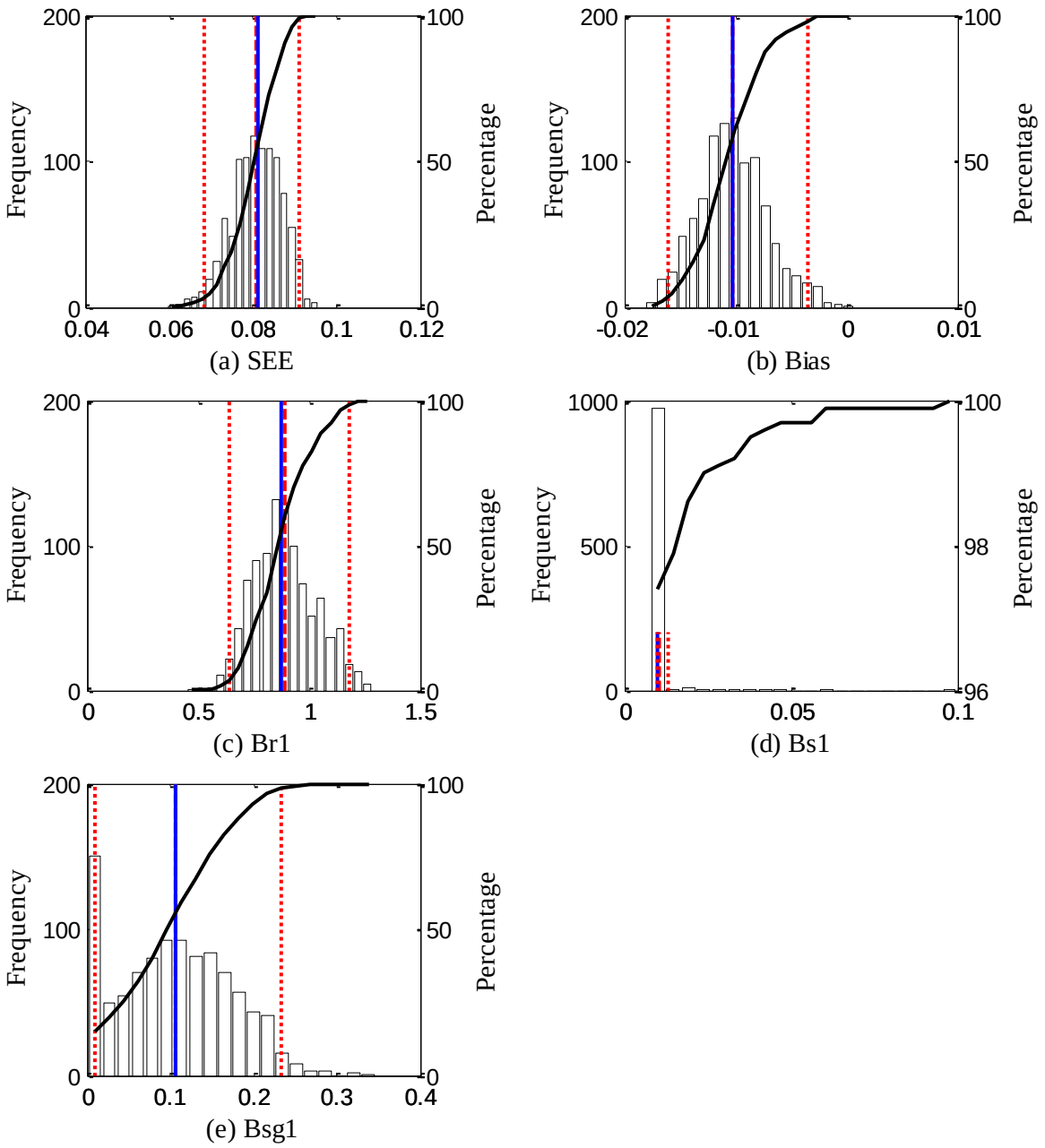


Figure B-261 Option 4: Method 2 – repeated split sampling total rutting frequency distributions – calibration

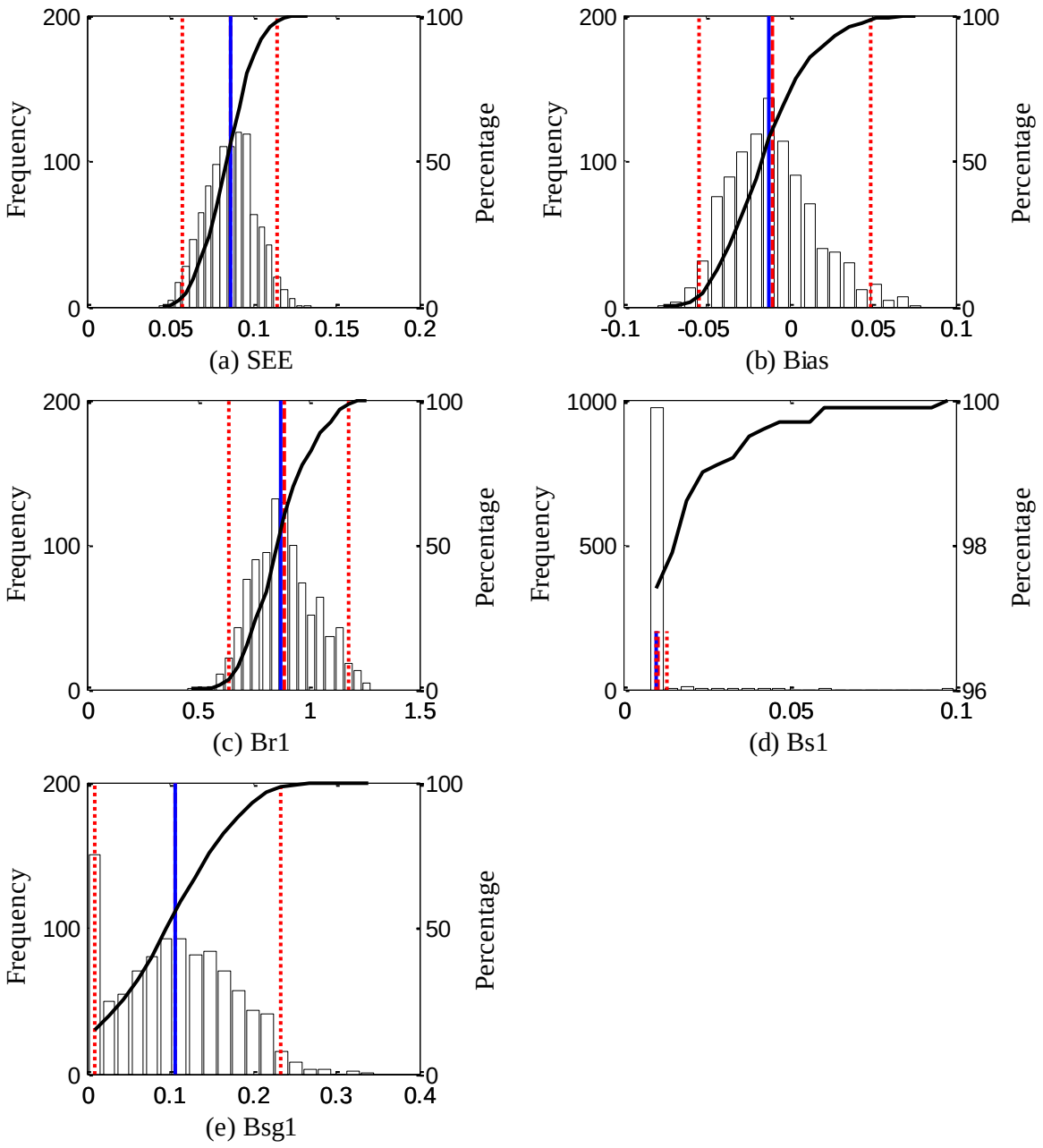
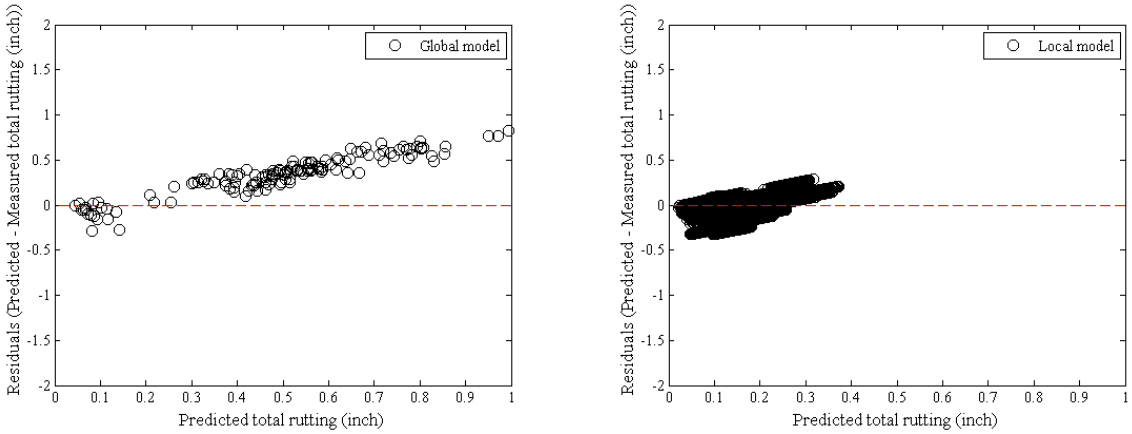
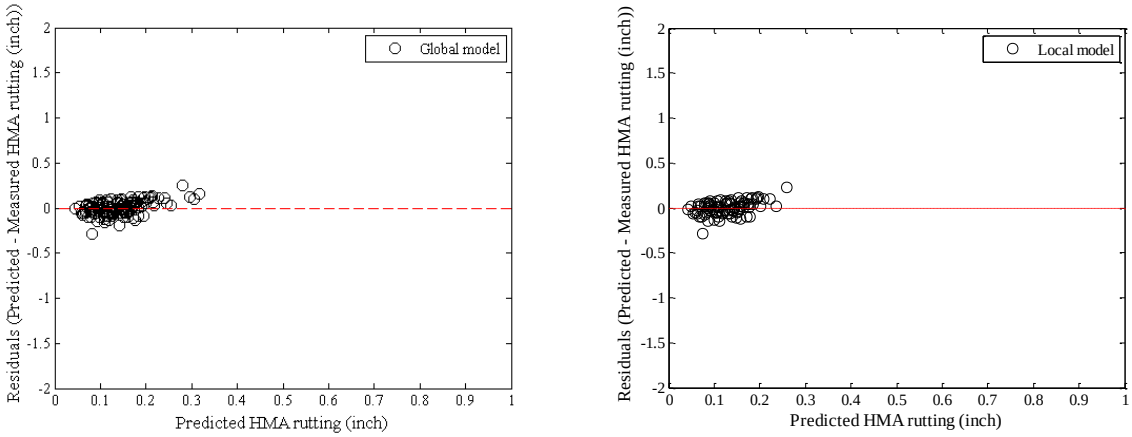


Figure B-262 Option 4: Method 2 – repeated split sampling total rutting frequency distributions – validation



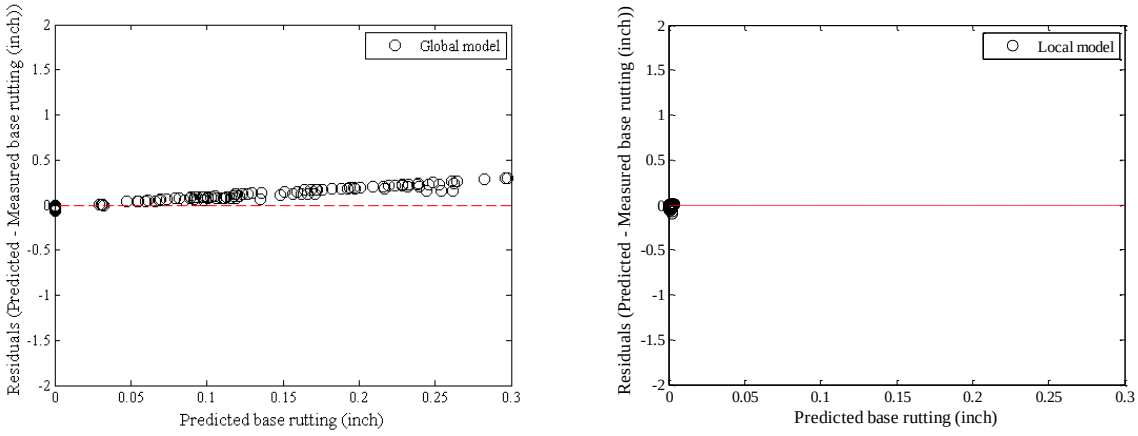
(a) Global model (b) Local model

Figure B-263 Option 4: Method 2 – Total rutting residual plots – repeated split sampling



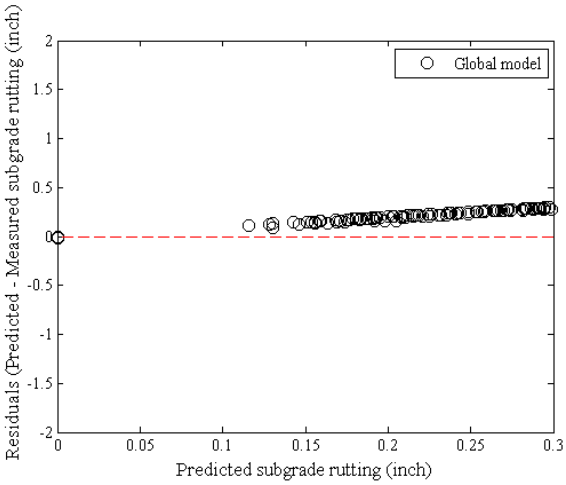
(a) Global model (b) Local model

Figure B-264 Option 4: Method 2 – HMA rutting residual plots - repeated split sampling

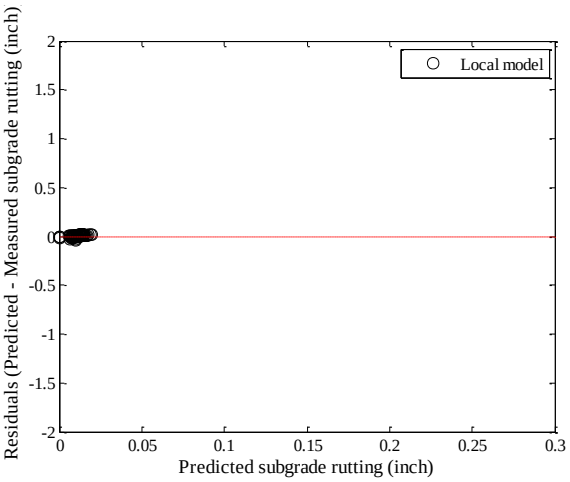


(a) Global model (b) Local model

Figure B-265 Option 4: Method 2 – Base rutting residual plots - repeated split sampling

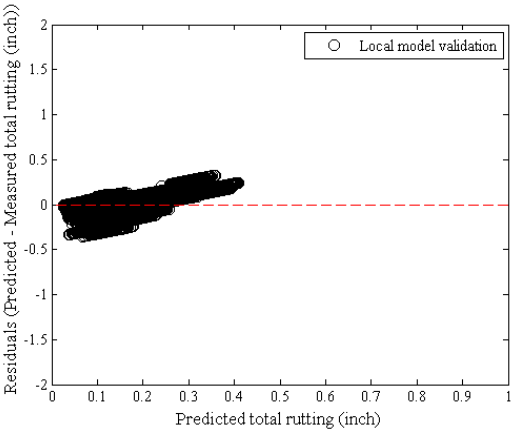


(a) Global model

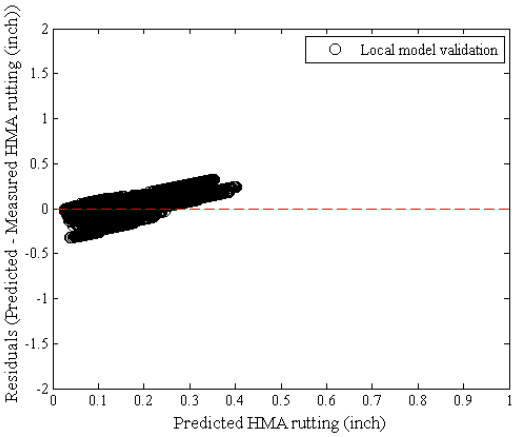


(b) Local model

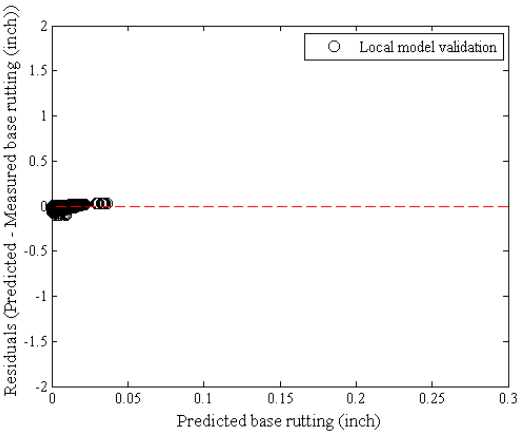
Figure B-266 Option 4: Method 2 – Subgrade rutting residual plots - repeated split sampling



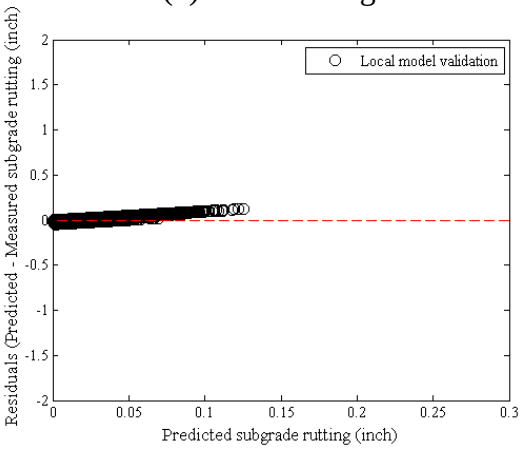
(a) Total rutting



(b) HMA rutting



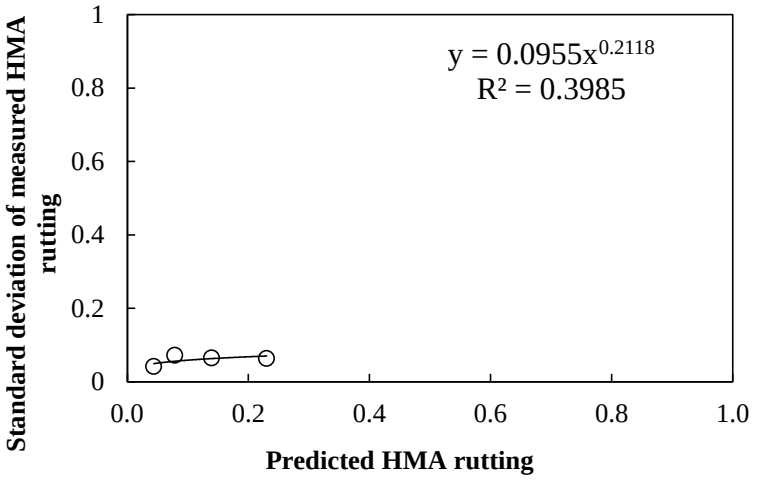
(c) Base rutting



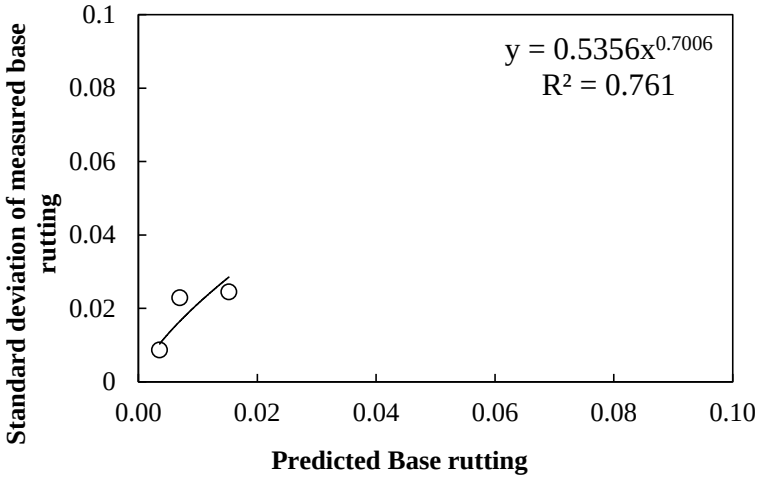
(d) Subgrade rutting

Figure B-267 Option 4: Method 2 – Rutting model validation residual plots – repeated split sampling

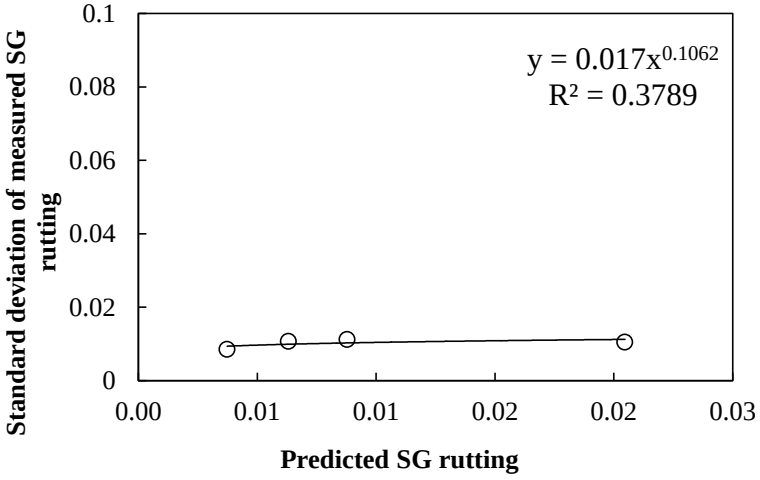
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-268 Rutting model reliability equations – option 4 method 2 – repeated split sampling

Bootstrapping

Table B-141 Option 4: Method 2 – Global model SEE and bias – bootstrapping

Calibration set	Average SEE	SEE Lower CI	SEE Upper CI	Average bias (in.)	Bias Lower CI	Bias Upper CI
AC rutting	0.0760	0.0612	0.0904	0.0032	-0.0187	0.0259
Base rutting	0.1788	0.1342	0.2189	0.1327	0.0901	0.1740
Subgrade rutting	0.2221	0.1943	0.2514	0.1954	0.1607	0.2316
Total rutting	0.4021	0.3390	0.4609	0.3313	0.2551	0.4031

Table B-142 Option 4: Method 2 – Local model SEE and bias – bootstrapping

Calibration set	AC rutting	Base rutting	Subgrade rutting	Total rutting
Average SEE	0.0758	0.0245	0.0236	0.0796
SEE Lower CI	0.0614	0.0163	0.0060	0.0644
SEE Upper CI	0.0905	0.0336	0.0628	0.0963
Average bias (in.)	-0.0110	-0.0141	0.0153	-0.0098
Bias Lower CI	-0.0538	-0.0214	-0.0058	-0.0181
Bias Upper CI	0.0173	-0.0067	0.0571	-0.0019
Average calibration coefficient	0.9042	0.0129	0.1011	N/A
Calibration coefficient Lower CI	0.5475	0.0100	0.0100	N/A
Calibration coefficient Upper CI	1.2275	0.0520	0.2866	N/A

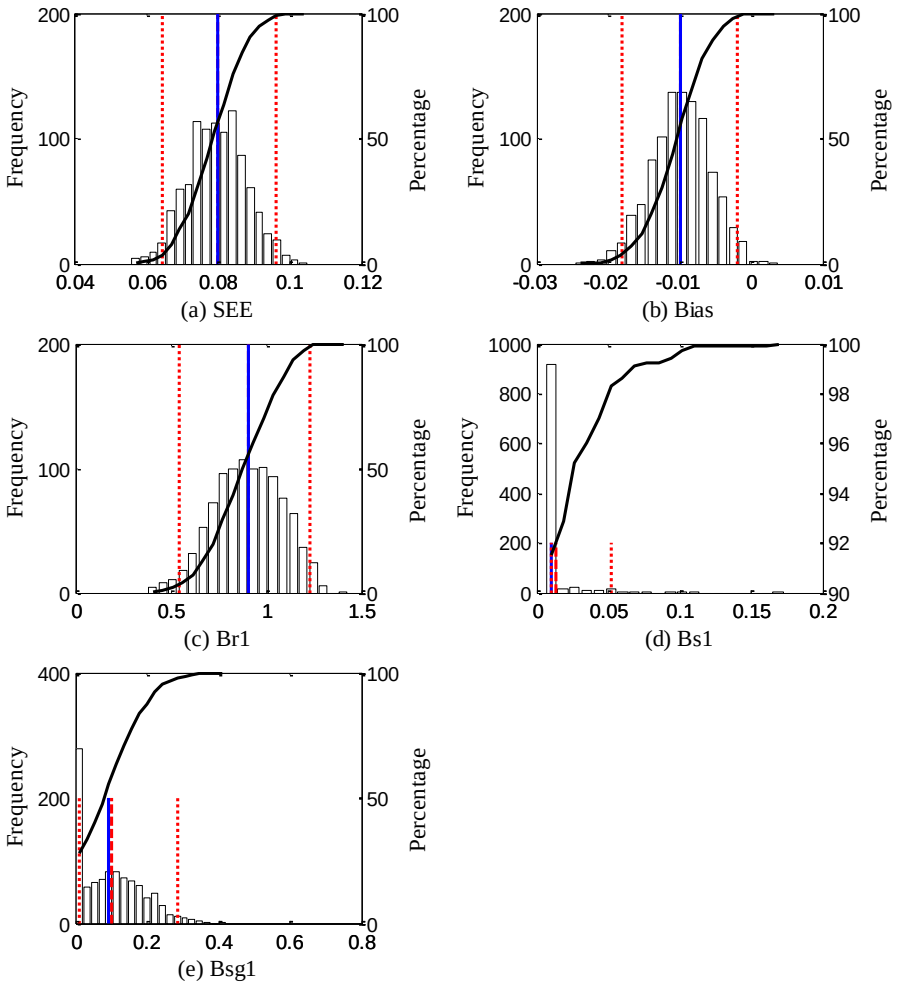


Figure B-269 Option 4: Method 2 – bootstrapping total rutting frequency distributions –calibration

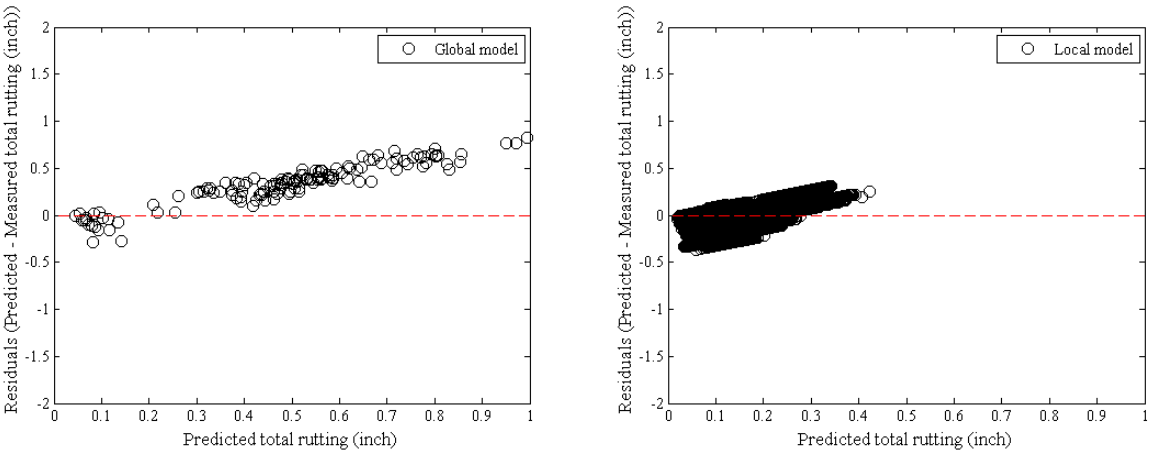
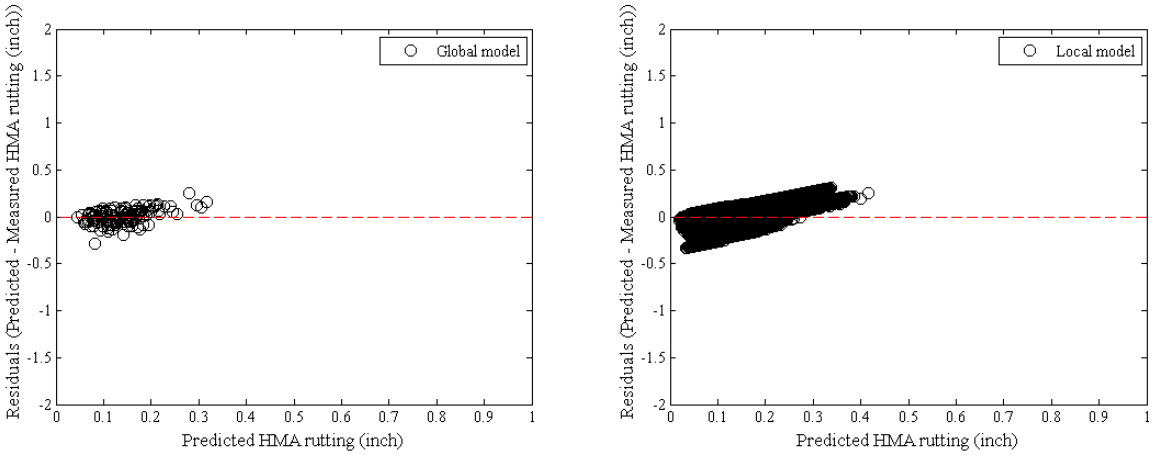
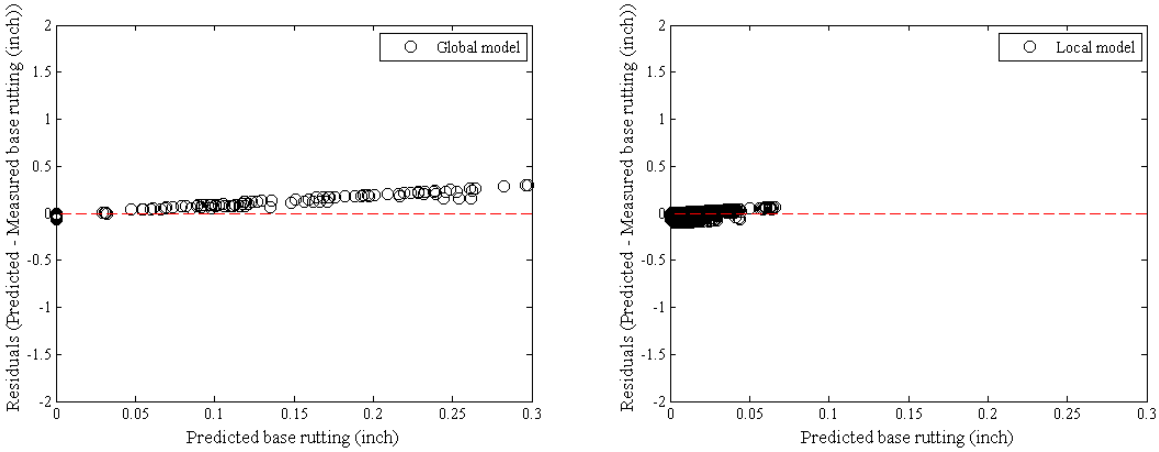


Figure B-270 Option 4: Method 2 – Total rutting residual plots - bootstrapping



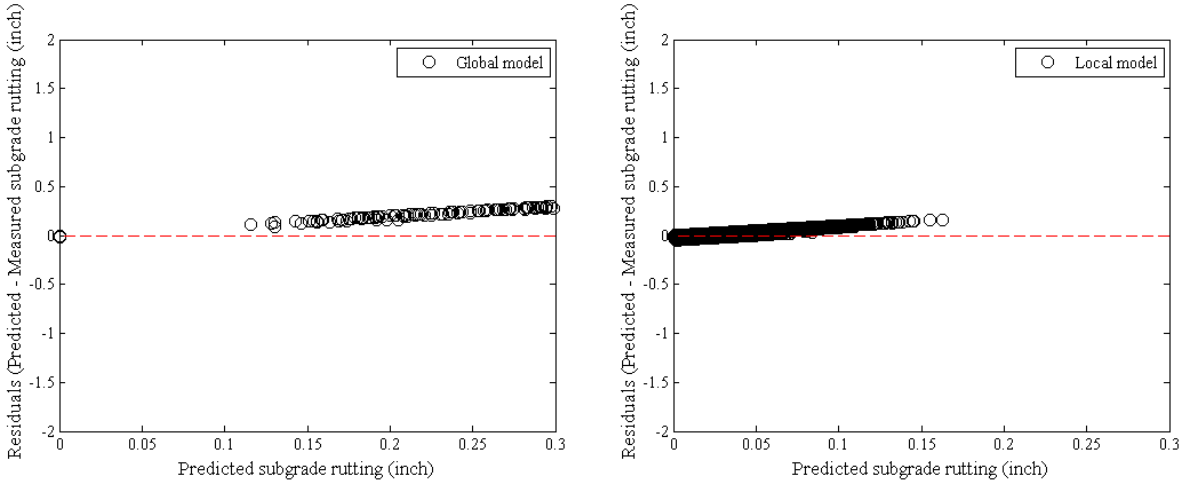
(a) Global model (b) Local model

Figure B-271 Option 4: Method 2 – HMA rutting residual plots - bootstrapping



(a) Global model (b) Local model

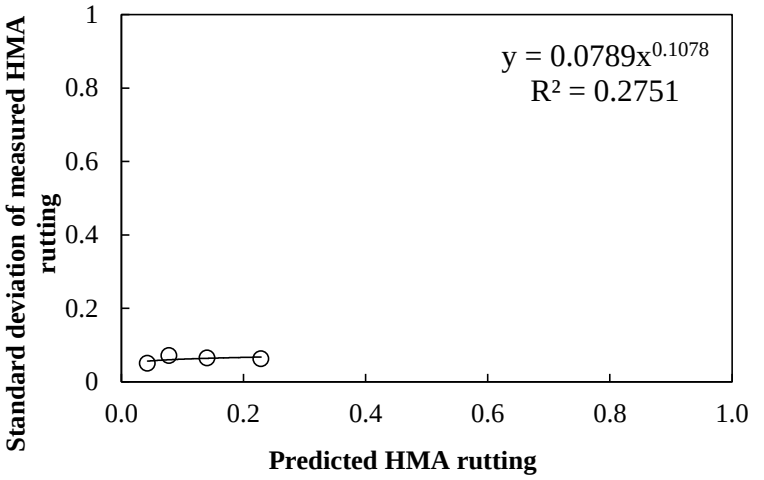
Figure B-272 Option 4: Method 2 – Base rutting residual plots - bootstrapping



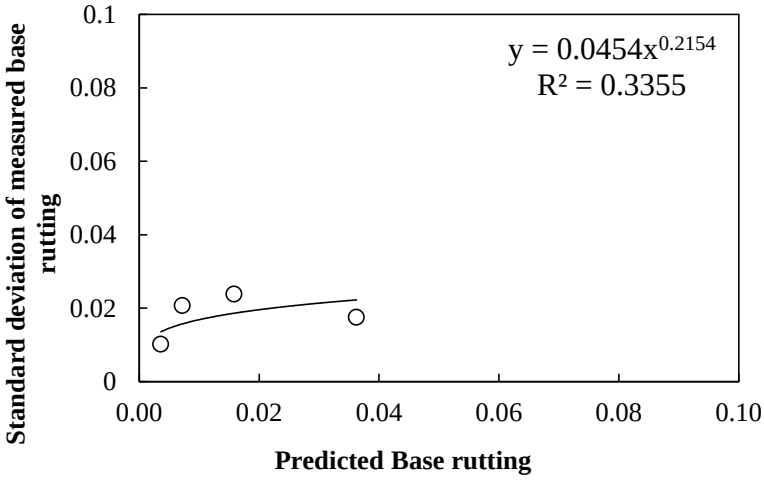
(a) Global model (b) Local model

Figure B-273 Option 4: Method 2 – Subgrade rutting residual plots - bootstrapping

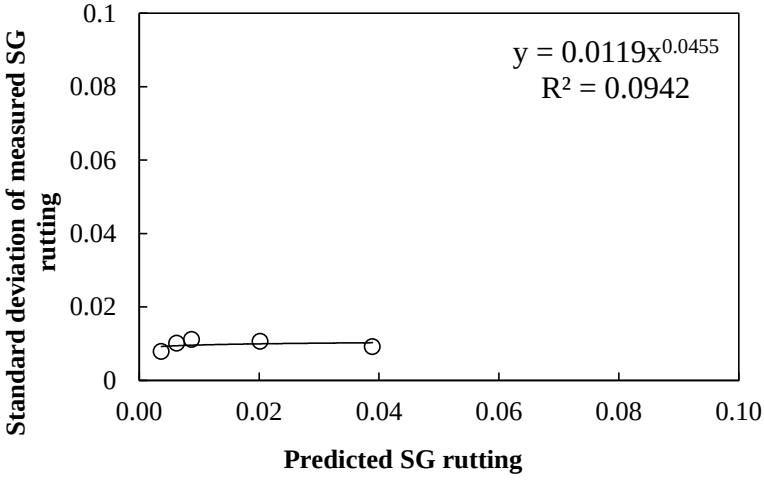
Reliability



(a) HMA rutting reliability



(b) Base rutting reliability



(c) Subgrade rutting reliability

Figure B-274 Rutting model reliability equations – option 4 method 2 – bootstrapping

B.1.4 Transverse Cracking Model

B.1.4.1 Level 1

Option 1

Table B-143 Level 1 Option 1 thermal cracking results

Parameter	SEE	Bias
Global model Level 1	1343.58	903.06
K = 0.5 Level 1	767.05	-217.64
K = 0.75 Level 1	753.24	-70.40
K = 1 Level 1	943.39	246.75
K = 1.1 Level 1	1019.15	369.83
K = 1.2 Level 1	1094.84	492.97
K = 1.3 Level 1	1176.40	630.50
K = 1.4 Level 1	1277.75	783.51
K = 1.7 Level 1	1459.76	1109.90
K = 2 Level 1	1560.47	1310.64
K = 2.5 Level 1	1692.66	1553.99

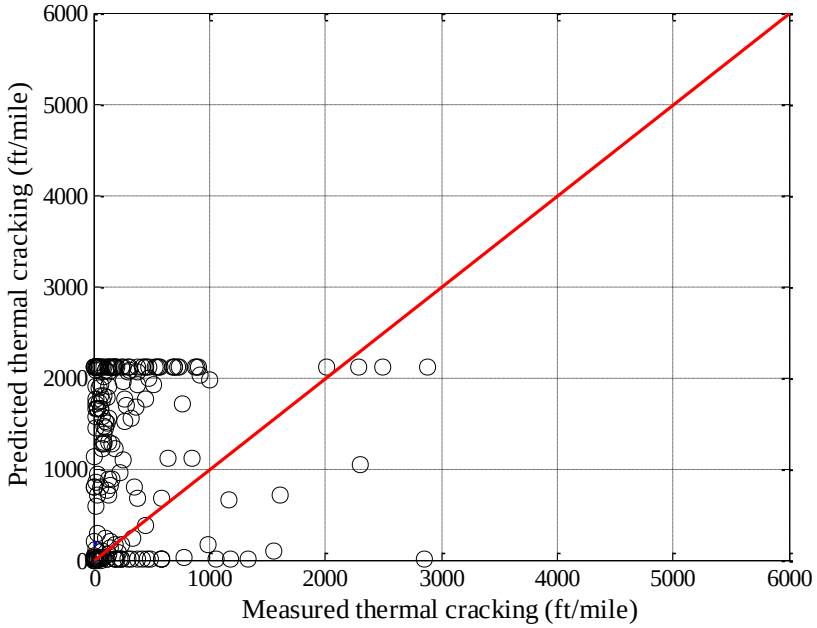


Figure B-275 Level 1 thermal cracking global model – option 1

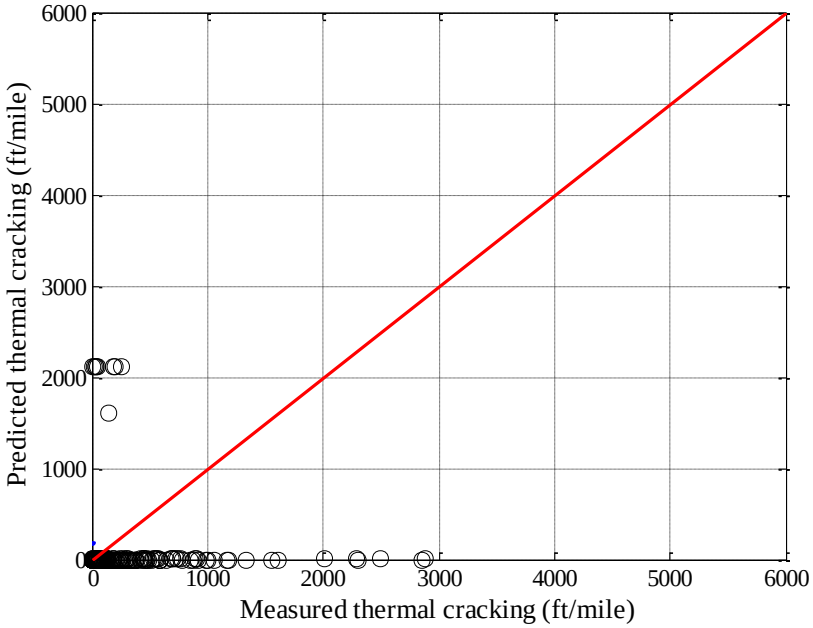


Figure B-276 Level 1 thermal cracking local model K = 0.5 – option 1

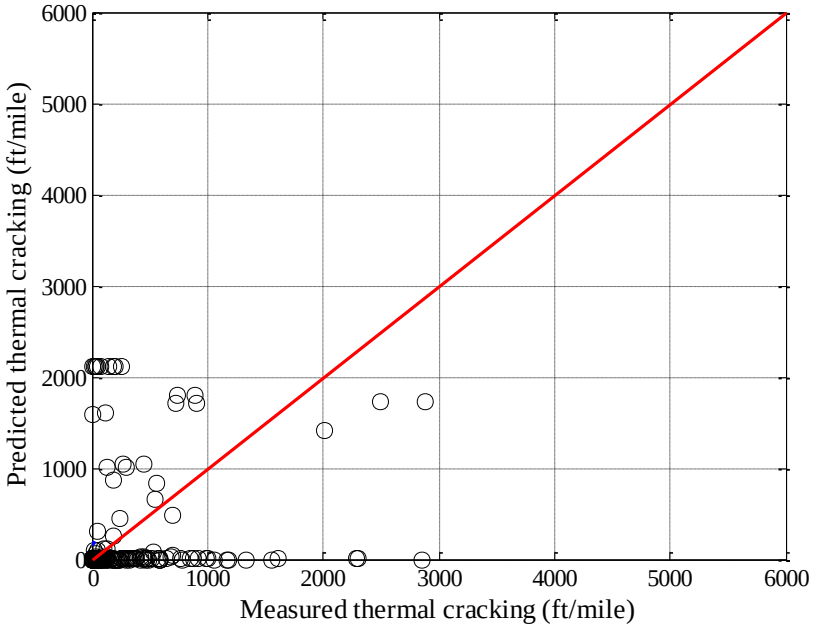


Figure B-277 Level 1 thermal cracking local model K = 0.75 – option 1

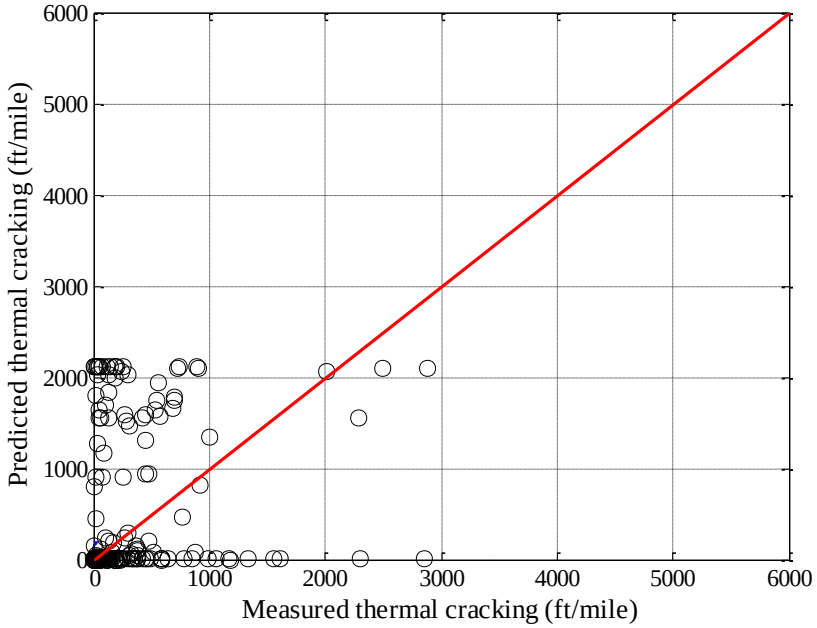


Figure B-278 Level 1 thermal cracking local model K = 1 – option 1

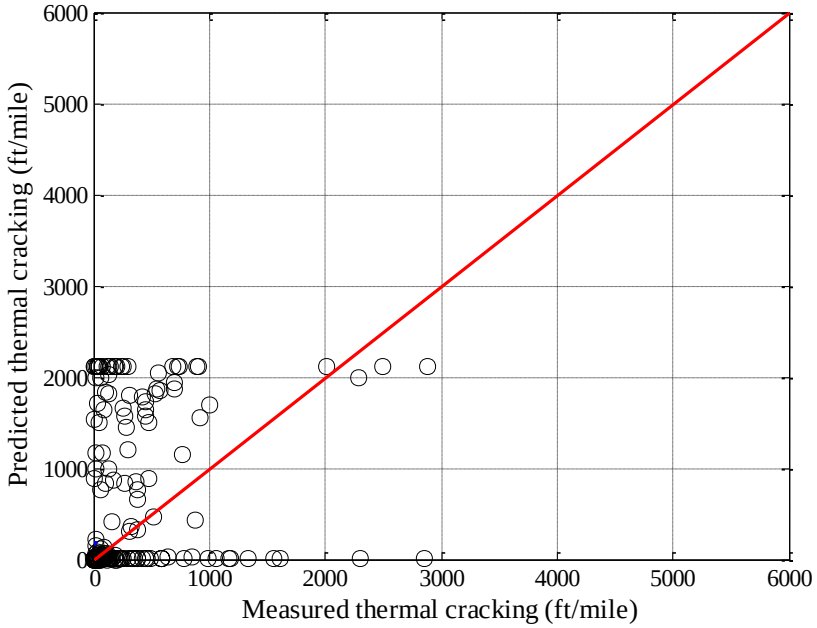


Figure B-279 Level 1 thermal cracking local model K = 1.1 – option 1

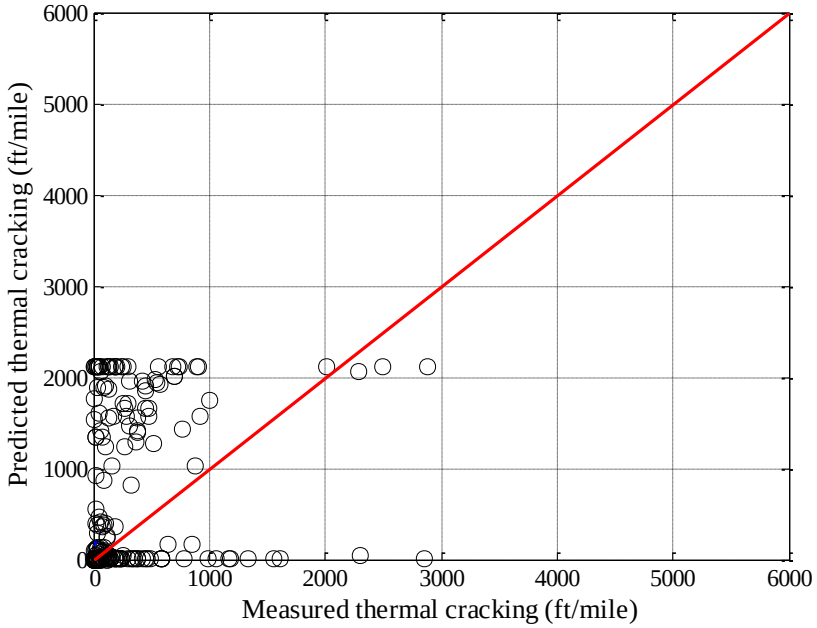


Figure B-280 Level 1 thermal cracking local model K = 1.2 – option 1

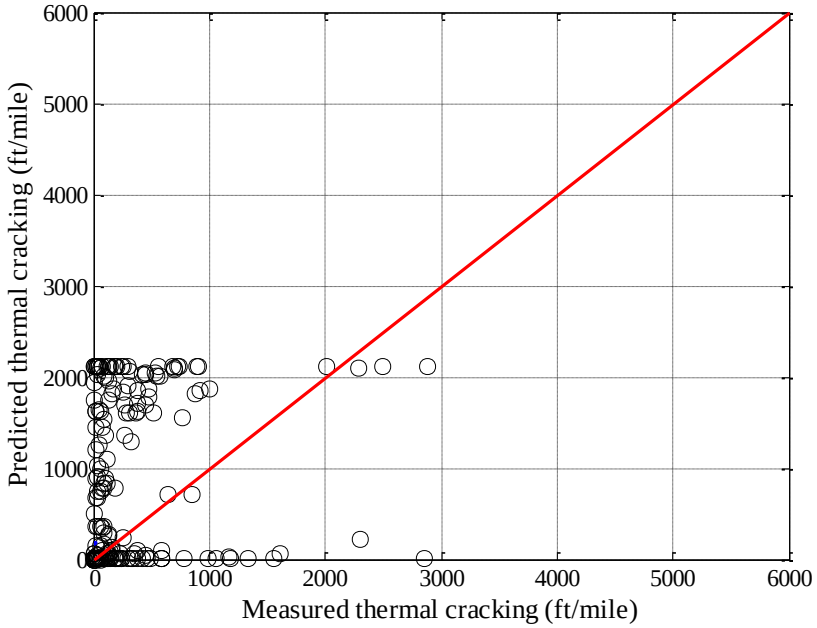


Figure B-281 Level 1 thermal cracking local model K = 1.3 – option 1

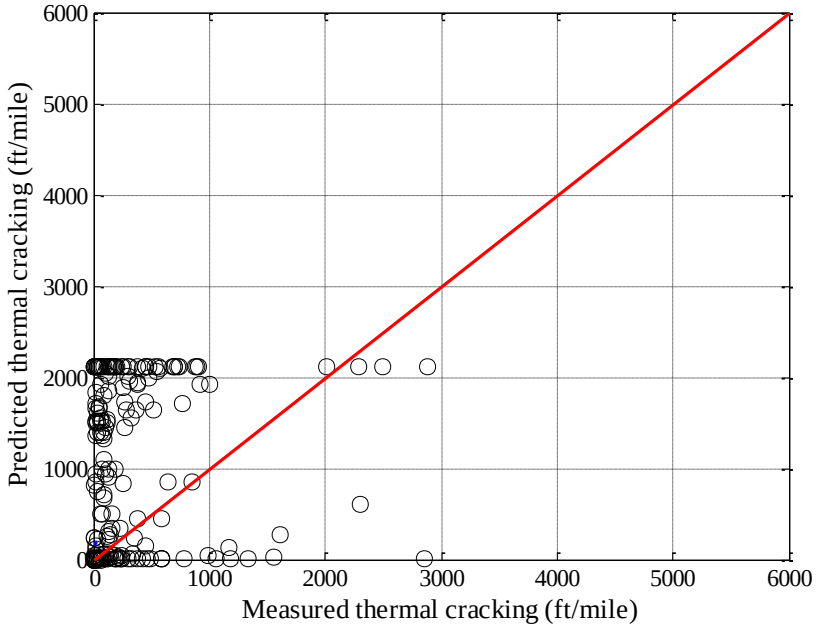


Figure B-282 Level 1 thermal cracking local model K = 1.4 – option 1

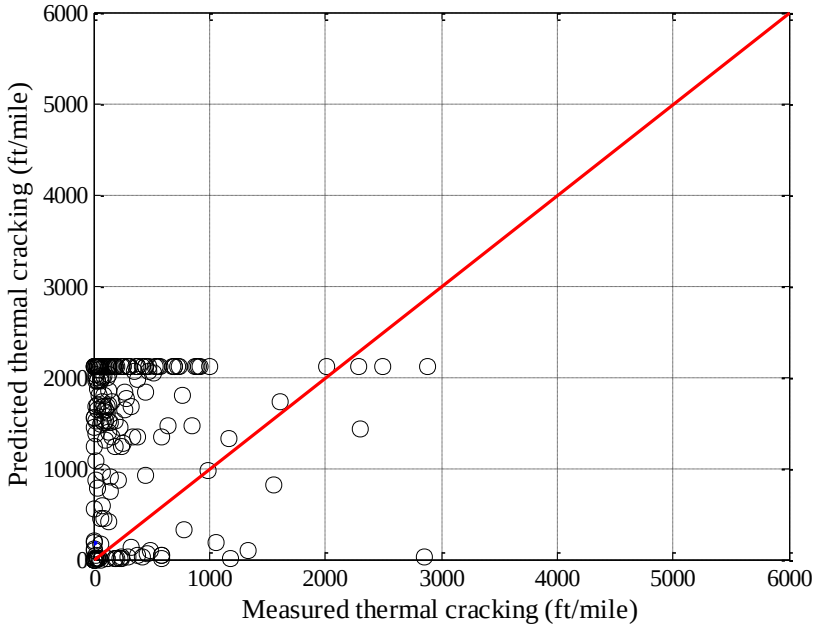


Figure B-283 Level 1 thermal cracking local model K = 1.7 – option 1

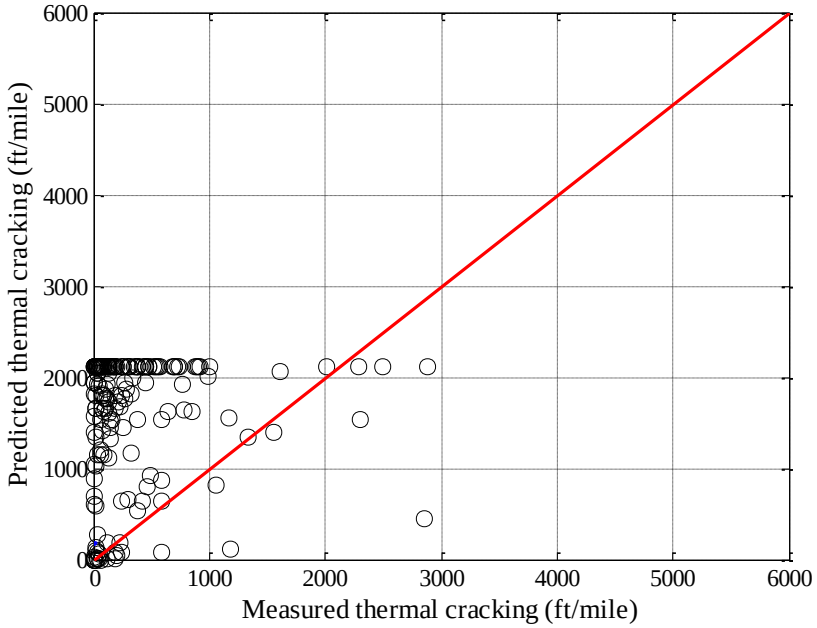


Figure B-284 Level 1 thermal cracking local model K = 2 – option 1

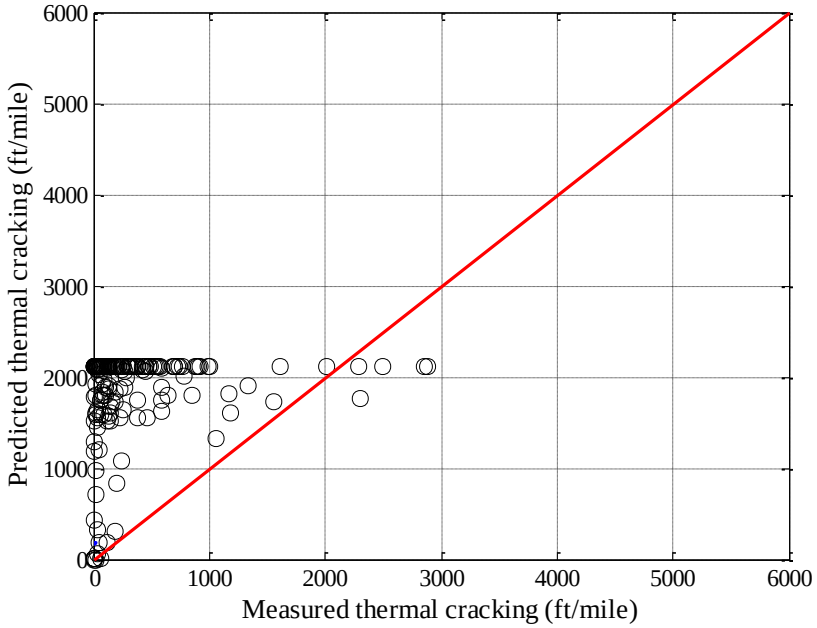


Figure B-285 Level 1 thermal cracking local model K = 2.5– option 1

Reliability

Table B-144 Level 1 Option 1 reliability equation

Data set option	Global model equation	Local model equation
Option 1	$s_e(Level1) = 0.1468(TC) + 65.027$	$s_e(Level1) = 0.4203(TC) + 216.94$

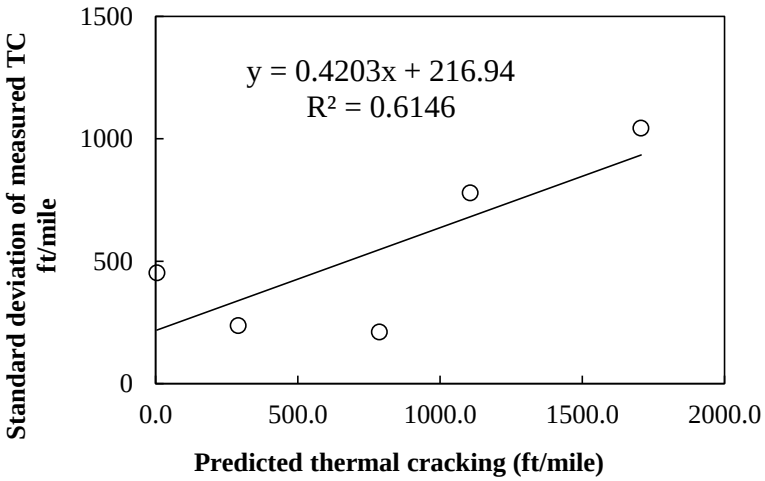


Figure B-286 Level 1 Option 1 thermal cracking fitted reliability model

Option 2

Table B-145 Level 1 Option 2 thermal cracking results

Parameter	SEE	Bias
Global model Level 1	1306.5	854.7
K = 0.5 Level 1	745.5	-212.6
K = 0.75 Level 1	732.1	-73.8
K = 1 Level 1	916.4	225.1
K = 1.1 Level 1	989.9	341.2
K = 1.2 Level 1	1063.2	457.5
K = 1.3 Level 1	1142.3	588.4
K = 1.4 Level 1	1241.0	736.0
K = 1.7 Level 1	1425.3	1064.9
K = 2 Level 1	1529.4	1271.1
K = 2.5 Level 1	1667.5	1524.3

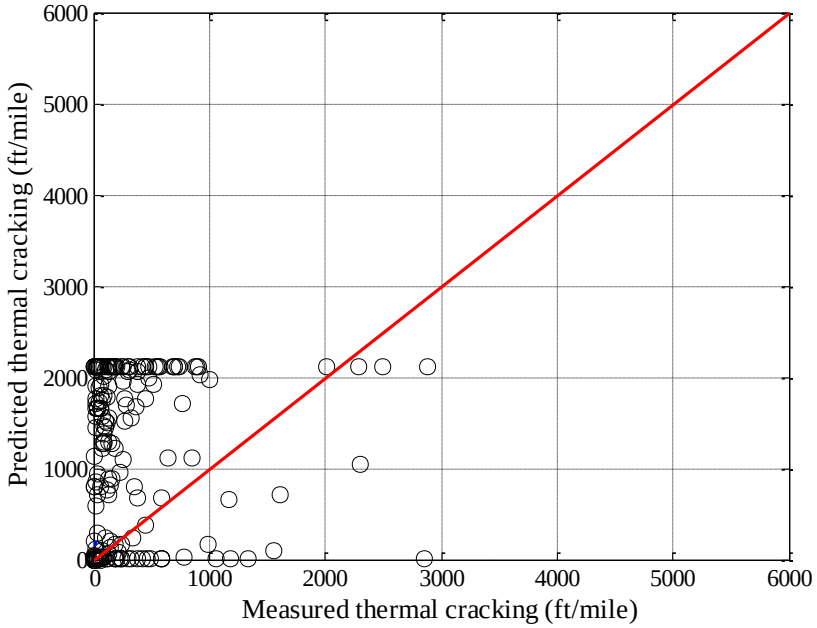


Figure B-287 Level 1 thermal cracking global model – option 2

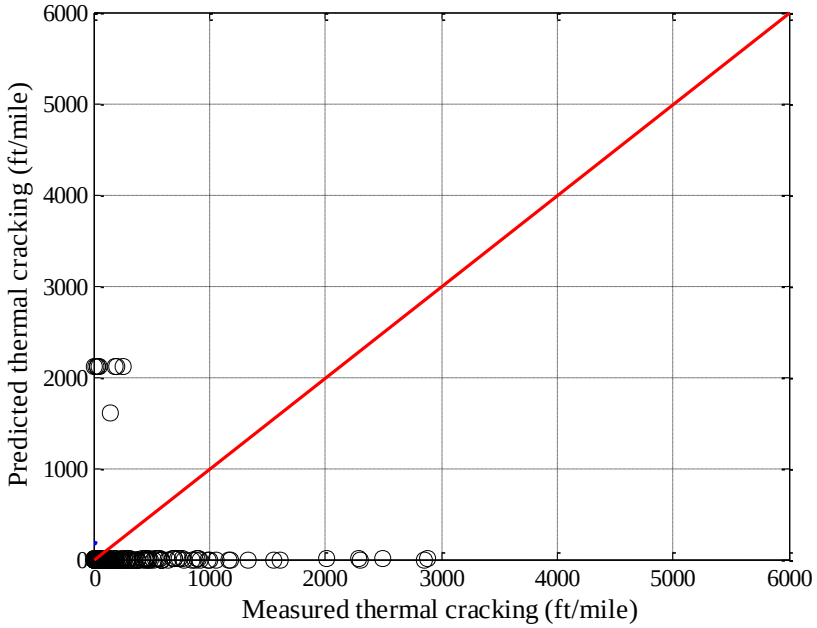


Figure B-288 Level 1 thermal cracking local model K = 0.5 – option 2

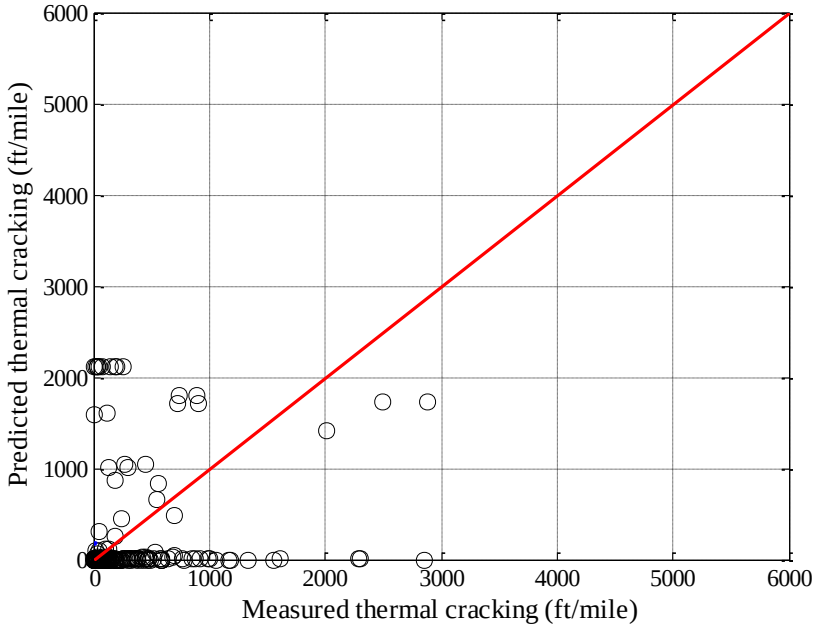


Figure B-289 Level 1 thermal cracking local model K = 0.75 – option 2

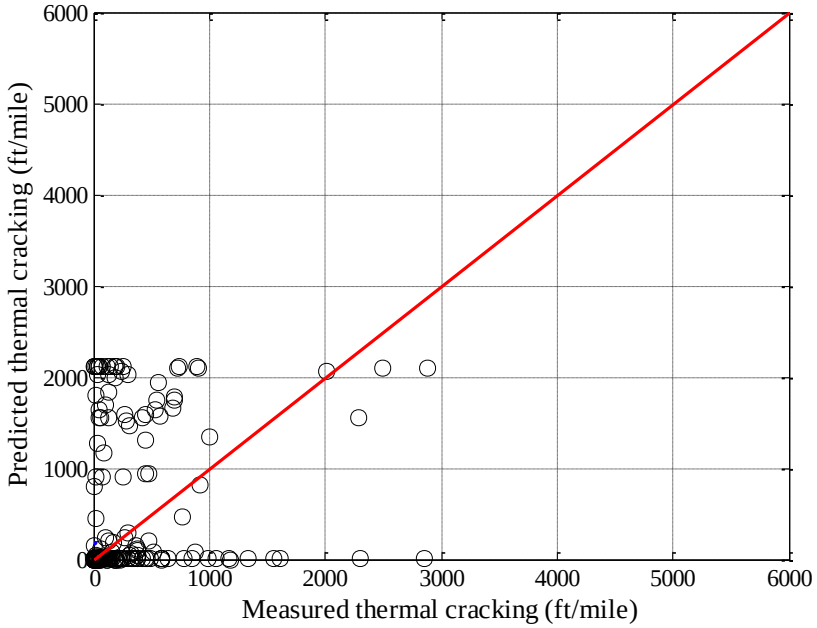


Figure B-290 Level 1 thermal cracking local model K = 1 – option 2

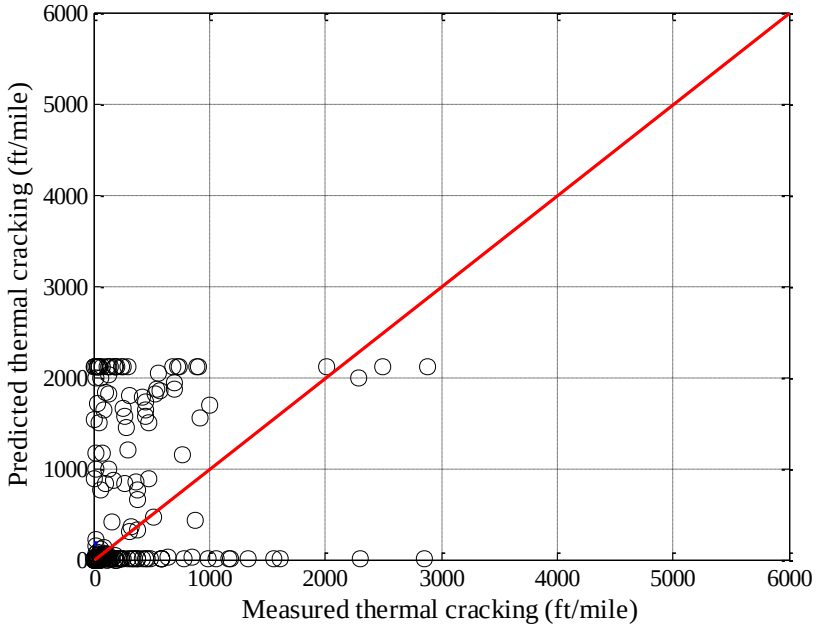


Figure B-291 Level 1 thermal cracking local model K = 1.1 – option 2

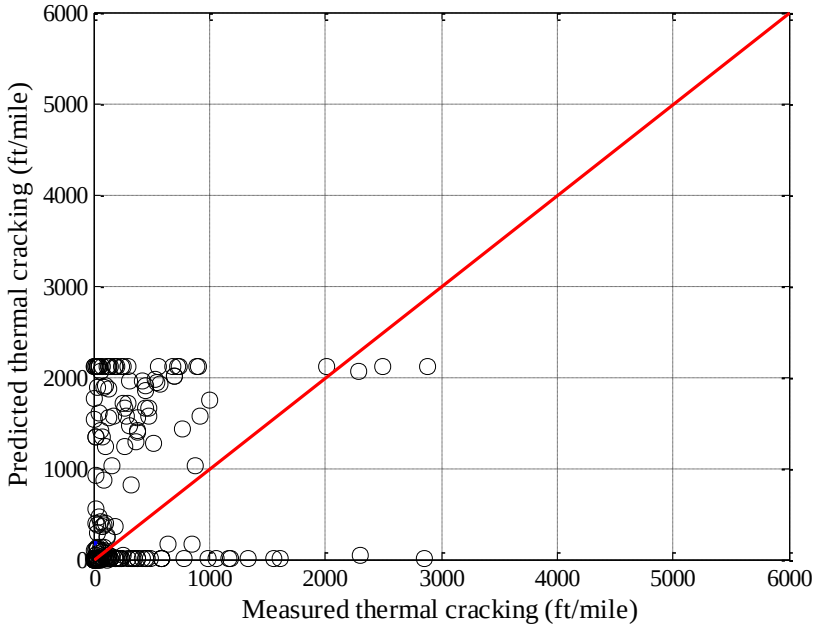


Figure B-292 Level 1 thermal cracking local model K = 1.2 – option 2

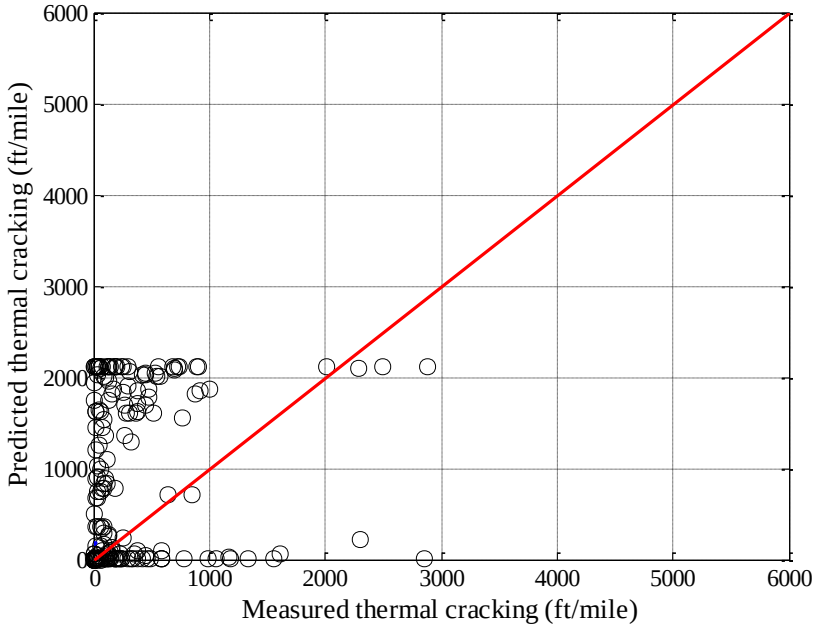


Figure B-293 Level 1 thermal cracking local model K = 1.3 – option 2

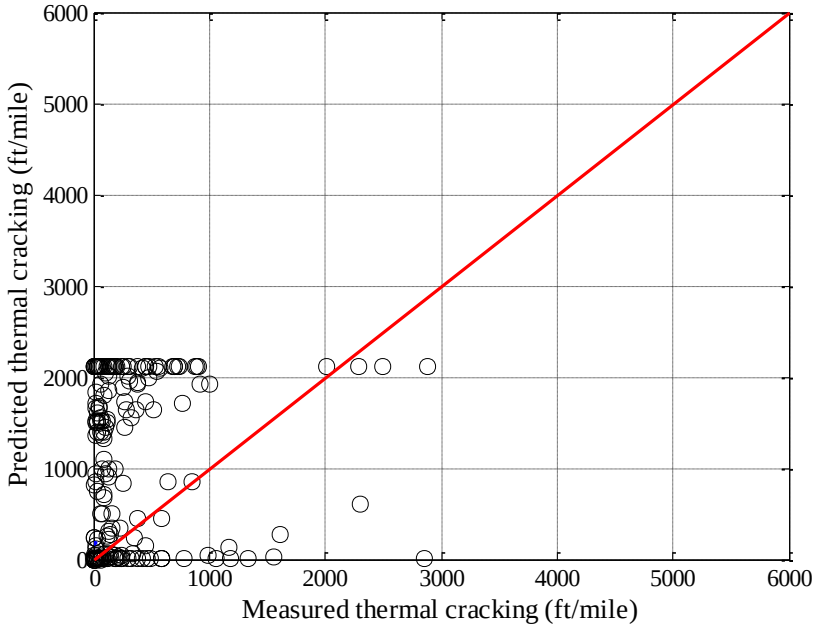


Figure B-294 Level 1 thermal cracking local model K = 1.4 – option 2

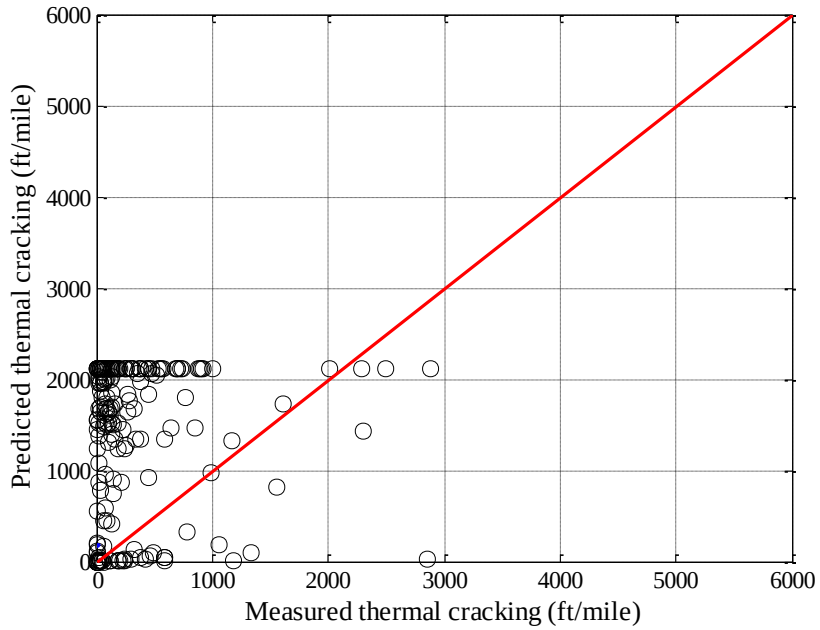


Figure B-295 Level 1 thermal cracking local model K = 1.7 – option 2

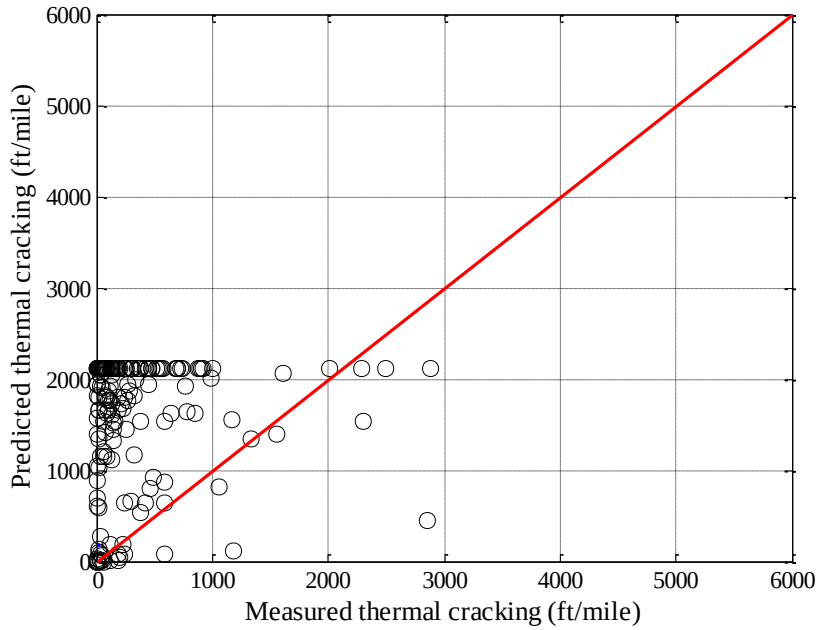


Figure B-296 Level 1 thermal cracking local model K = 2 – option 2

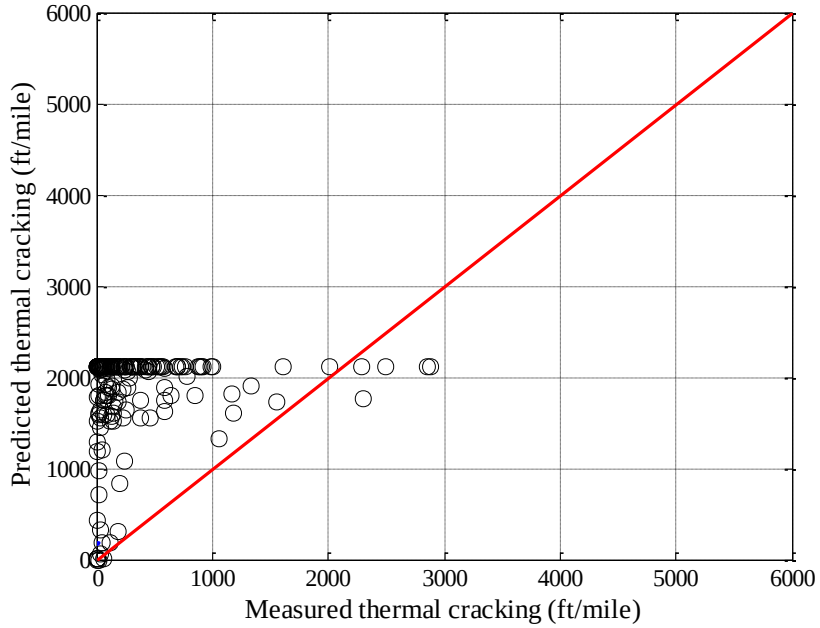


Figure B-297 Level 1 thermal cracking local model K = 2.5 – option 2

Reliability

Table B-146 Level 1 Option 2 reliability equation

Data set option	Global model equation	Local model equation
Option 2	$s_e(Level1) = 0.1468(TC) + 65.027$	$s_e(Level1) = 0.4258(TC) + 210.08$

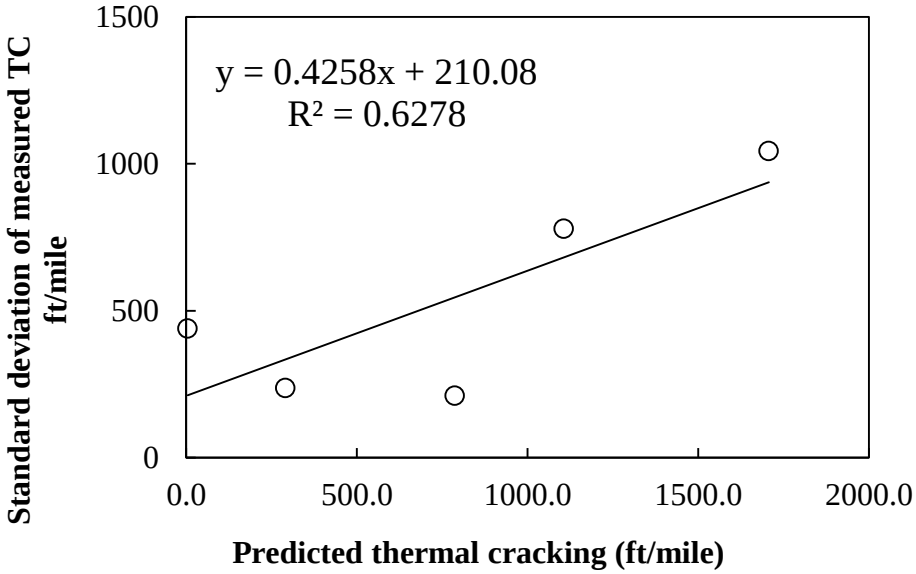


Figure B-298 Level 1 Option 2 thermal cracking fitted reliability model

B.1.4.2 Level 3

Option 1

Table B-147 Level 3 Option 1 thermal cracking results

Parameter	SEE	Bias
Global model K = 1.5	754.6	-318.5
K = 2 Level 3	785.5	-249.7
K = 3 Level 3	867.2	-23.2
K = 4 Level 3	978.2	233.9
K = 5 Level 3	1107.2	494.5

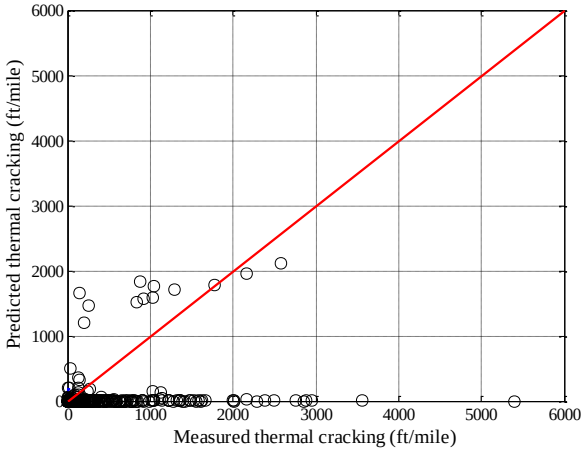


Figure B-299 Level 3 thermal cracking global model – option 1

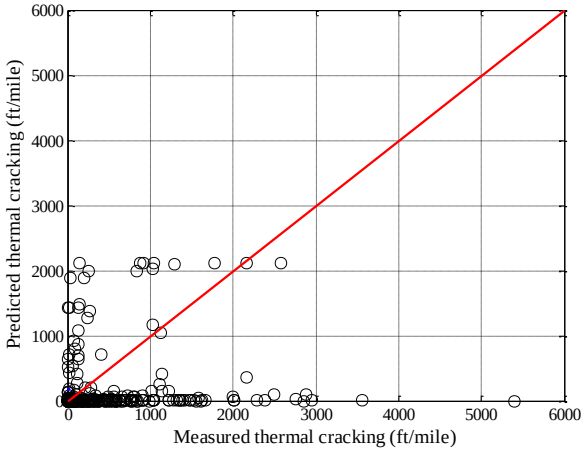


Figure B-300 Level 3 thermal cracking local model K = 2 – option 1

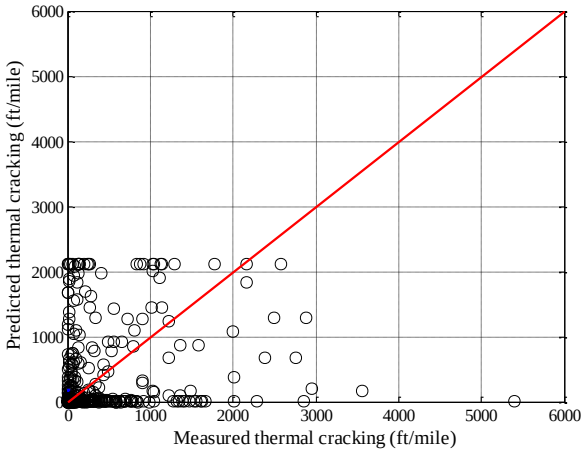


Figure B-301 Level 3 thermal cracking local model K = 3 – option 1

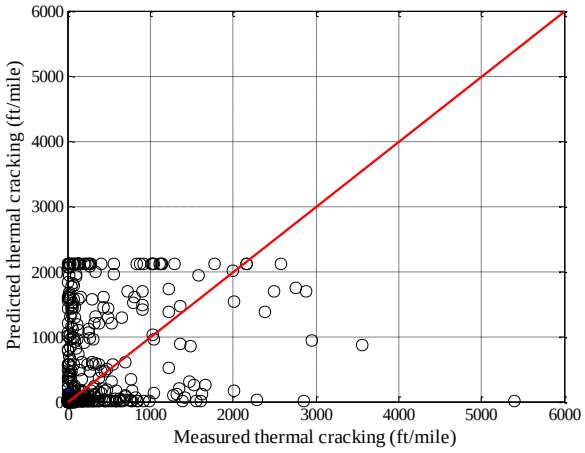


Figure B-302 Level 3 thermal cracking local model K =4 – option 1

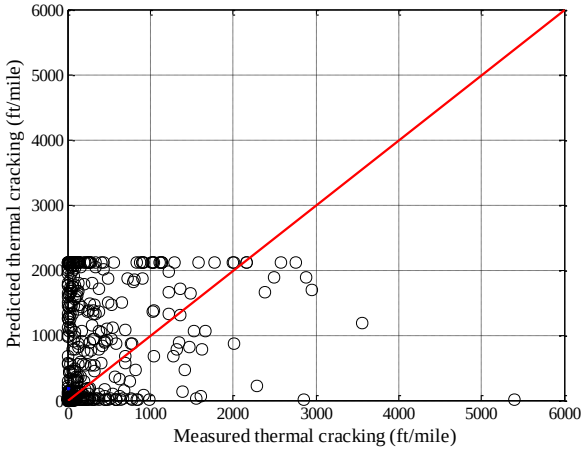


Figure B-303 Level 3 thermal cracking local model K = 5 – option 1

Reliability

Table B-148 Level 3 Option 1 reliability equation

Data set option	Global model equation	Local model equation
Option 1	$s_e(Level3) = 0.3972(TC) + 20.422$	$s_e(Level3) = 0.142(TC) + 670.28$

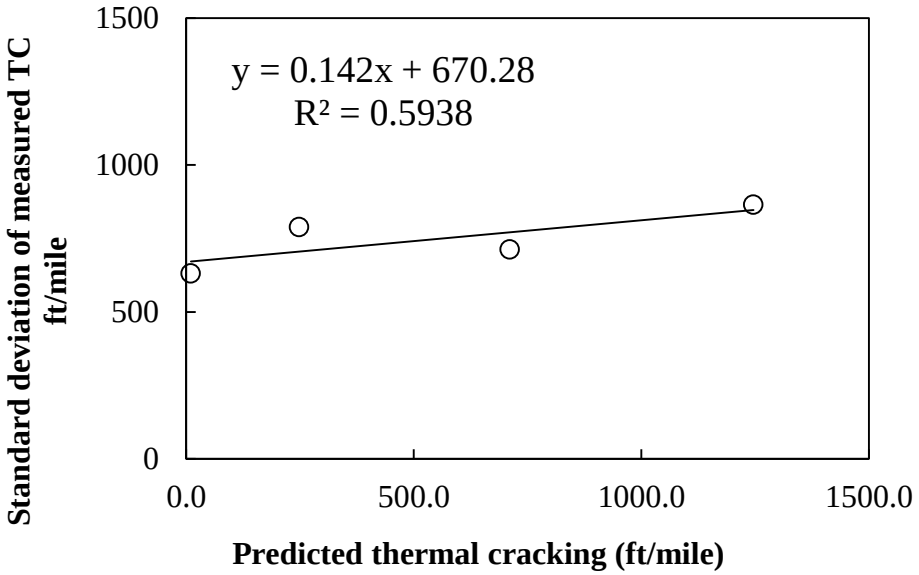


Figure B-304 Level 3 Option 1 thermal cracking fitted reliability model

Option 2

Table B-149 Level 3 Option 2 thermal cracking results

Parameter	SEE	Bias
Global model Level 3	945.0	-489.0
K = 2 Level 3	965.6	-416.2
K = 3 Level 3	1022.4	-209.6
K = 4 Level 3	1057.7	35.3
K = 5 Level 3	1121.8	289.6

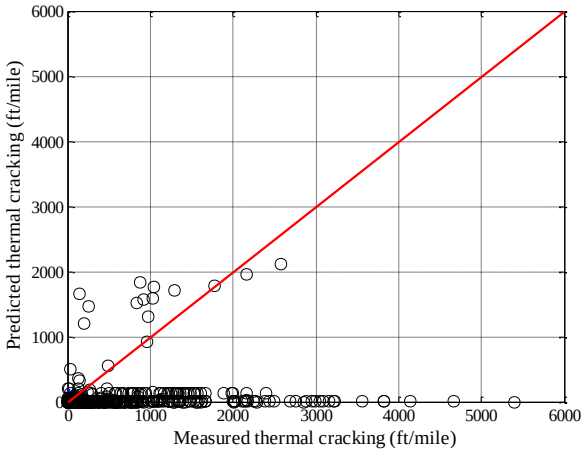


Figure B-305 Level 3 thermal cracking global model – option 2

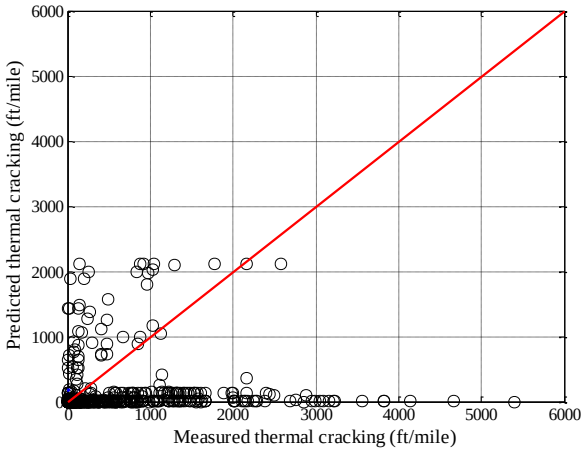


Figure B-306 Level 3 thermal cracking local model K = 2 – option 2

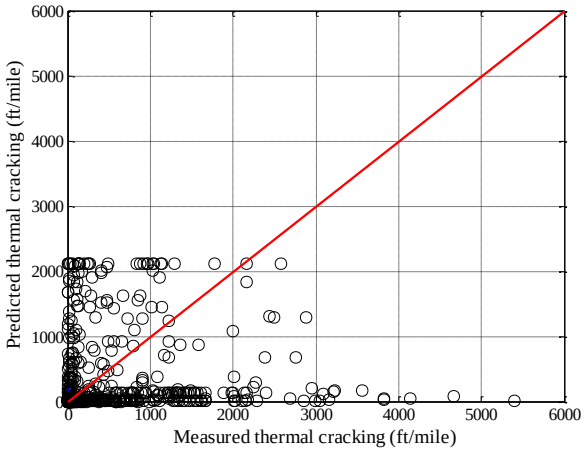


Figure B-307 Level 3 thermal cracking local model K = 3 – option 2

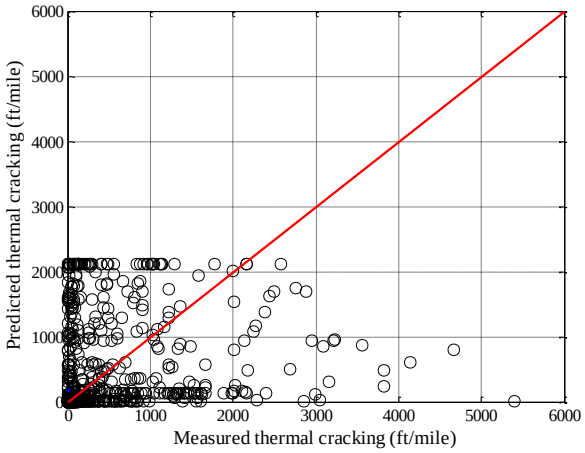


Figure B-308 Level 3 thermal cracking local model K =4 – option 2

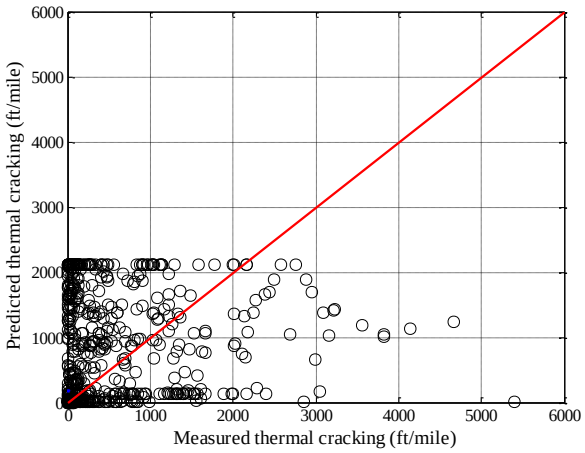


Figure B-309 Level 3 thermal cracking local model K = 5 – option 2

Reliability

Table B-150 Level 3 Option 2 reliability equation

Data set option	Global model equation	Local model equation
Option 2	$s_e(Level3) = 0.3972(TC) + 20.422$	$s_e(Level3) = 0.7737(TC) + 622.92$

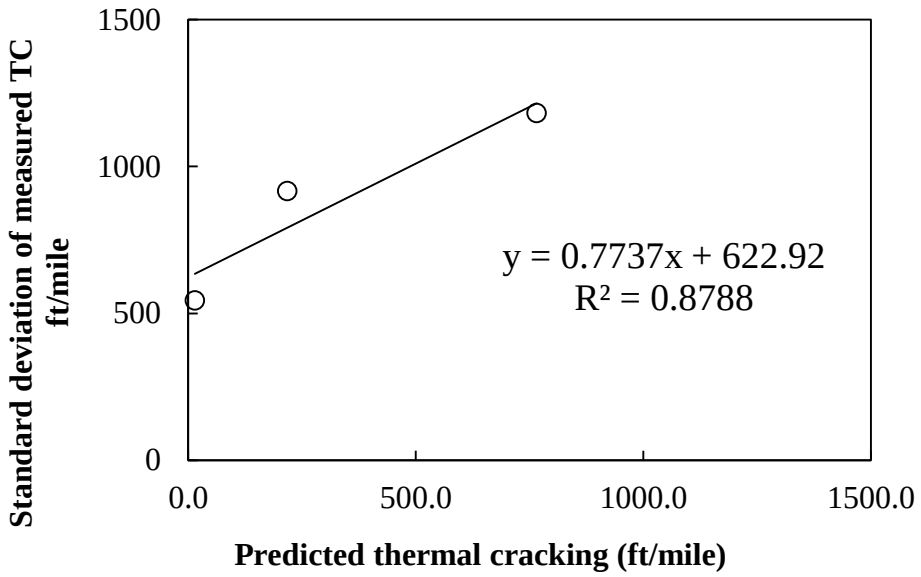


Figure B-310 Level 3 Option 2 thermal cracking fitted reliability model

Option 4

Table B-151 Level 3 Option 4 thermal cracking results

Parameter	SEE	Bias
Global model Level 3	1304.7	-906.6
K = 2 Level 3	1312.1	-824.0
K = 3 Level 3	1334.6	-666.1
K = 4 Level 3	1237.6	-451.0
K = 5 Level 3	1163.8	-212.0

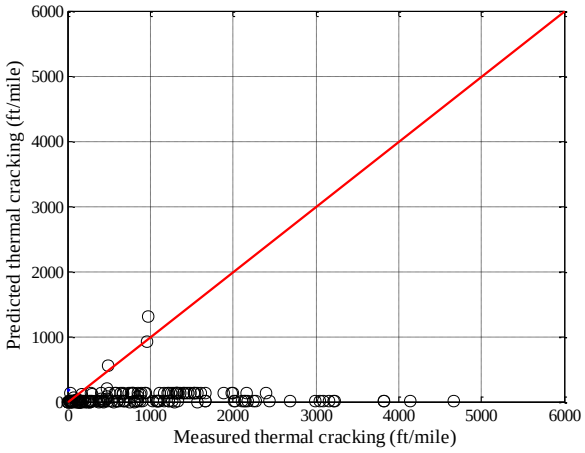


Figure B-311 Level 3 thermal cracking global model – option 3

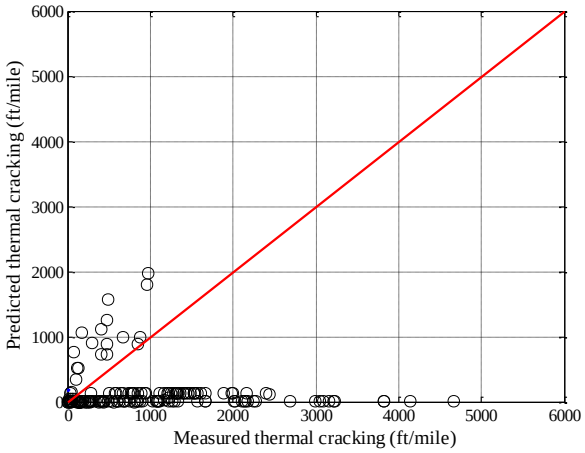


Figure B-312 Level 3 thermal cracking local model K = 2 – option 3

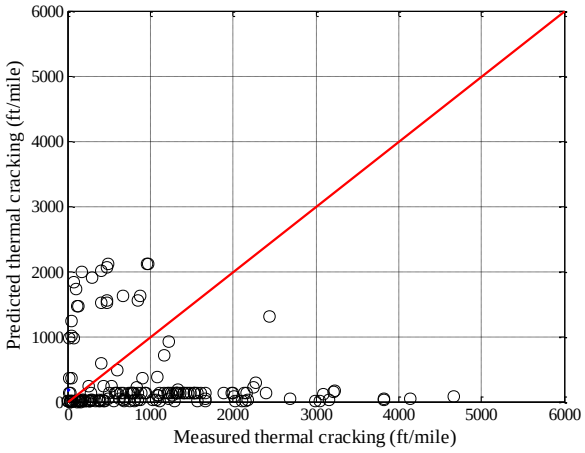


Figure B-313 Level 3 thermal cracking local model K = 3 – option 3

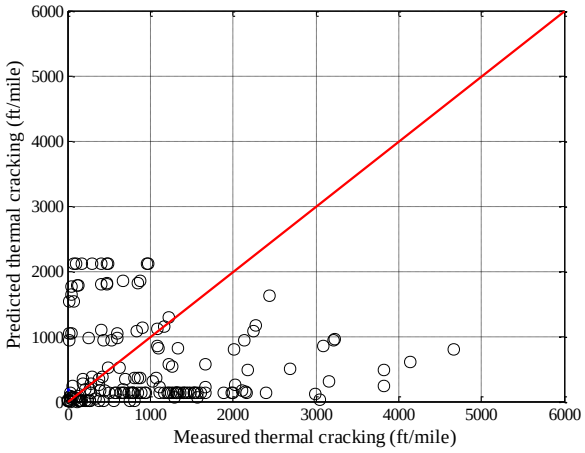


Figure B-314 Level 3 thermal cracking local model K =4 – option 3

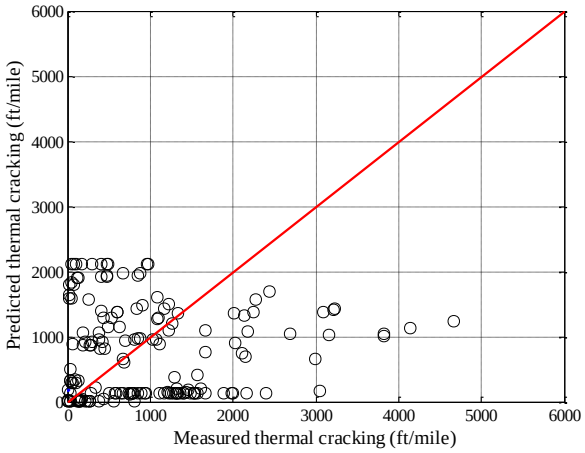


Figure B-315 Level 3 thermal cracking local model K = 5 – option 3

Reliability

Table B-152 Level 3 Option 4 reliability equation

Data set option	Global model equation	Local model equation
Option 4	$s_e(Level3) = 0.3972(TC) + 20.422$	$s_e(Level3) = 0.7039(TC) + 324.26$

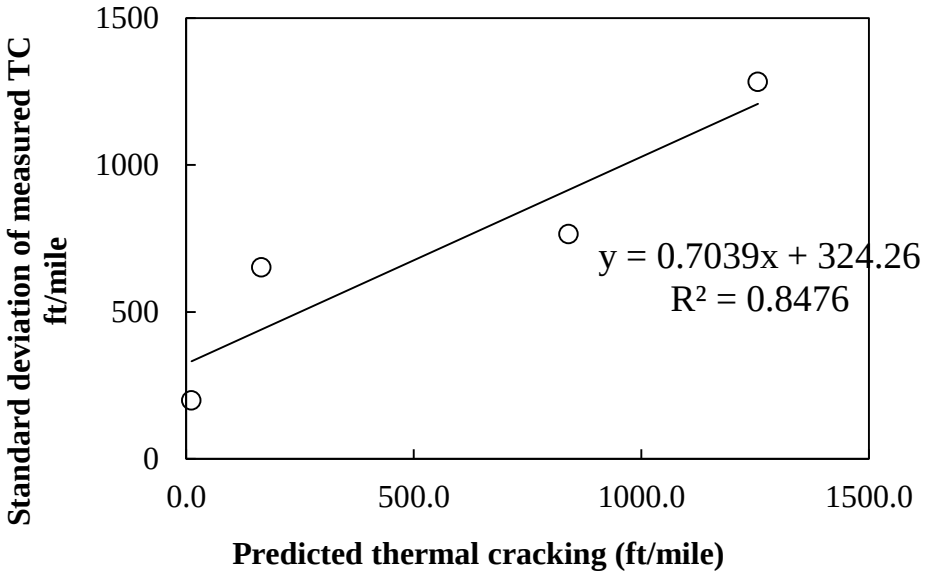


Figure B-316 Level 3 Option 4 thermal cracking fitted reliability model

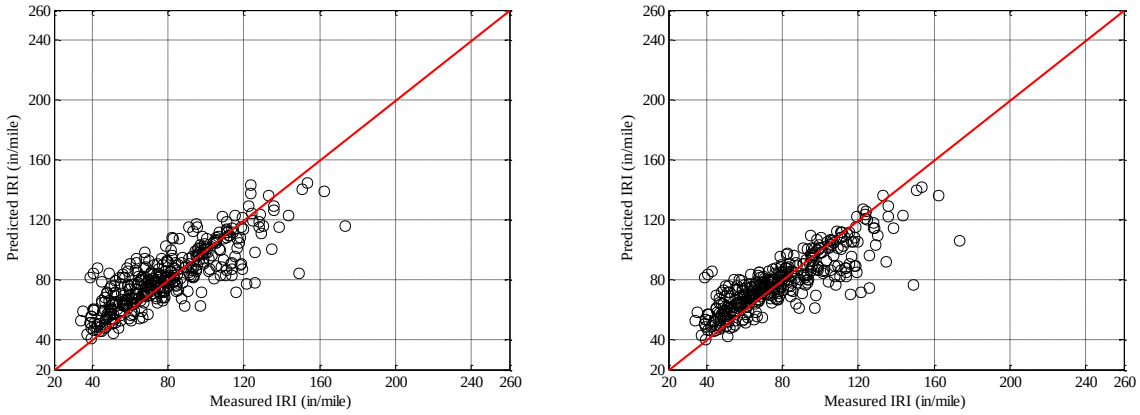
B.1.5 Pavement Roughness (IRI)

B.1.5.1 Option 1

No sampling

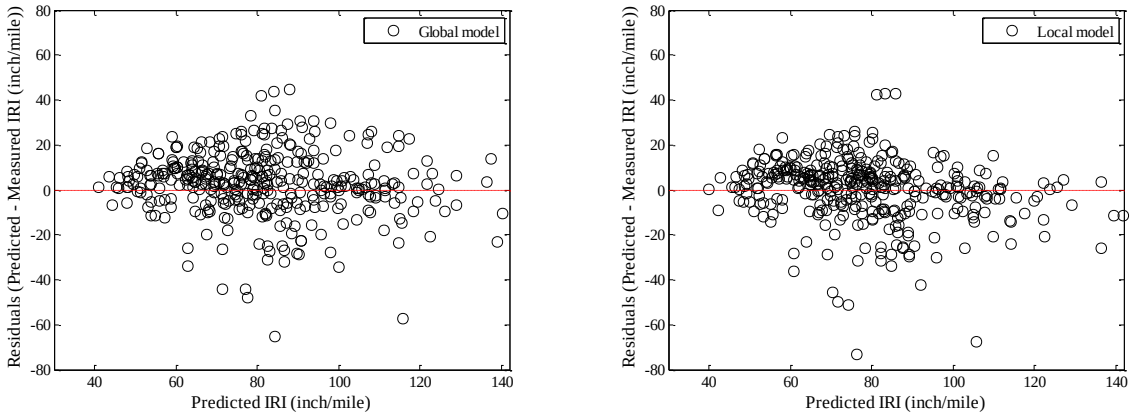
Table B-153 Option 1 IRI local calibration results – no sampling

Parameter	Global	Local
SEE	14.8261	14.1044
Bias	2.7552	0.0070
R^2	0.6922	0.7228
t-test pvalue	0.0003	0.9923
Intercept = 0	0.0000	0.0000
Slope = 1	0.0000	0.0000
C1	40.0000	48.5626
C2	0.4000	0.4781
C3	0.0080	0.0064
C4	0.0150	0.0072



(a) Global model (b) Local model

Figure B-317 Option 1 IRI local calibration measured versus predicted – no sampling



(a) Global model (b) Local model

Figure B-318 Option 1 IRI local calibration residual plots – no sampling

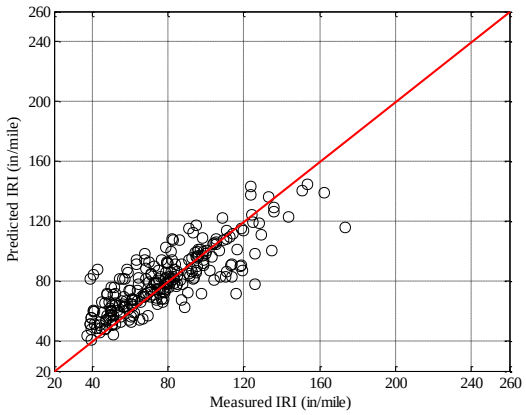
Reliability

The IRI reliability is internally estimated by the software.

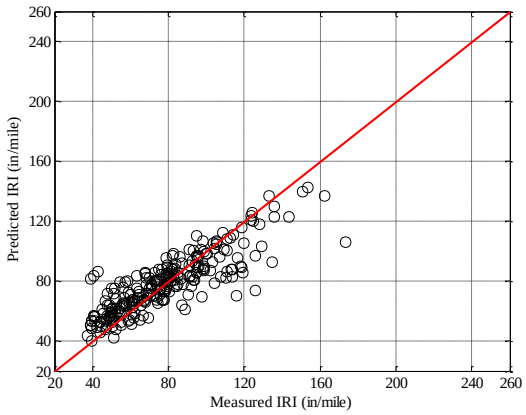
Split sampling

Table B-154 Option 1 IRI local calibration results – split sampling

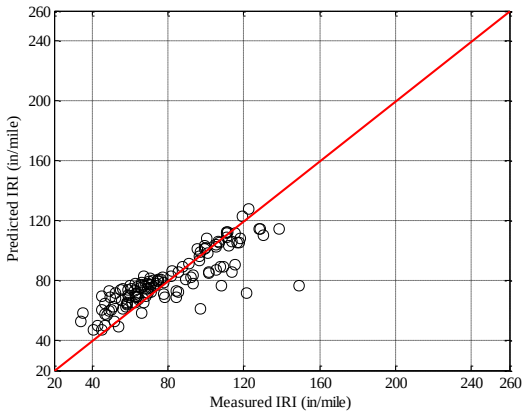
Parameter	Global model	Local model	Validation
SEE	14.9090	14.1483	14.1497
Bias	2.4035	0.0973	0.5702
R^2	0.6945	0.7280	0.7129
t-test pvalue	0.0108	0.9140	0.6515
Intercept = 0	0.0000	0.0000	0.0000
Slope = 1	0.0000	0.0000	0.0000
C1	40.0000	52.8662	52.8662
C2	0.4000	0.3535	0.3535
C3	0.0080	0.0064	0.0064
C4	0.0150	0.0071	0.0071



(a) Global model

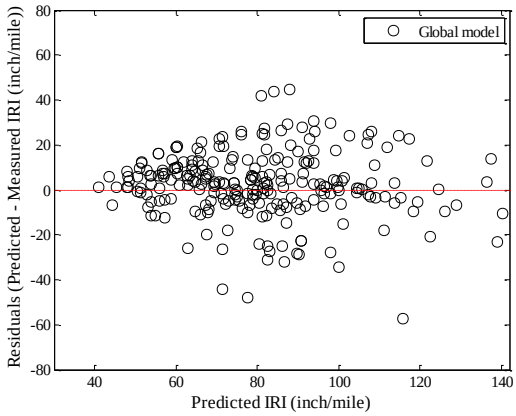


(b) Local model

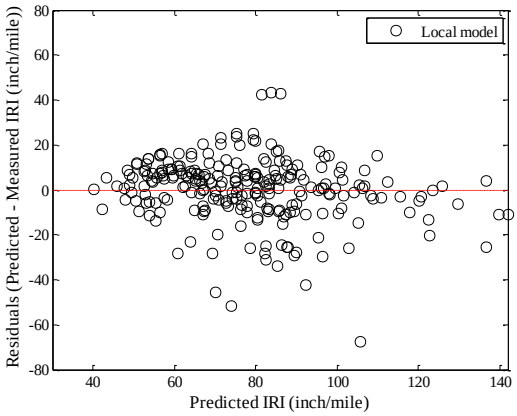


(c) Local model validation

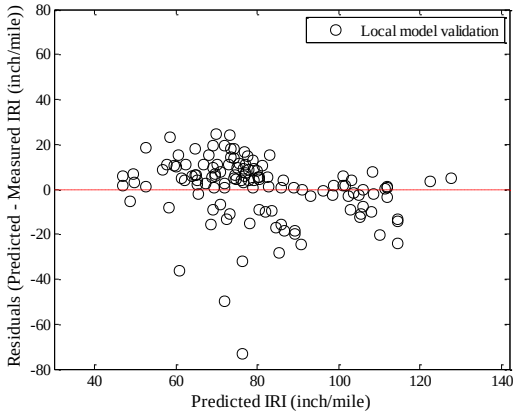
Figure B-319 Option 1 IRI local calibration measured versus predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-320 Option 1 IRI local calibration residual plots – split sampling

Reliability

The IRI reliability is internally estimated by the software.

Repeated split sampling

Table B-155 Option 1 IRI local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	14.8176	14.8629	13.3900	15.9512
Bias	2.7282	2.7679	1.0972	4.2236
C1	40.0000	40.0000	-	-
C2	0.4000	0.4000	-	-
C3	0.0080	0.0080	-	-
C4	0.0150	0.0150	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	14.0562	14.1138	12.3621	15.3295
Bias	0.0294	0.0213	-0.4797	0.6616
C1	50.8200	50.8000	41.8300	57.8000
C2	0.4088	0.4693	0.3200	0.4800
C3	0.0064	0.0064	0.0064	0.0070
C4	0.0070	0.0072	0.0053	0.0072
Local Model validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	14.2948	14.3197	10.9564	17.7144
Bias	0.1403	0.1667	-4.5686	4.9868
C1	50.8200	50.8000	41.8300	57.8000
C2	0.4088	0.4693	0.3200	0.4800
C3	0.0064	0.0064	0.0064	0.0070
C4	0.0070	0.0072	0.0053	0.0072

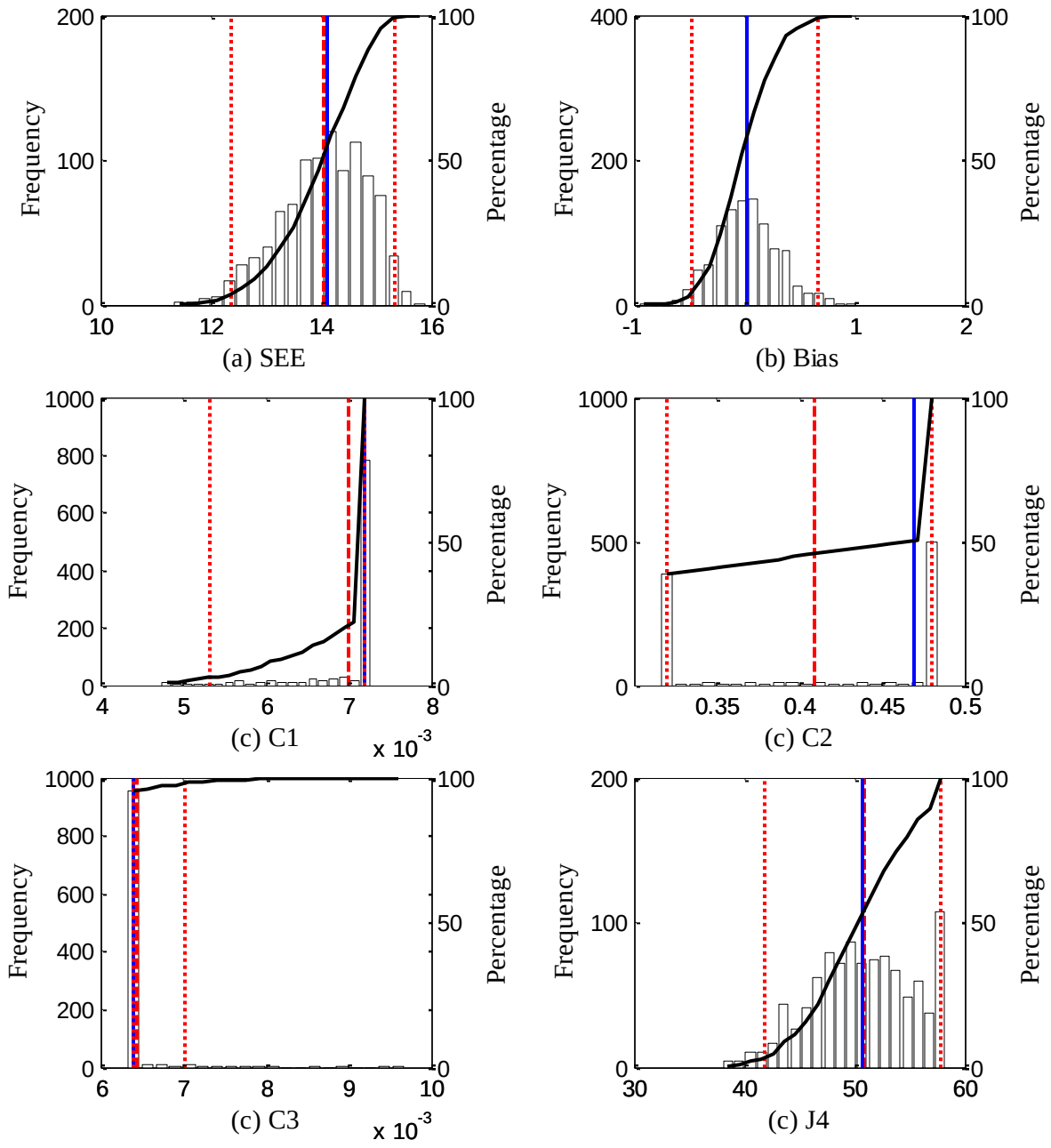


Figure B-321 Option 1 IRI repeated split sampling frequency distributions – calibration

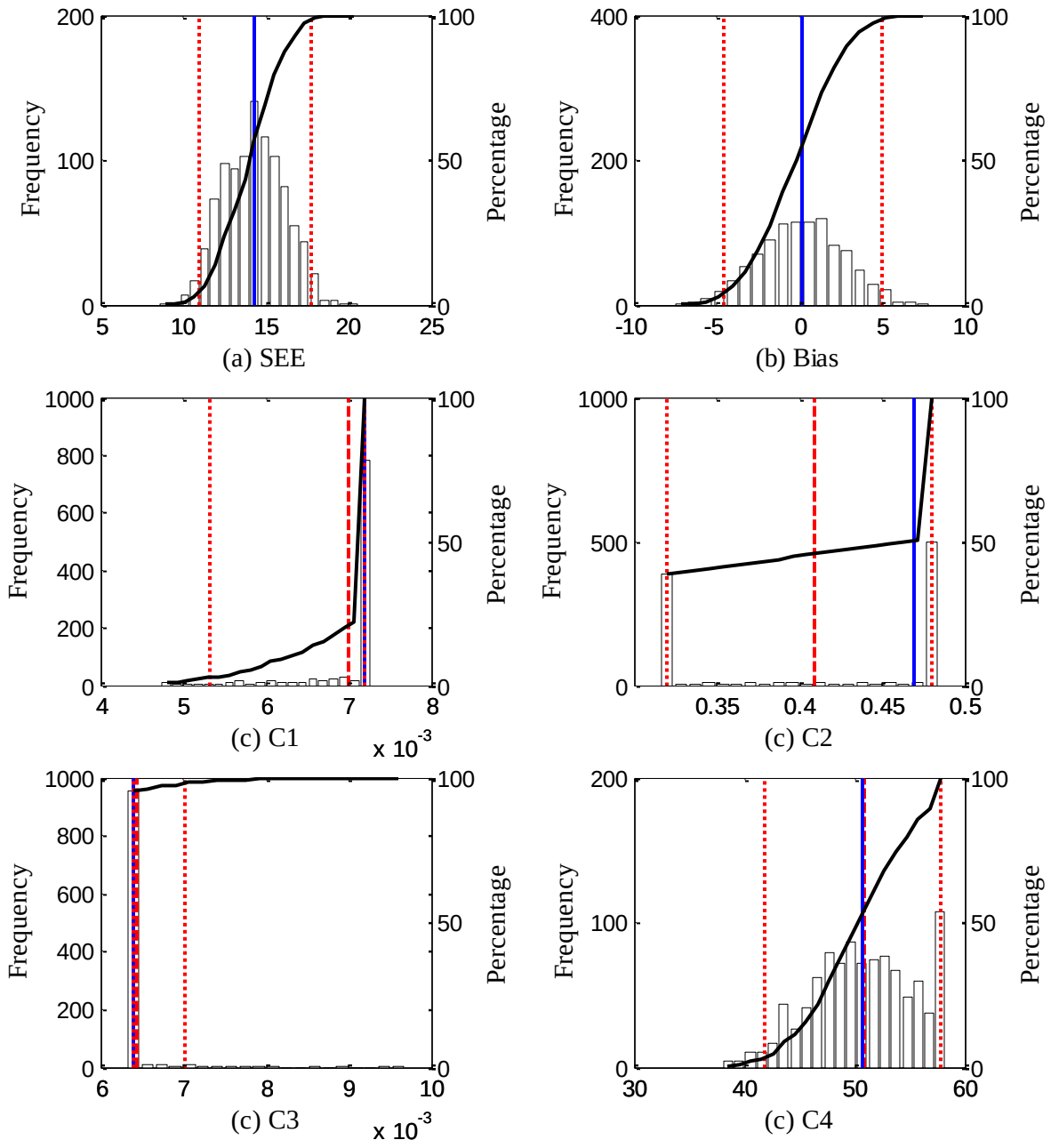
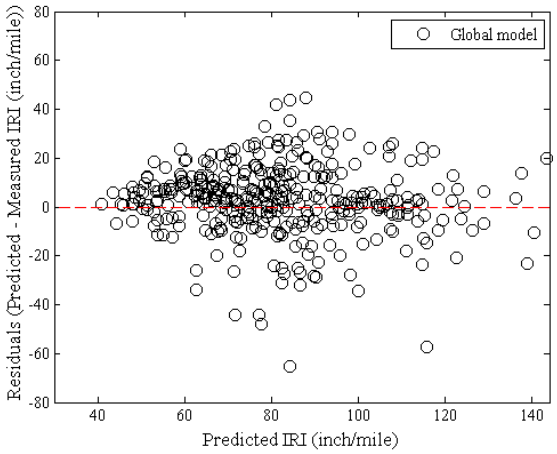
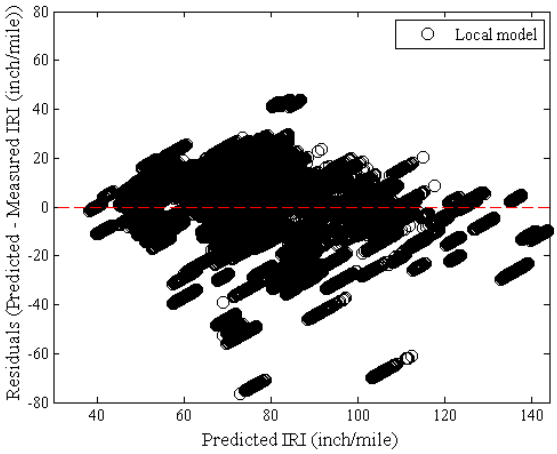


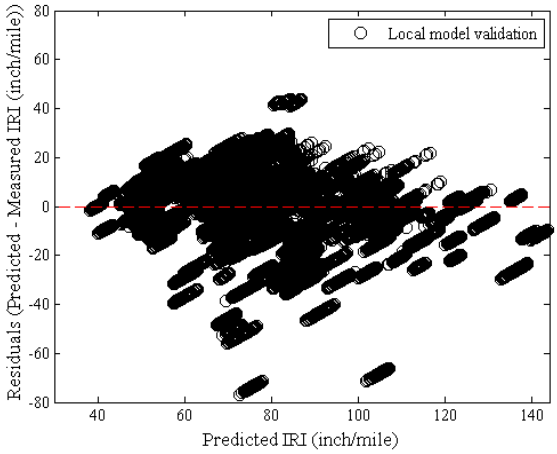
Figure B-322 Option 1 IRI repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-323 Option 1 IRI local calibration residual plots – repeated split sampling

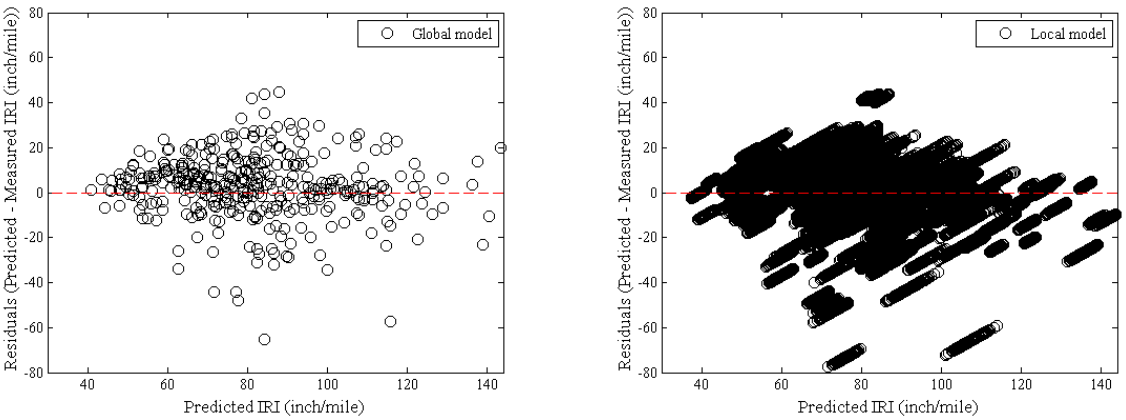
Reliability

The IRI reliability is internally estimated by the software.

Bootstrapping

Table B-156 Option 1 IRI local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	14.7738	14.7500	12.9187	16.6746
Bias	2.7817	2.7779	0.4205	5.0187
C1	40.0000	40.0000	-	-
C2	0.4000	0.4000	-	-
C3	0.0080	0.0080	-	-
C4	0.0150	0.0150	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	13.9428	13.9428	11.8322	16.2173
Bias	-0.0391	-0.0160	-0.9072	0.8145
C1	50.3720	51.1021	38.5371	57.8050
C2	0.4102	0.4800	0.3200	0.4800
C3	0.0066	0.0064	0.0064	0.0084
C4	0.0068	0.0072	0.0048	0.0072



(a) Global model (b) Local model

Figure B-324 Option 1 IRI local calibration residual plots – bootstrapping

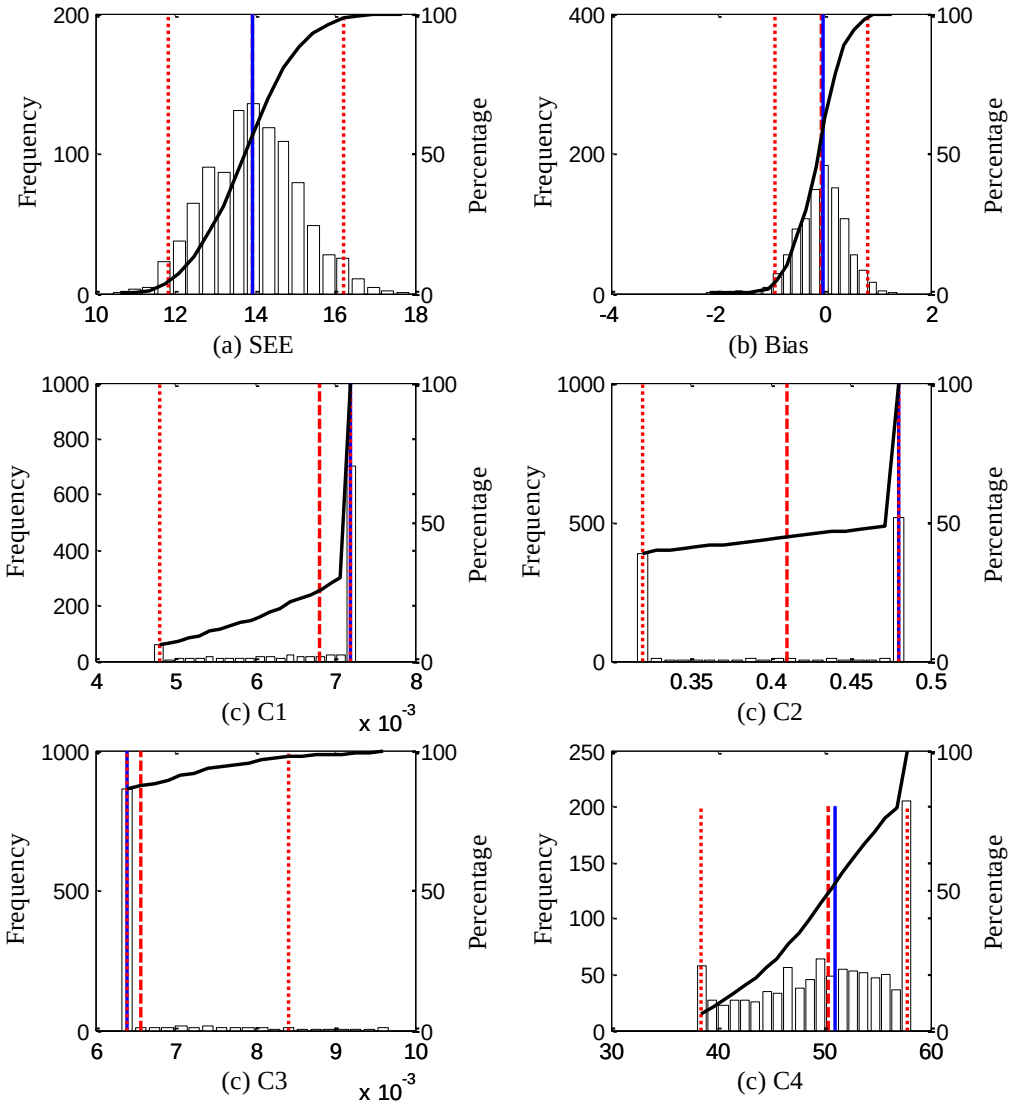


Figure B-325 Option 1 IRI bootstrapping frequency distributions

Reliability

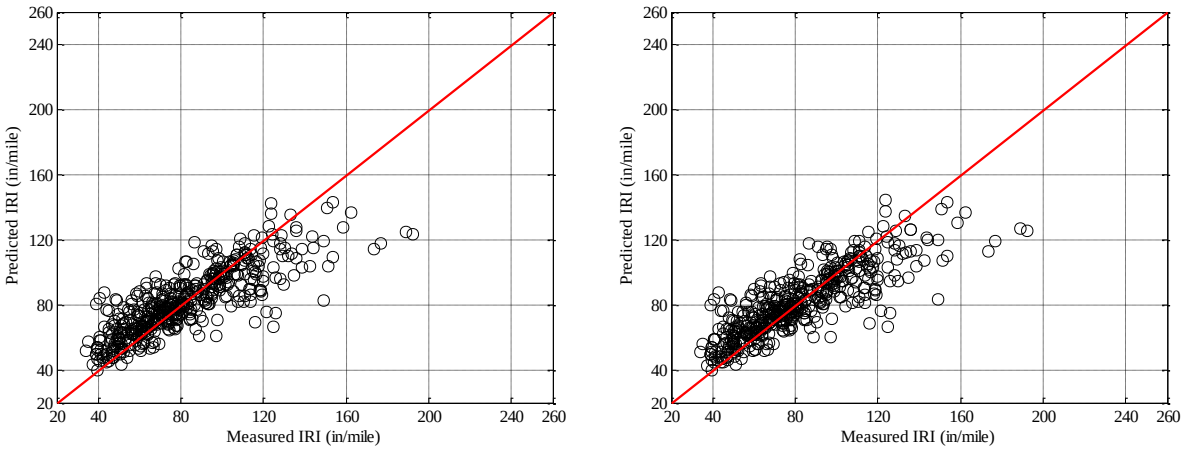
The IRI reliability is internally estimated by the software.

B.1.5.2 Option 2

No sampling

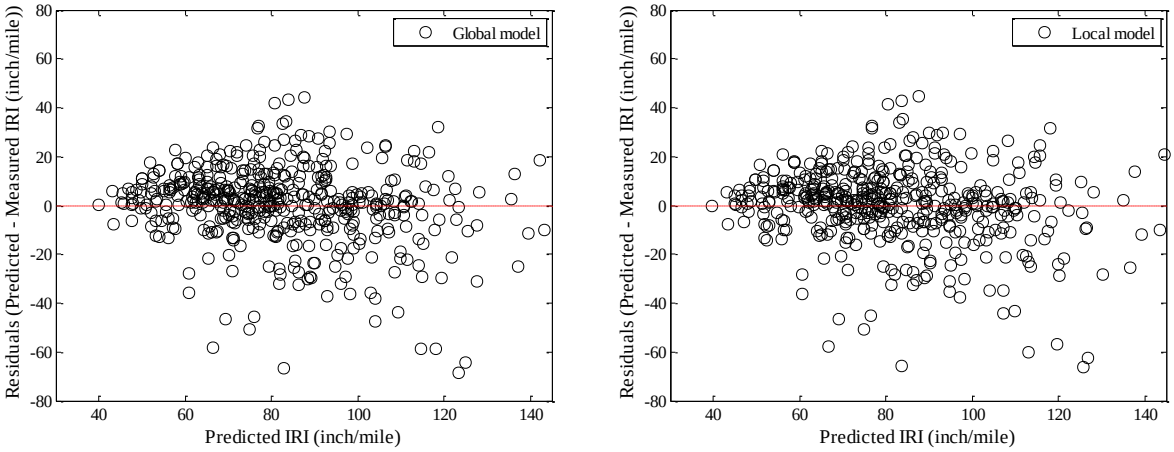
Table B-157 Option 2 IRI local calibration results – no sampling

Parameter	Global	Local
SEE	16.0659	15.8267
Bias	0.2456	0.0564
R^2	0.6857	0.6936
t-test pvalue	0.7407	0.9385
Intercept = 0	0.0000	0.0000
Slope = 1	0.0000	0.0000
C1	40.0000	32.0602
C2	0.4000	0.3200
C3	0.0080	0.0064
C4	0.0150	0.0180



(a) Global model (b) Local model

Figure B-326 Option 2 IRI local calibration measured versus predicted – no sampling



(a) Global model (b) Local model

Figure B-327 Option 2 IRI local calibration residual plots – no sampling

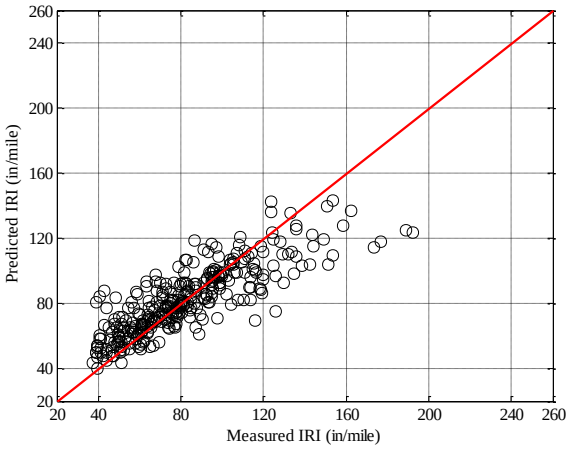
Reliability

The IRI reliability is internally estimated by the software.

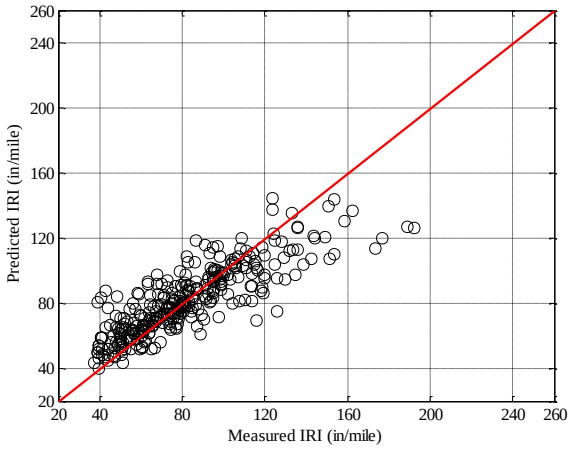
Split sampling

Table B-158 Option 2 IRI local calibration results – split sampling

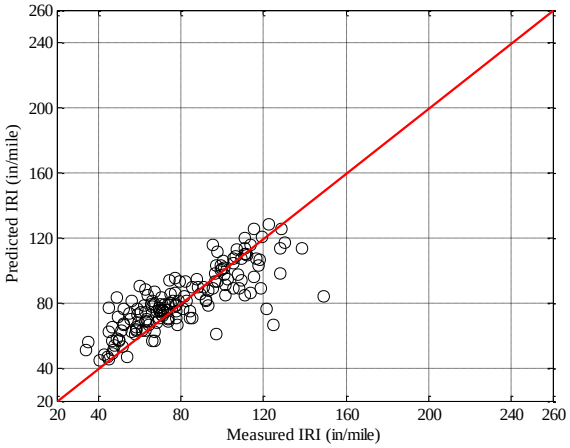
Parameter	Global model	Local model	Validation
SEE	16.6468	16.3668	14.7618
Bias	-0.2285	-0.2634	1.3524
R^2	0.6991	0.7091	0.6549
t-test pvalue	0.8074	0.7749	0.2553
Intercept = 0	0.0000	0.0000	0.0000
Slope = 1	0.0000	0.0000	0.0000
C1	40.0000	33.4400	33.4400
C2	0.4000	0.3200	0.3200
C3	0.0080	0.0064	0.0064
C4	0.0150	0.0180	0.0180



(a) Global model

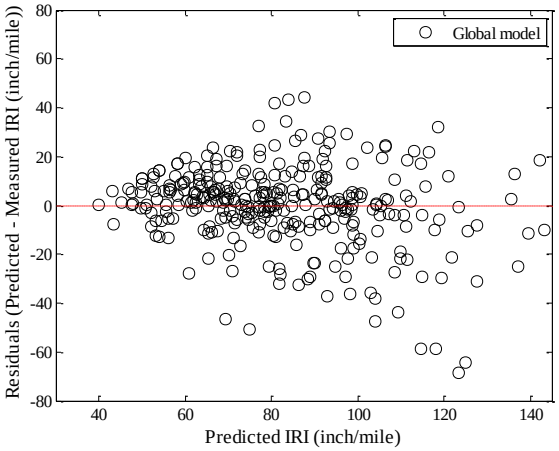


(b) Local model

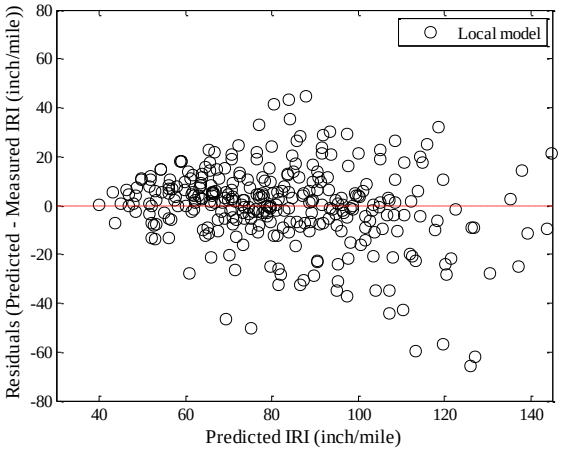


(c) Local model validation

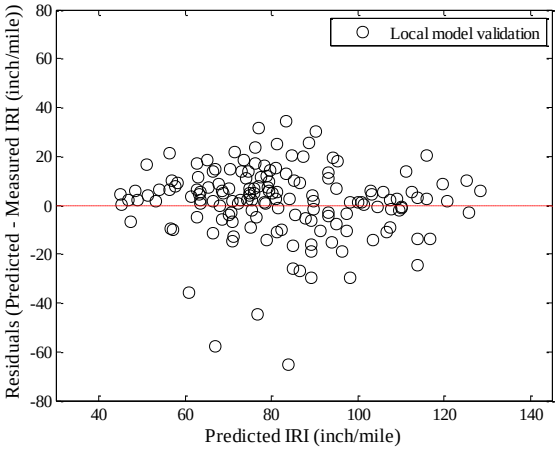
Figure B-328 Option 2 IRI local calibration measured versus predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-329 Option 2 IRI local calibration residual plots – split sampling

Reliability

The IRI reliability is internally estimated by the software.

Repeated split sampling

Table B-159 Option 2 IRI local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	16.1000	16.1383	14.8243	17.2964
Bias	0.2126	0.2346	-1.2712	1.7130
C1	40.0000	40.0000	-	-
C2	0.4000	0.4000	-	-
C3	0.0080	0.0080	-	-
C4	0.0150	0.0150	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	15.8346	15.8684	14.5452	17.0303
Bias	-0.2411	-0.1812	-1.1543	0.3264
C1	32.1854	33.4400	25.6184	33.4400
C2	0.3428	0.3200	0.3200	0.4800
C3	0.0064	0.0064	0.0064	0.0064
C4	0.0175	0.0180	0.0149	0.0180
Local Model validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	15.8973	15.9040	12.8664	18.7973
Bias	-0.1664	0.0272	-4.8854	3.8174
C1	32.1854	33.4400	25.6184	33.4400
C2	0.3428	0.3200	0.3200	0.4800
C3	0.0064	0.0064	0.0064	0.0064
C4	0.0175	0.0180	0.0149	0.0180

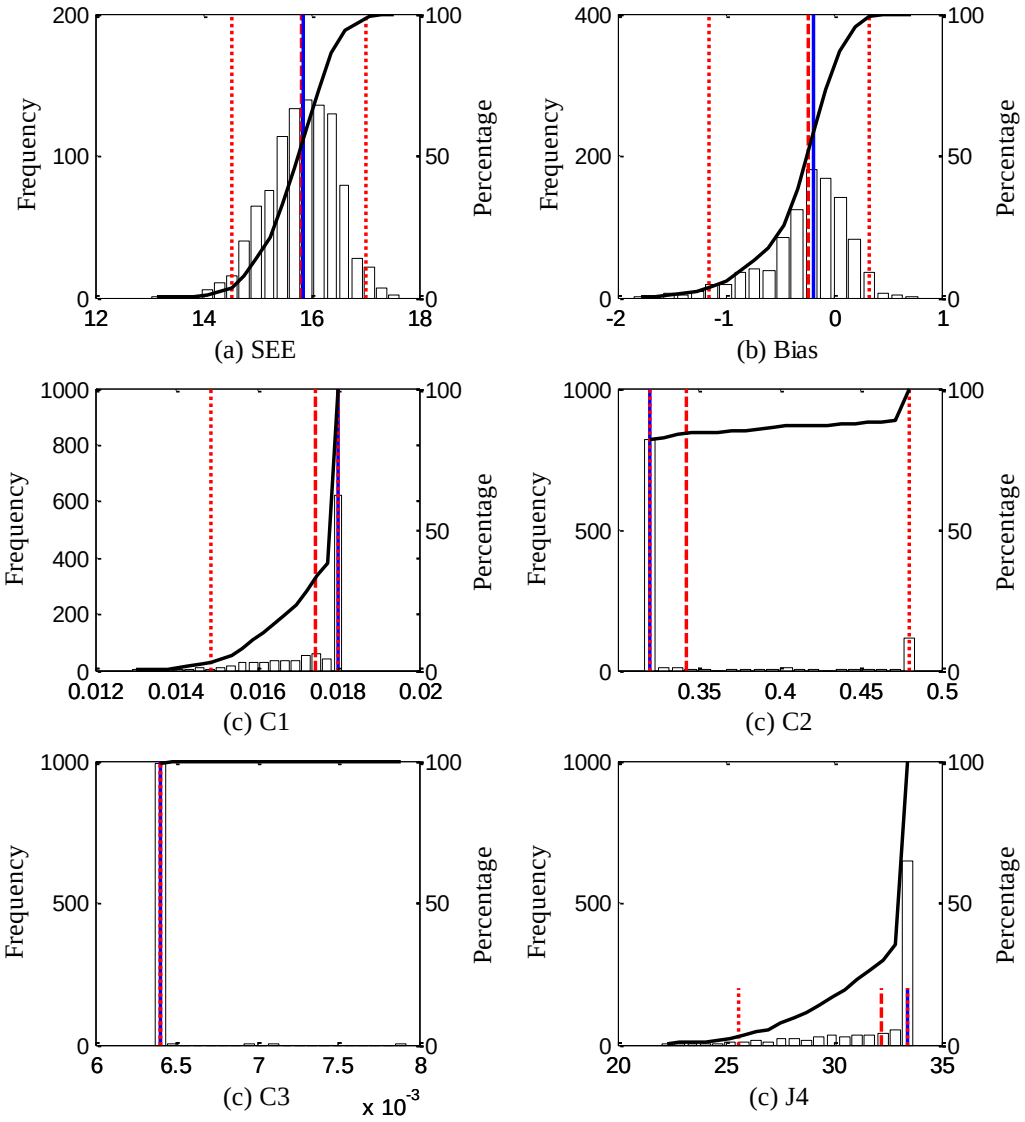


Figure B-330 Option 2 IRI repeated split sampling frequency distributions – calibration

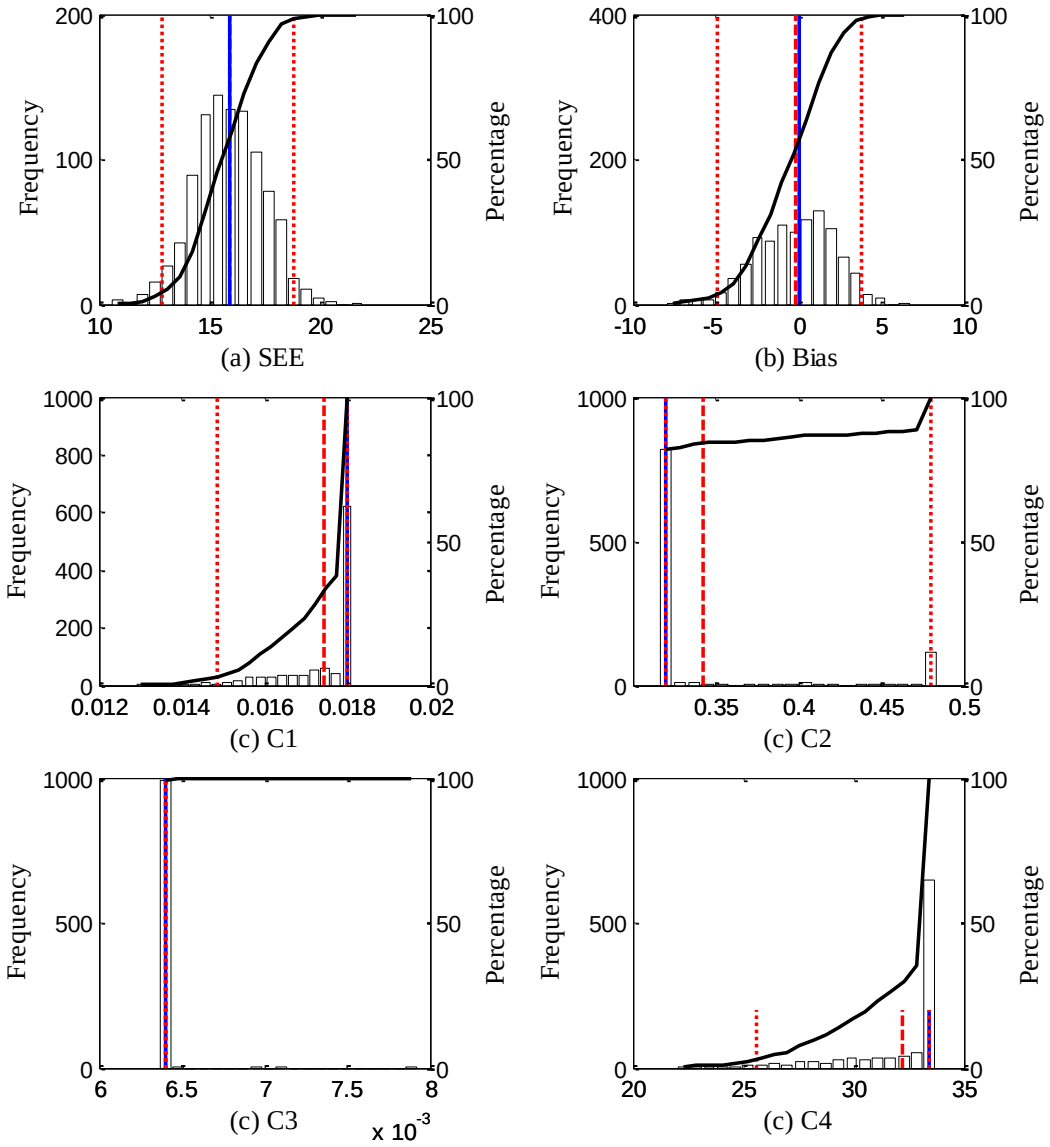
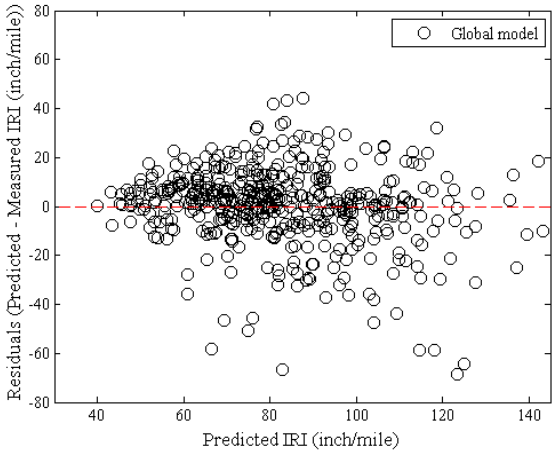
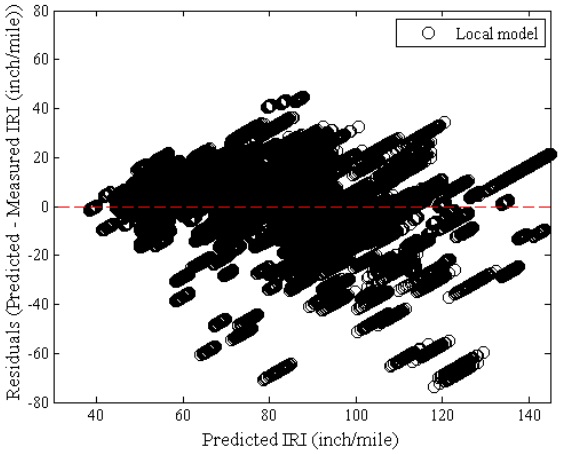


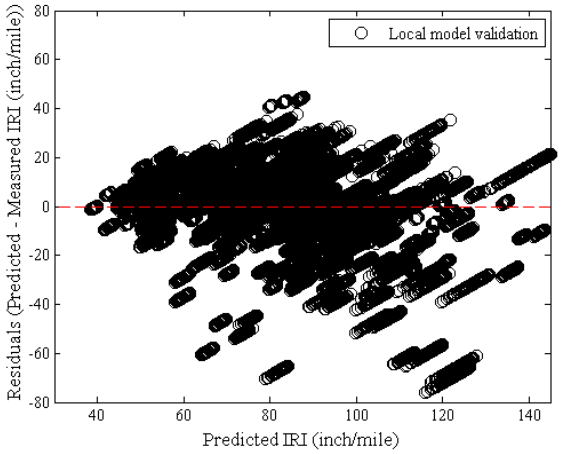
Figure B-331 Option 2 IRI repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-332 Option 2 IRI local calibration residual plots – repeated split sampling

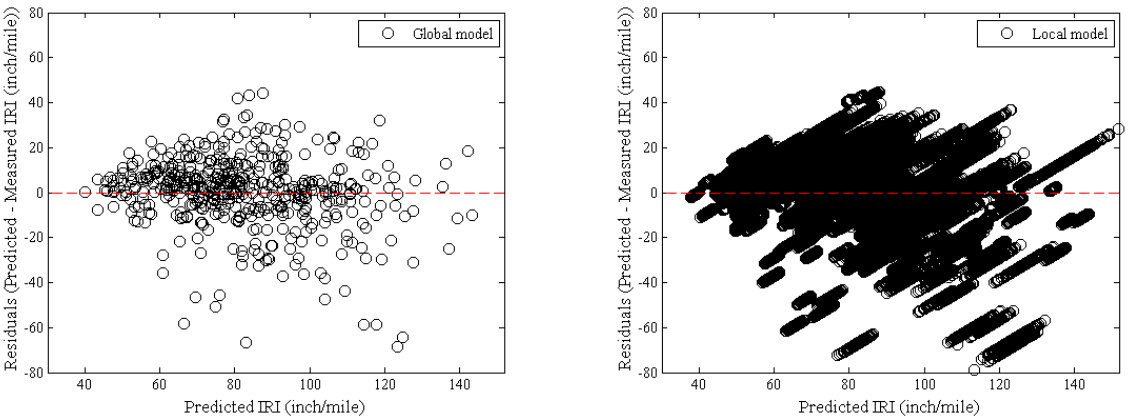
Reliability

The IRI reliability is internally estimated by the software.

Bootstrapping

Table B-160 Option 2 IRI local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	16.0256	16.0372	13.9711	17.9502
Bias	0.2779	0.2614	-1.9643	2.5374
C1	40.0000	40.0000	-	-
C2	0.4000	0.4000	-	-
C3	0.0080	0.0080	-	-
C4	0.0150	0.0150	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	15.7316	15.7544	13.6244	17.6772
Bias	-0.3810	-0.3082	-1.6554	0.4516
C1	31.6450	33.4400	22.2960	33.4400
C2	0.3613	0.3200	0.3200	0.4800
C3	0.0065	0.0064	0.0064	0.0071
C4	0.0172	0.0180	0.0137	0.0180



(a) Global model (b) Local model

Figure B-333 Option 2 IRI local calibration residual plots – repeated split sampling

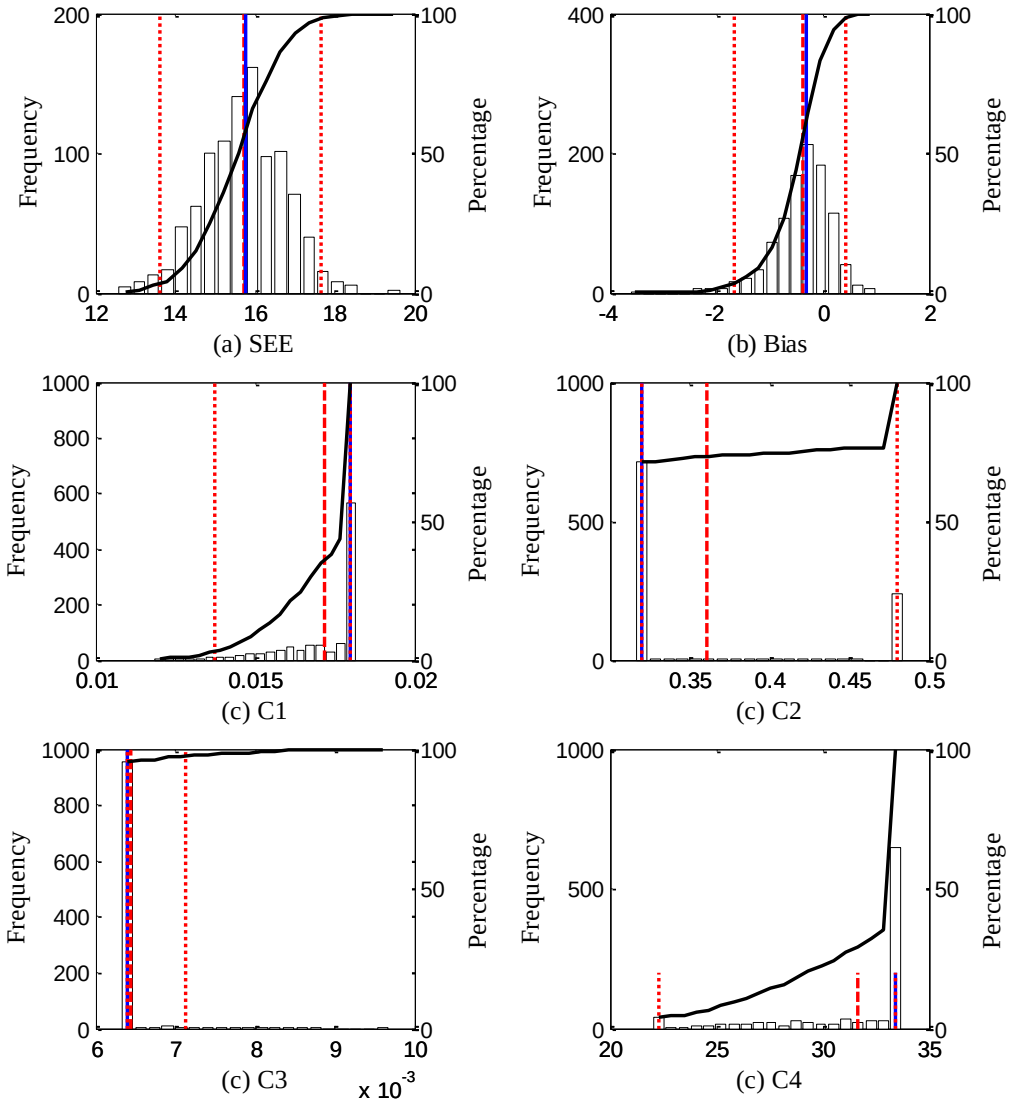


Figure B-334 Option 2 IRI bootstrapping frequency distributions

Reliability

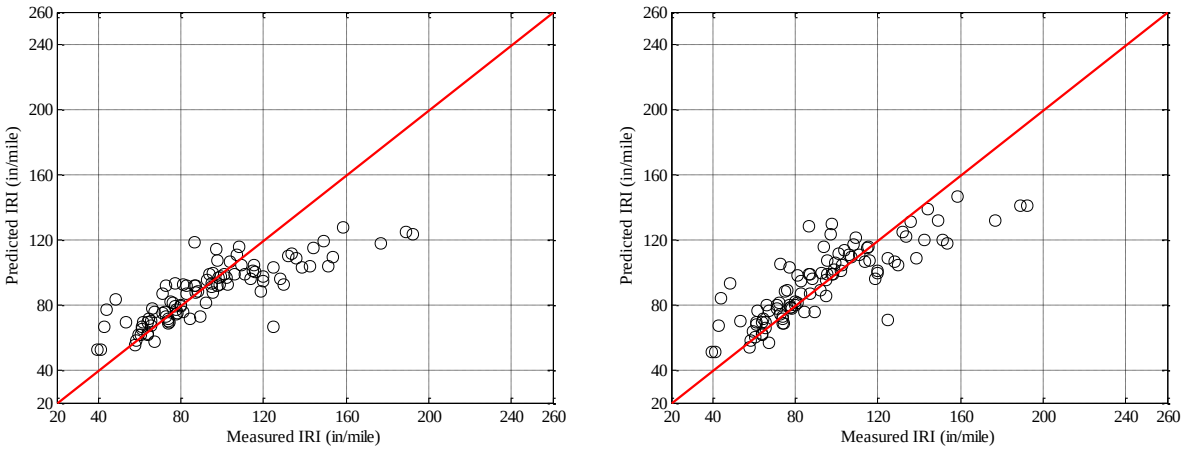
The IRI reliability is internally estimated by the software.

B.1.5.3 Option 4

No sampling

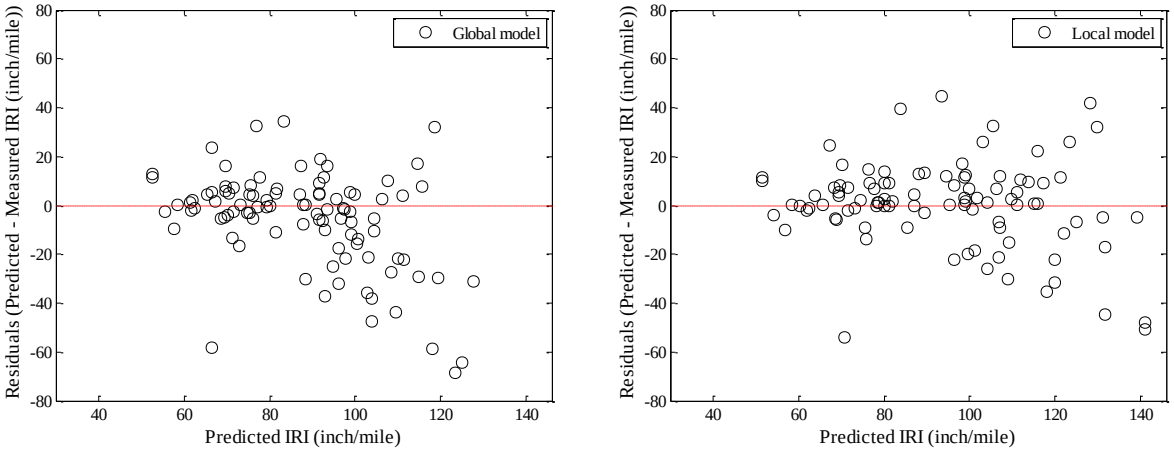
Table B-161 Option 4 IRI local calibration results – no sampling

Parameter	Global	Local
SEE	20.6944	17.9586
Bias	-5.9035	0.3185
R^2	0.6884	0.7006
t-test pvalue	0.0040	0.8610
Intercept = 0	0.0000	0.0000
Slope = 1	0.0000	0.0000
C1	40.0000	20.8000
C2	0.4000	0.1600
C3	0.0080	0.0048
C4	0.0150	0.0277



(a) Global model (b) Local model

Figure B-335 Option 4 IRI local calibration measured versus predicted – no sampling



(a) Global model (b) Local model

Figure B-336 Option 4 IRI local calibration residual plots – no sampling

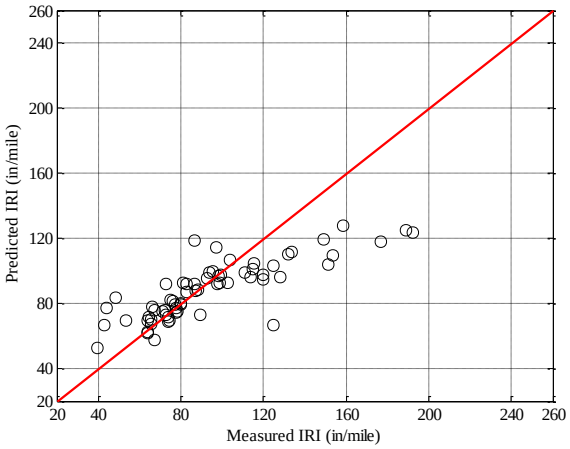
Reliability

The IRI reliability is internally estimated by the software.

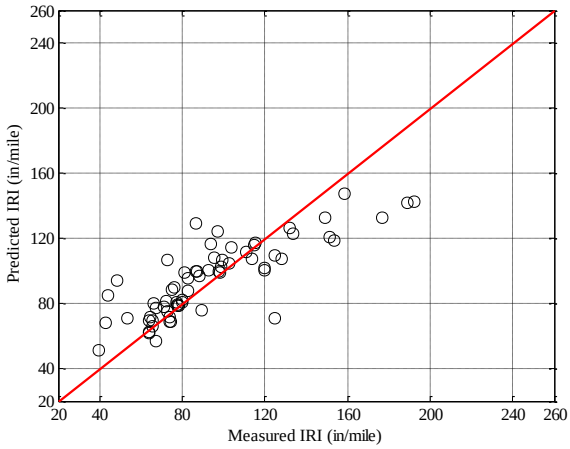
Split sampling

Table B-162 Option 4 IRI local calibration results – split sampling

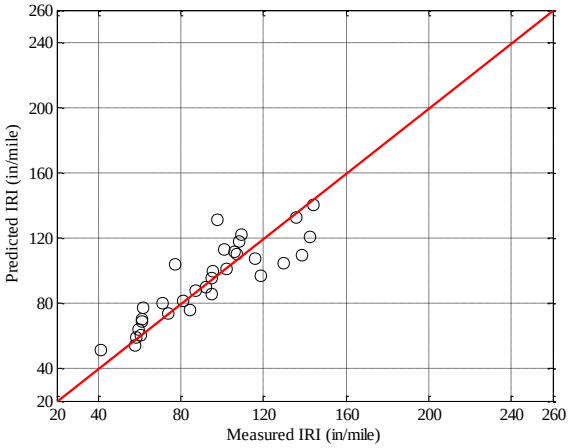
Parameter	Global model	Local model	Validation
SEE	22.6387	19.9658	13.6126
Bias	-5.8644	0.8658	0.7417
R^2	0.6798	0.6814	0.7711
t-test pvalue	0.0328	0.7255	0.7558
Intercept = 0	0.0000	0.0000	0.0037
Slope = 1	0.0000	0.0000	0.0035
C1	40.0000	20.8000	20.8000
C2	0.4000	0.1600	0.1600
C3	0.0080	0.0048	0.0048
C4	0.0150	0.0282	0.0282



(a) Global model

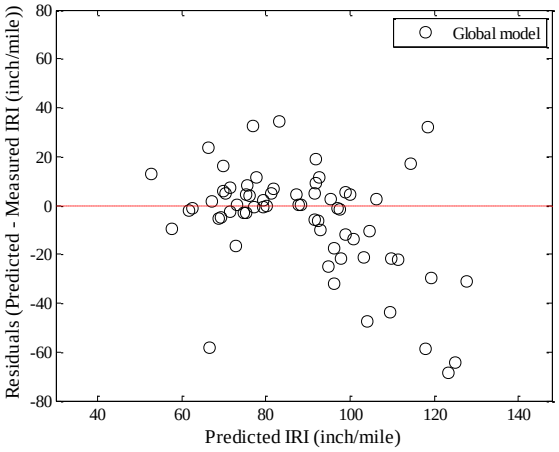


(b) Local model

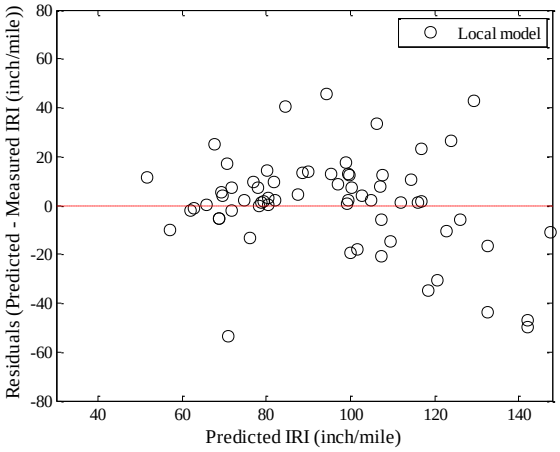


(c) Local model validation

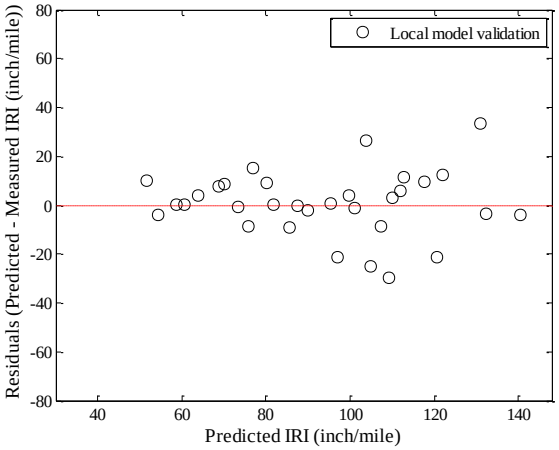
Figure B-337 Option 4 IRI local calibration measured versus predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-338 Option 4 IRI local calibration residual plots – split sampling

Reliability

The IRI reliability is internally estimated by the software.

Repeated split sampling

Table B-163 Option 4 IRI local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	20.7012	20.9912	16.4997	23.8782
Bias	-5.8767	-5.9631	-9.3455	-2.0099
C1	40.0000	40.0000	-	-
C2	0.4000	0.4000	-	-
C3	0.0080	0.0080	-	-
C4	0.0150	0.0150	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	17.8550	18.0194	14.7366	20.2766
Bias	0.2396	0.2738	-0.9799	1.3002
C1	20.8988	20.8000	20.8000	21.6186
C2	0.1600	0.1600	0.1600	0.1600
C3	0.0048	0.0048	0.0048	0.0048
C4	0.0275	0.0277	0.0232	0.0300
Local Model validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	18.7280	18.7737	11.7677	25.7248
Bias	-0.0133	0.2452	-11.4828	8.9161
C1	20.8988	20.8000	20.8000	21.6186
C2	0.1600	0.1600	0.1600	0.1600
C3	0.0048	0.0048	0.0048	0.0048
C4	0.0275	0.0277	0.0232	0.0300

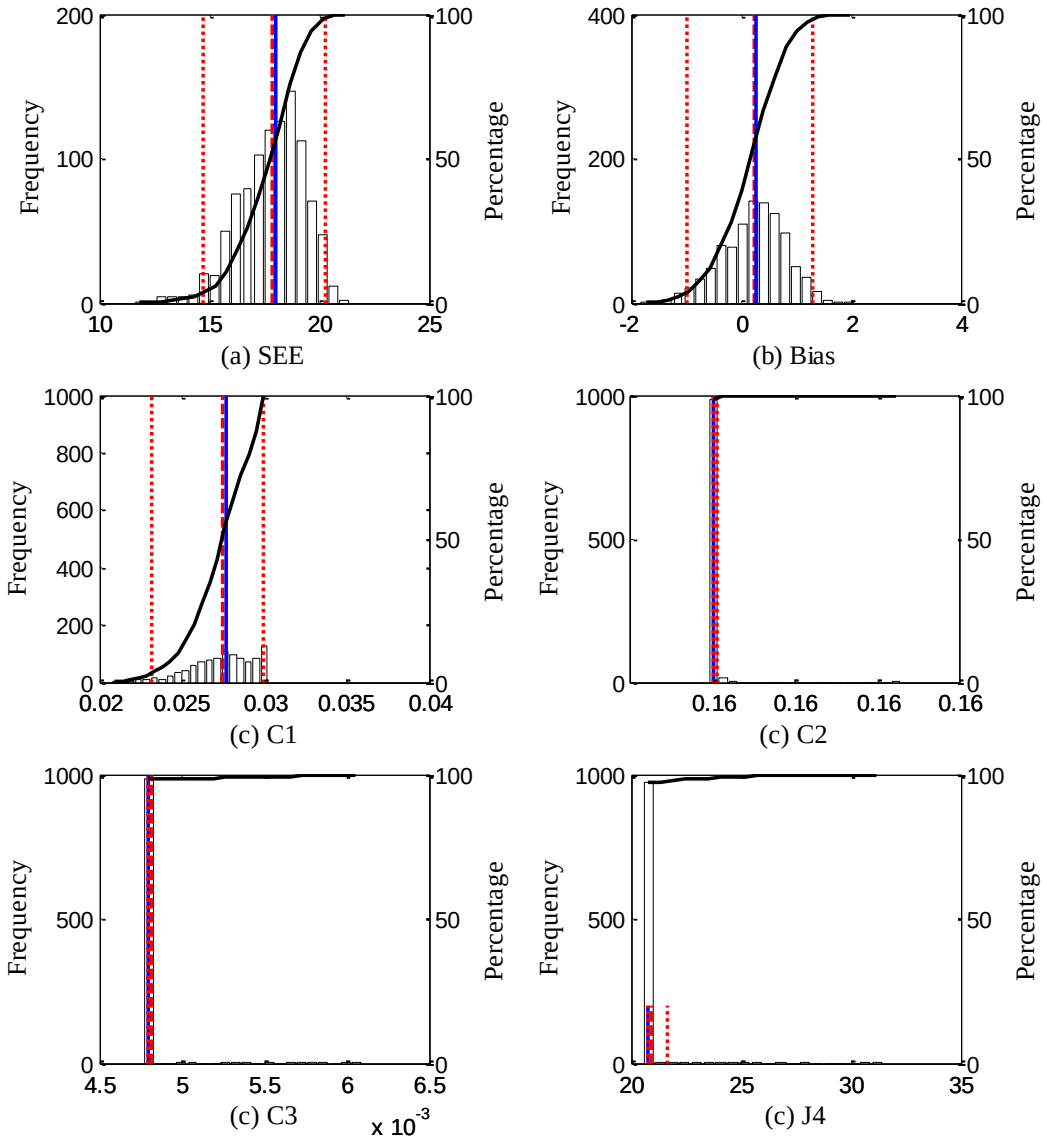


Figure B-339 Option 4 IRI repeated split sampling frequency distributions – calibration

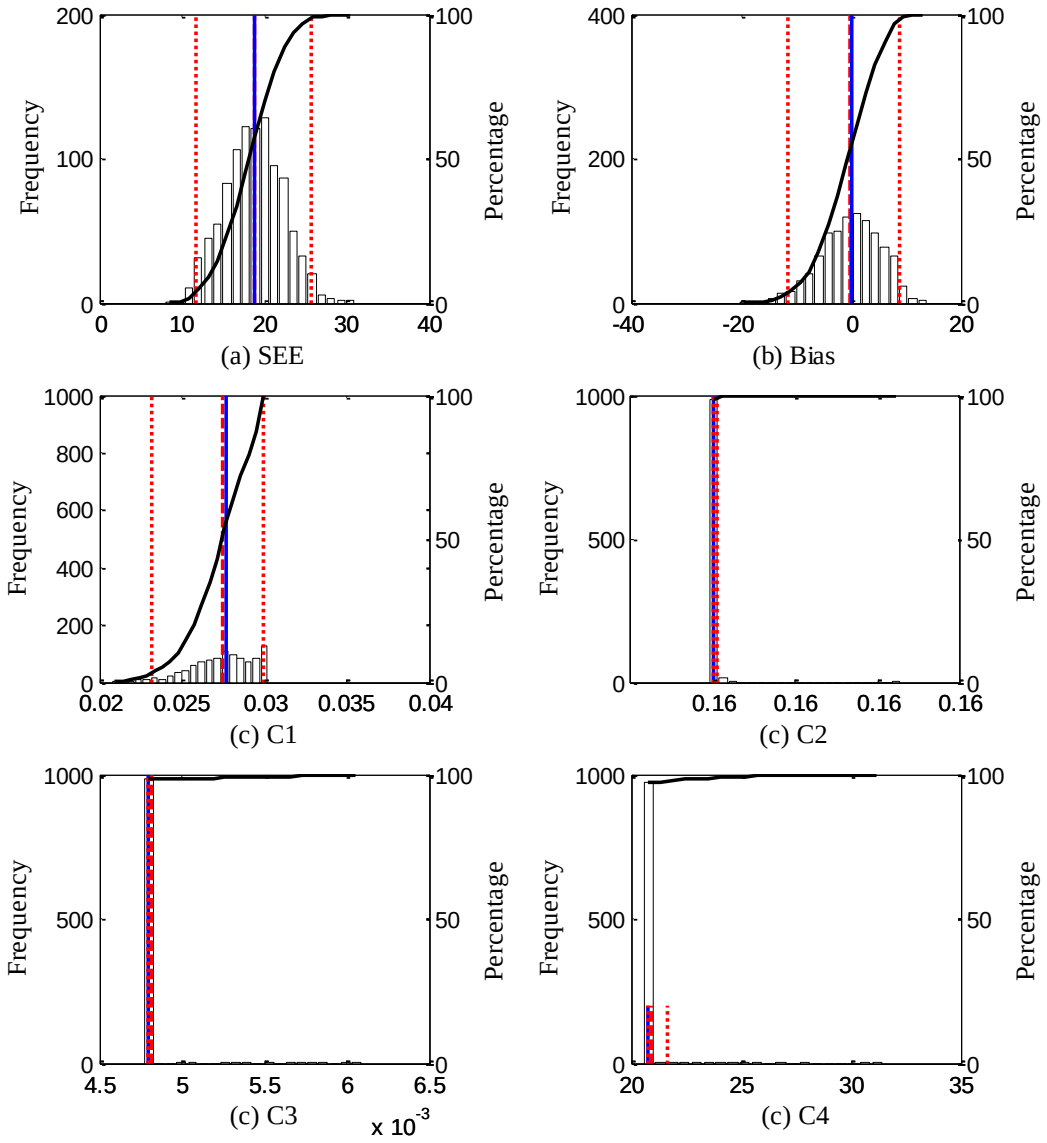
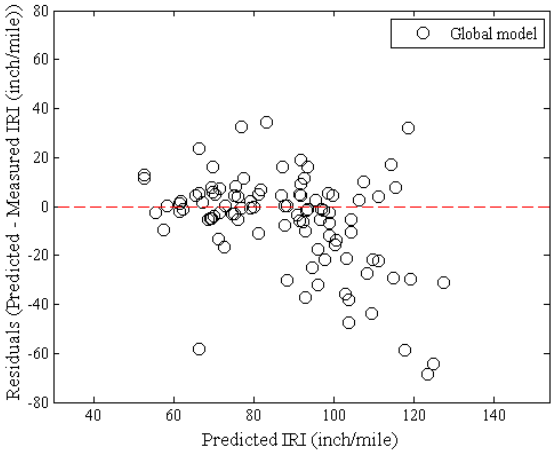
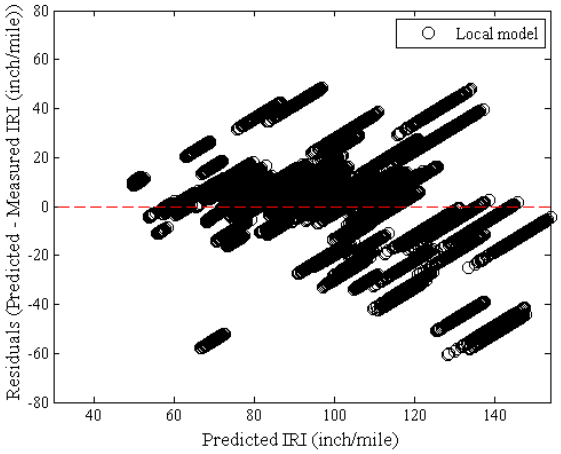


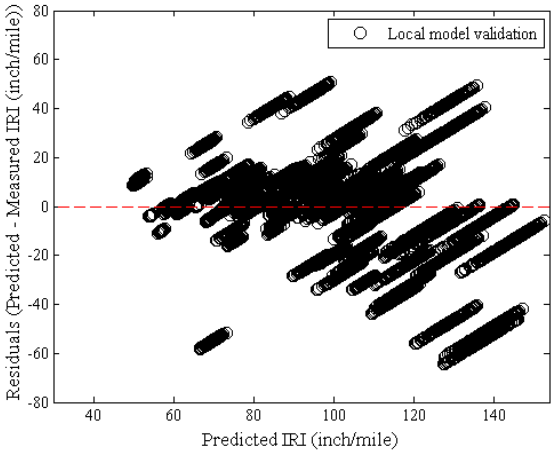
Figure B-340 Option 4 IRI repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-341 Option 4 IRI local calibration residual plots – repeated split sampling

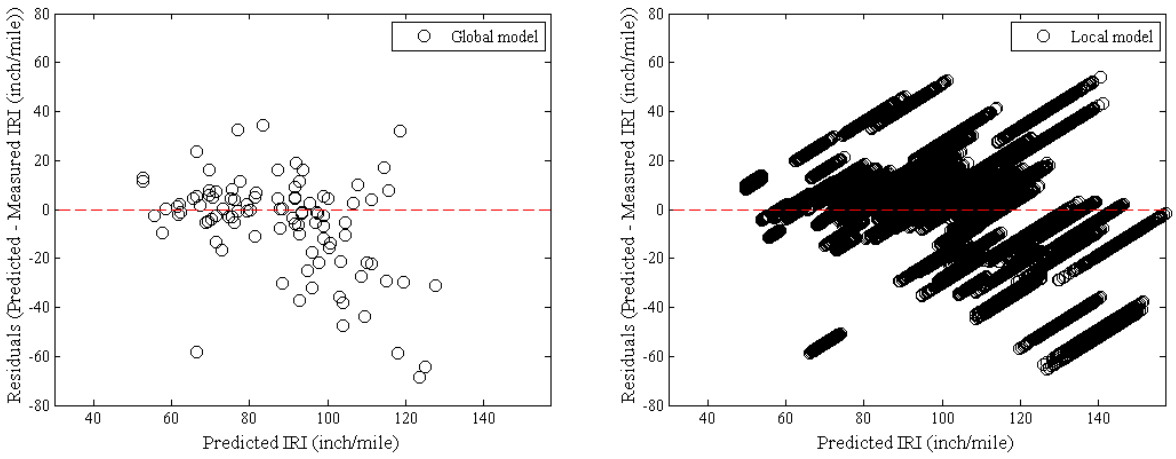
Reliability

The IRI reliability is internally estimated by the software.

Bootstrapping

Table B-164 Option 4 IRI local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	20.4800	20.6428	14.9401	25.4311
Bias	-5.8312	-5.9656	-11.3979	0.1292
C1	40.0000	40.0000	-	-
C2	0.4000	0.4000	-	-
C3	0.0080	0.0080	-	-
C4	0.0150	0.0150	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	17.5260	17.6062	13.2472	21.3238
Bias	0.1290	0.1613	-1.4172	1.5613
C1	21.4303	20.8000	20.8000	31.2000
C2	0.1600	0.1600	0.1600	0.1600
C3	0.0049	0.0048	0.0048	0.0071
C4	0.0271	0.0276	0.0208	0.0300



(a) Global model (b) Local model

Figure B-342 Option 4 IRI local calibration residual plots – bootstrapping

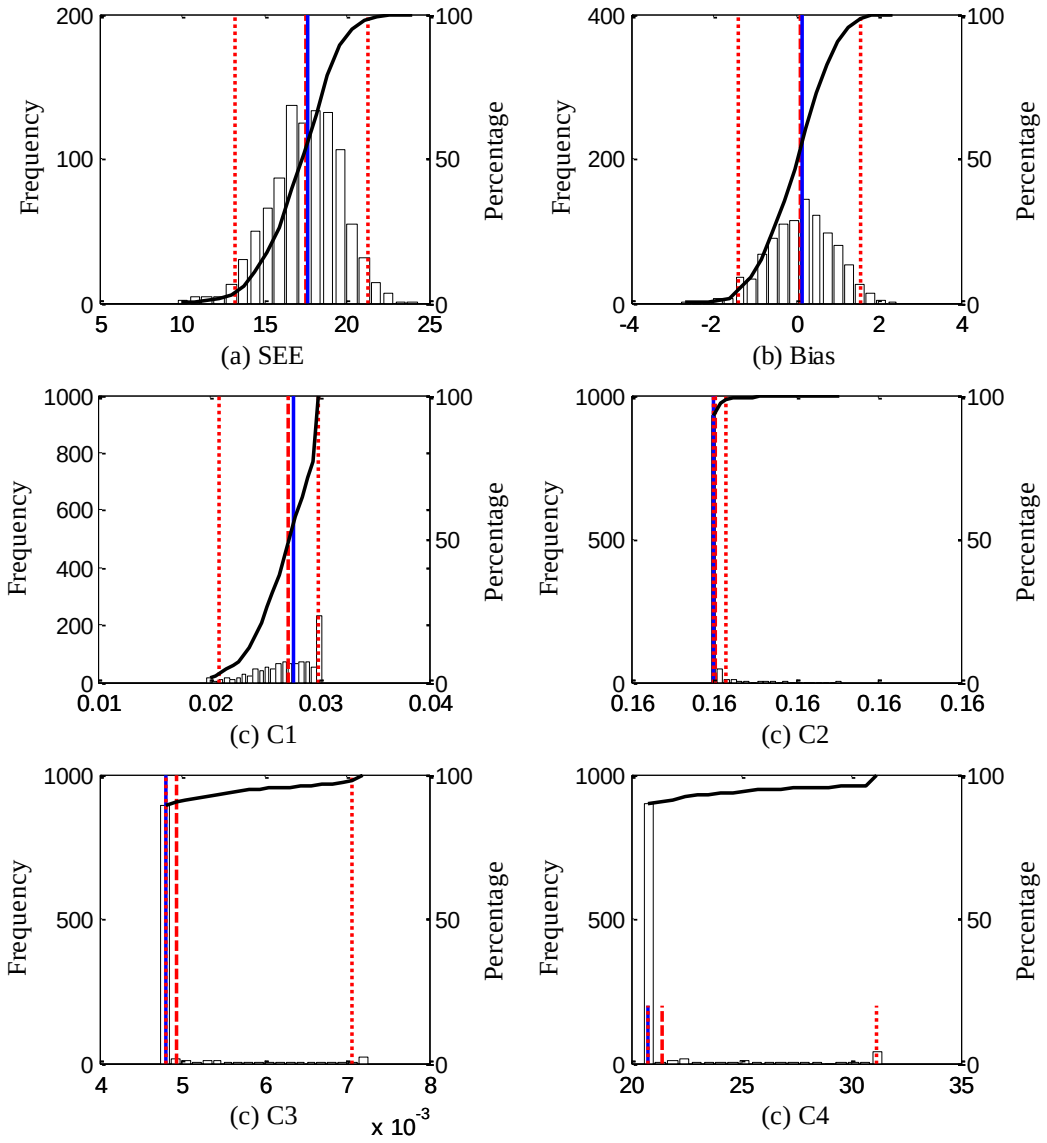


Figure B-343 Option 2 IRI bootstrapping frequency distributions

Reliability

The IRI reliability is internally estimated by the software.

B.2 Rigid Pavement Performance Prediction Models

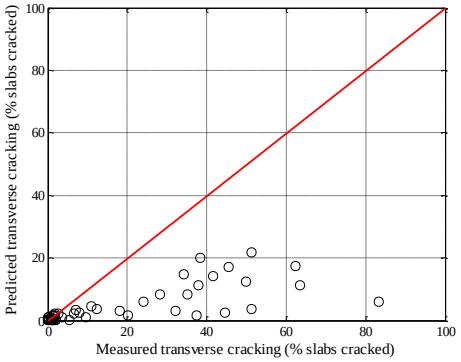
B.2.1 Transverse cracking

B.2.1.1 Option 1

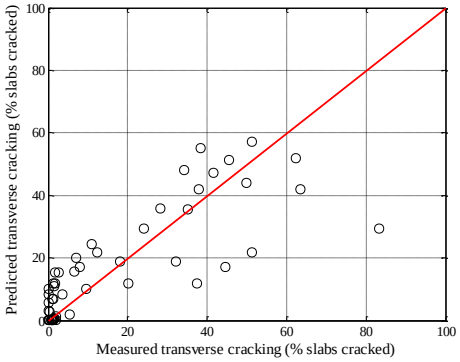
No sampling

Table B-165 Option 1 transverse cracking local calibration results – no sampling

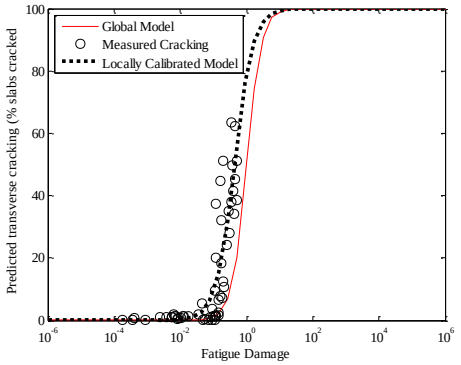
Parameter	Global model	Local model
SEE	21.10	12.30
Bias	-11.86	0.17
R^2	0.58	0.67
t-test pvalue	0.00	0.92
Intercept = 0	0.36	0.00
Slope = 1	0.00	0.00
C4	1.00	0.27
C5	-1.98	-1.56



(a) Global model

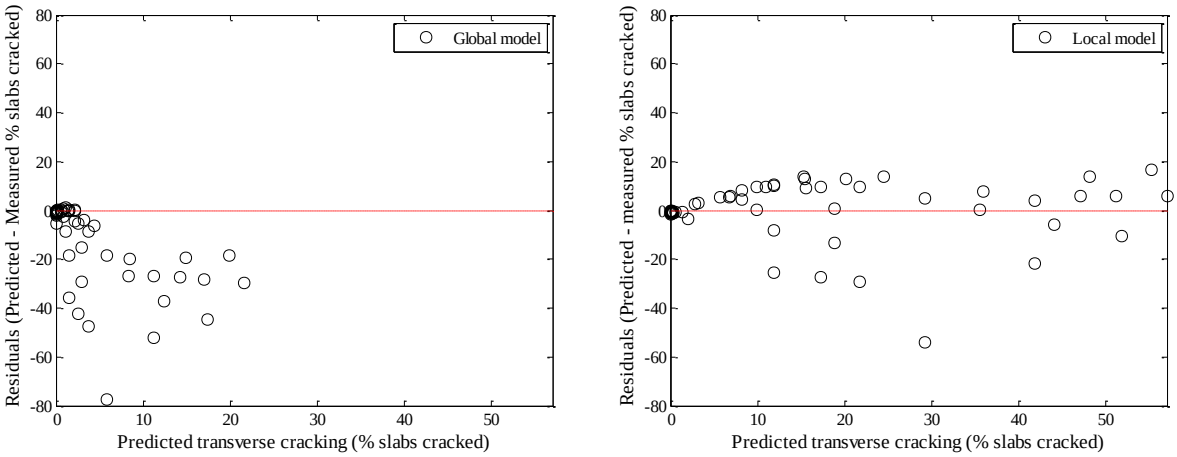


(b) Local model



(c) Fatigue damage predicted cracking

Figure B-344 Option 1 transverse cracking local calibration measured vs. predicted – no sampling



(a) Global model (b) Local model

Figure B-345 Option 1 transverse cracking residual plots – no sampling

Reliability

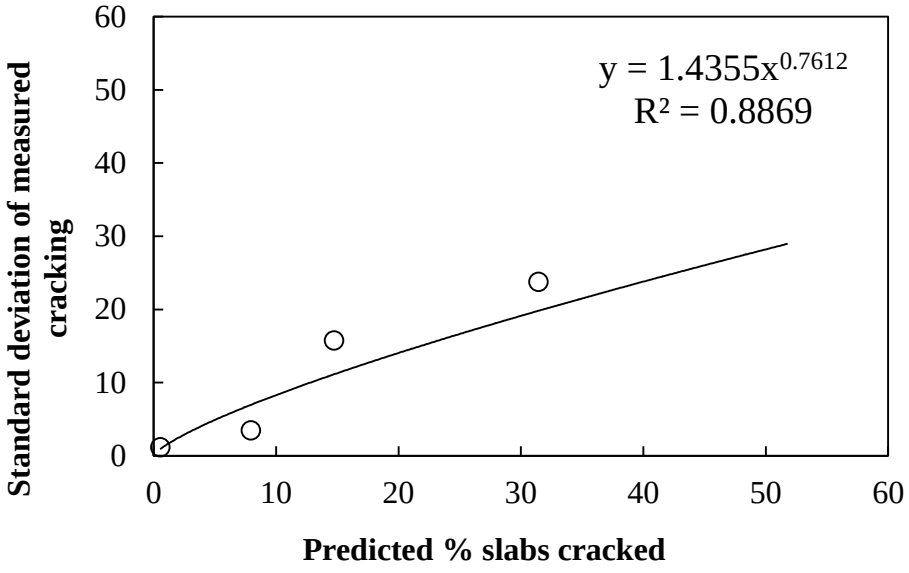
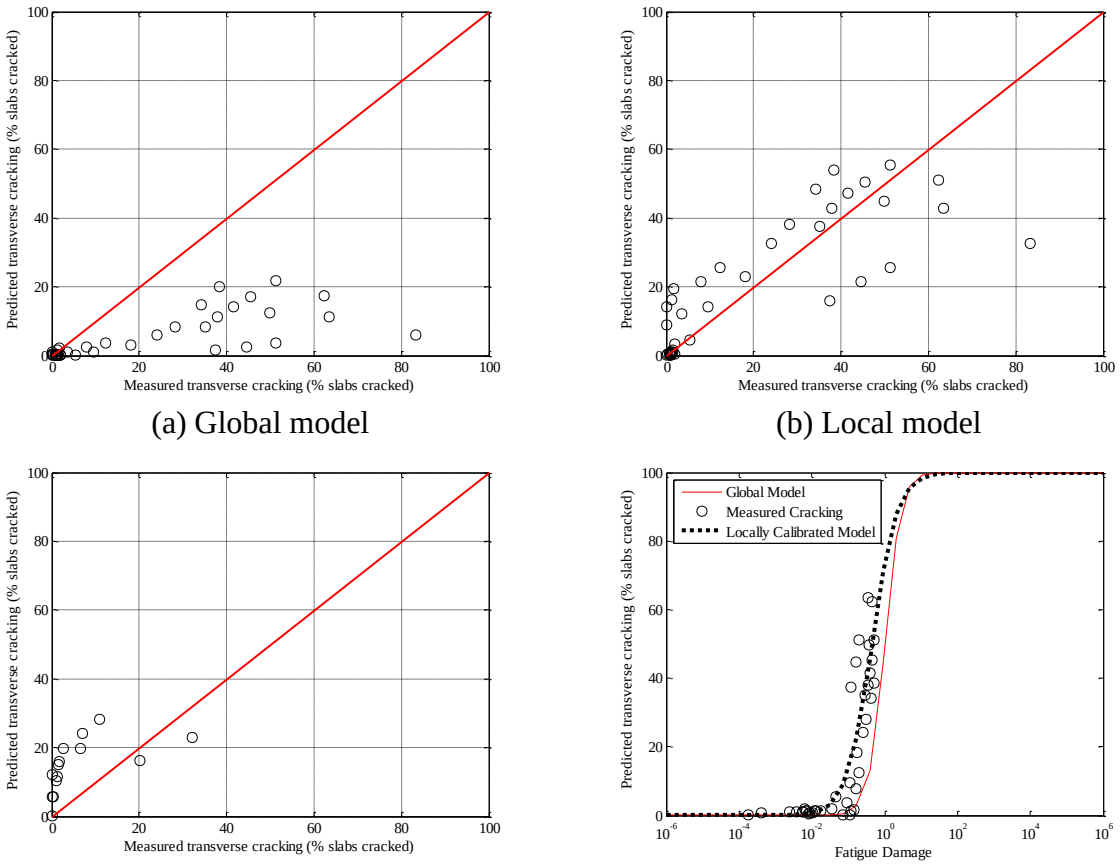


Figure B-346 Option 1 Transverse cracking reliability model fitting – no sampling

Split sampling

Table B-166 Option 1 transverse cracking local calibration results – split sampling

Parameter	Global model	Local model calibration	Local model validation
SEE	24.09	13.05	12.24
Bias	-14.59	0.14	8.13
R^2	0.57	0.69	0.32
t-test pvalue	0.00	0.94	0.00
Intercept = 0	0.50	0.01	0.00
Slope = 1	0.00	0.00	0.04
C4	1.00	0.35	0.35
C5	-1.98	-1.28	-1.28



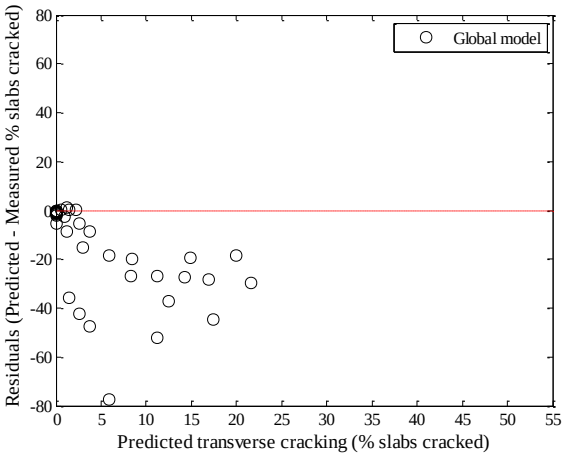
(a) Global model

(b) Local model

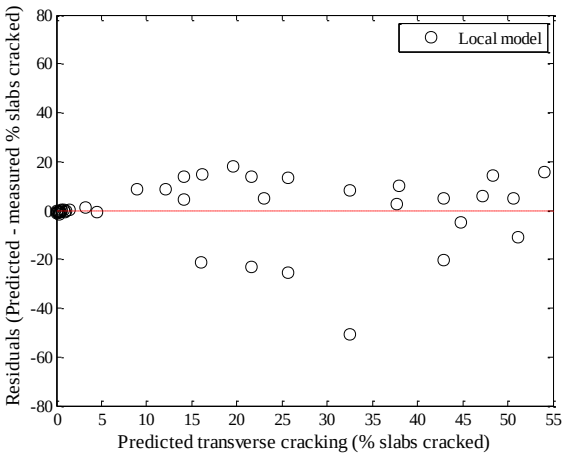
(c) Local model validation

(d) Fatigue damage predicted cracking

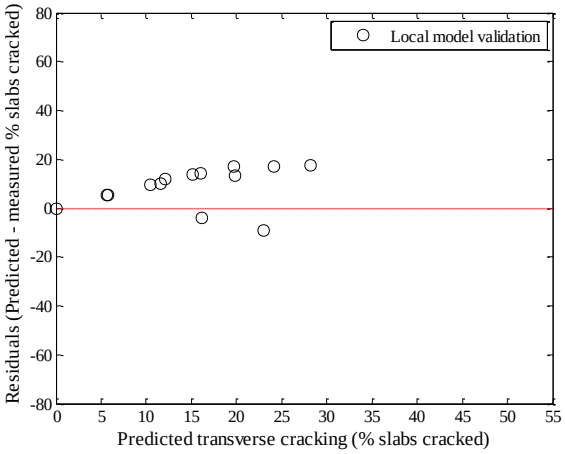
Figure B-347 Option 1 transverse cracking local calibration measured vs. predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-348 Option 1 transverse cracking residual plots – split sampling

Reliability

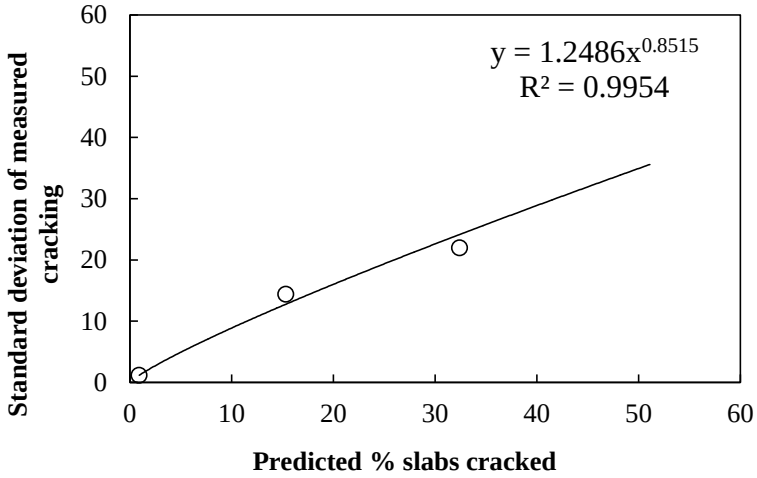


Figure B-349 Option 1 Transverse cracking reliability model fitting – split sampling

Repeated split sampling

Table B-167 Option 1 transverse cracking local calibration results – repeated split sampling

Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	21.03	21.03	14.59	25.06
Bias	-11.83	-11.83	-15.71	-7.48
C4	1.00	1.00	-	-
C5	-1.98	-1.98	-	-
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	11.92	12.71	7.04	14.33
Bias	0.15	0.17	-0.37	0.52
C4	0.26	0.27	0.14	0.36
C5	-1.63	-1.59	-1.98	-1.31
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	14.10	13.02	5.30	26.35
Bias	0.04	0.06	-13.69	12.30
C4	0.26	0.27	0.14	0.36
C5	-1.63	-1.59	-1.98	-1.31

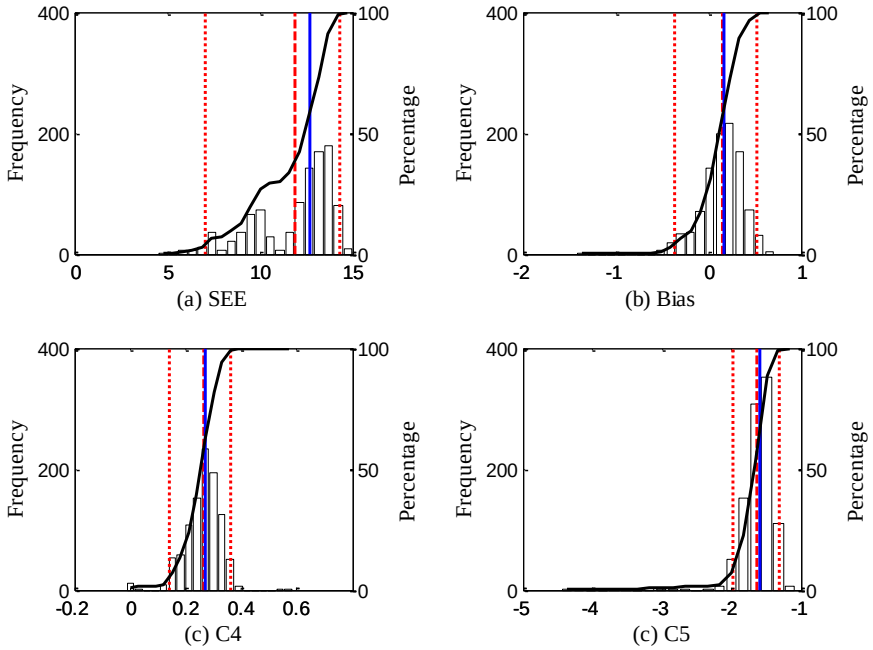


Figure B-350 Option 1 – Distribution of calibration parameters – repeated split sampling - Calibration

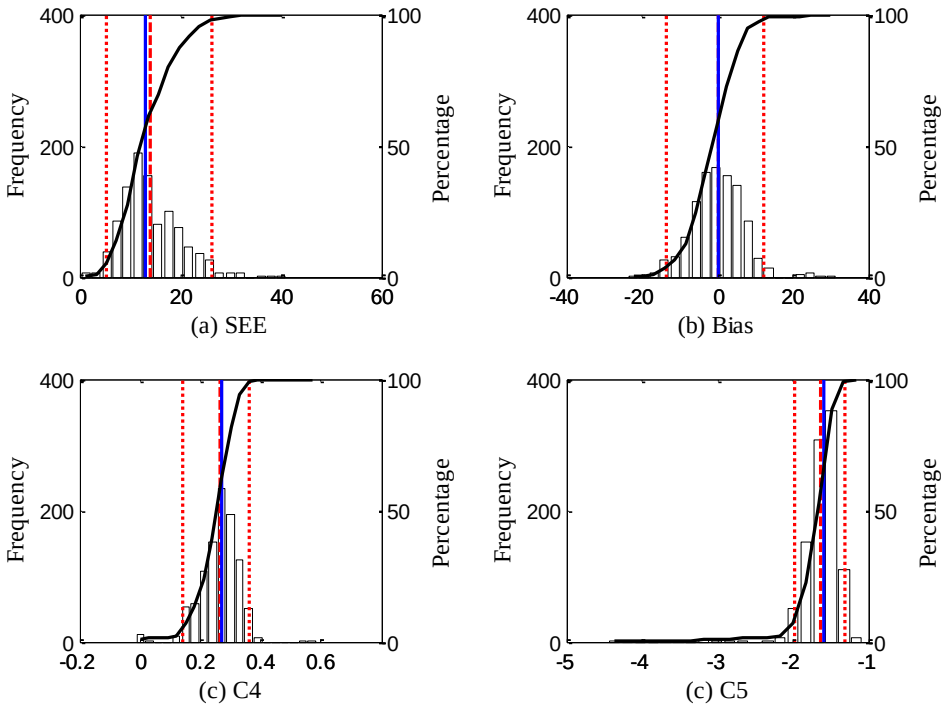


Figure B-351 Option 1 – Distribution of calibration parameters – repeated split sampling - Validation

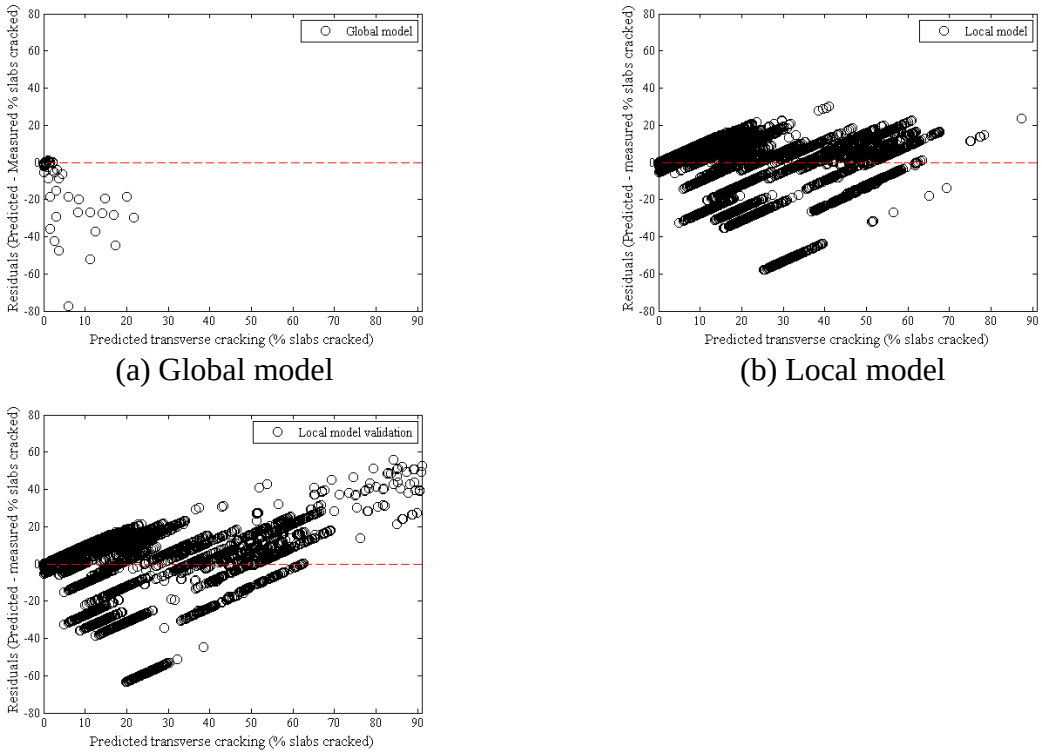


Figure B-352 Option 1 transverse cracking residual plots – repeated split sampling

Reliability

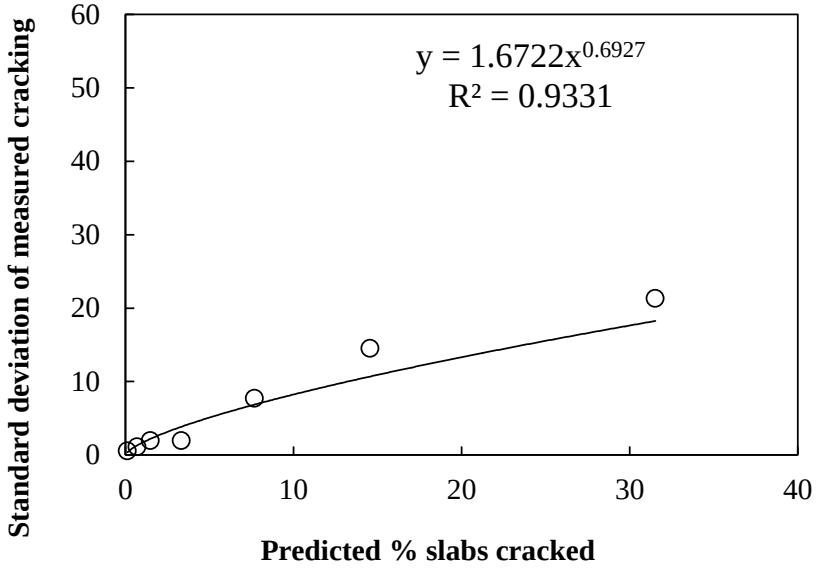


Figure B-353 Option 1 Transverse cracking reliability model fitting – repeated split sampling

Bootstrapping

Table B-168 Option 1 transverse cracking local calibration results – bootstrapping

Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	20.62	20.68	12.05	28.91
Bias	-11.74	-11.55	-18.69	-5.54
C4	1.00	1.00	-	-
C5	-1.98	-1.98	-	-
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	11.37	11.65	5.21	16.21
Bias	0.13	0.15	-0.54	0.68
C4	0.25	0.26	0.02	0.44
C5	-1.71	-1.63	-2.95	-1.21

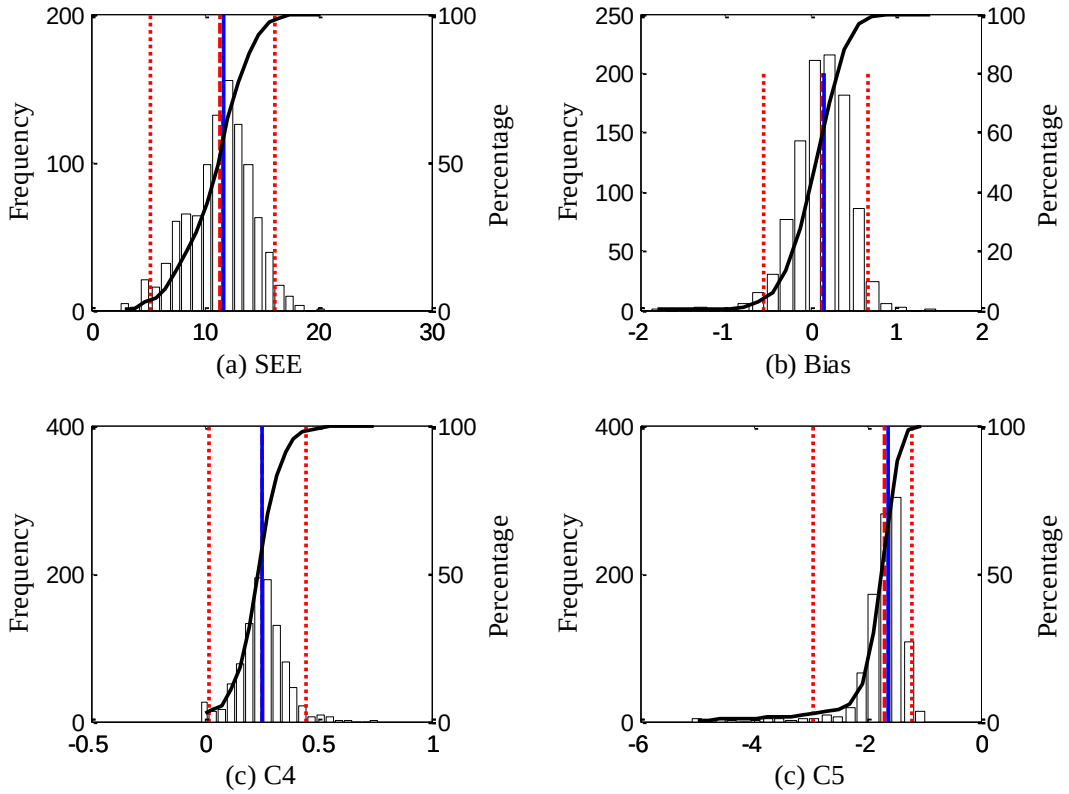


Figure B-354 Option 1 – Distribution of calibration parameters – bootstrapping

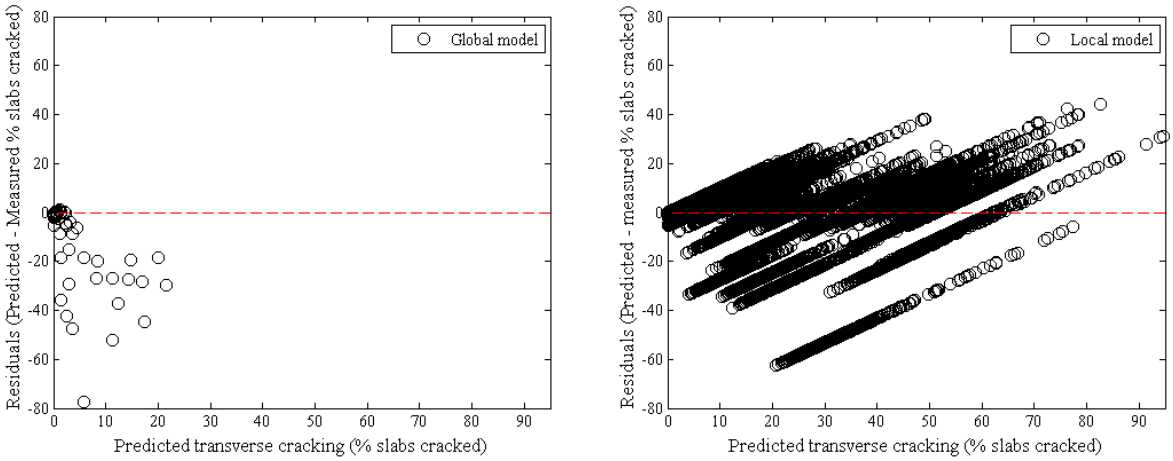


Figure B-355 Option 1 transverse cracking residual plots – bootstrapping

Reliability

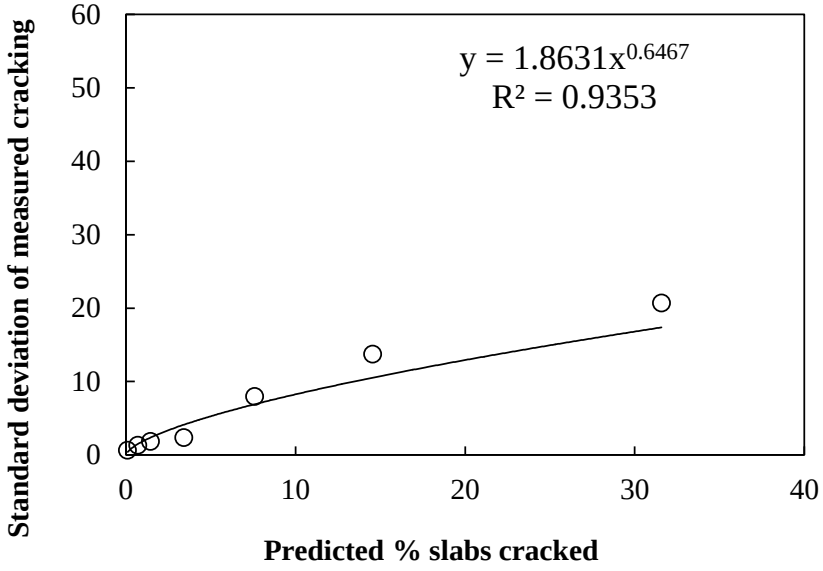


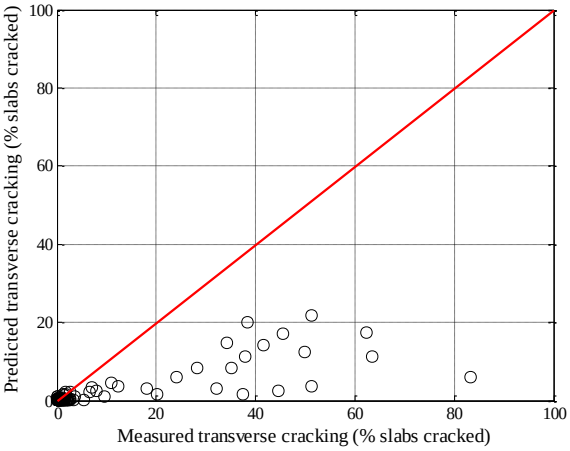
Figure B-356 Option 1 Transverse cracking reliability model fitting – bootstrapping

B.2.1.2 Option 2

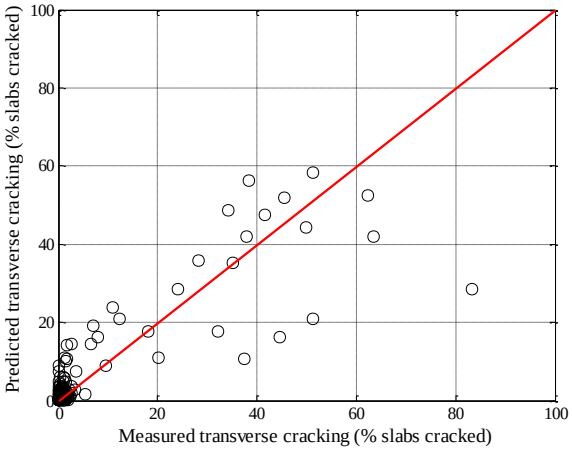
No sampling

Table B-169 Option 2 transverse cracking local calibration results – no sampling

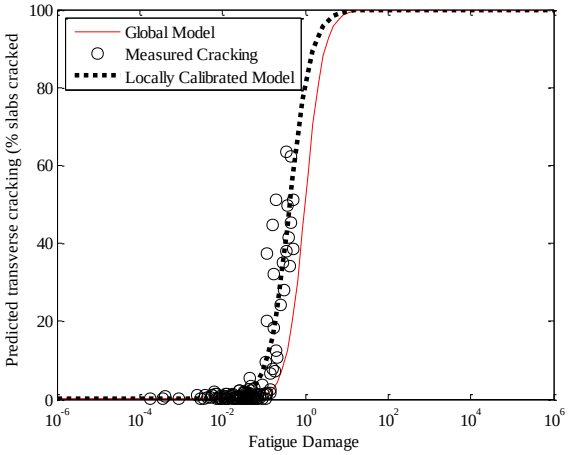
Parameter	Global model	Local model
SEE	14.30	8.43
Bias	-5.83	0.37
R^2	0.65	0.73
t-test pvalue	0.00	0.63
Intercept = 0	0.42	0.00
Slope = 1	0.00	0.00
C4	1.00	0.24
C5	-1.98	-1.67



(a) Global model

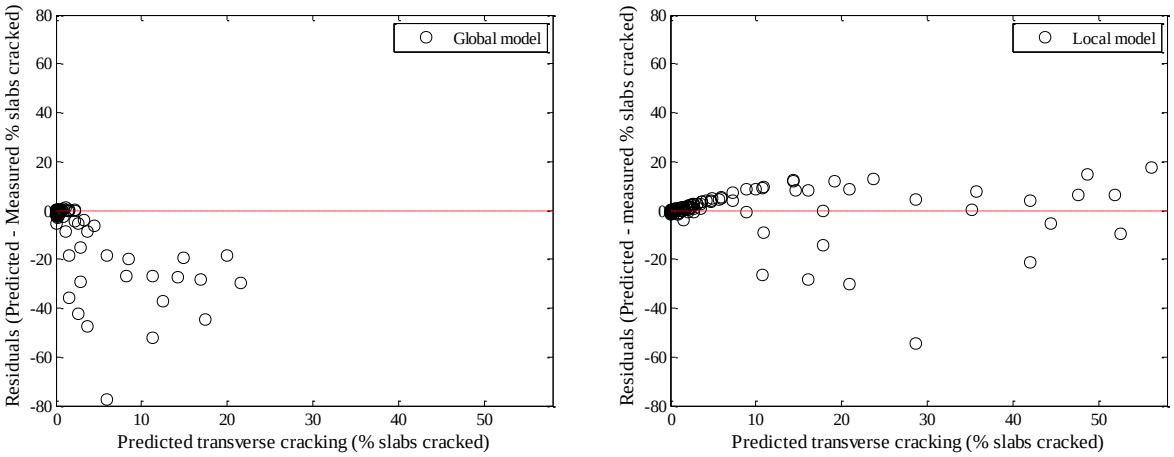


(b) Local model



(c) Fatigue damage predicted cracking

Figure B-357 Option 2 transverse cracking local calibration measured vs. predicted – no sampling



(a) Global model (b) Local model

Figure B-358 Option 2 transverse cracking residual plots – no sampling

Reliability

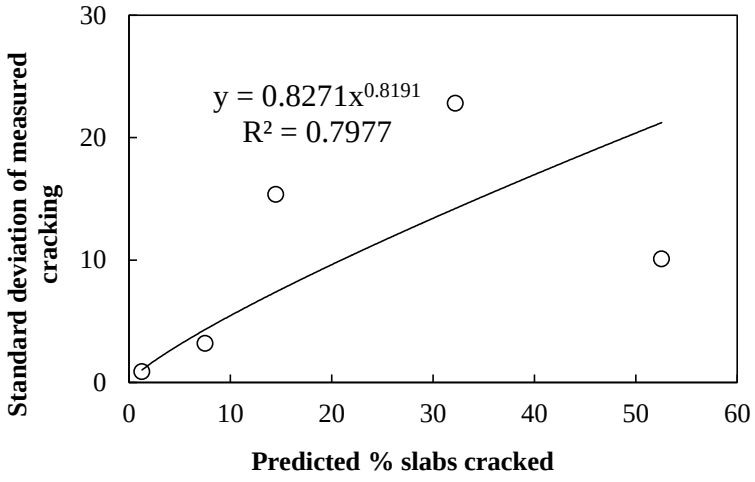
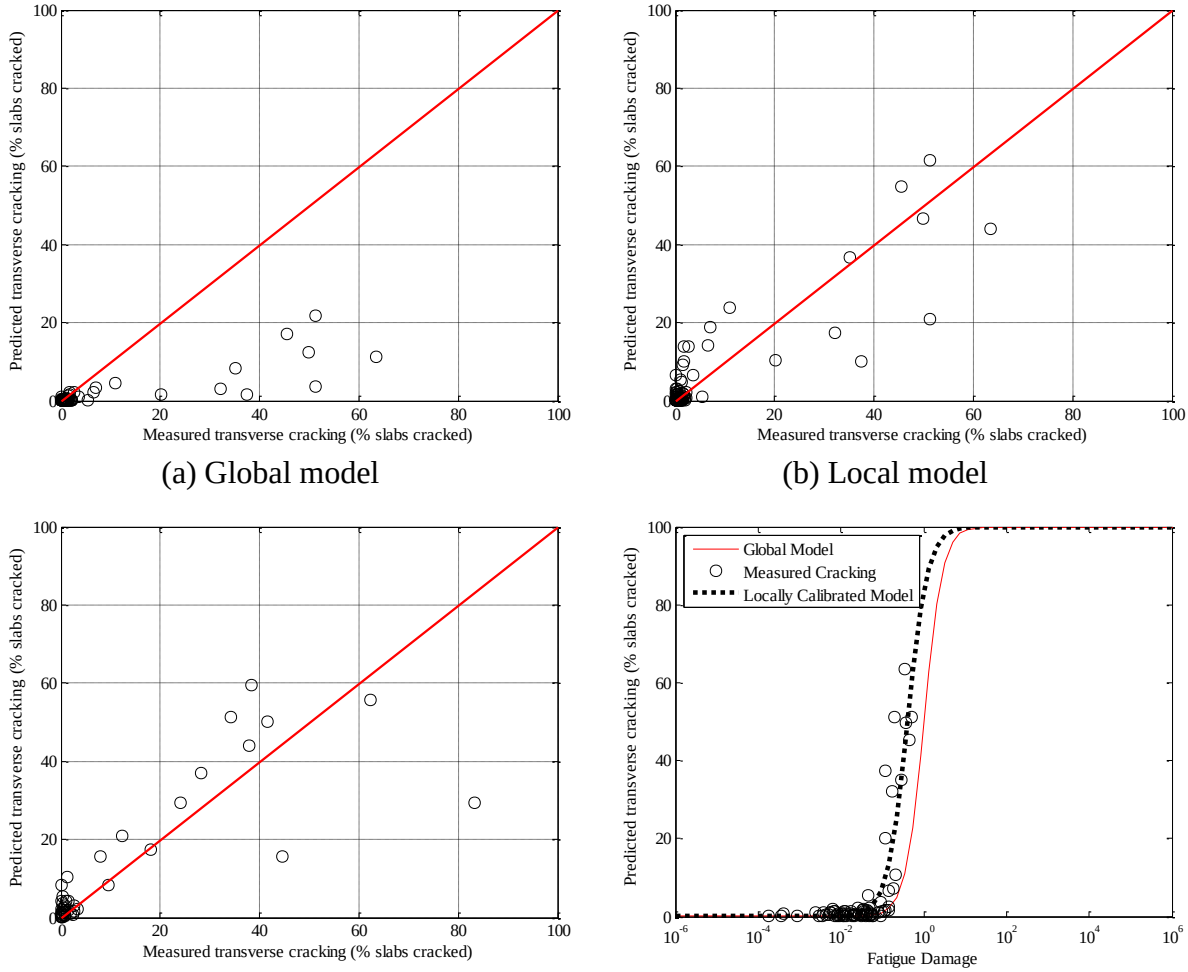


Figure B-359 Option 2 Transverse cracking reliability model fitting – no sampling

Split sampling

Table B-170 Option 2 transverse cracking local calibration results – split sampling

Parameter	Global model	Local model calibration	Local model validation
SEE	12.18	6.74	11.18
Bias	-4.60	0.06	0.84
R^2	0.70	0.77	0.68
t-test pvalue	0.00	0.94	0.62
Intercept = 0	0.87	0.07	0.04
Slope = 1	0.00	0.00	0.00
C4	1.00	0.19	0.19
C5	-1.98	-1.81	-1.81



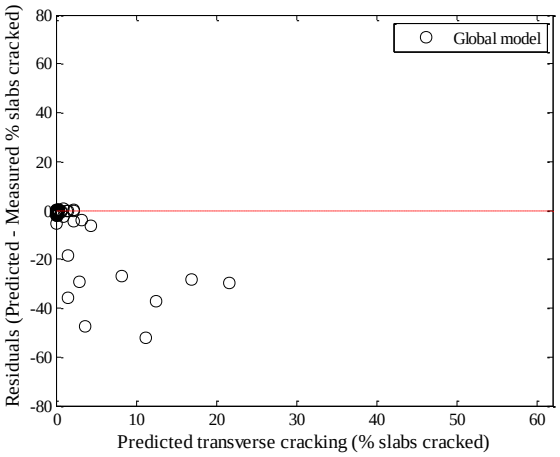
(a) Global model

(b) Local model

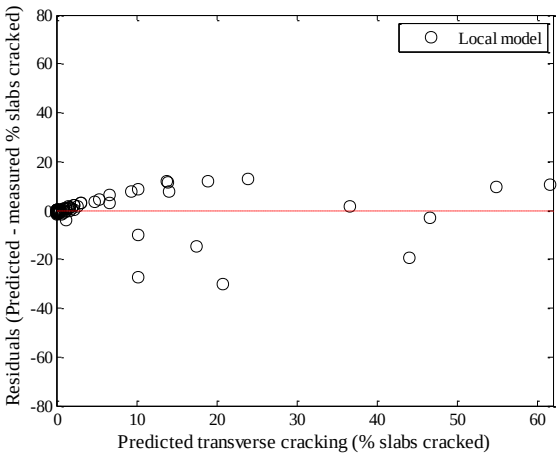
(c) Local model validation

(d) Fatigue damage predicted cracking

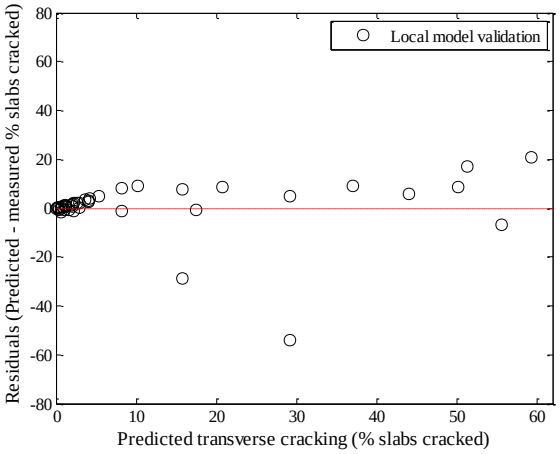
Figure B-360 Option 2 transverse cracking local calibration measured vs. predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-361 Option 2 transverse cracking residual plots – split sampling

Reliability

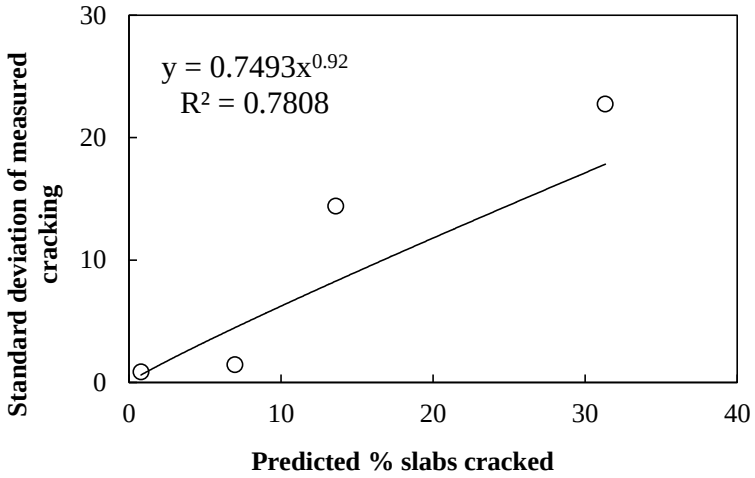


Figure B-362 Option 2 Reliability model fitting – split sampling

Repeated split sampling

Table B-171 Option 2 transverse cracking local calibration results – repeated split sampling

Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	14.19	14.19	9.56	17.28
Bias	-5.83	-5.83	-8.11	-3.35
C4	1.00	1.00	-	-
C5	-1.98	-1.98	-	-
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	8.16	8.76	4.30	10.09
Bias	0.33	0.37	-0.24	0.70
C4	0.23	0.24	0.12	0.31
C5	-1.74	-1.69	-2.17	-1.50
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	9.22	8.42	2.41	18.22
Bias	0.49	0.59	-5.98	7.36
C4	0.23	0.24	0.12	0.31
C5	-1.74	-1.69	-2.17	-1.50

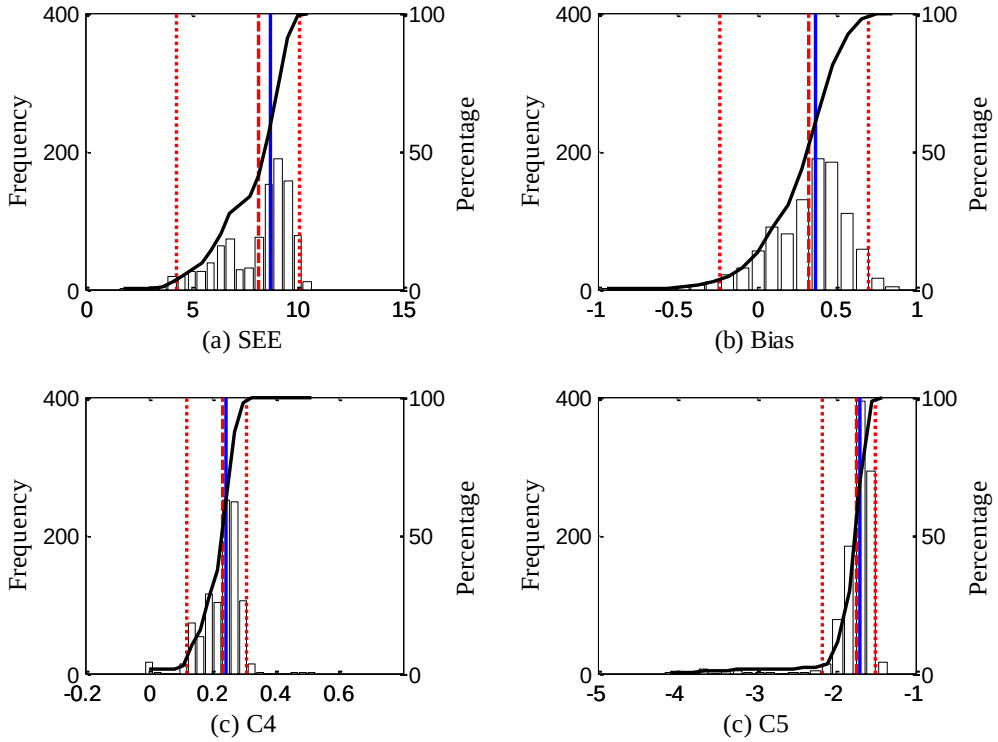


Figure B-363 Option 2 – Distribution of calibration parameters – repeated split sampling - Calibration

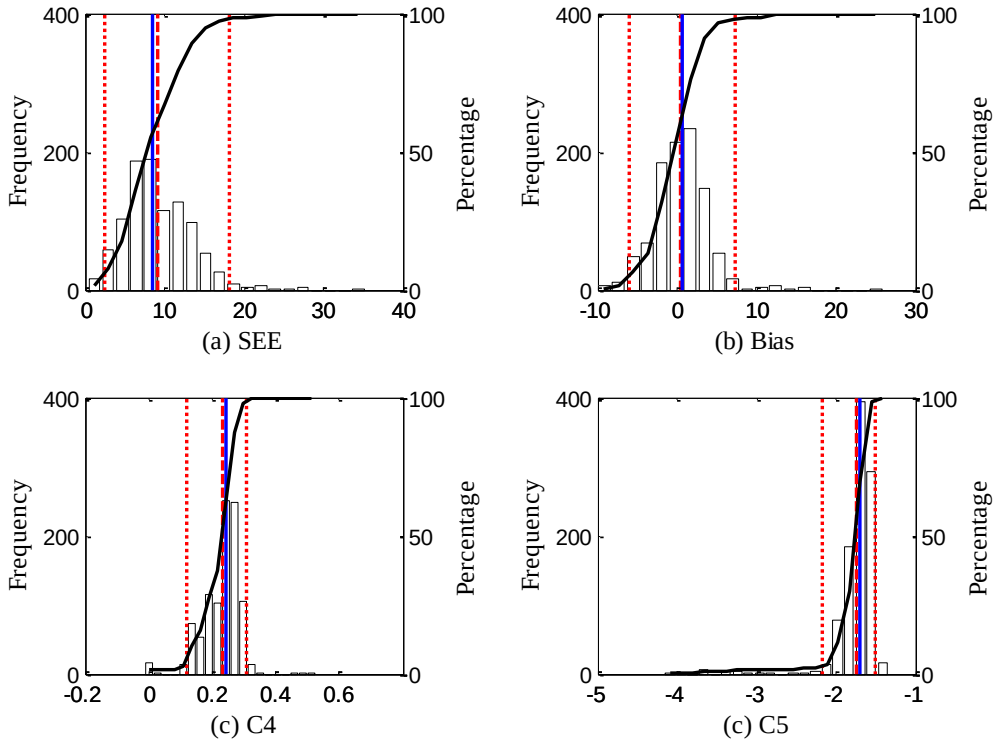
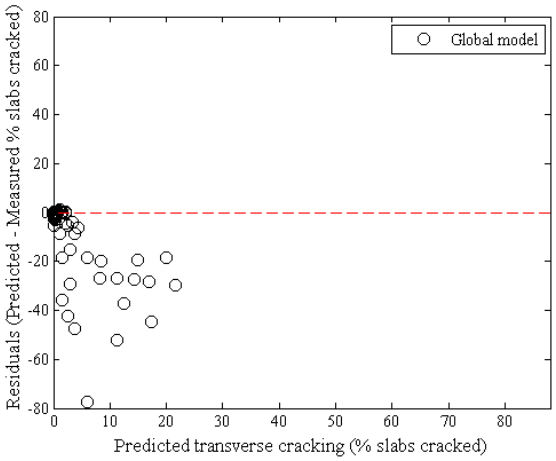
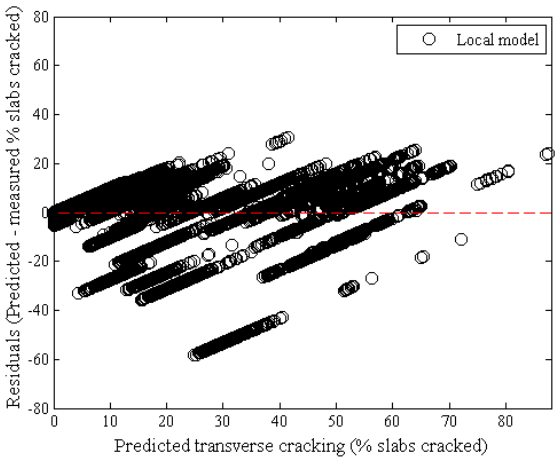


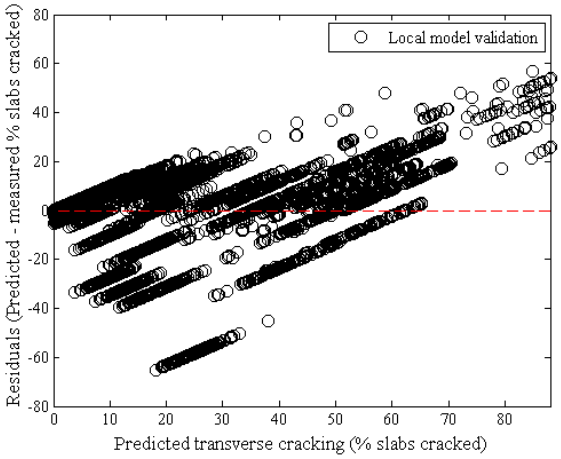
Figure B-364 Option 2 – Distribution of calibration parameters – repeated split sampling - Validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-365 Option 2 transverse cracking residual plots – repeated split sampling

Reliability

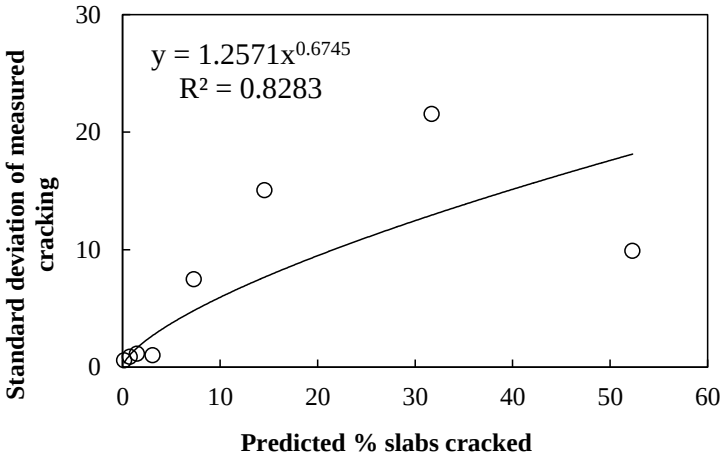


Figure B-366 Option 2 Transverse cracking reliability model fitting – repeated split sampling

Bootstrapping

Table B-172 Option 2 transverse cracking local calibration results – bootstrapping

Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	13.86	13.76	7.15	19.80
Bias	-5.79	-5.59	-9.79	-2.40
C4	1.00	1.00	-	-
C5	-1.98	-1.98	-	-
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	7.81	7.92	3.53	11.78
Bias	0.30	0.31	-0.45	0.84
C4	0.23	0.23	0.02	0.42
C5	-1.80	-1.71	-3.03	-1.43

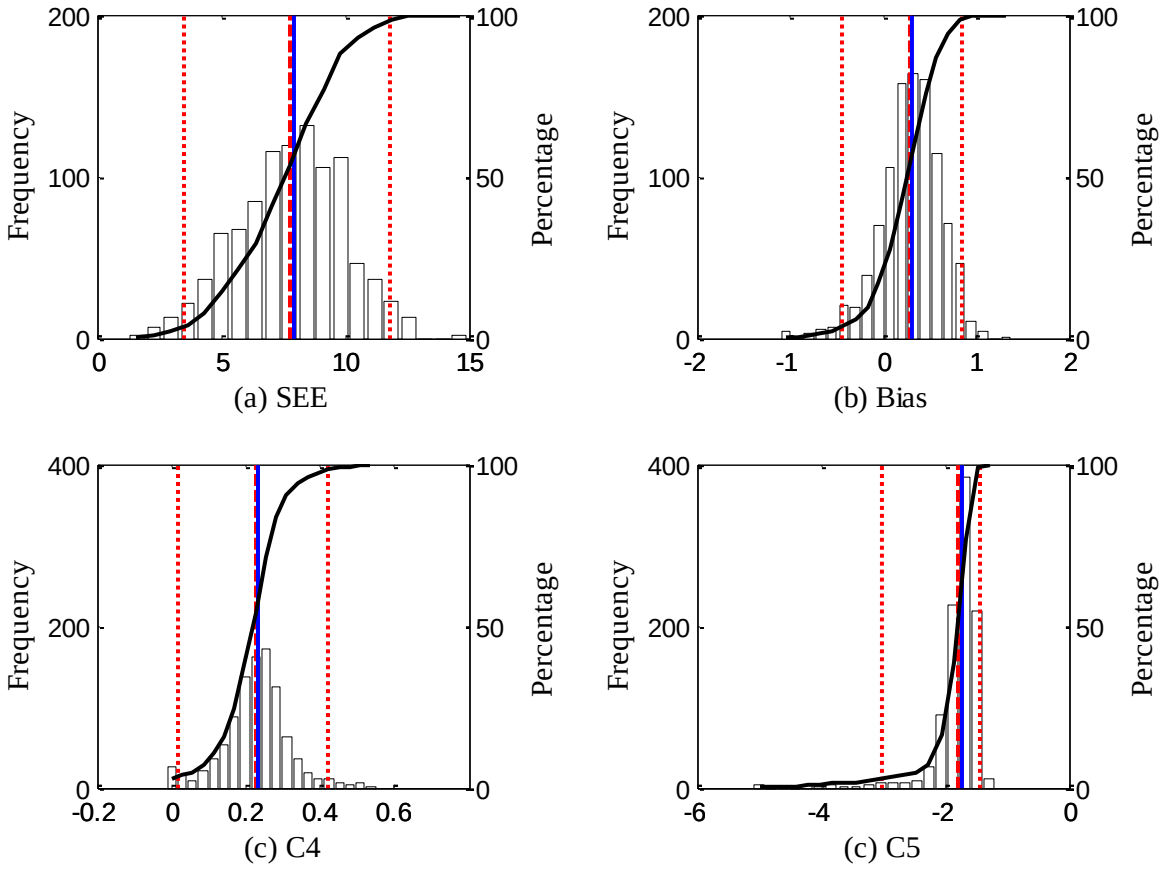
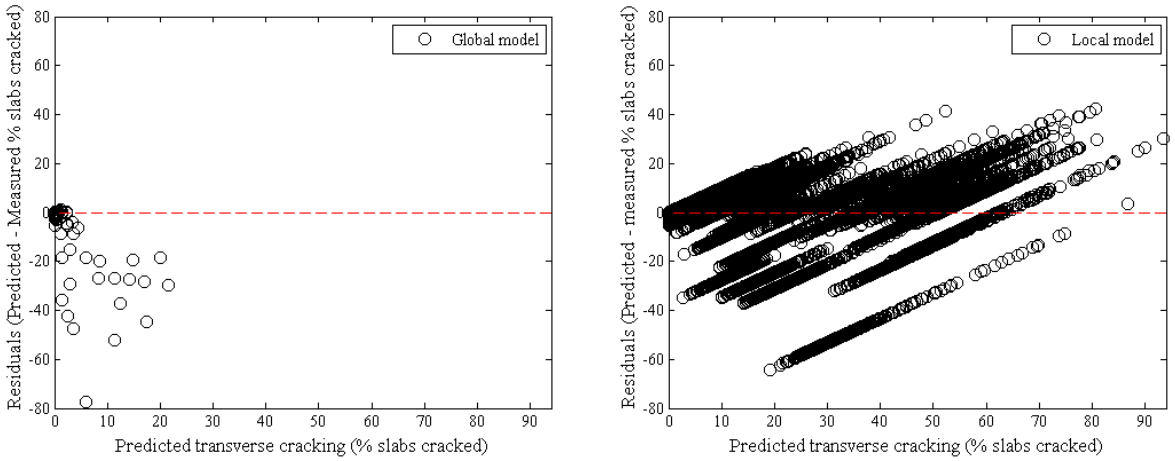


Figure B-367 Option 2 – Distribution of calibration parameters – bootstrapping



(a) Global model (b) Local model

Figure B-368 Option 2 transverse cracking residual plots – bootstrapping

Reliability

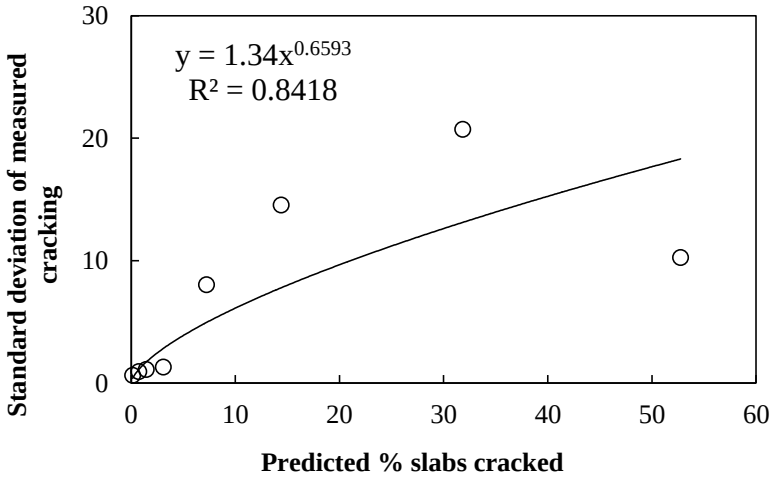


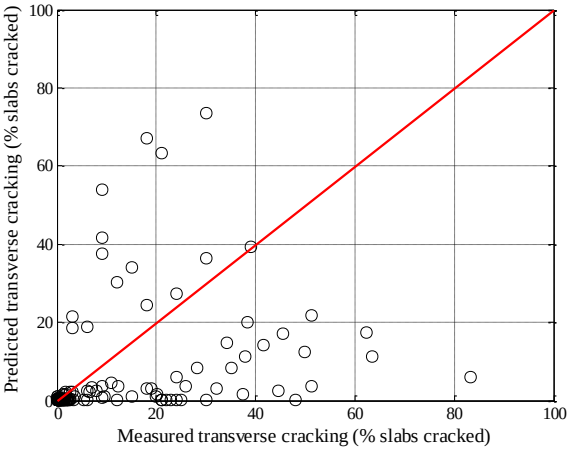
Figure B-369 Option 2 Transverse cracking reliability model fitting – bootstrapping

B.2.1.3 Option 3

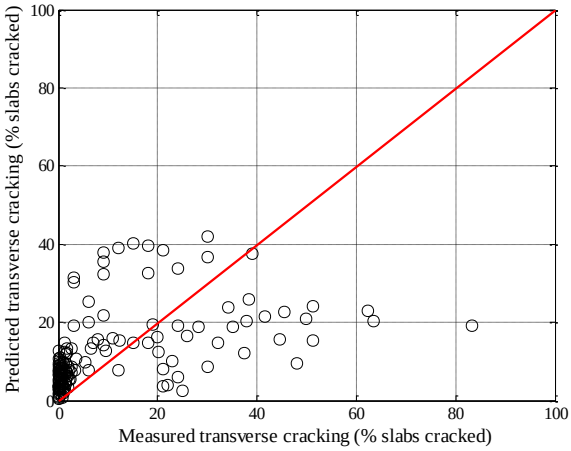
No sampling

Table B-173 Option 3 transverse cracking local calibration results – no sampling

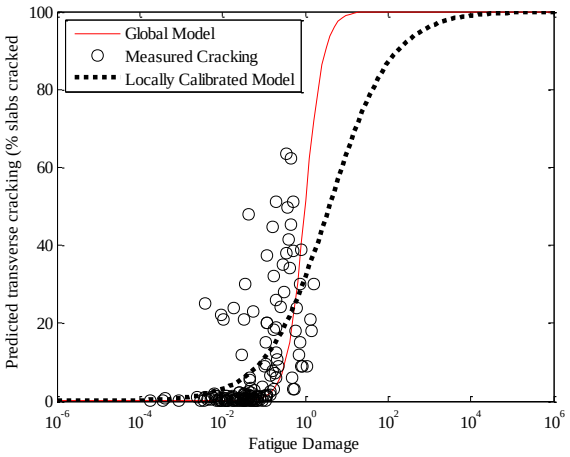
Parameter	Global model	Local model
SEE	16.94	13.79
Bias	-4.46	1.76
R^2	0.13	0.26
t-test pvalue	0.00	0.11
Intercept = 0	0.04	0.00
Slope = 1	0.00	0.00
C4	1.00	2.16
C5	-1.98	-0.58



(a) Global model

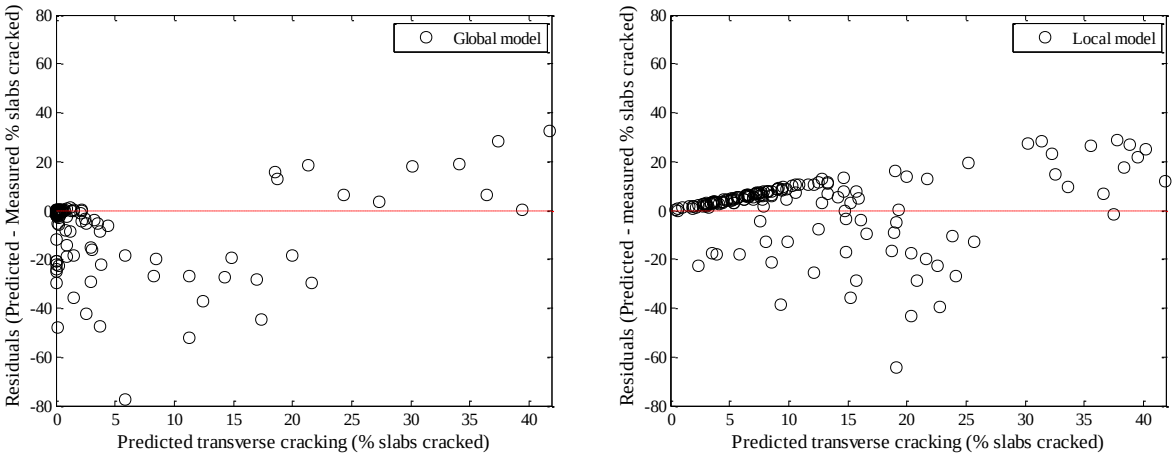


(b) Local model



(c) Fatigue damage predicted cracking

Figure B-370 Option 3 transverse cracking local calibration measured vs. predicted – no sampling



(a) Global model (b) Local model

Figure B-371 Option 3 transverse cracking residual plots – no sampling

Reliability

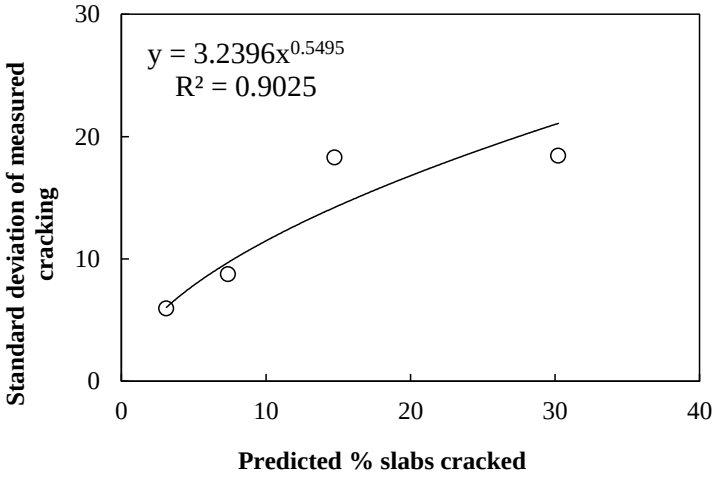
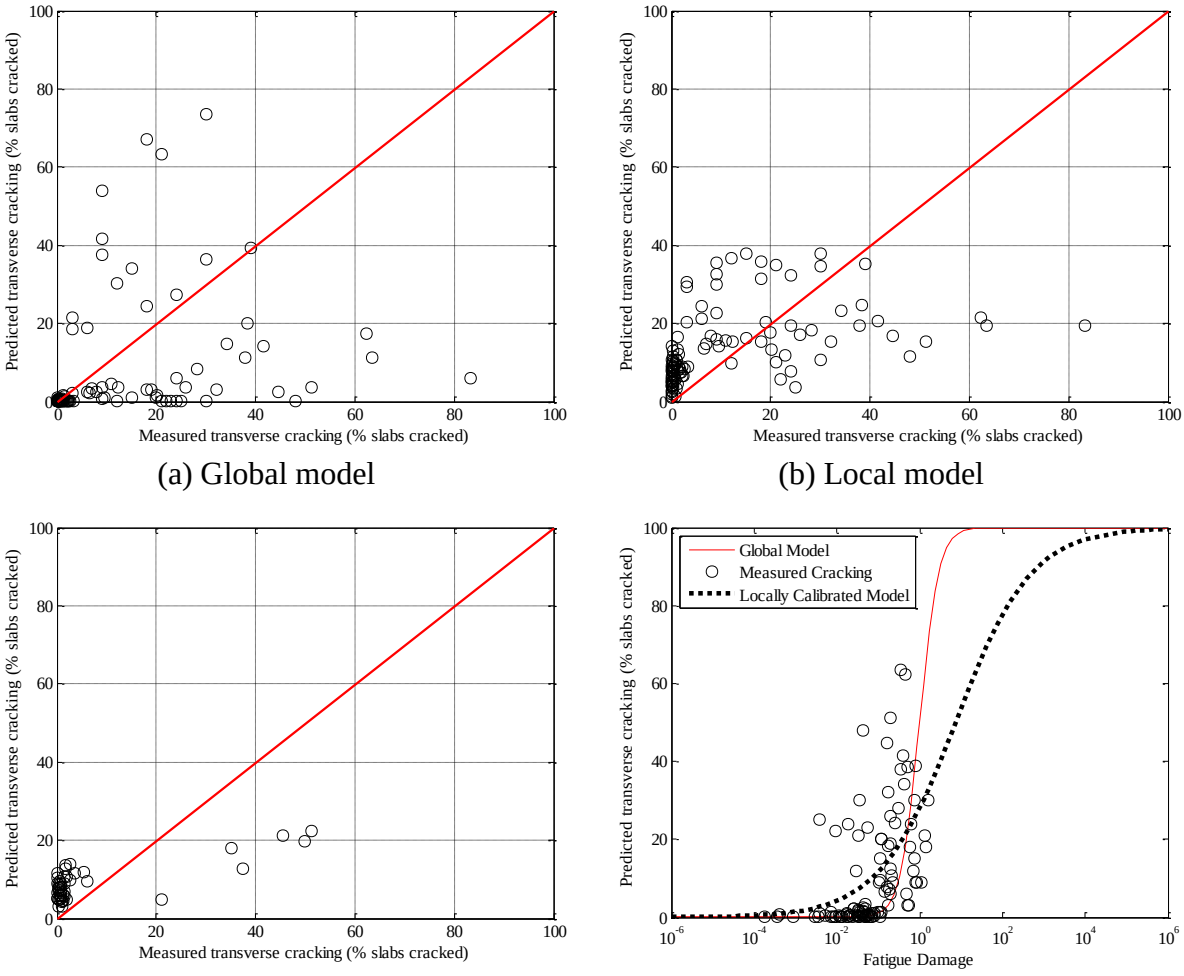


Figure B-372 Option 3 Transverse cracking reliability model fitting – no sampling

Split sampling

Table B-174 Option 3 transverse cracking local calibration results – split sampling

Parameter	Global model	Local model calibration	Local model validation
SEE	18.92	14.96	11.13
Bias	-4.36	2.44	2.60
R^2	0.10	0.20	0.59
t-test pvalue	0.01	0.09	0.11
Intercept = 0	0.03	0.00	0.00
Slope = 1	0.00	0.00	0.00
C4	1.00	2.56	2.56
C5	-1.98	-0.48	-0.48



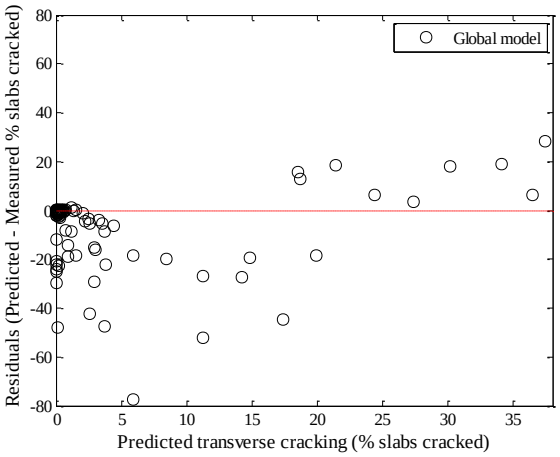
(a) Global model

(b) Local model

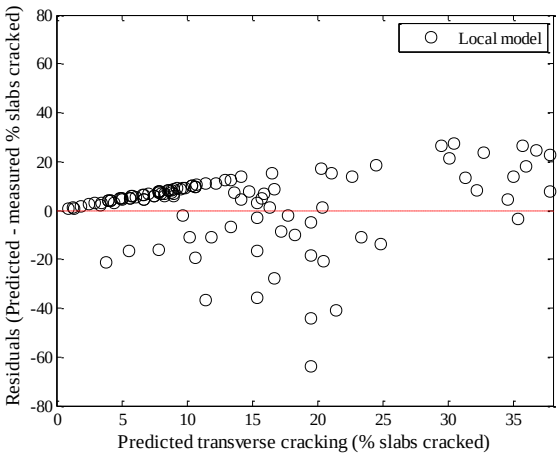
(c) Local model validation

(d) Fatigue damage predicted cracking

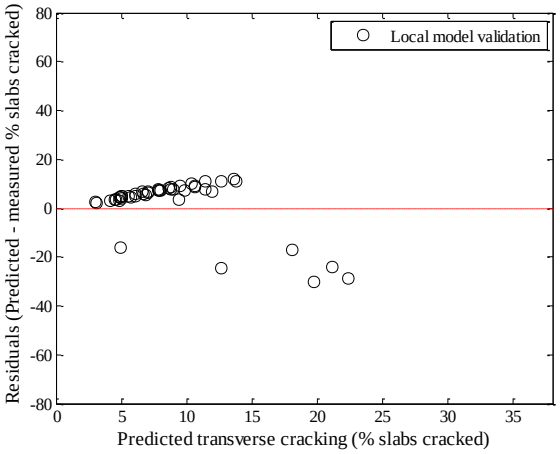
Figure B-373 Option 3 transverse cracking local calibration measured vs. predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-374 Option 3 transverse cracking residual plots – split sampling

Reliability

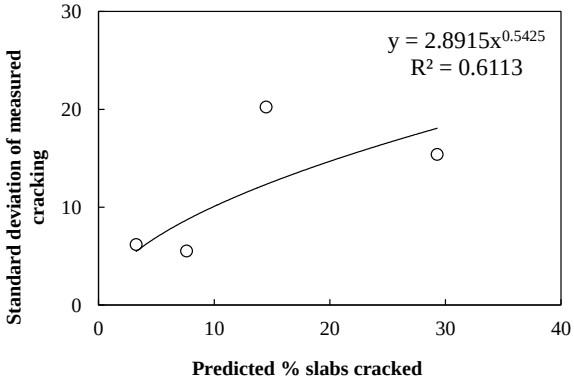


Figure B-375 Option 3 Transverse cracking reliability model fitting – split sampling

Repeated split sampling

Table B-175 Option 3 transverse cracking local calibration results – repeatedsplit sampling

Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	16.98	16.98	12.69	19.95
Bias	-4.44	-4.44	-7.56	-1.76
C4	1.00	1.00	-	-
C5	-1.98	-1.98	-	-
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	13.62	13.78	10.25	15.91
Bias	1.70	1.78	0.43	2.63
C4	2.15	2.23	0.81	3.33
C5	-0.61	-0.56	-1.01	-0.45
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	14.95	14.50	9.69	21.89
Bias	2.03	2.16	-6.38	9.29
C4	2.15	2.23	0.81	3.33
C5	-0.61	-0.56	-1.01	-0.45

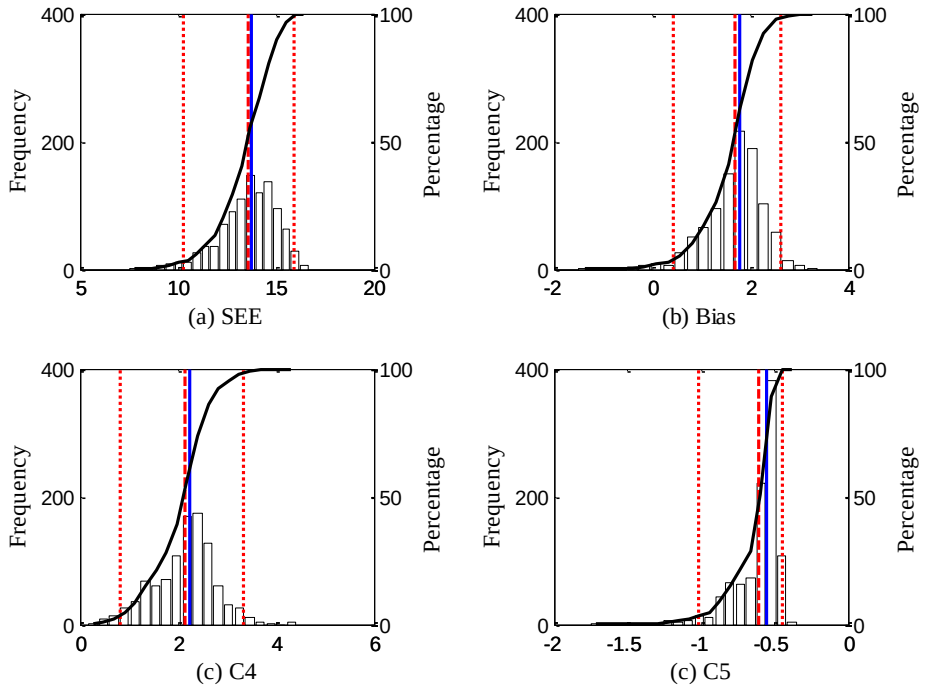


Figure B-376 Option 3 – Distribution of calibration parameters – repeated split sampling - Calibration

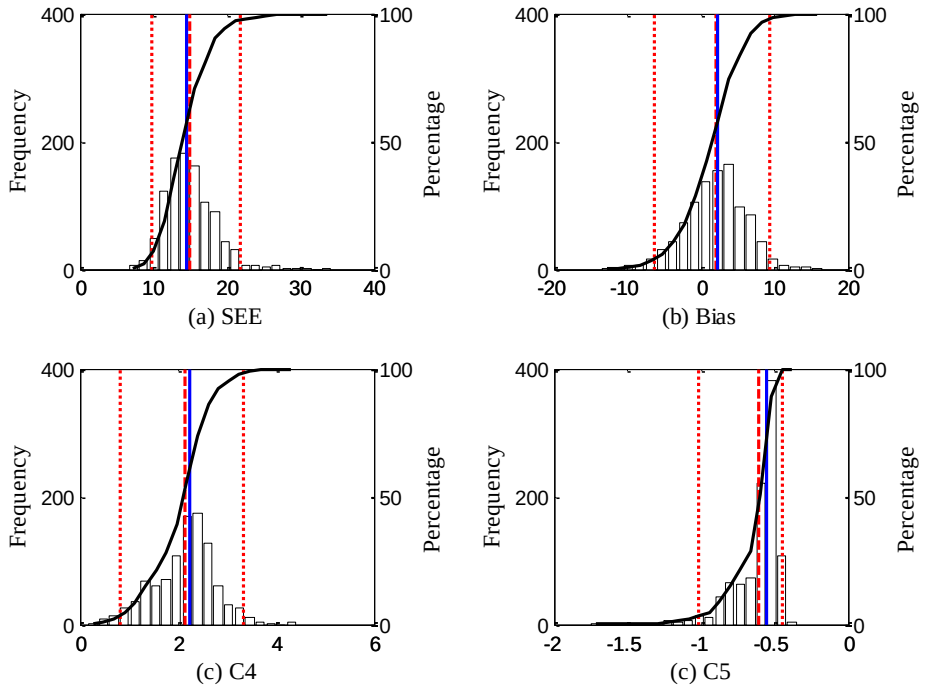


Figure B-377 Option 3 – Distribution of calibration parameters – repeated split sampling – Validation

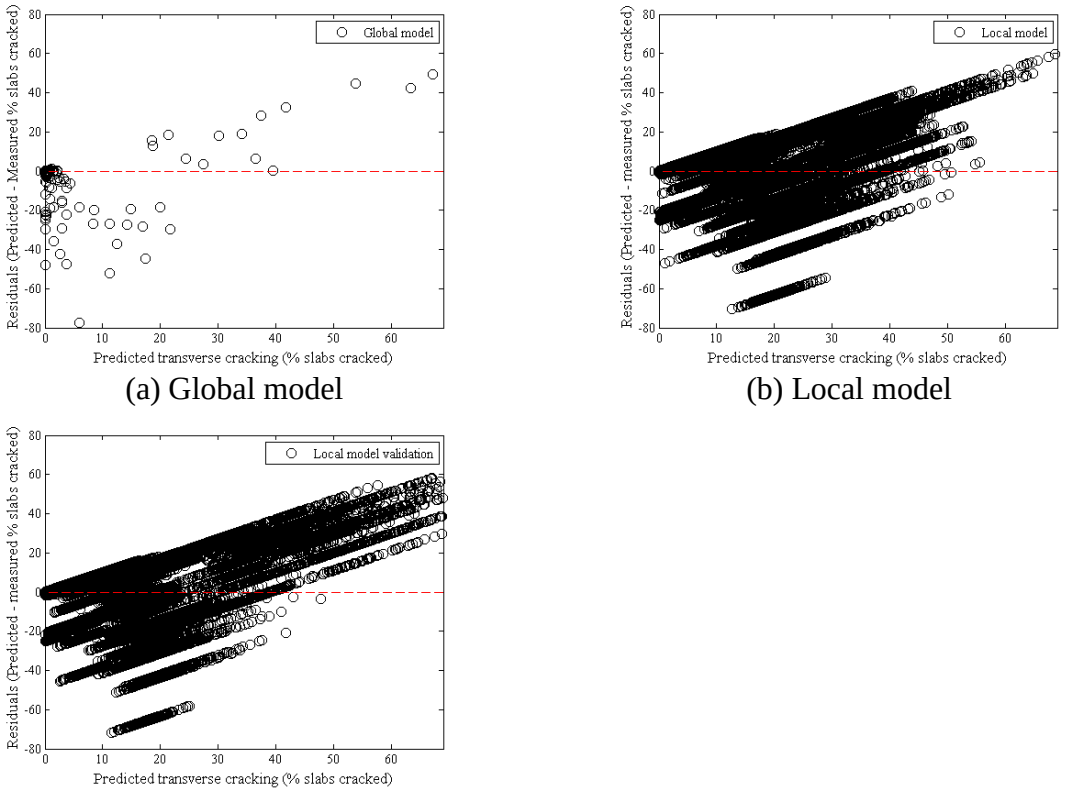


Figure B-378 Option 3 transverse cracking residual plots – repeated split sampling

Reliability

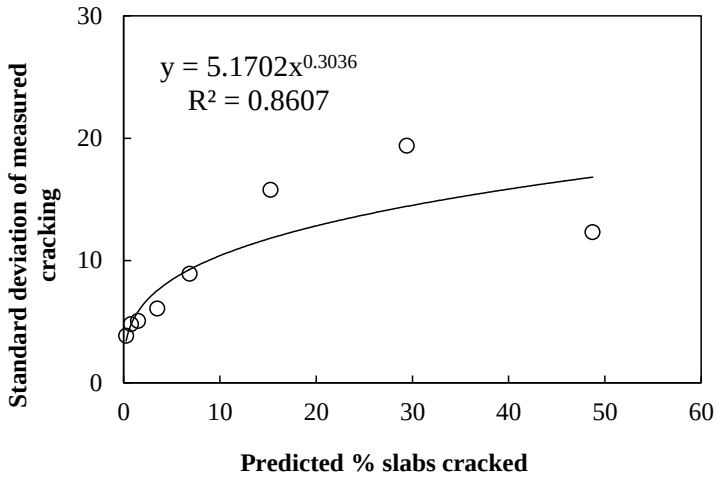


Figure B-379 Option 3 Transverse cracking reliability model fitting – repeated split sampling

Bootstrapping

Table B-176 Option 3 transverse cracking local calibration results – bootstrapping

Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	16.77	16.86	11.19	22.09
Bias	-4.45	-4.52	-8.86	0.03
C4	1.00	1.00	-	-
C5	-1.98	-1.98	-	-
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	13.24	13.42	8.56	17.11
Bias	1.65	1.67	-0.26	3.41
C4	2.14	2.16	0.50	3.69
C5	-0.64	-0.59	-1.25	-0.37

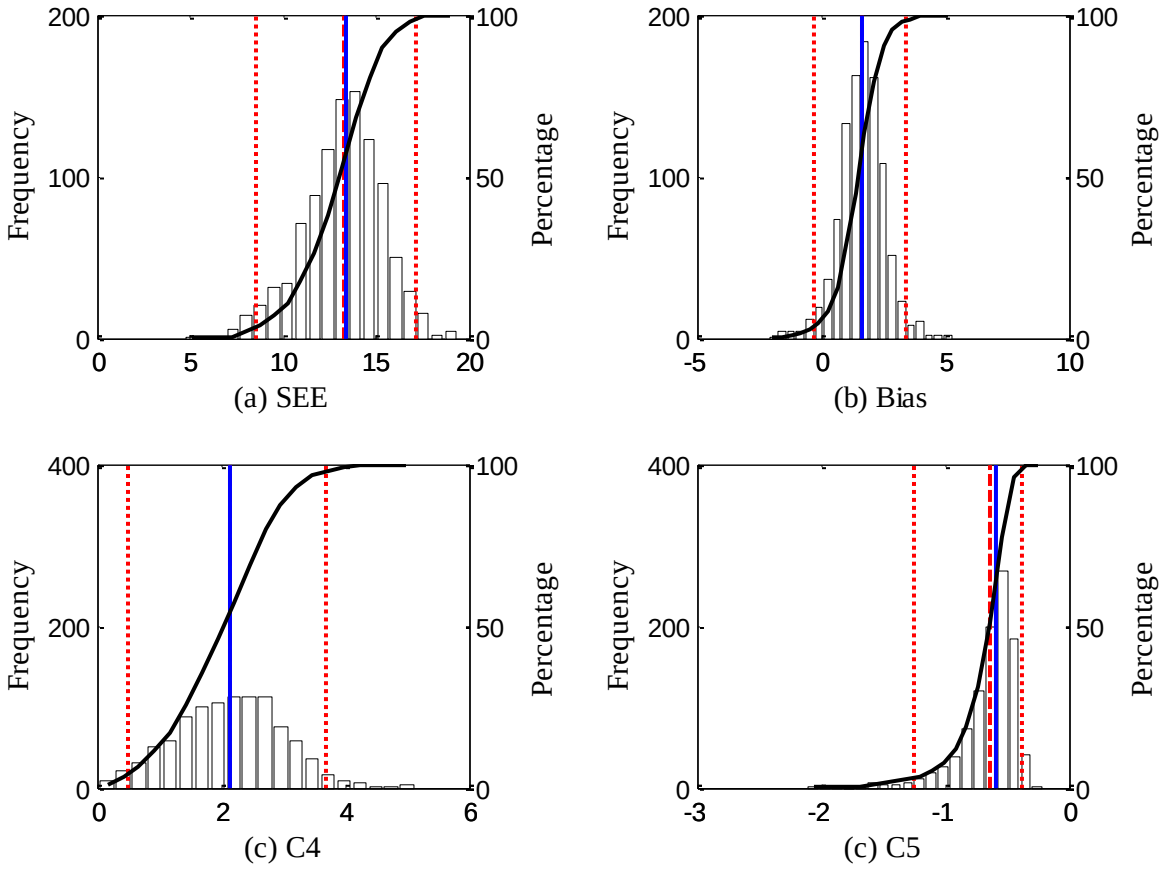
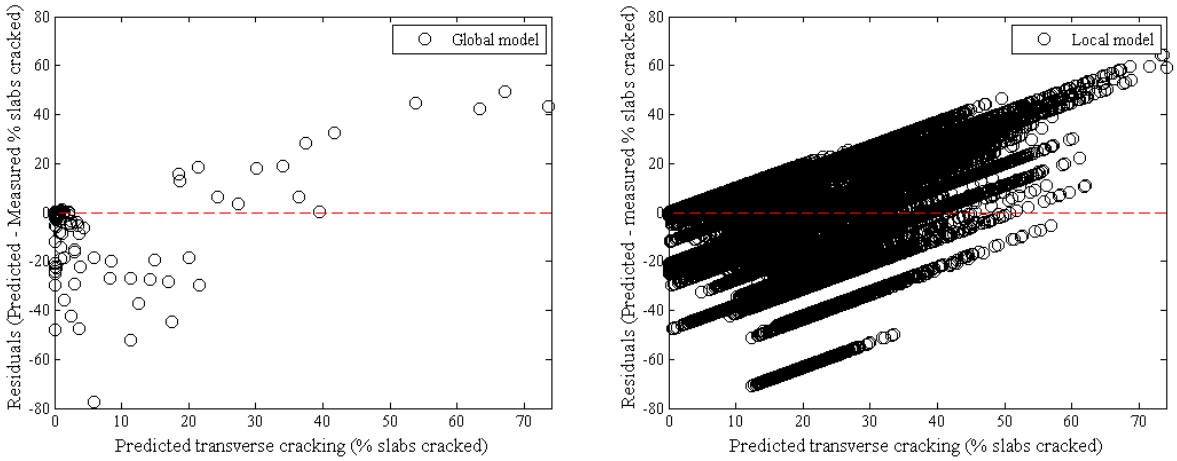


Figure B-380 Option 3 – Distribution of calibration parameters – bootstrapping



(a) Global model (b) Local model

Figure B-381 Option 3 transverse cracking residual plots – bootstrapping

Reliability

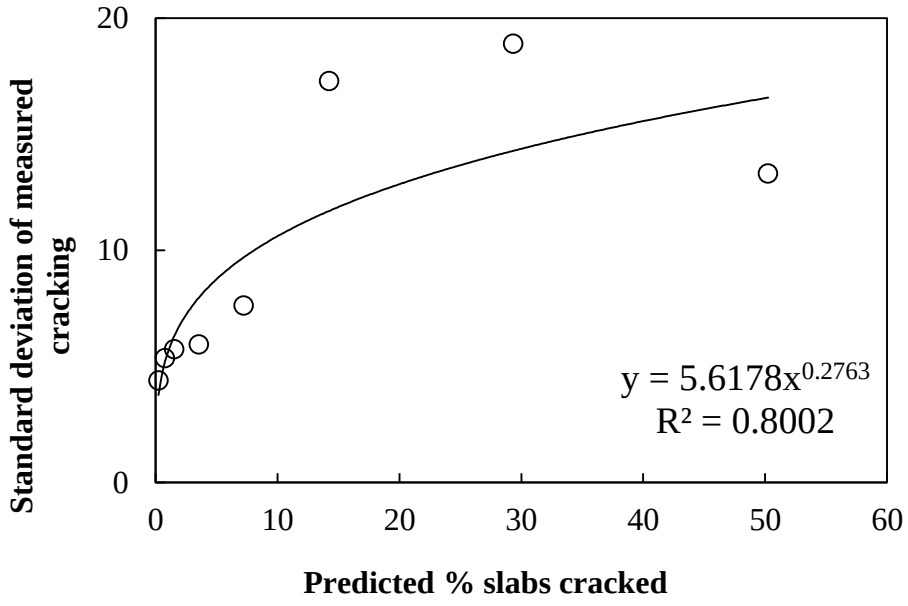


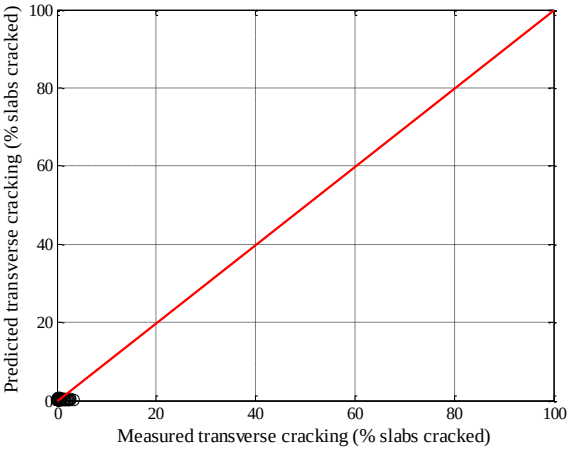
Figure B-382 Option 3 Transverse cracking reliability model fitting – bootstrapping

B.2.1.4 Option 4

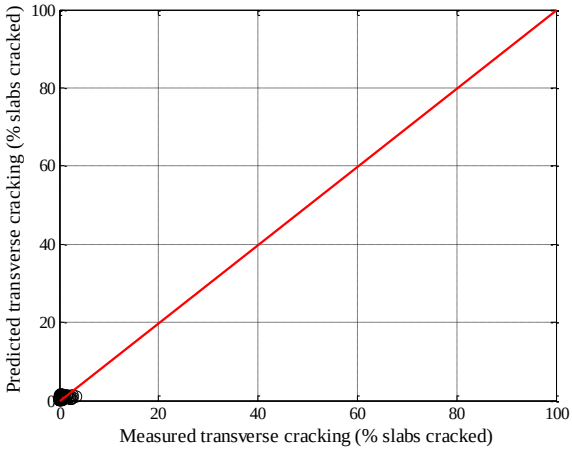
No sampling

Table B-177 Option 4 transverse cracking local calibration results – no sampling

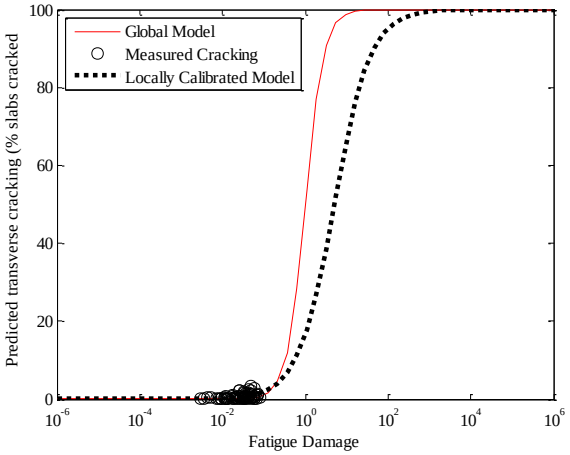
Parameter	Global model	Local model
SEE	0.92	0.72
Bias	-0.55	-0.04
R^2	0.07	0.12
t-test pvalue	0.00	0.65
Intercept = 0	0.00	0.00
Slope = 1	0.00	0.00
C4	1.00	5.00
C5	-1.98	-1.00



(a) Global model

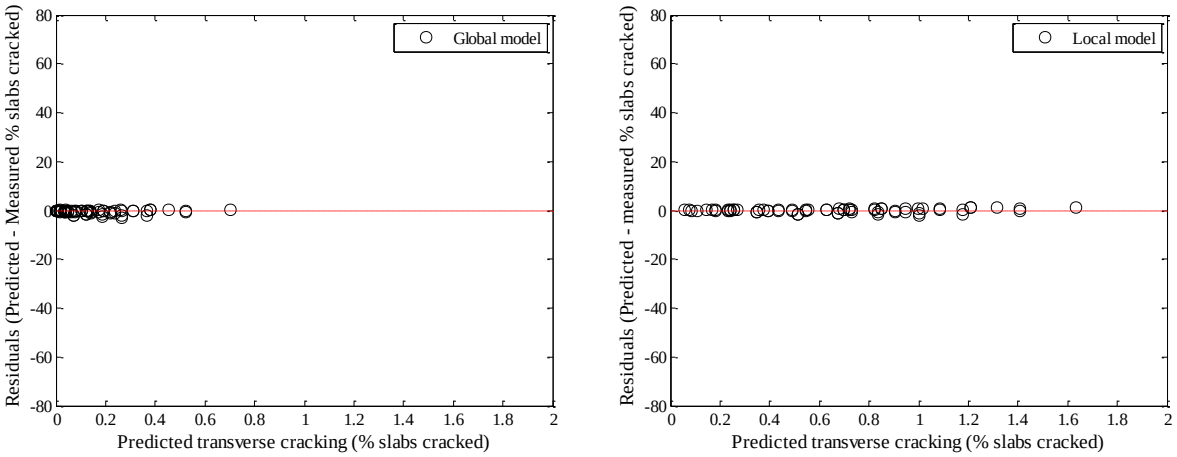


(b) Local model



(c) Fatigue damage predicted cracking

Figure B-383 Option 4 transverse cracking local calibration measured vs. predicted – no sampling



(a) Global model (b) Local model

Figure B-384 Option 4 transverse cracking residual plots – no sampling

Reliability

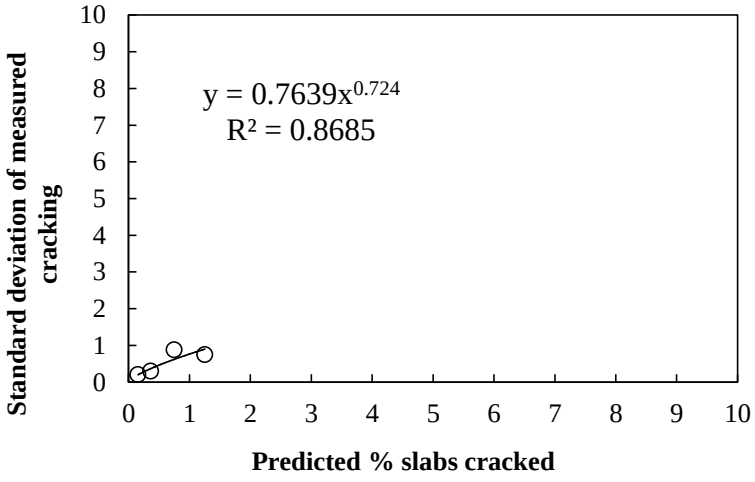
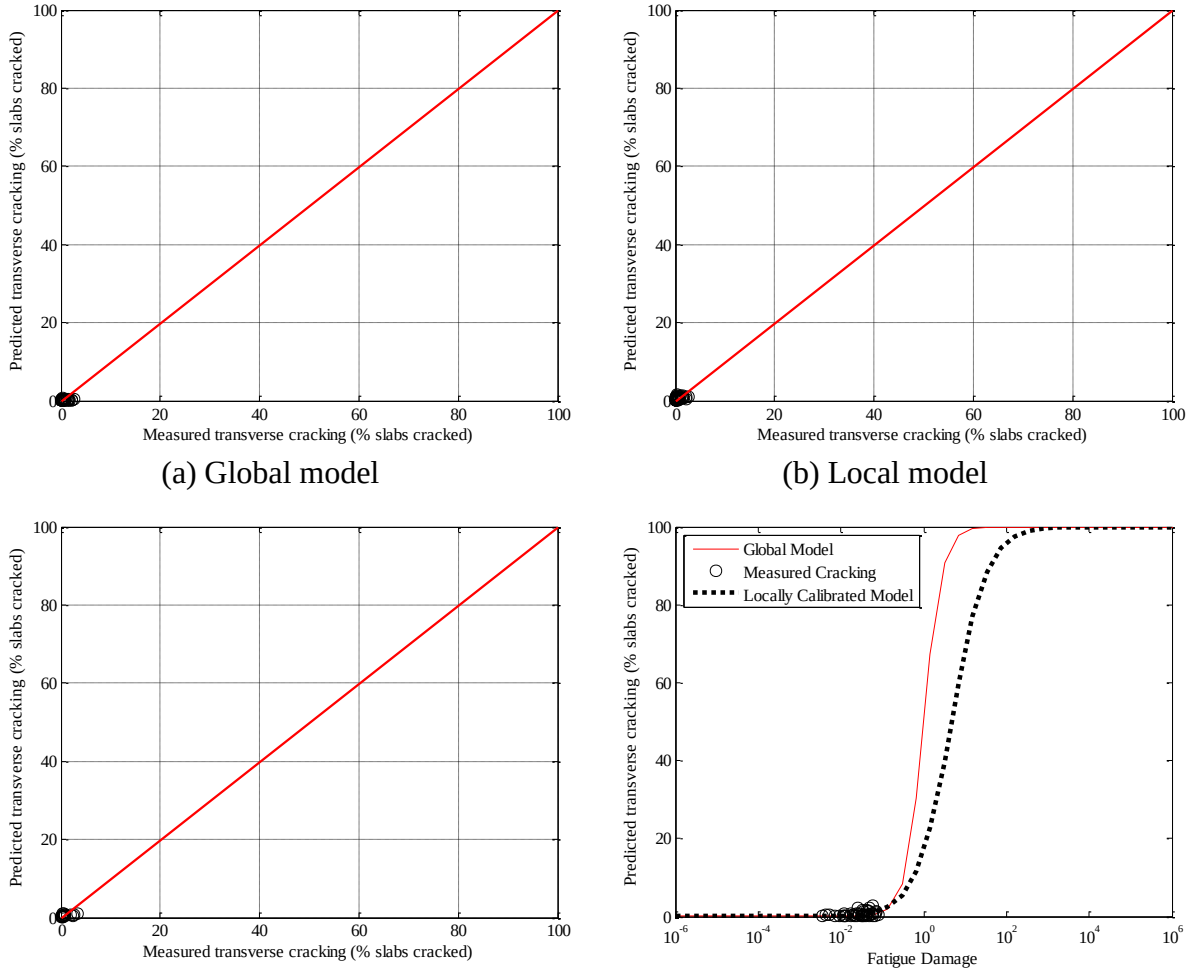


Figure B-385 Option 4 Transverse cracking reliability model fitting – no sampling

Split sampling

Table B-178 Option 4 transverse cracking local calibration results – split sampling

Parameter	Global model	Local model calibration	Local model validation
SEE	0.80	0.63	0.95
Bias	-0.48	-0.05	-0.29
R^2	0.09	0.14	0.13
t-test pvalue	0.00	0.63	0.16
Intercept = 0	0.00	0.00	0.00
Slope = 1	0.00	0.00	0.00
C4	1.00	5.00	5.00
C5	-1.98	-1.04	-1.04



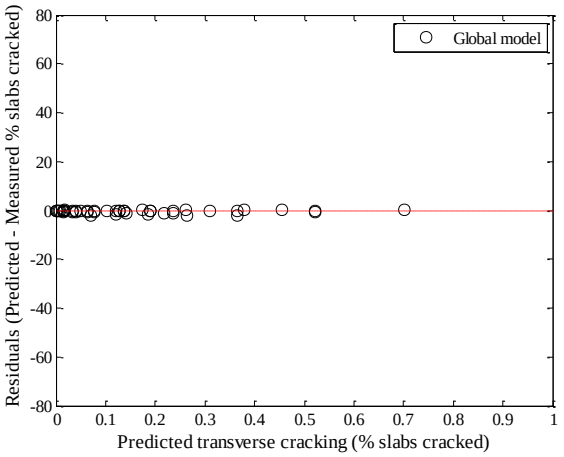
(a) Global model

(b) Local model

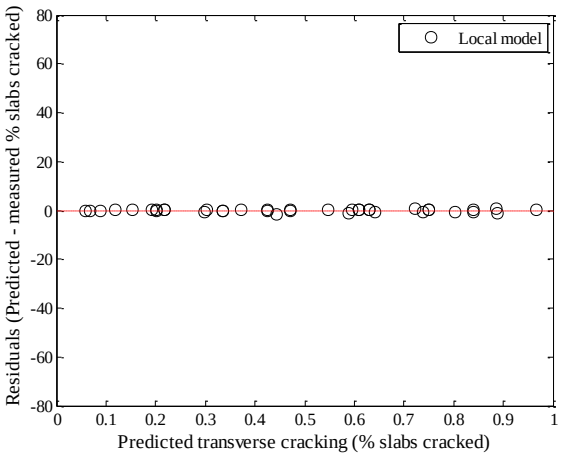
(c) Local model validation

(d) Fatigue damage predicted cracking

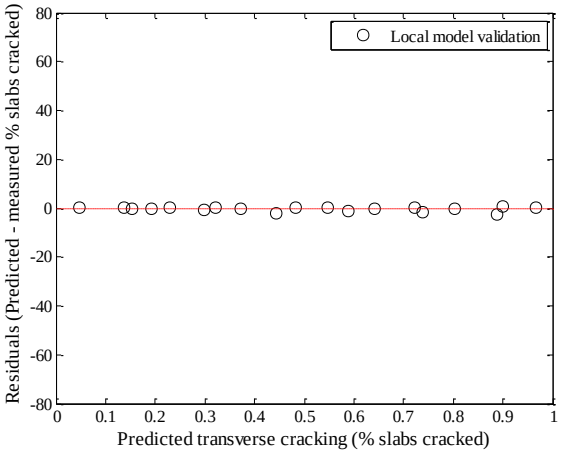
Figure B-386 Option 4 transverse cracking local calibration measured vs. predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-387 Option 4 transverse cracking residual plots – split sampling

Reliability

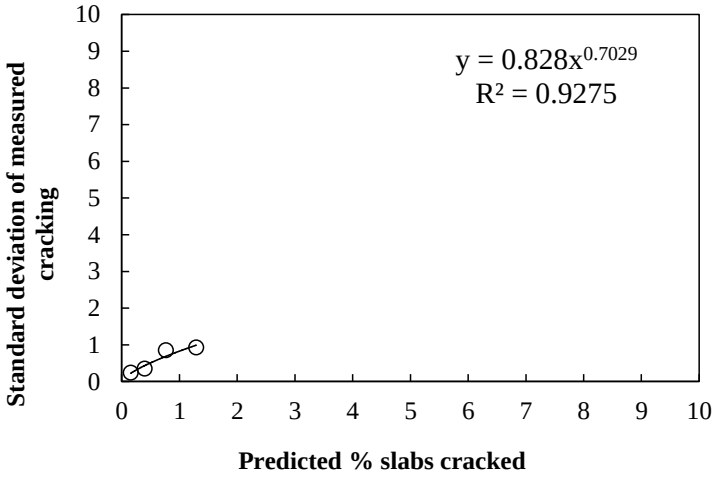


Figure B-388 Option 4 Transverse cracking reliability model fitting – split sampling

Repeated split sampling

Table B-179 Option 4 transverse cracking local calibration results – repeated split sampling

Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	0.91	0.91	0.57	1.10
Bias	-0.55	-0.55	-0.73	-0.31
C4	1.00	1.00	-	-
C5	-1.98	-1.98	-	-
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	0.70	0.74	0.43	0.83
Bias	-0.04	-0.04	-0.07	0.00
C4	5.00	5.00	5.00	5.00
C5	-1.00	-0.99	-1.13	-0.90
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	0.78	0.76	0.38	1.24
Bias	-0.02	-0.01	-0.78	0.66
C4	5.00	5.00	5.00	5.00
C5	-1.00	-0.99	-1.13	-0.90

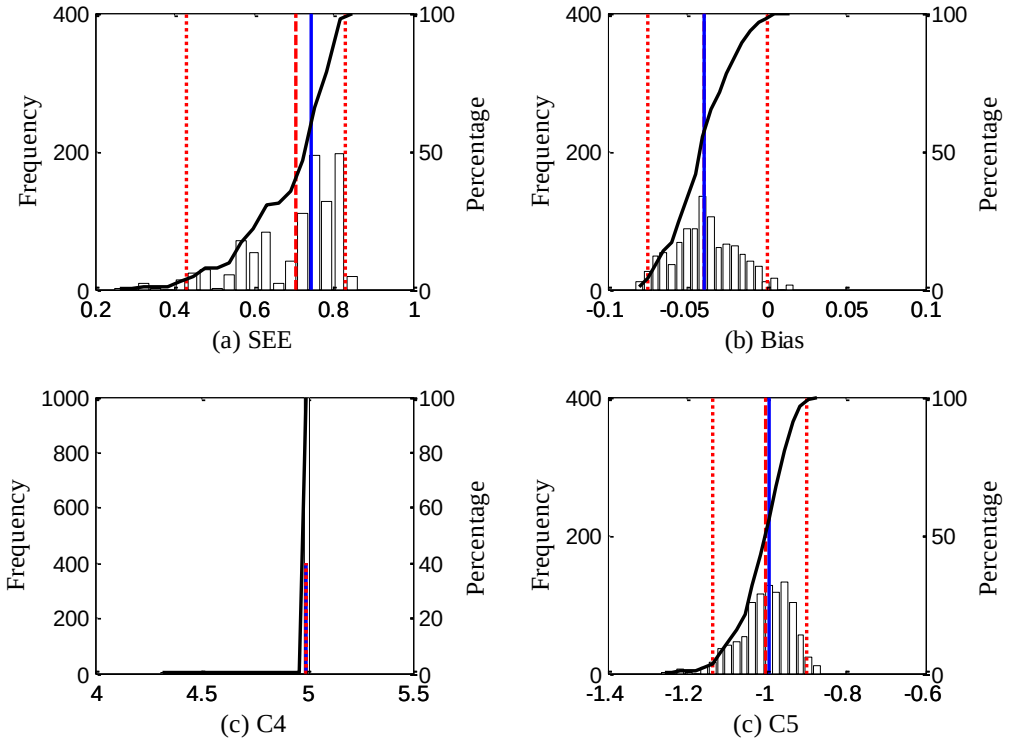


Figure B-389 Option 4 – Distribution of calibration parameters – repeated split sampling - Calibration

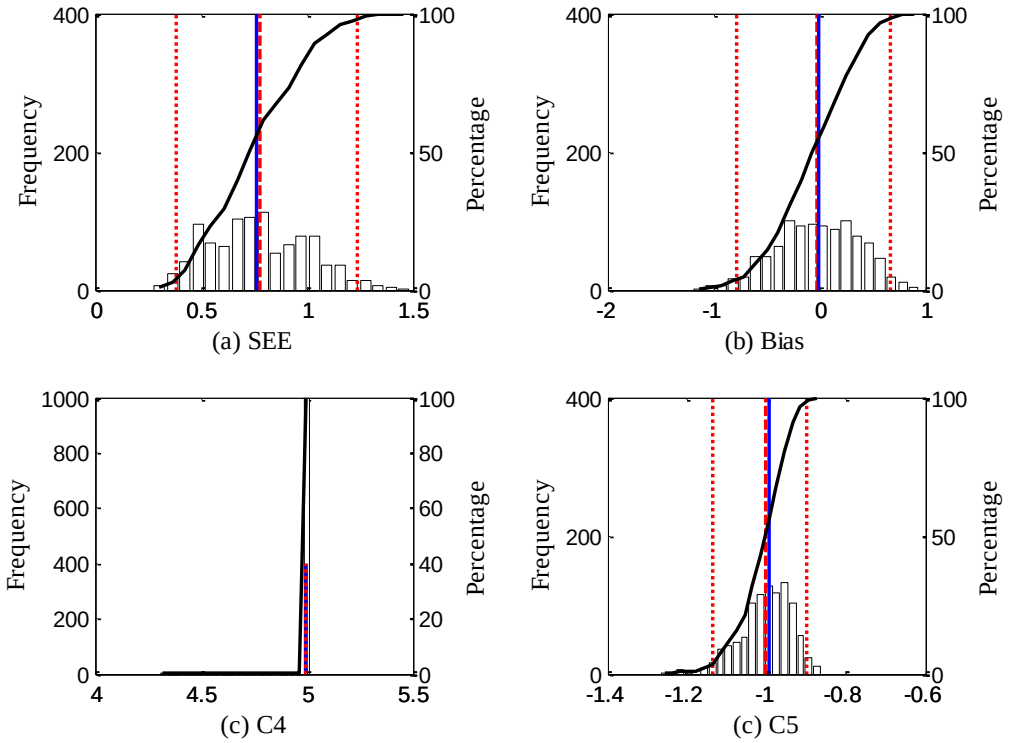
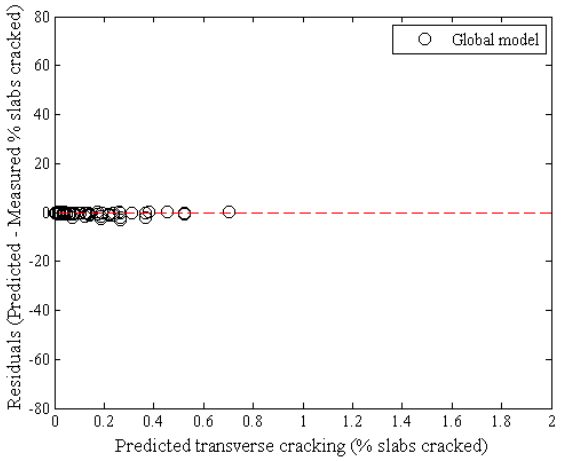
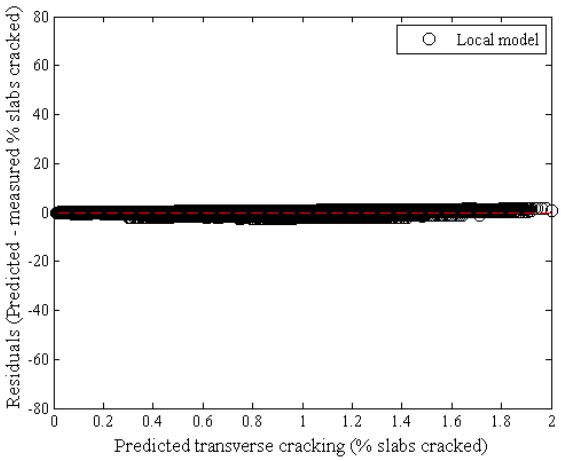


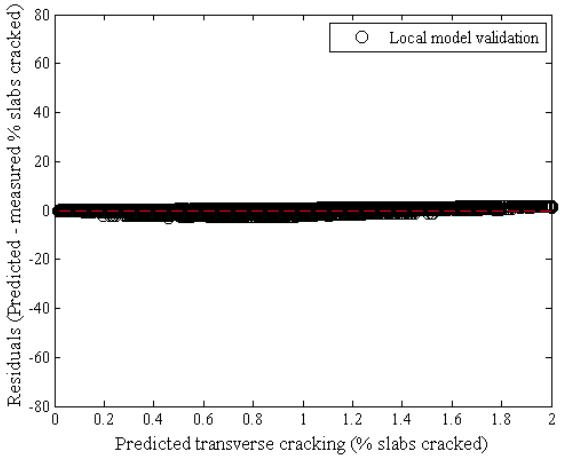
Figure B-390 Option 4 – Distribution of calibration parameters – repeated split sampling - Validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-391 Option 4 transverse cracking residual plots – repeated split sampling

Reliability

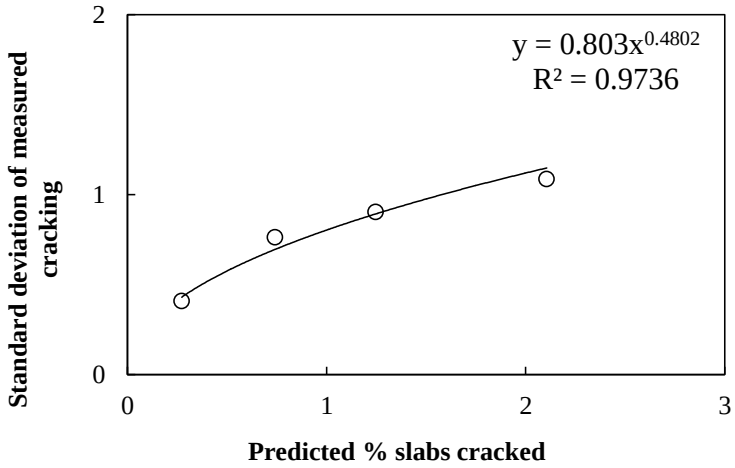


Figure B-392 Option 4 Transverse cracking reliability model fitting – repeated split sampling

Bootstrapping

Table B-180 Option 4 transverse cracking local calibration results – bootstrapping

Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	0.88	0.89	0.44	1.26
Bias	-0.54	-0.54	-0.87	-0.25
C4	1.00	1.00	-	-
C5	-1.98	-1.98	-	-
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	0.67	0.69	0.35	0.90
Bias	-0.04	-0.04	-0.09	0.01
C4	4.96	5.00	4.63	5.00
C5	-1.01	-1.00	-1.20	-0.86

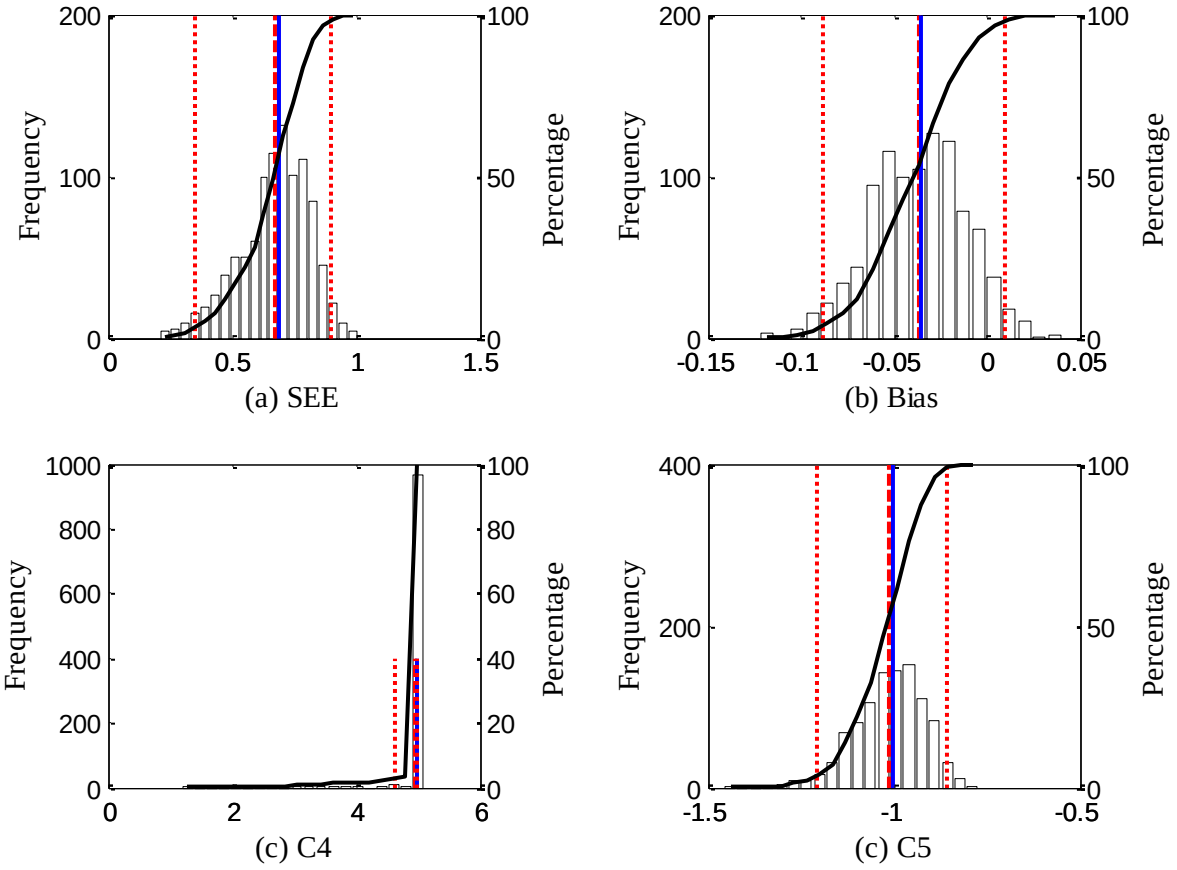
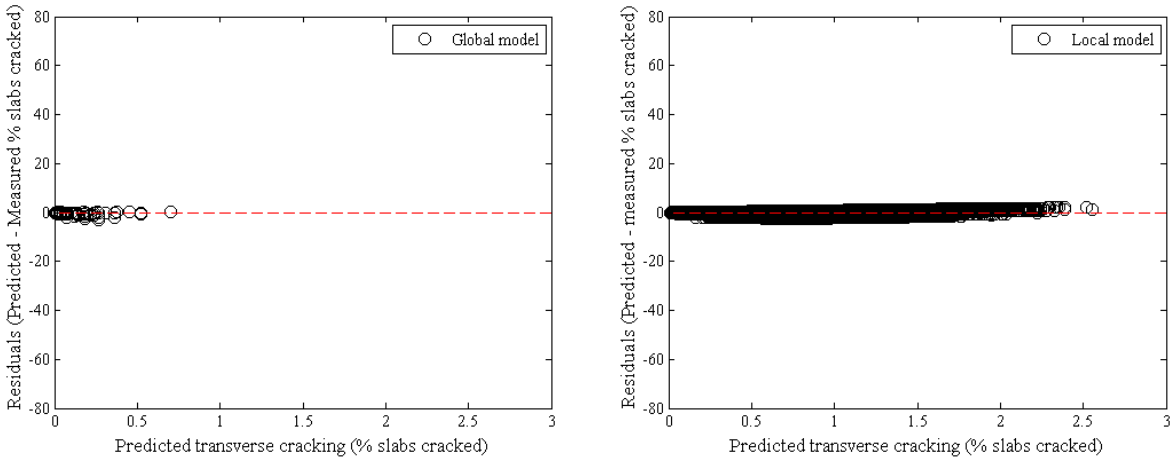


Figure B-393 Option 4 – Distribution of calibration parameters – bootstrapping



(a) Global model (b) Local model

Figure B-394 Option 3 transverse cracking residual plots – bootstrapping

Reliability

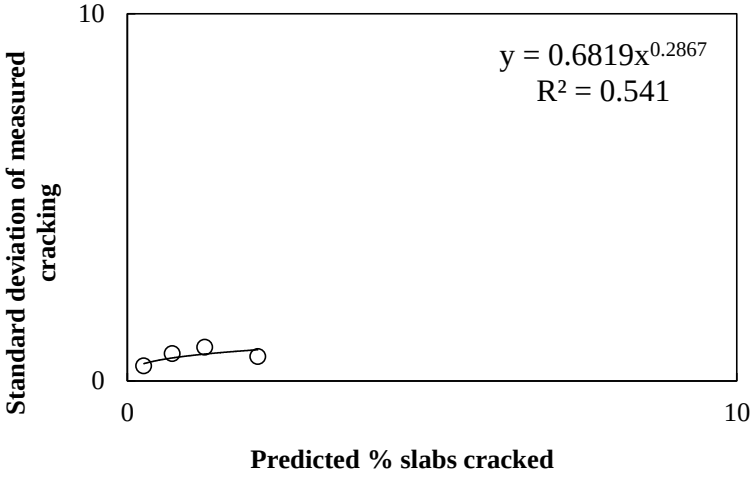


Figure B-395 Option 4 Transverse cracking reliability model fitting – bootstrapping

B.2.2 Faulting

B.2.2.1 Option 1

Table B-181 Option 1 faulting model local calibration results

Parameter	SEE	Bias
Global model	0.059	0.035
C1 = 0.4	0.024	0.007
C1 = 0.5	0.029	0.011
C1 = 0.6	0.034	0.015
C1 = 0.65	0.036	0.017
C1 = 0.7	0.039	0.020
C1 = 0.75	0.042	0.022
C1 = 0.8	0.045	0.025
C1 = 0.85	0.048	0.027
C1 = 0.9	0.045	0.025

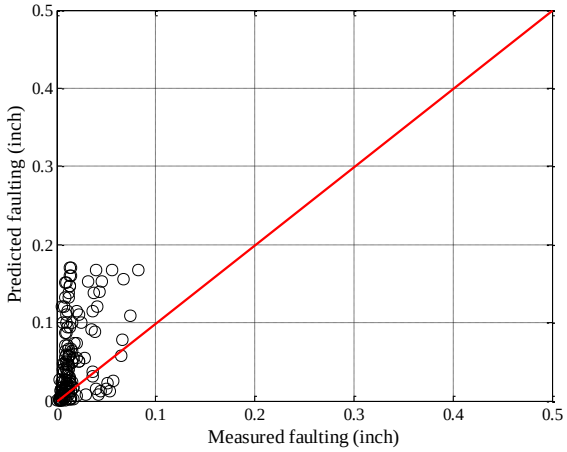


Figure B-396 Option 1 – Global faulting model

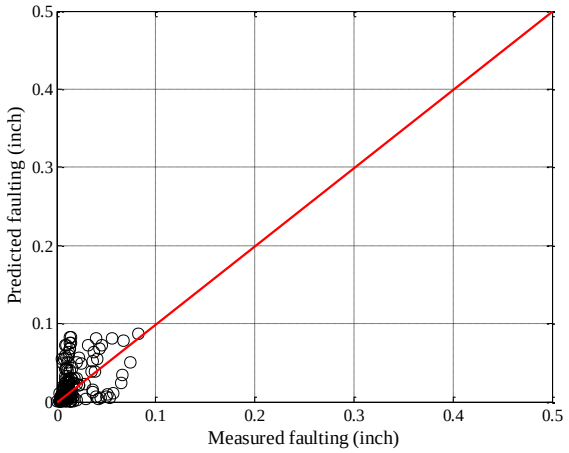


Figure B-397 Option 1 – C1 = 0.4

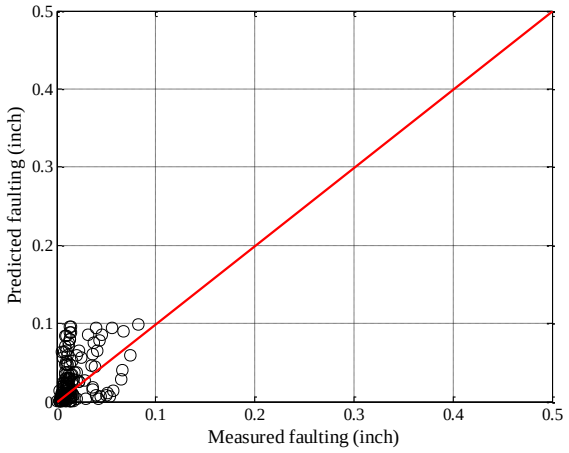


Figure B-398 Option 1 – C1 = 0.5

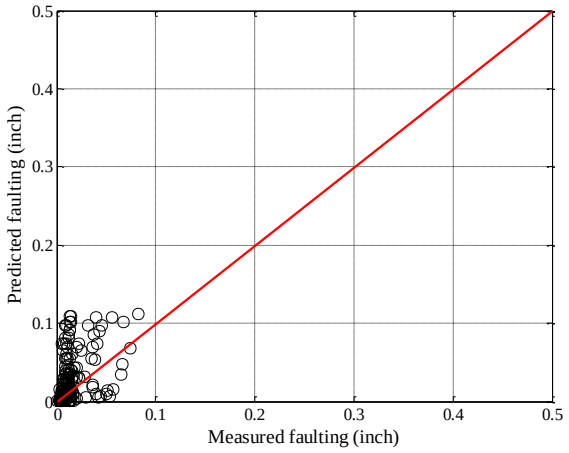


Figure B-399 Option 1 – C1 = 0.6

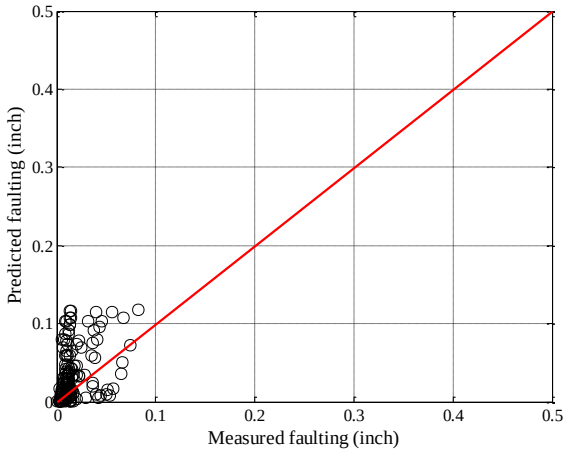


Figure B-400 Option 1 – C1 = 0.65

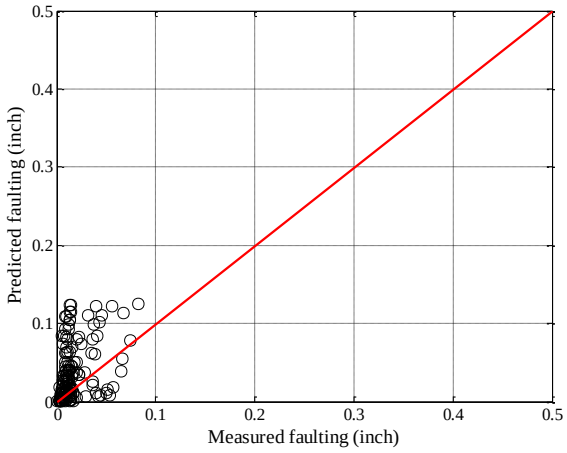


Figure B-401 Option 1 – C1 = 0.7

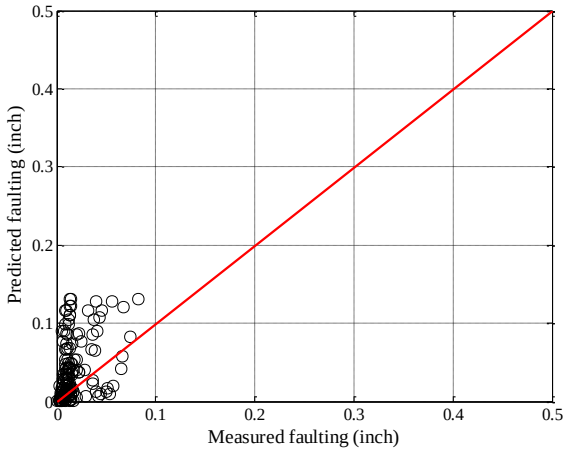


Figure B-402 Option 1 – C1 = 0.75

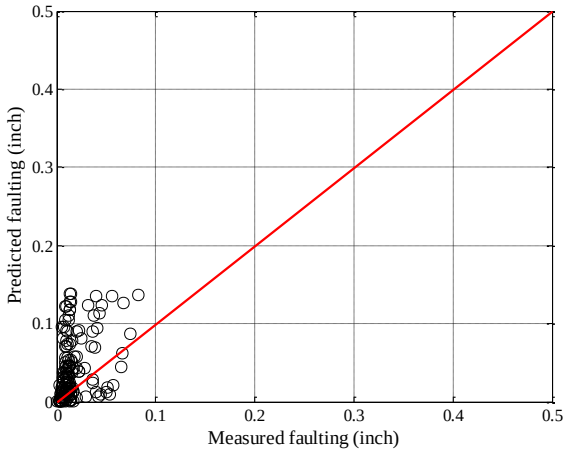


Figure B-403 Option 1 – C1 = 0.8

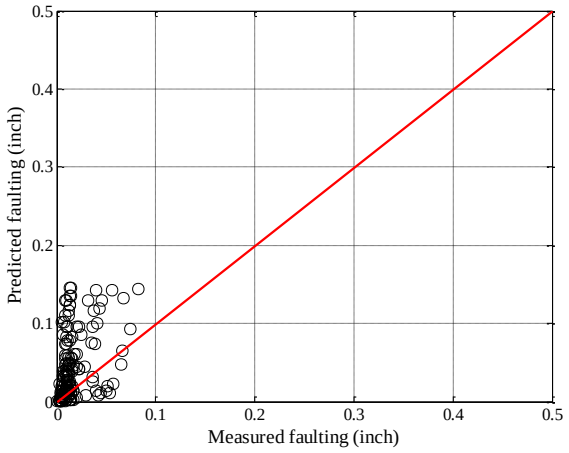


Figure B-404 Option 1 – C1 = 0.85

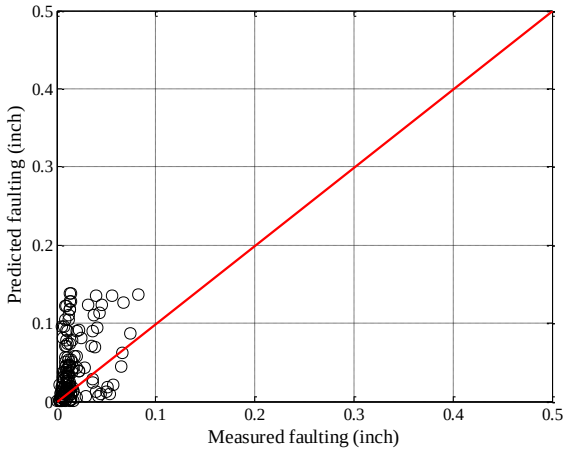


Figure B-405 Option 1 – C1 = 0.9

Reliability

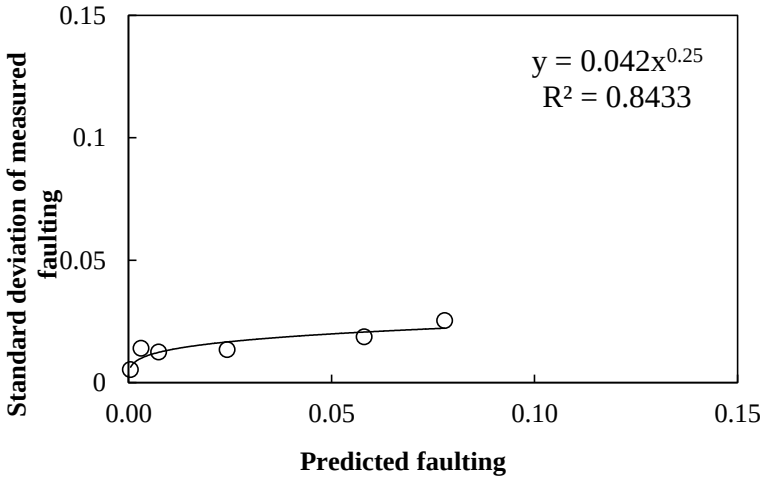


Figure B-406 Option 1 faulting model reliability equation

B.2.2.2 Option 2

Table B-182 Option 2 faulting model local calibration results

Parameter	SEE	Bias
Global model	0.051	0.026
C1 = 0.4	0.021	0.004
C1 = 0.5	0.025	0.008
C1 = 0.6	0.029	0.011
C1 = 0.65	0.032	0.013
C1 = 0.7	0.034	0.015
C1 = 0.75	0.037	0.016
C1 = 0.8	0.039	0.018
C1 = 0.85	0.042	0.020
C1 = 0.9	0.039	0.018

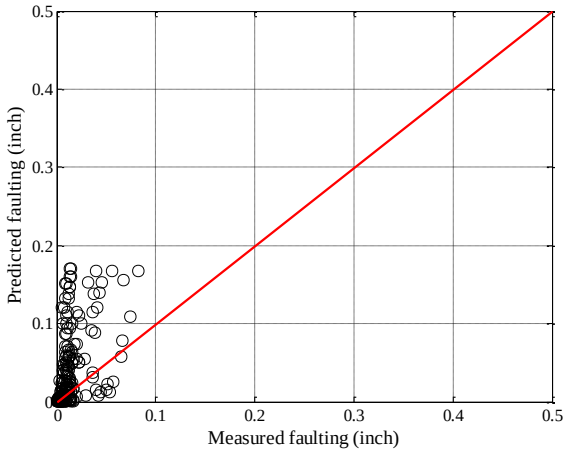


Figure B-407 Option 2 – Global faulting model

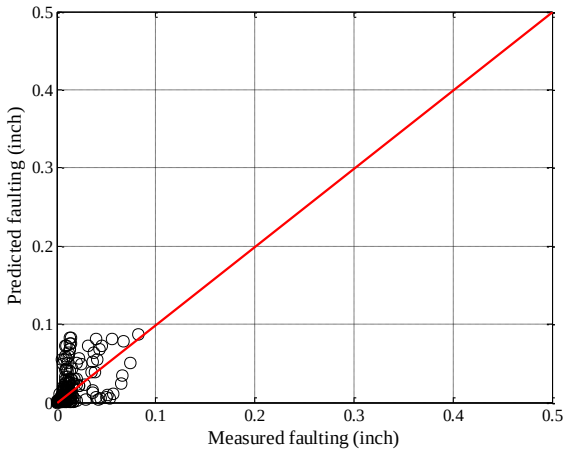


Figure B-408 Option 2 – C1 = 0.4

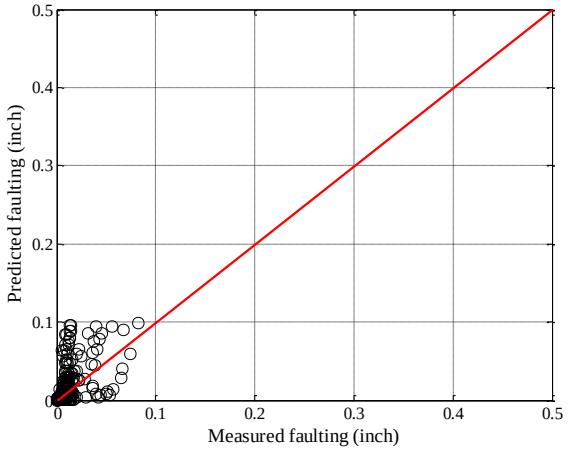


Figure B-409 Option 2 – C1 = 0.5

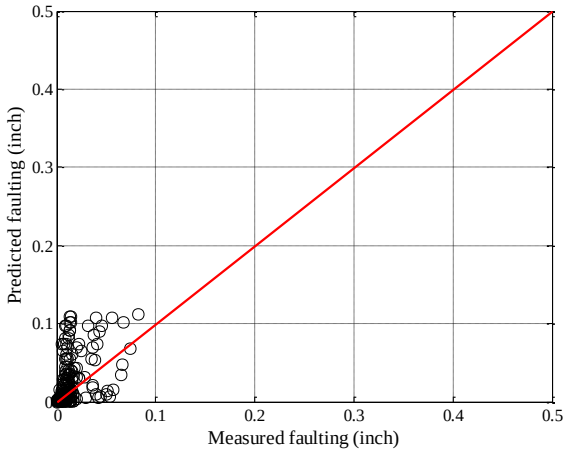


Figure B-410 Option 2 – C1 = 0.6

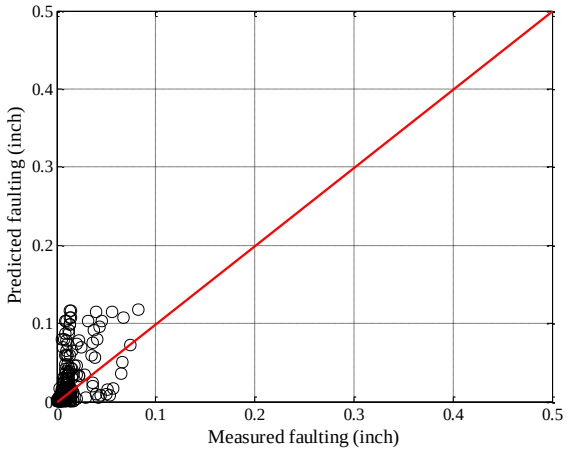


Figure B-411 Option 2 – C1 = 0.65

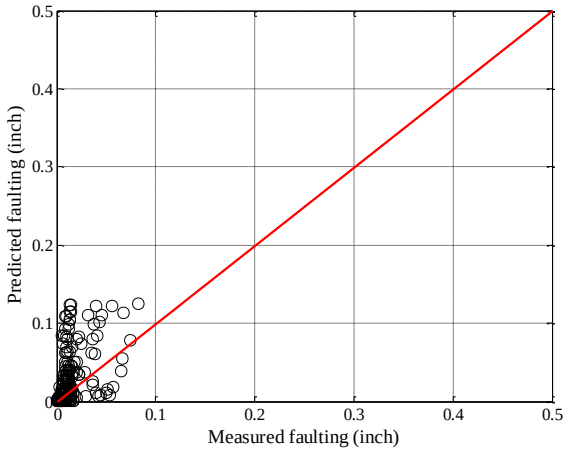


Figure B-412 Option 2 – C1 = 0.7

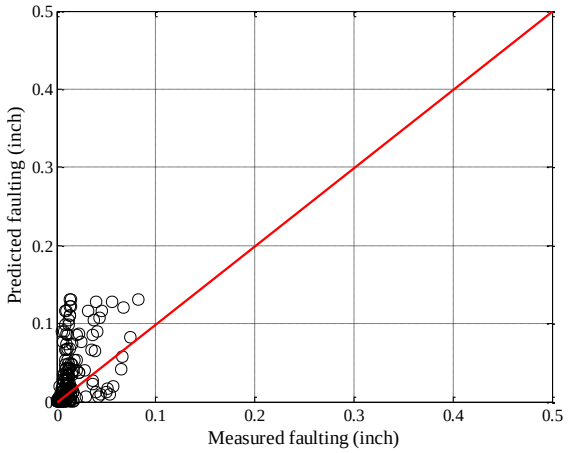


Figure B-413 Option 2 – C1 = 0.75

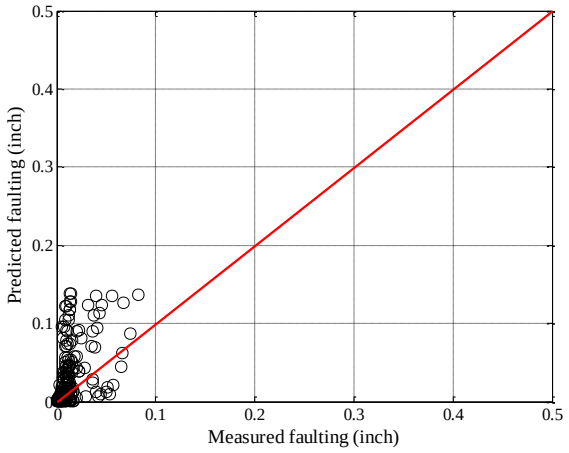


Figure B-414 Option 2 – C1 = 0.8

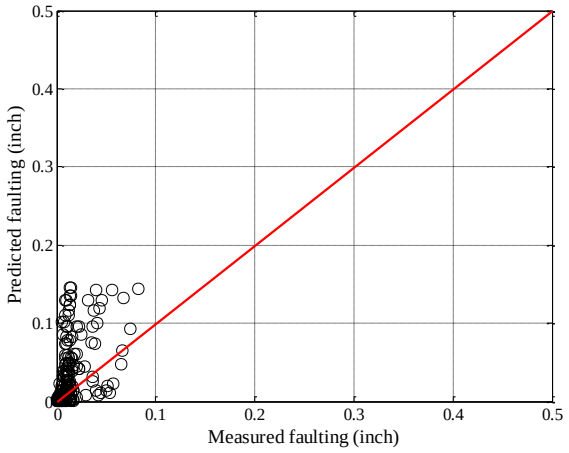


Figure B-415 Option 2 – C1 = 0.85

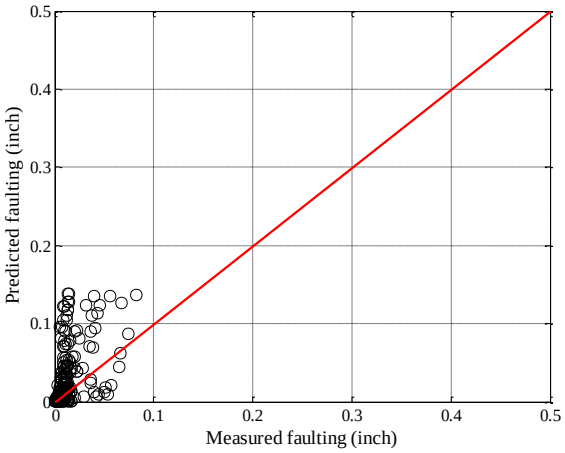


Figure B-416 Option 2 – C1 = 0.9

Reliability

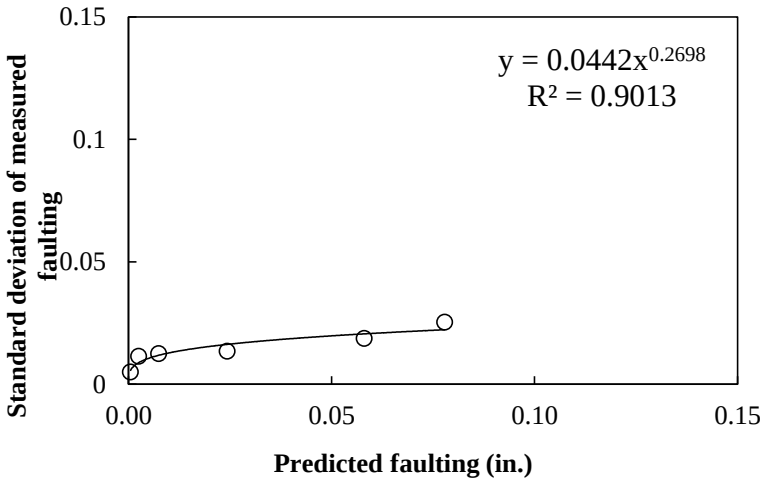


Figure B-417 Option 2 faulting model reliability equation

B.2.2.3 Option 3

Table B-183 Option 3 faulting model local calibration results

Parameter	SEE	Bias
Global model	0.049	0.023
C1 = 0.4	0.022	0.002
C1 = 0.5	0.025	0.005
C1 = 0.6	0.029	0.008
C1 = 0.65	0.031	0.010
C1 = 0.7	0.033	0.012
C1 = 0.75	0.035	0.014
C1 = 0.8	0.038	0.015
C1 = 0.85	0.040	0.017
C1 = 0.9	0.038	0.015

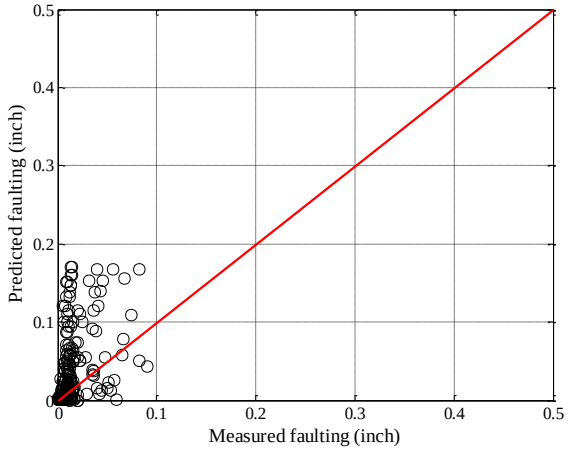


Figure B-418 Option 3 - Global faulting model

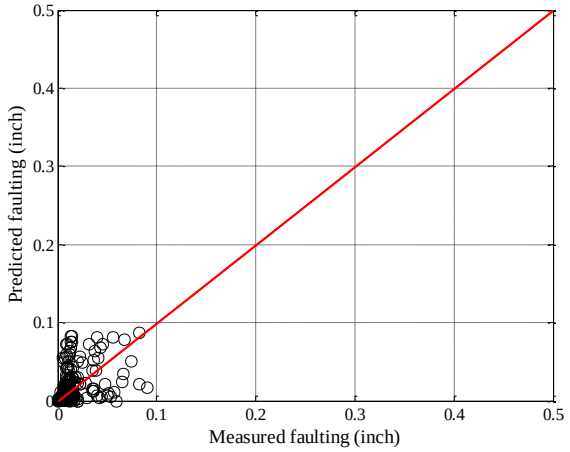


Figure B-419 Option 3 - C1 = 0.4

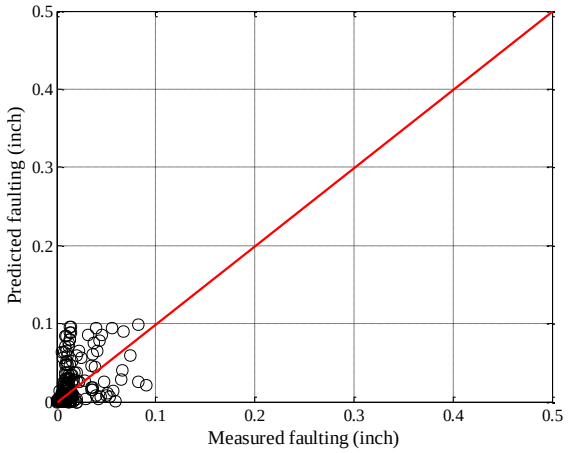


Figure B-420 Option 3 - C1 = 0.5

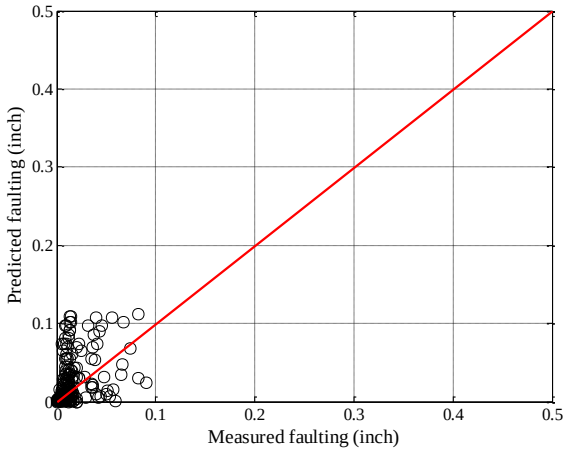


Figure B-421 Option 3 - C1 = 0.6

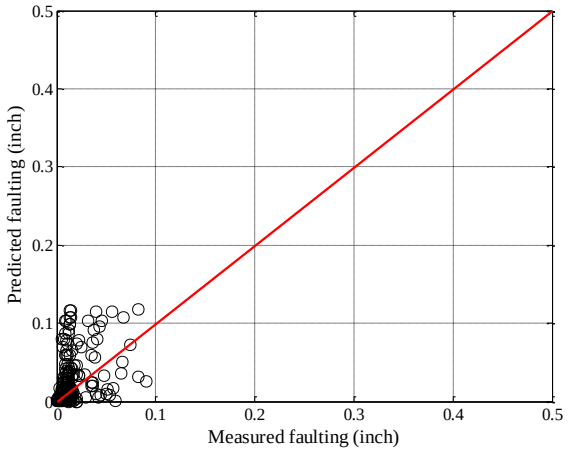


Figure B-422 Option 3 - C1 = 0.65

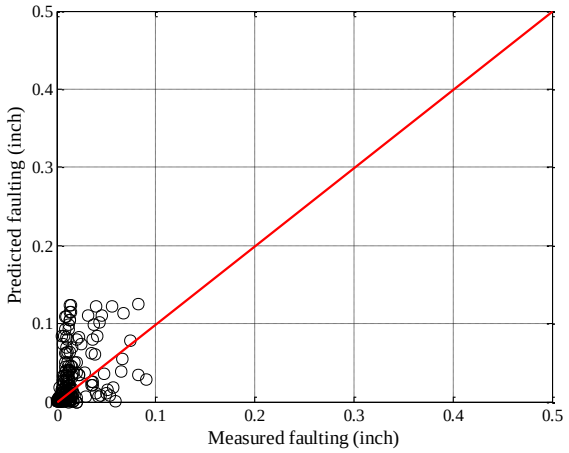


Figure B-423 Option 3 - C1 = 0.7

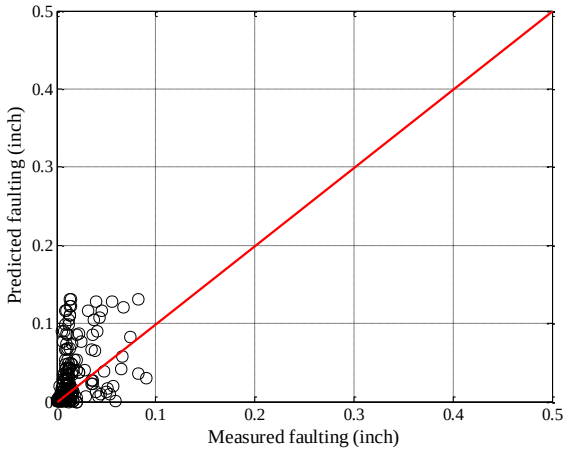


Figure B-424 Option 3 - C1 = 0.75

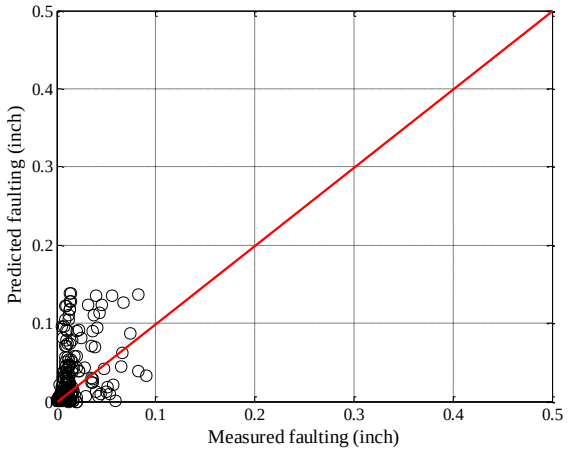


Figure B-425 Option 3 - C1 = 0.8

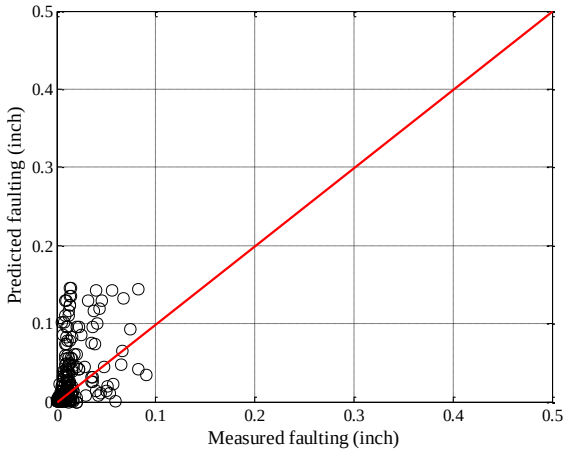


Figure B-426 Option 3 - C1 = 0.85

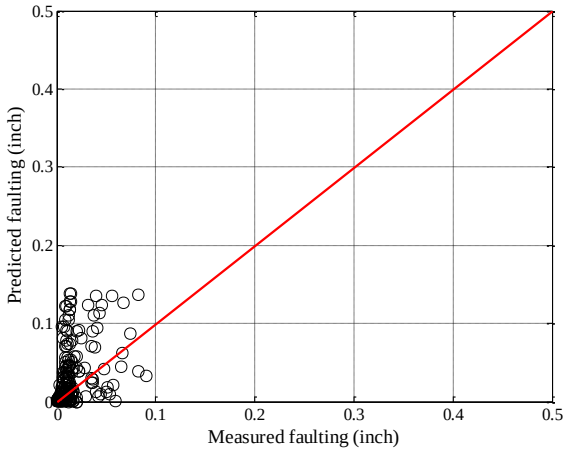


Figure B-427 Option 3 - C1 = 0.9

Reliability

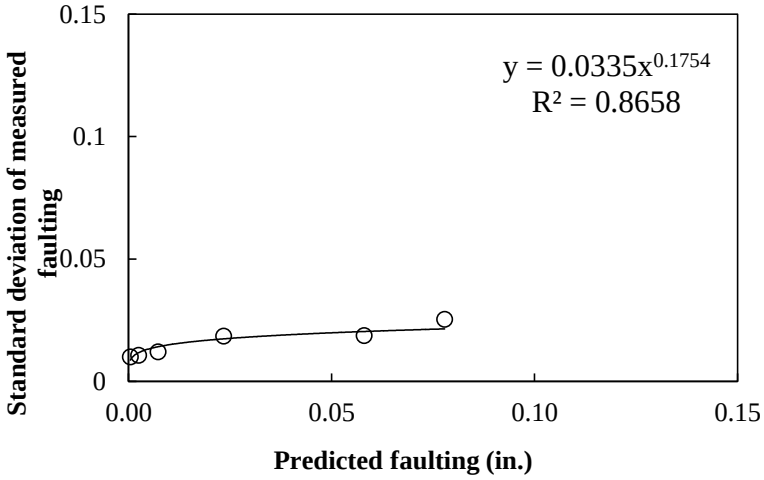


Figure B-428 Option 3 faulting model reliability equation

B.2.2.4 Option 4

Table B-184 Option 4 faulting model local calibration results

Parameter	SEE	Bias
Global model	0.005	-0.002
C1 = 0.4	0.005	-0.003
C1 = 0.5	0.005	-0.002
C1 = 0.6	0.005	-0.002
C1 = 0.65	0.005	-0.002
C1 = 0.7	0.005	-0.002
C1 = 0.75	0.005	-0.002
C1 = 0.8	0.004	-0.002
C1 = 0.85	0.004	-0.001
C1 = 0.9	0.004	-0.002

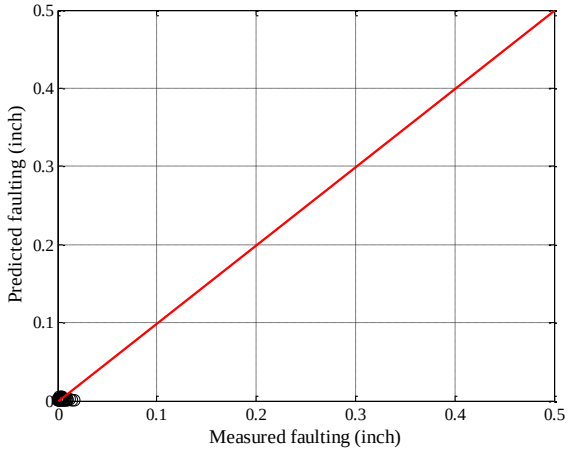


Figure B-429 Option 4 - Global faulting model

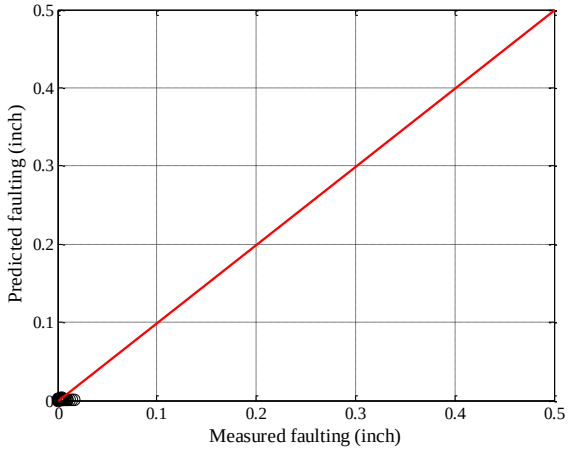


Figure B-430 Option 4 - C1 = 0.4

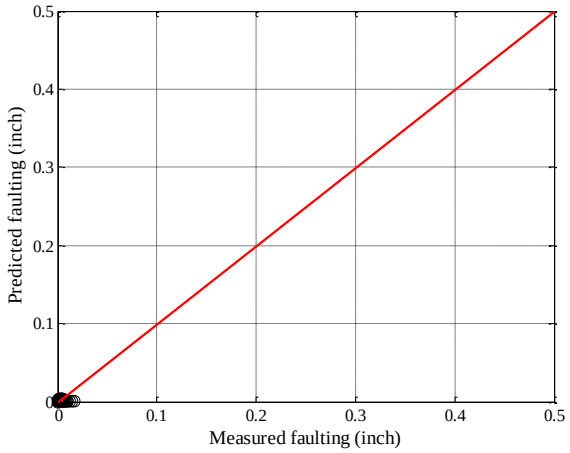


Figure B-431 Option 4 - C1 = 0.5

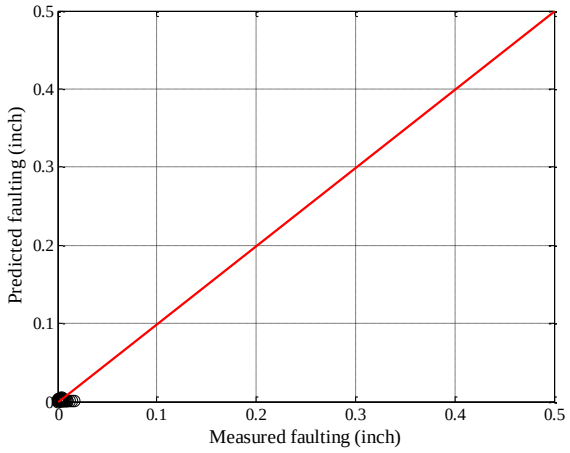


Figure B-432 Option 4 - C1 = 0.6

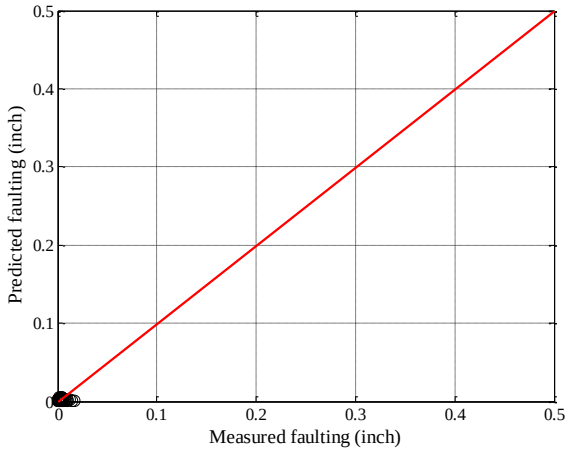


Figure B-433 Option 4 - C1 = 0.65

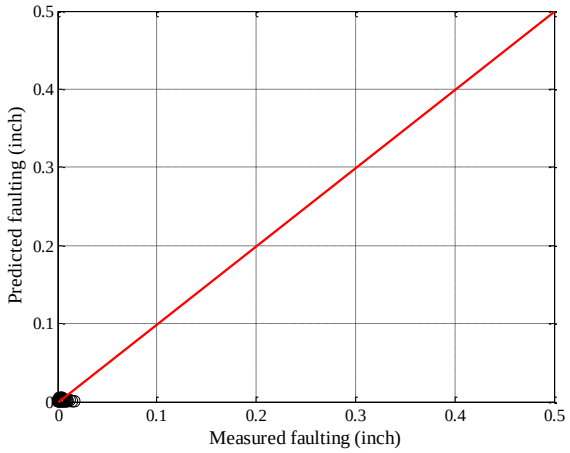


Figure B-434 Option 4 - C1 = 0.7

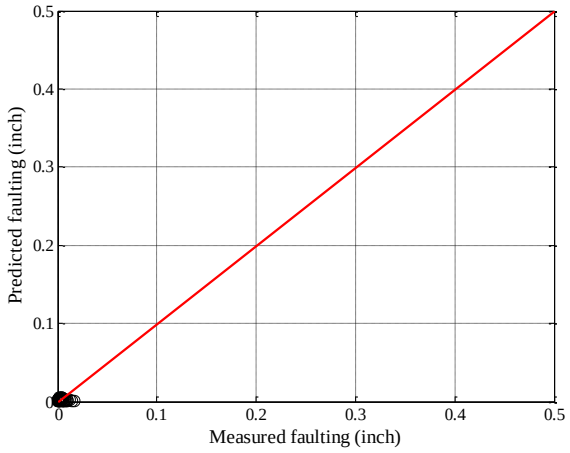


Figure B-435 Option 4 - C1 = 0.75

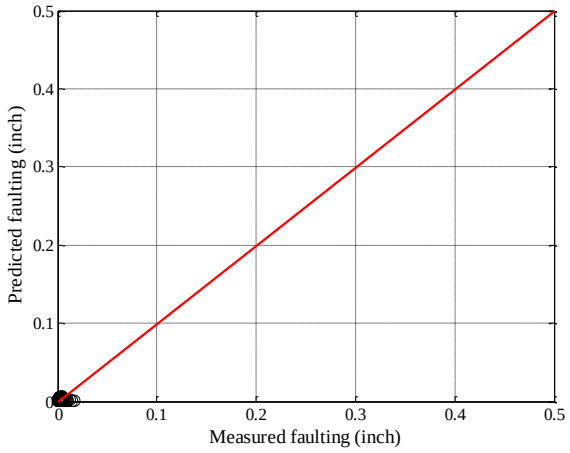


Figure B-436 Option 4 - C1 = 0.8

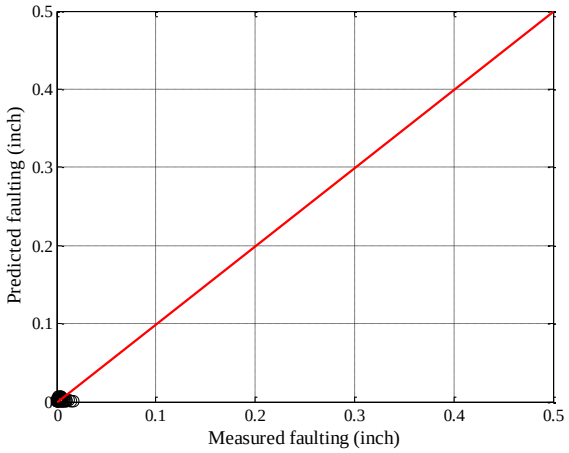


Figure B-437 Option 4 - C1 = 0.85

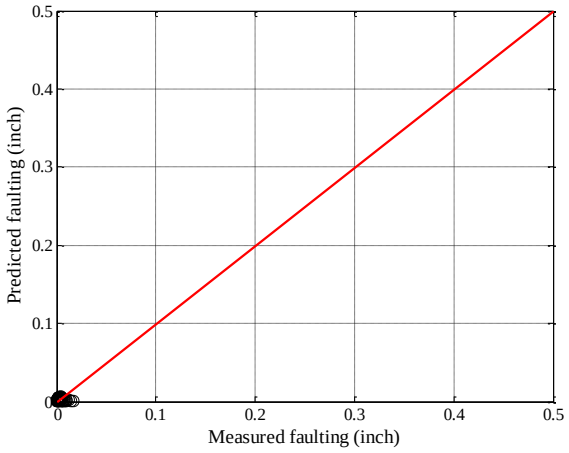


Figure B-438 Option 4 - C1 = 0.9

Reliability

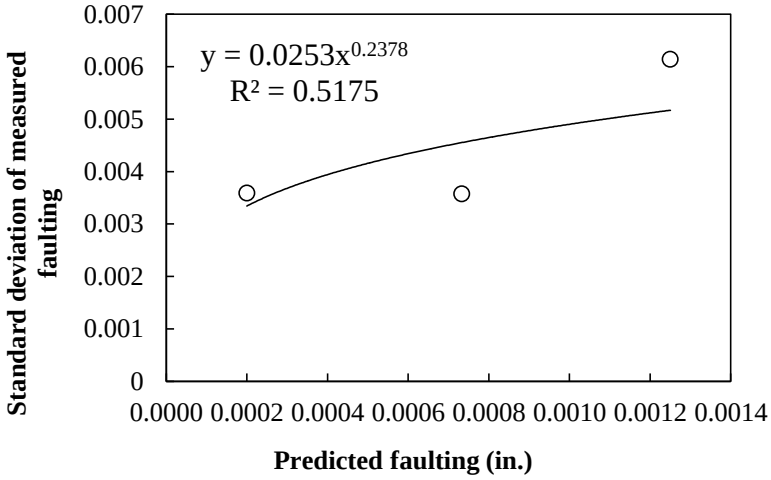


Figure B-439 Option 4 faulting model reliability equation

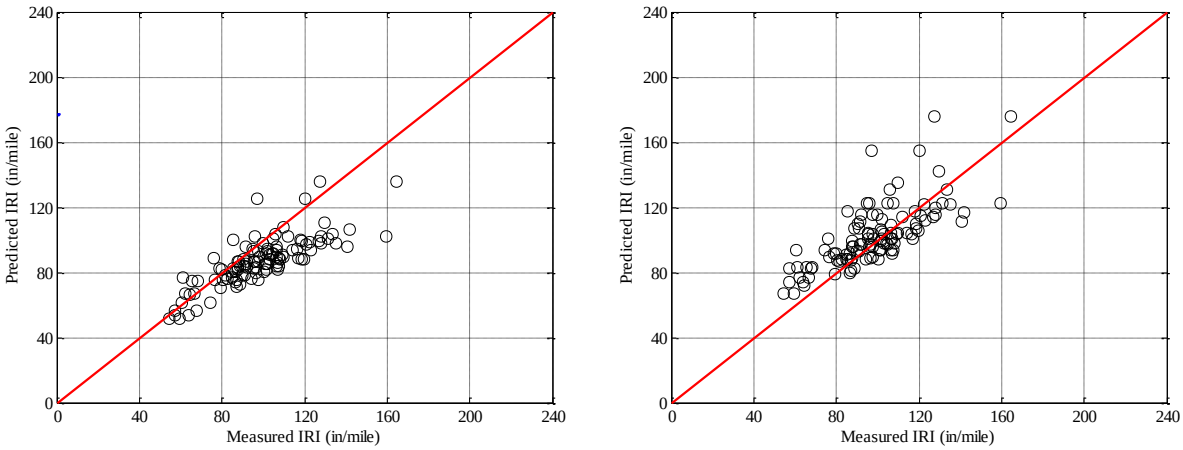
B.2.3 Pavement Roughness (IRI)

B.2.3.1 Option 1

No sampling

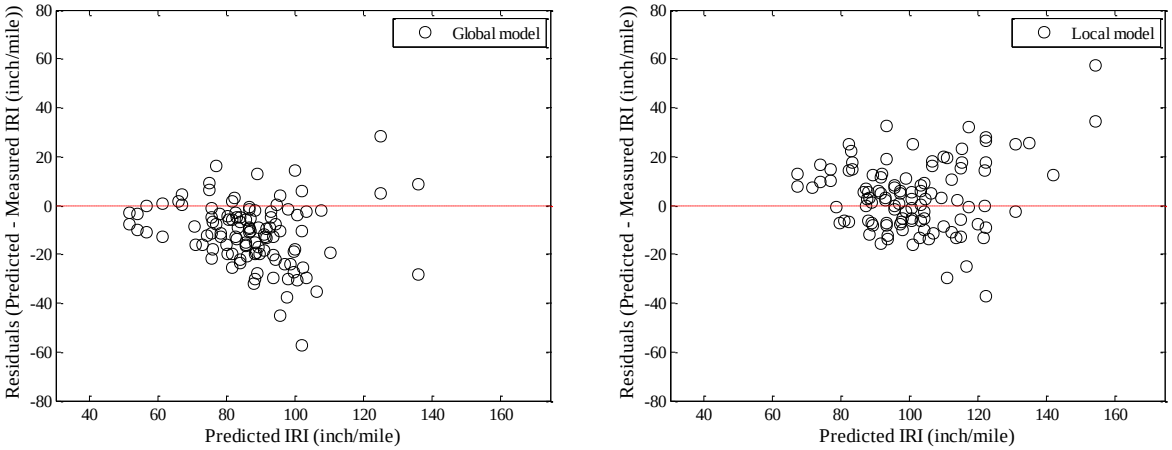
Table B-185 Option 1 IRI local calibration results – no sampling

Parameter	Global	Local
SEE	17.314	15.564
Bias	-11.398	4.215
R^2	0.640	0.538
t-test pvalue	0.000	0.004
Intercept = 0	0.000	0.000
Slope = 1	0.000	0.000
C1	0.820	0.586
C2	0.442	11.833
C3	1.493	1.493
C4	25.240	25.240



(a) Global model (b) Local model

Figure B-440 Option 1 IRI local calibration measured versus predicted – no sampling



(a) Global model (b) Local model

Figure B-441 Option 1 IRI local calibration residual plots – no sampling

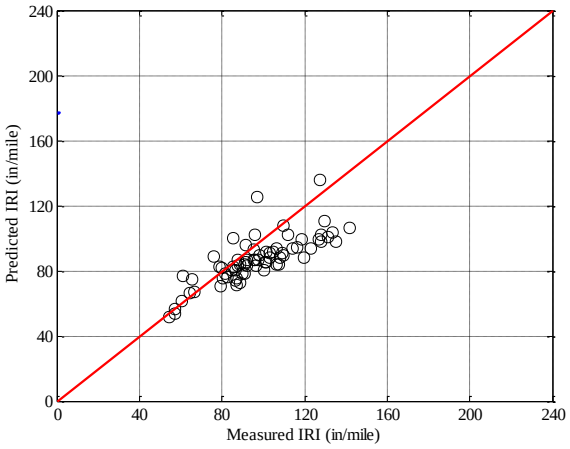
Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

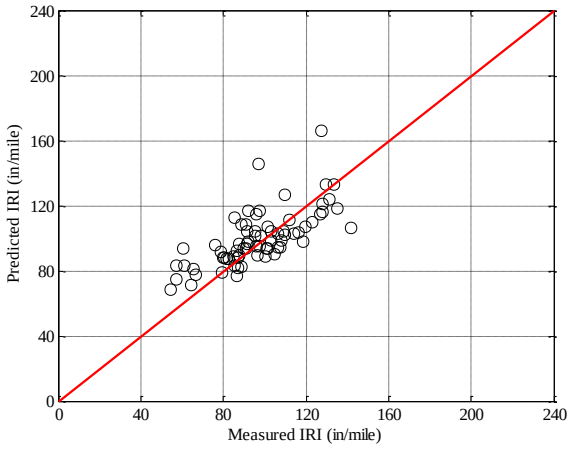
Split sampling

Table B-186 Option 1 IRI local calibration results – split sampling

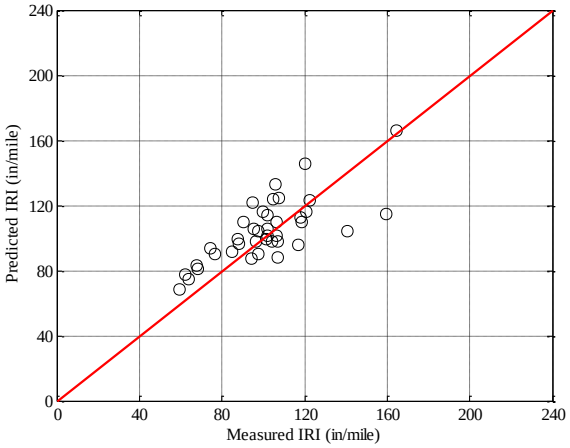
Parameter	Global model	Local model	Validation
SEE	16.263	14.999	16.341
Bias	-10.020	3.070	3.401
R^2	0.614	0.497	0.543
t-test pvalue	0.000	0.080	0.186
Intercept = 0	0.000	0.000	0.000
Slope = 1	0.000	0.000	0.000
C1	0.820	0.342	0.342
C2	0.442	12.599	12.599
C3	1.493	1.493	1.493
C4	25.240	25.240	25.240



(a) Global model

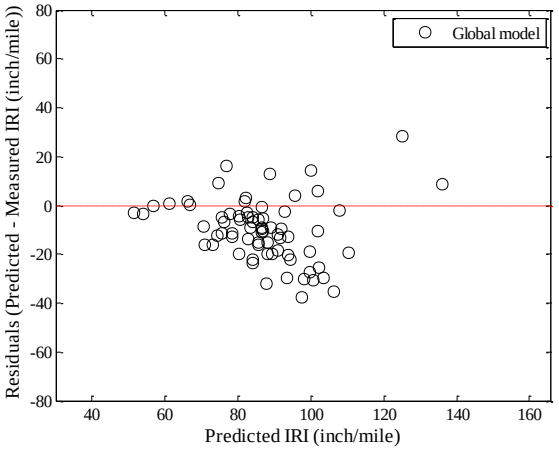


(b) Local model

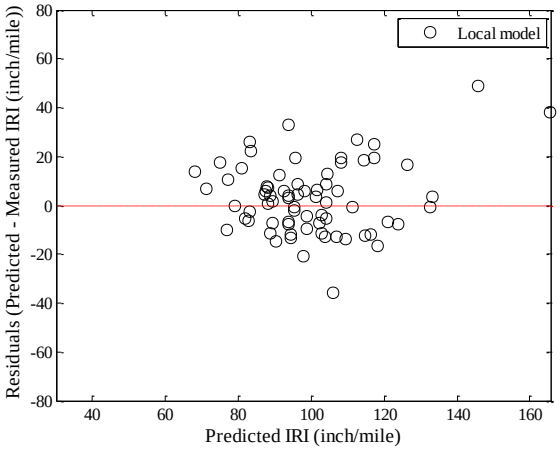


(c) Local model validation

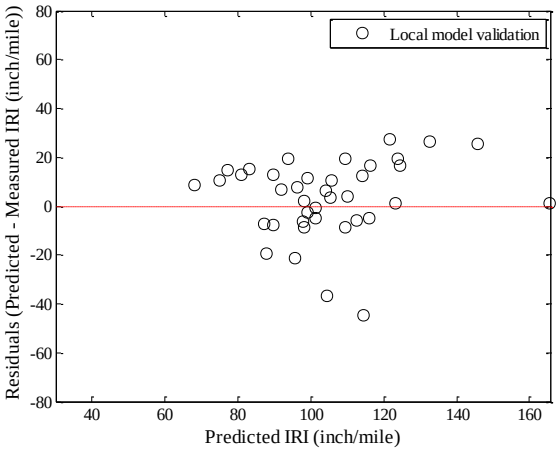
Figure B-442 Option 1 IRI local calibration measured versus predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-443 Option 1 IRI local calibration residual plots – split sampling

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

Repeated split sampling

Table B-187 Option 1 IRI local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	17.330	17.658	14.491	19.182
Bias	-11.410	-11.393	-14.018	-9.028
C1	0.820	0.820	-	-
C2	0.442	0.442	-	-
C3	1.492	1.492	-	-
C4	25.240	25.240	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	15.263	15.406	12.163	17.195
Bias	4.314	4.341	2.710	5.766
C1	0.603	0.604	0.161	1.051
C2	11.840	11.721	9.757	14.422
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240
Local Model validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	17.109	16.515	10.052	29.205
Bias	4.383	4.166	-6.031	17.373
C1	0.603	0.604	0.161	1.051
C2	11.840	11.721	9.757	14.422
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240

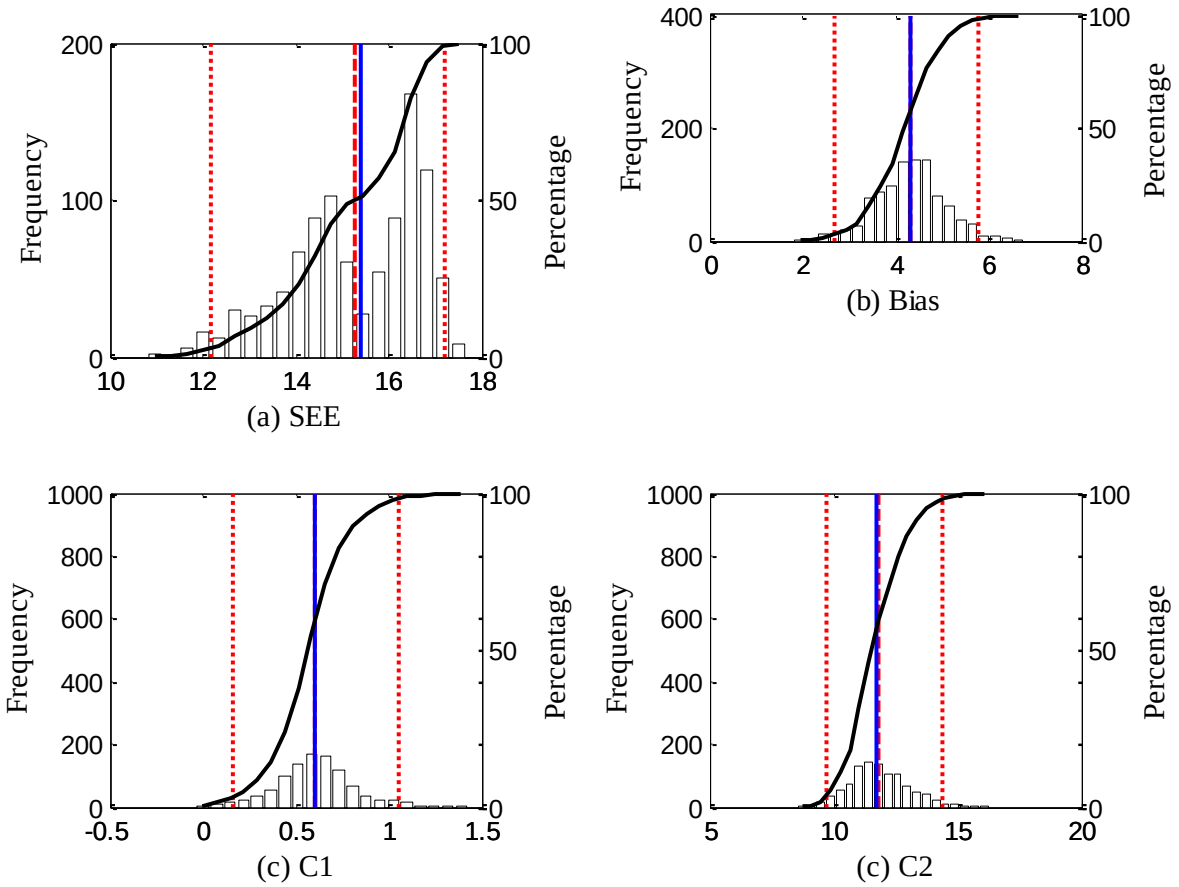


Figure B-444 Option 1 IRI repeated split sampling frequency distributions – calibration

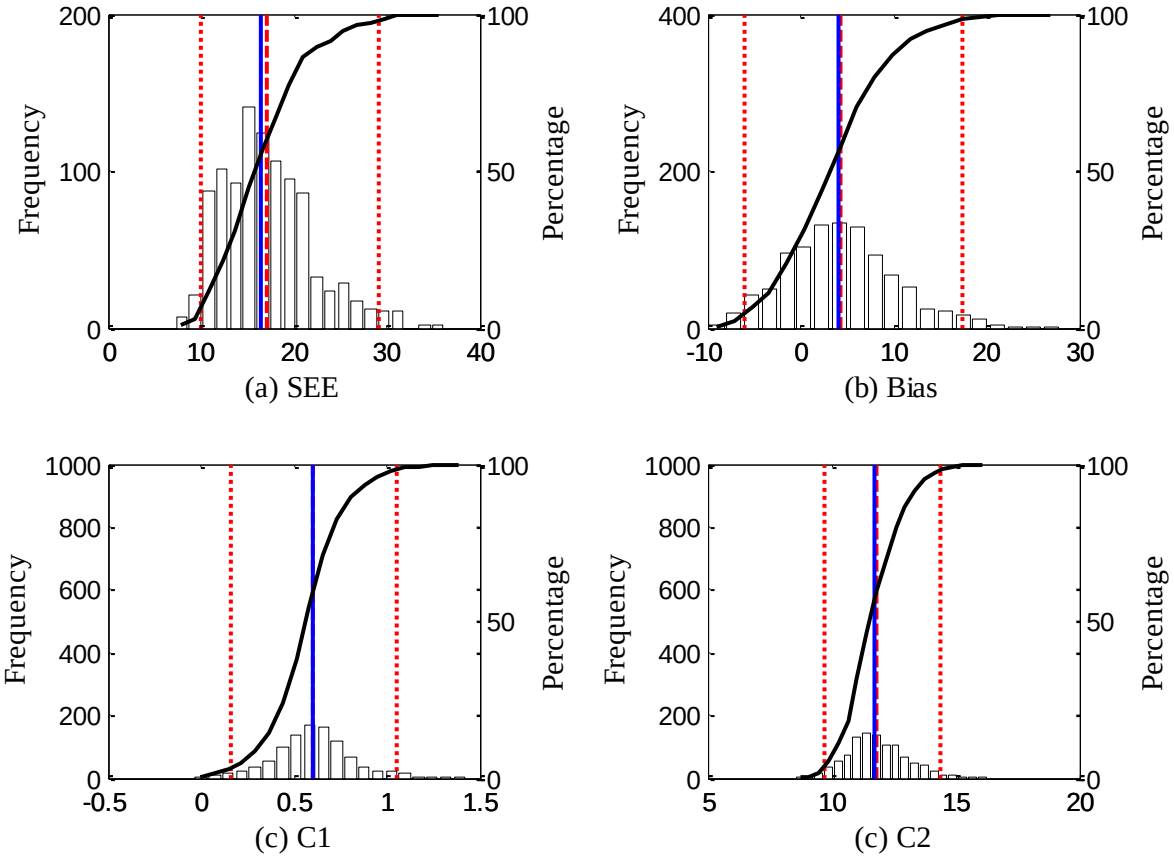
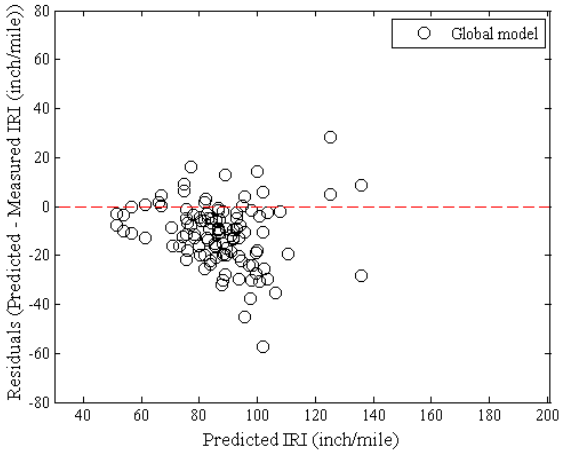
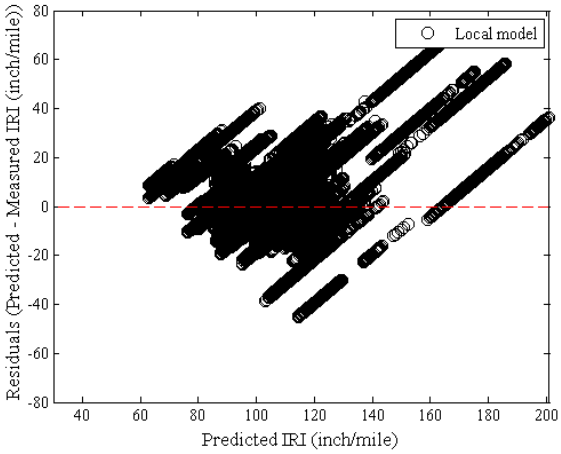


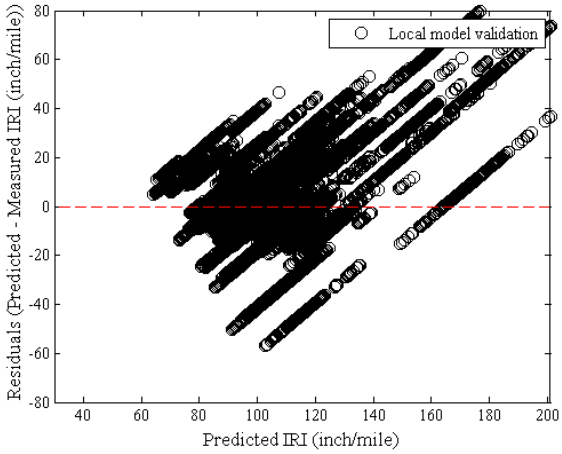
Figure B-445 Option 1 IRI repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-446 Option 1 IRI local calibration residual plots – repeated split sampling

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

Bootstrapping

Table B-188 Option 1 IRI local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	17.239	17.085	13.847	21.179
Bias	-11.466	-11.462	-14.950	-7.870
C1	0.820	0.820	-	-
C2	0.442	0.442	-	-
C3	1.492	1.492	-	-
C4	25.240	25.240	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	14.899	14.833	11.651	18.350
Bias	4.417	4.395	2.673	6.422
C1	0.584	0.590	0.035	1.159
C2	12.068	12.023	8.754	15.396
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240

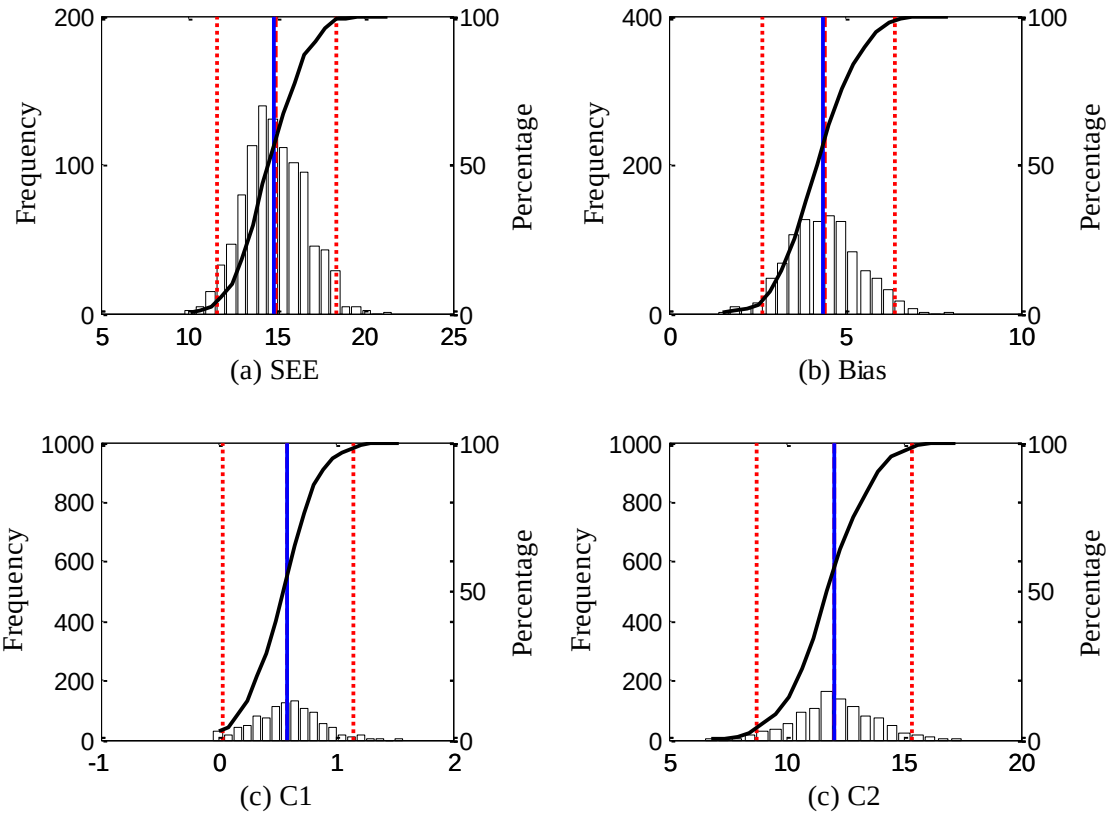
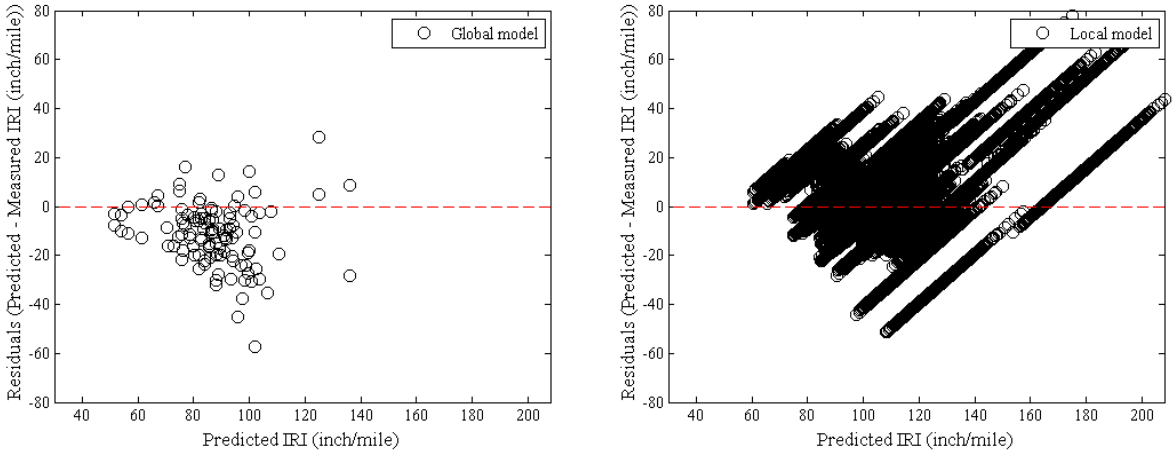


Figure B-447 Option 1 IRI bootstrapping frequency distributions



(a) Global model (b) Local model

Figure B-448 Option 1 IRI local calibration residual plots – repeated split sampling

Reliability

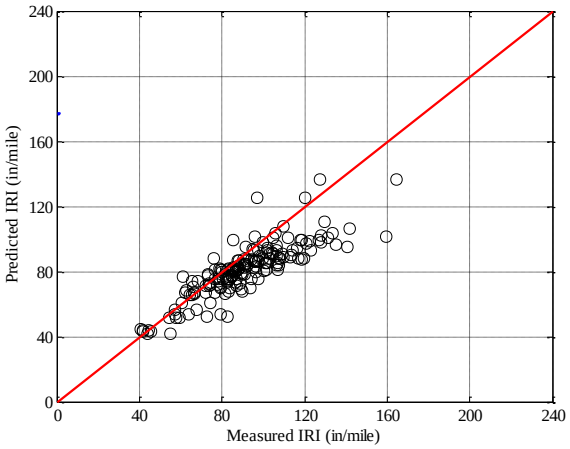
The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

B.2.3.2 Option 2

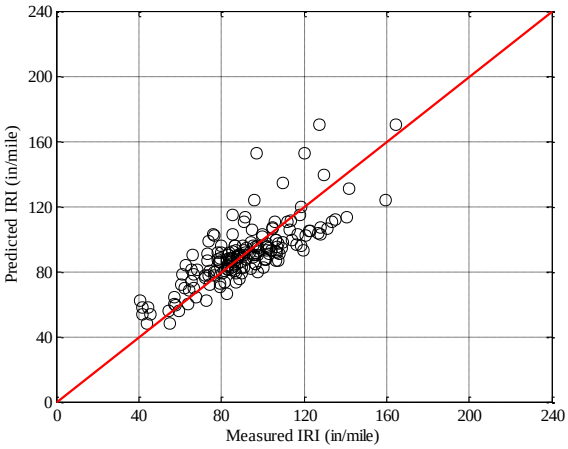
No sampling

Table B-189 Option 2 IRI local calibration results – no sampling

Parameter	Global	Local
SEE	15.474	13.792
Bias	-10.026	-0.498
R^2	0.722	0.614
t-test pvalue	0.000	0.638
Intercept = 0	0.000	0.000
Slope = 1	0.000	0.000
C1	0.820	1.182
C2	0.442	3.465
C3	1.493	1.493
C4	25.240	25.240

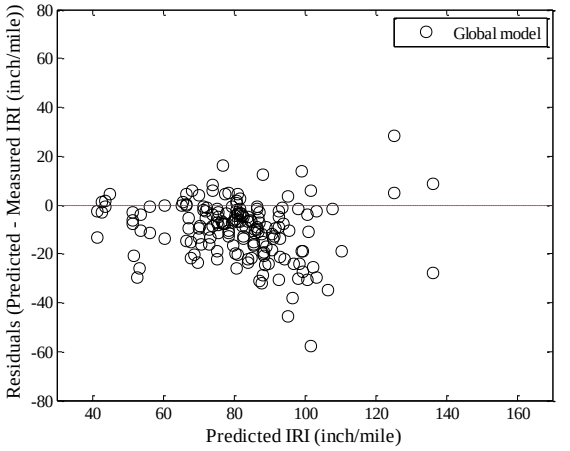


(a) Global model

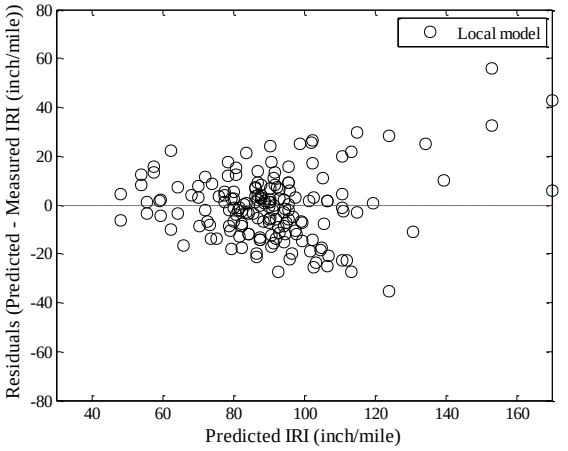


(b) Local model

Figure B-449 Option 2 IRI local calibration measured versus predicted – no sampling



(a) Global model



(b) Local model

Figure B-450 Option 2 IRI local calibration residual plots– no sampling

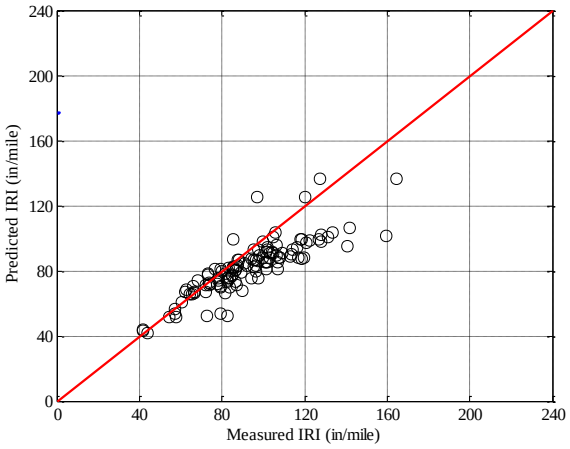
Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

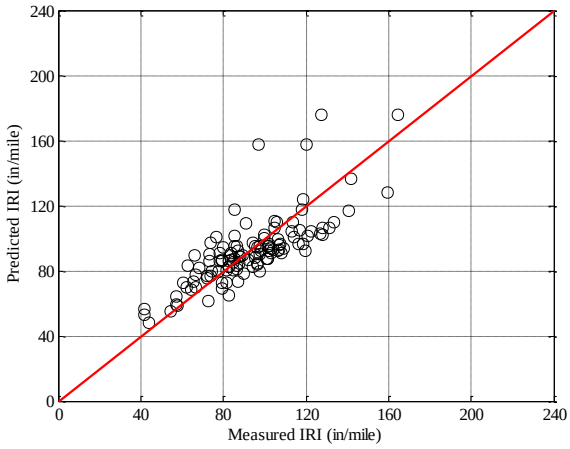
Split sampling

Table B-190 Option 2 IRI local calibration results – split sampling

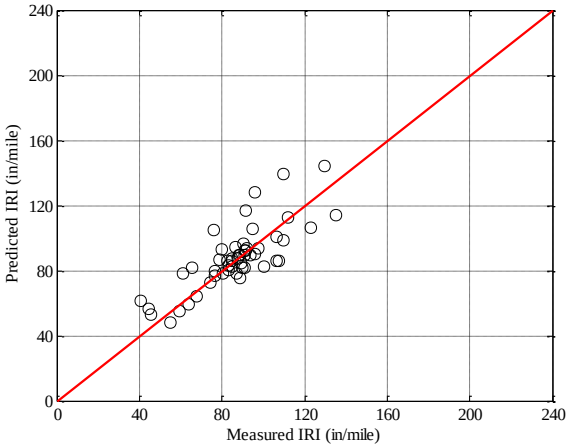
Parameter	Global model	Local model	Validation
SEE	16.433	14.847	12.641
Bias	-10.745	-1.109	1.212
R^2	0.716	0.597	0.630
t-test pvalue	0.000	0.418	0.486
Intercept = 0	0.000	0.000	0.015
Slope = 1	0.000	0.000	0.019
C1	0.820	1.301	1.301
C2	0.442	3.202	3.202
C3	1.493	1.493	1.493
C4	25.240	25.240	25.240



(a) Global model

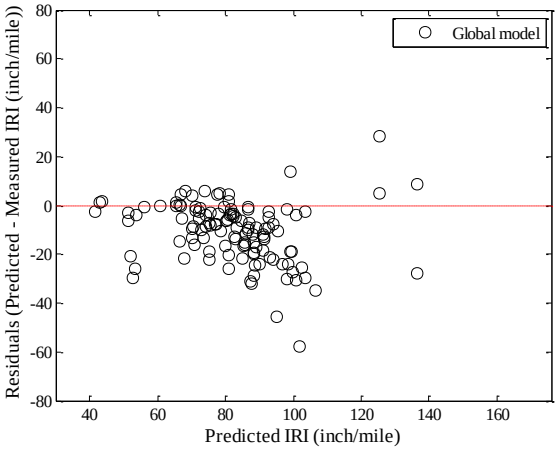


(b) Local model

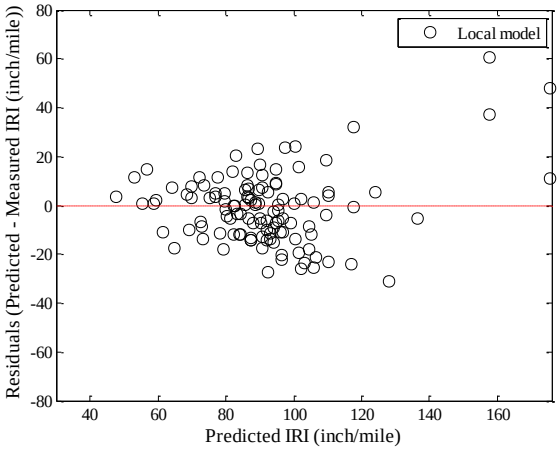


(c) Local model validation

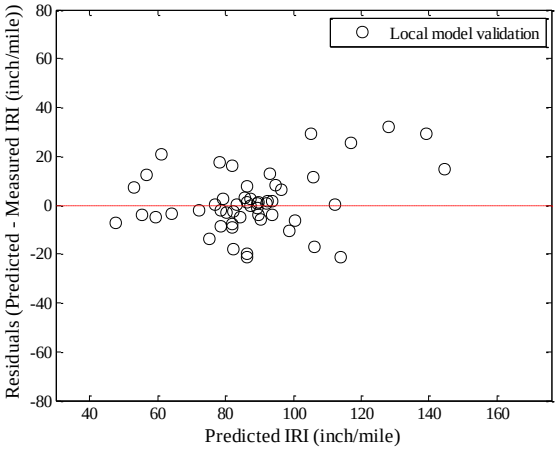
Figure B-451 Option 2 IRI local calibration measured versus predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-452 Option 2 IRI local calibration residual plots – split sampling

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

Repeated split sampling

Table B-191 Option 2 IRI local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	15.508	15.704	13.453	16.981
Bias	-10.038	-10.008	-11.764	-8.197
C1	0.820	0.820	-	-
C2	0.442	0.442	-	-
C3	1.492	1.492	-	-
C4	25.240	25.240	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	13.648	13.714	11.501	15.181
Bias	-0.415	-0.399	-1.543	0.704
C1	1.192	1.175	0.920	1.604
C2	3.512	3.467	2.701	4.610
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240
Local Model validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	14.954	14.644	9.934	22.917
Bias	-0.189	-0.436	-8.036	8.568
C1	1.192	1.175	0.920	1.604
C2	3.512	3.467	2.701	4.610
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240

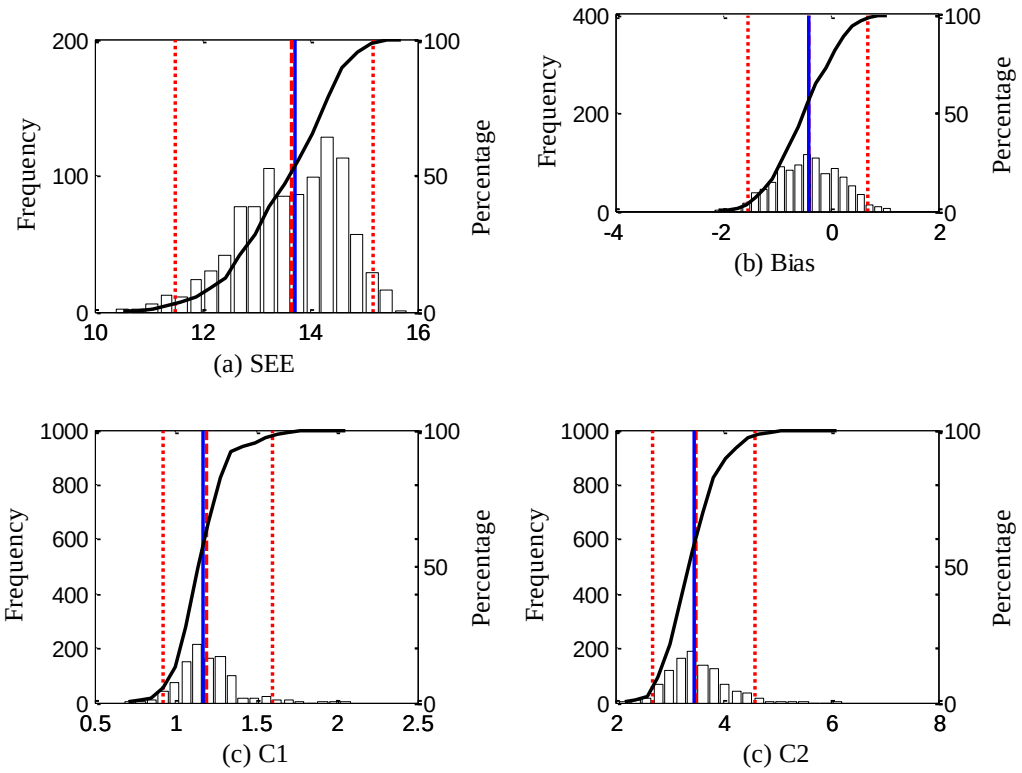


Figure B-453 Option 2 IRI repeated split sampling frequency distributions – calibration

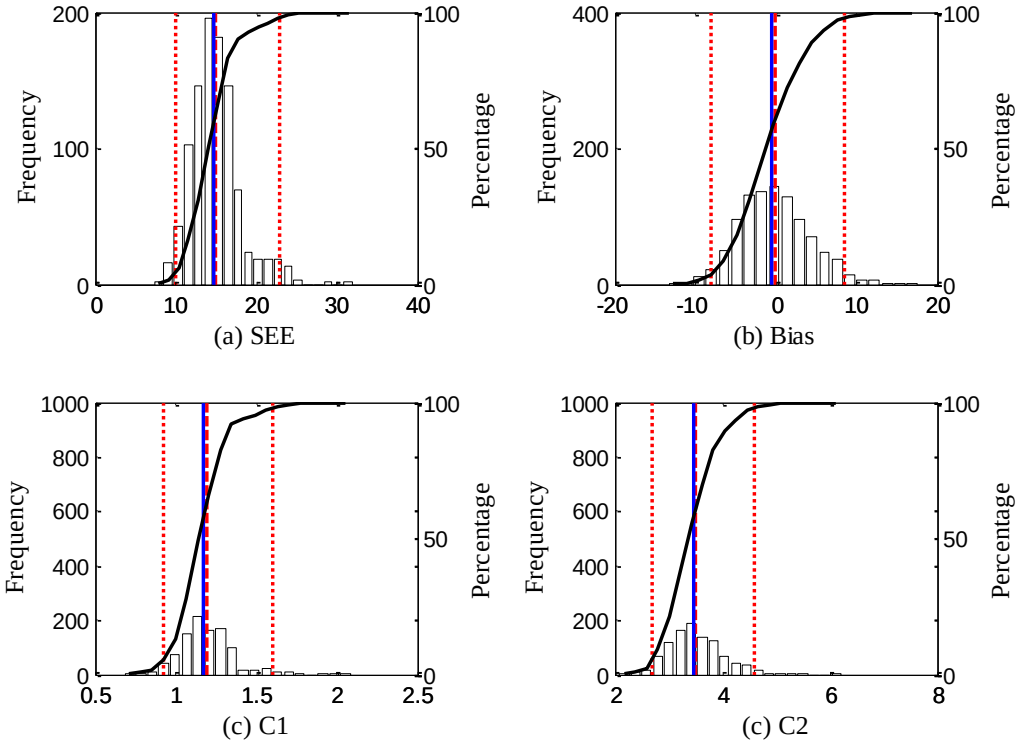
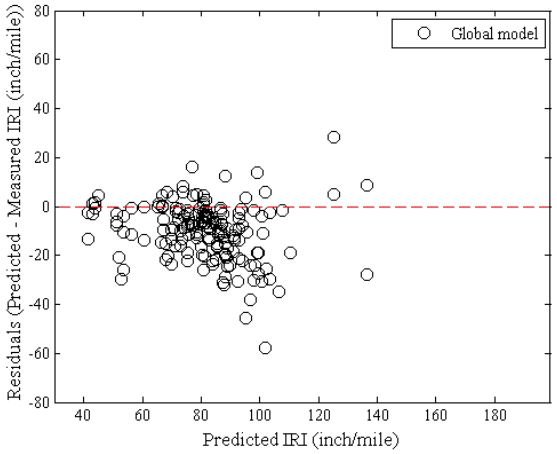
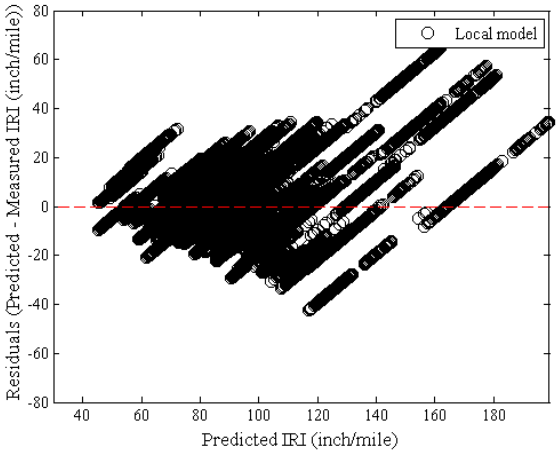


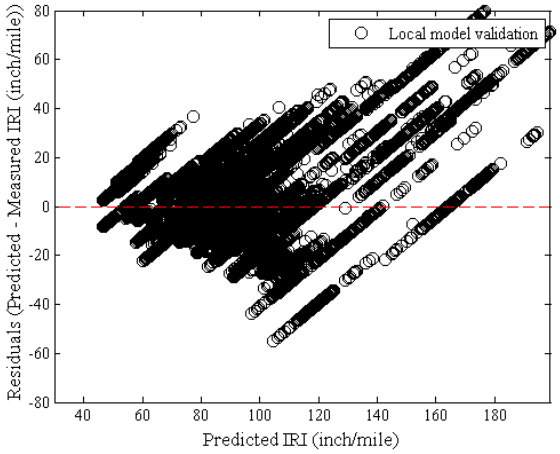
Figure B-454 Option 2 IRI repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-455 Option 2 IRI local calibration residual plots – repeated split sampling

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

Bootstrapping

Table B-192 Option 2 IRI local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	15.390	15.341	12.704	18.146
Bias	-10.024	-10.025	-12.716	-7.403
C1	0.820	0.820	-	-
C2	0.442	0.442	-	-
C3	1.492	1.492	-	-
C4	25.240	25.240	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	13.424	13.451	10.963	15.932
Bias	-0.382	-0.407	-2.056	1.423
C1	1.198	1.171	0.829	1.686
C2	3.570	3.517	2.323	5.234
C3	1.492	1.492	1.492	1.492
C4	25.240	25.240	25.240	25.240

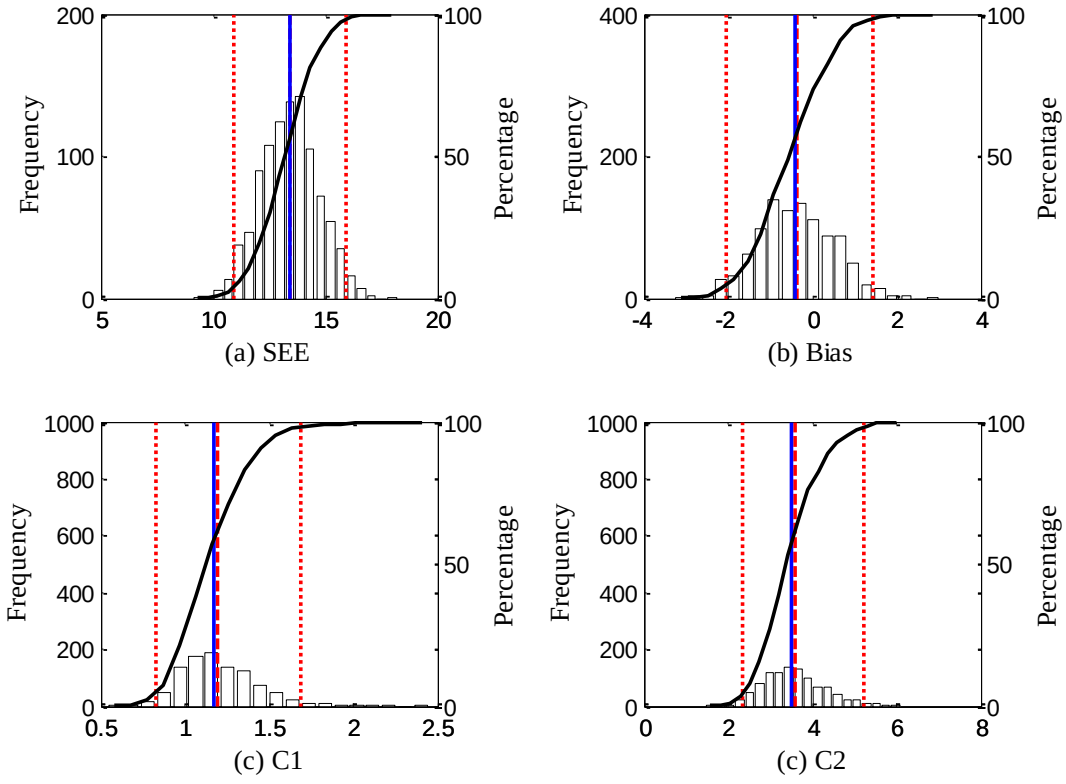
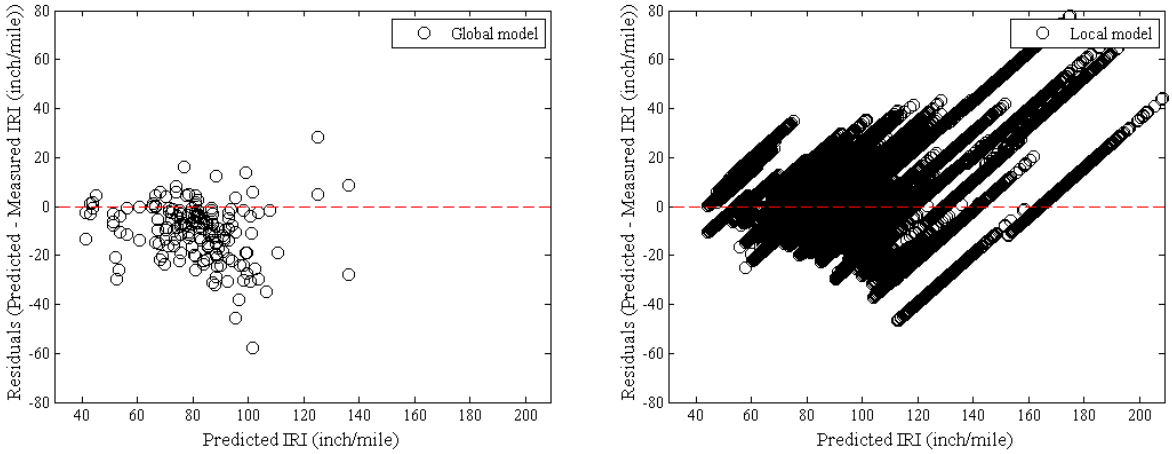


Figure B-456 Option 2 IRI bootstrapping frequency distributions



(a) Global model (b) Local model

Figure B-457 Option 2 IRI local calibration residual plots – bootstrapping

Reliability

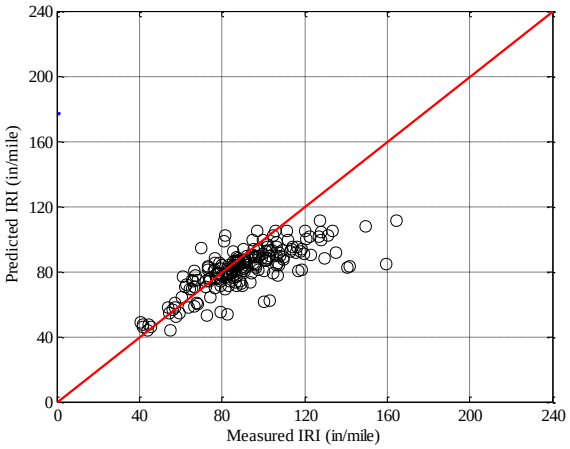
The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

B.2.3.3 Option 3

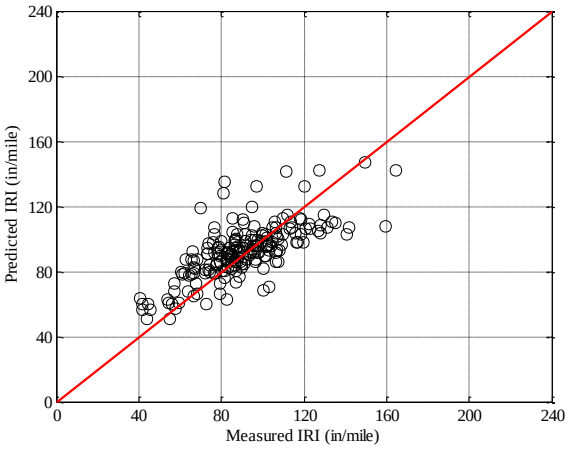
No sampling

Table B-193 Option 3 IRI local calibration results – no sampling

Parameter	Global	Local
SEE	23.056	21.471
Bias	-9.862	0.770
R^2	0.346	0.313
t-test pvalue	0.000	0.616
Intercept = 0	0.000	0.000
Slope = 1	0.000	0.000
C1	0.820	1.781
C2	0.442	2.028
C3	1.493	1.493
C4	25.240	25.240

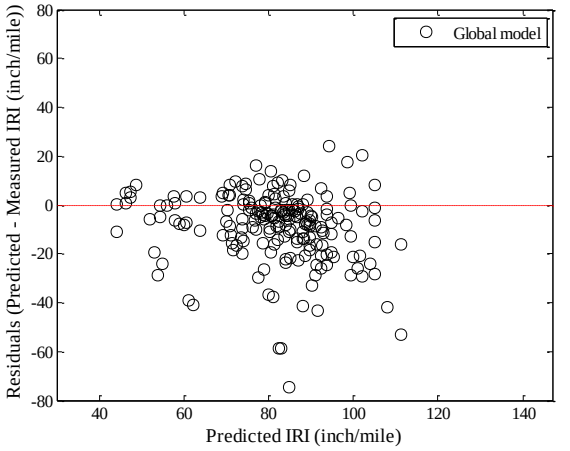


(a) Global model

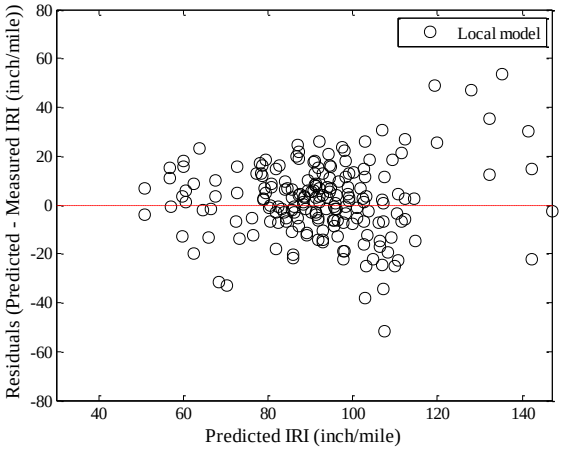


(b) Local model

Figure B-458 Option 3 IRI local calibration measured versus predicted – no sampling



(a) Global model



(b) Local model

Figure B-459 Option 3 IRI local calibration residual plots – no sampling

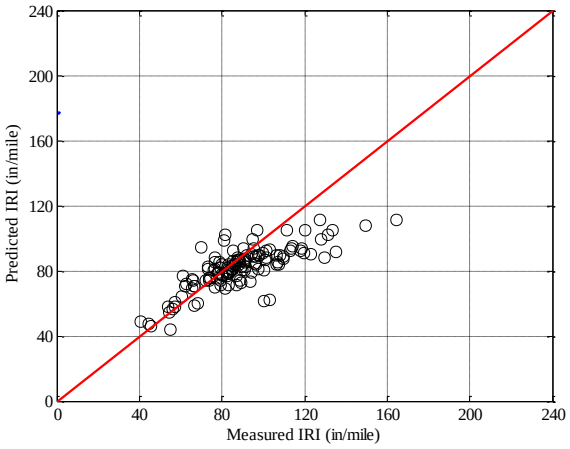
Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

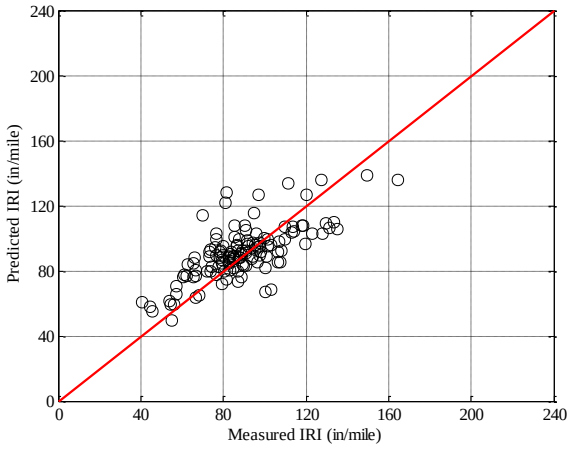
Split sampling

Table B-194 Option 3 IRI local calibration results – split sampling

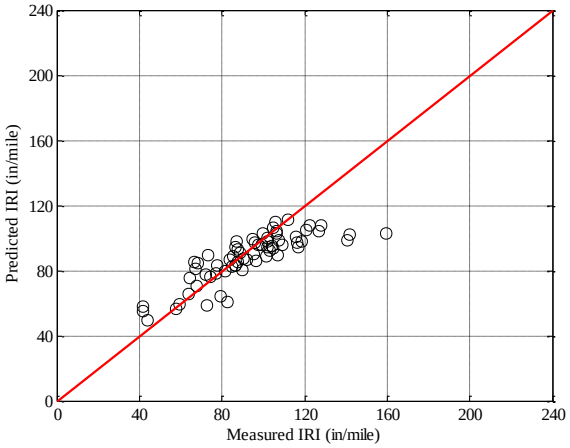
Parameter	Global model	Local model	Validation
SEE	24.611	23.889	14.764
Bias	-8.805	0.365	-4.996
R^2	0.274	0.230	0.686
t-test pvalue	0.000	0.862	0.004
Intercept = 0	0.000	0.000	0.000
Slope = 1	0.000	0.000	0.000
C1	0.820	1.562	1.562
C2	0.442	1.760	1.760
C3	1.493	1.493	1.493
C4	25.240	25.240	25.240



(a) Global model

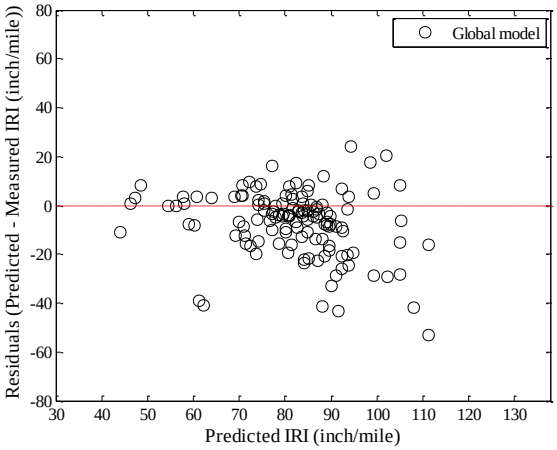


(b) Local model

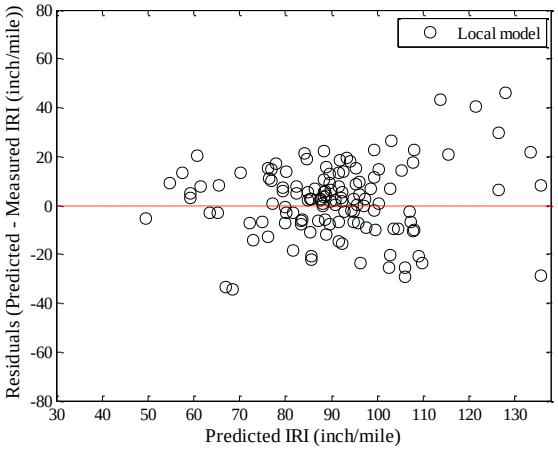


(c) Local model validation

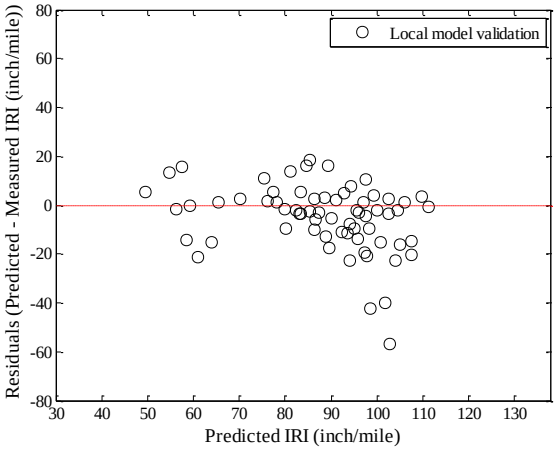
Figure B-460 Option 3 IRI local calibration measured versus predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-461 Option 3 IRI local calibration residual plots – split sampling

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

Repeated split sampling

Table B-195 Option 3 IRI local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	22.844	24.913	14.515	26.687
Bias	-9.897	-9.968	-12.087	-7.283
C1	0.820	0.820	-	-
C2	0.442	0.442	-	-
C3	1.492	1.492	-	-
C4	25.240	25.240	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	21.096	23.226	13.031	24.773
Bias	0.863	0.912	-0.883	2.445
C1	1.834	1.709	1.354	2.611
C2	1.993	2.027	0.292	3.670
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240
Local Model validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	21.177	18.866	11.079	34.851
Bias	1.535	0.722	-8.065	13.248
C1	1.834	1.709	1.354	2.611
C2	1.993	2.027	0.292	3.670
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240

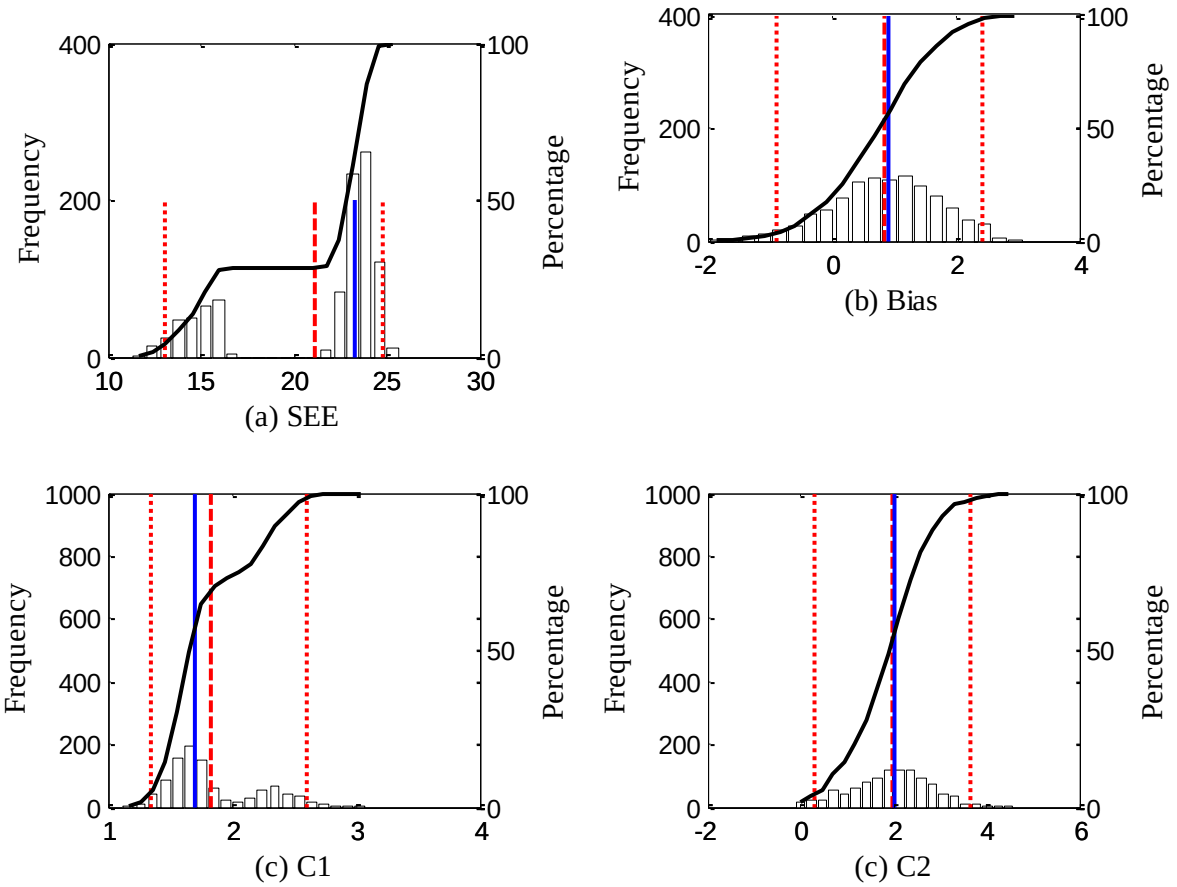


Figure B-462 Option 3 IRI repeated split sampling frequency distributions – calibration

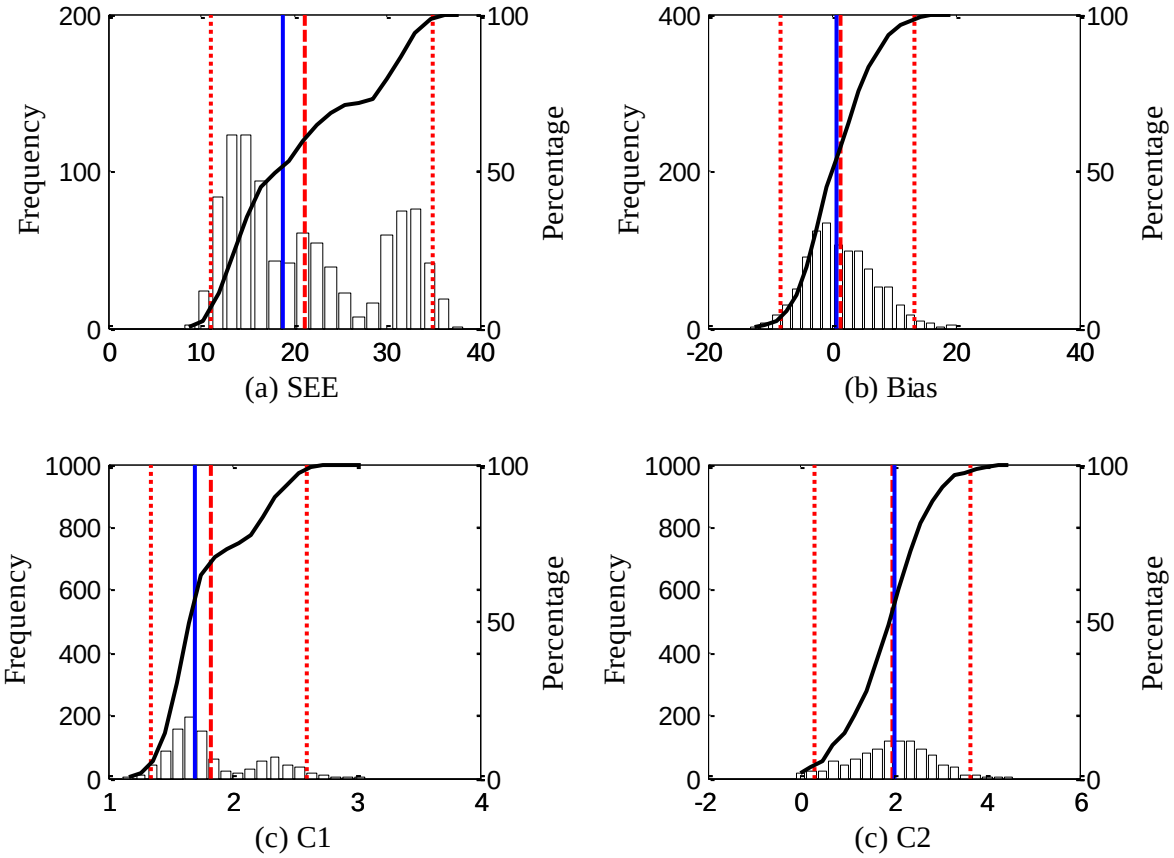
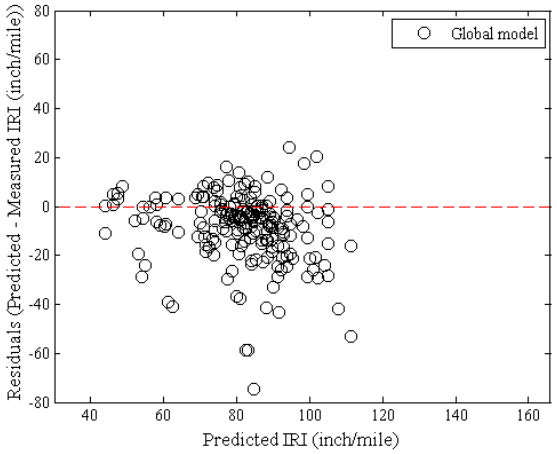
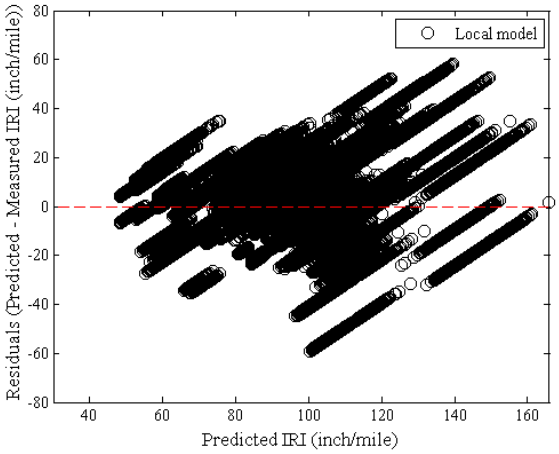


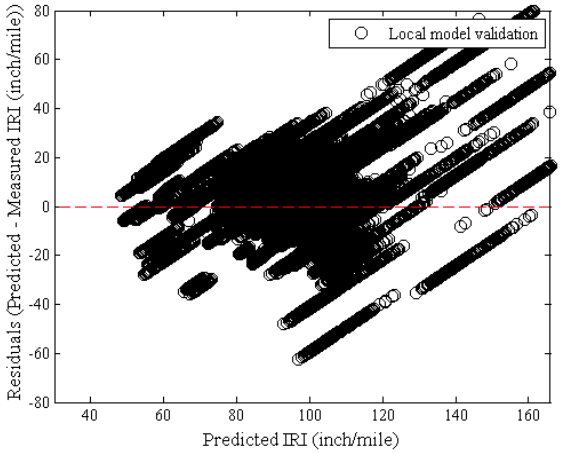
Figure B-463 Option 3 IRI repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-464 Option 3 IRI local calibration residual plots – repeated split sampling

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

Bootstrapping

Table B-196 Option 1 IRI local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	21.999	21.994	13.546	32.976
Bias	-9.799	-9.654	-13.994	-6.247
C1	0.820	0.820	-	-
C2	0.442	0.442	-	-
C3	1.492	1.492	-	-
C4	25.240	25.240	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	20.099	20.566	12.371	31.016
Bias	0.996	0.939	-1.343	3.343
C1	1.855	1.799	1.096	2.785
C2	1.980	1.965	0.000	4.327
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240

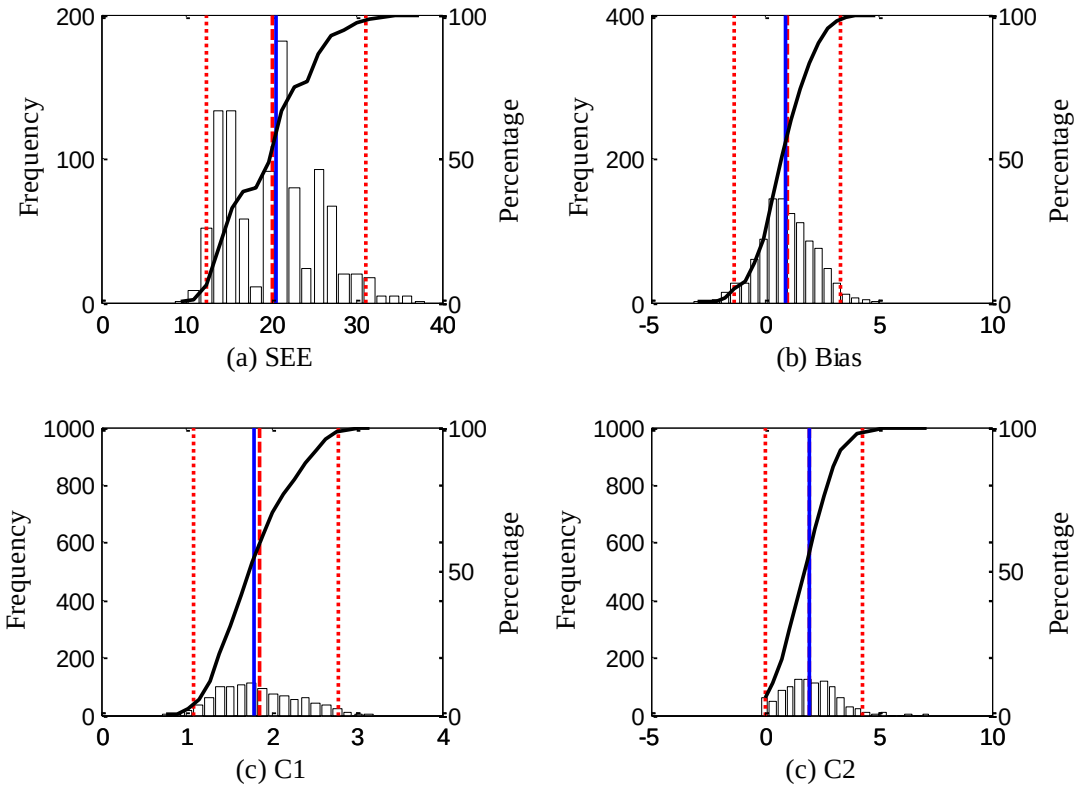
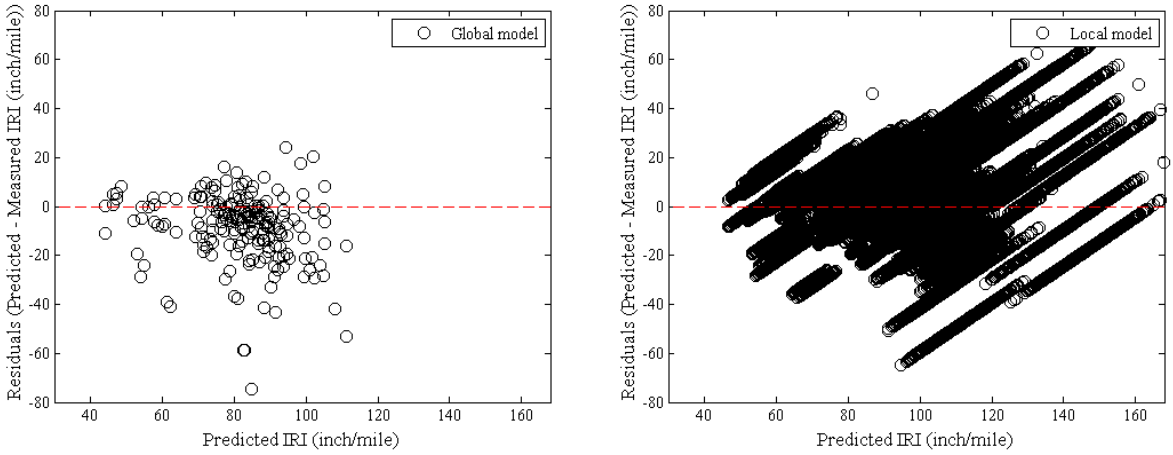


Figure B-465 Option 3 IRI bootstrapping frequency distributions



(a) Global model (b) Local model

Figure B-466 Option 3 IRI local calibration residual plots – bootstrapping

Reliability

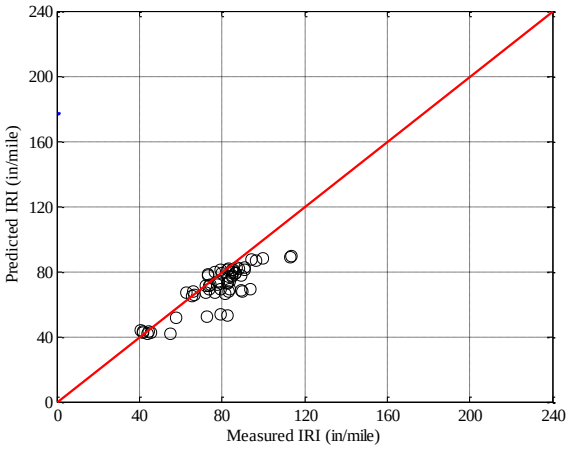
The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

B.2.3.4 Option 4

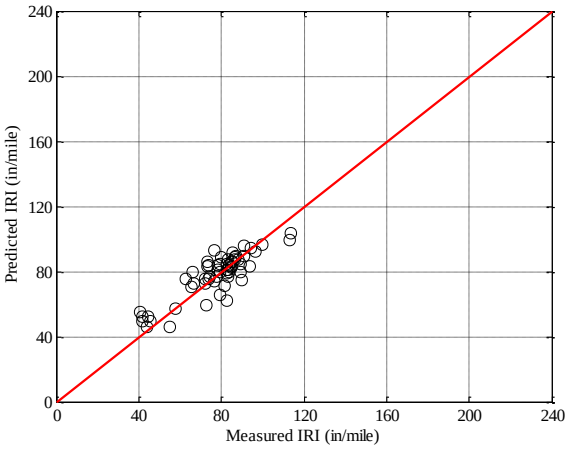
No sampling

Table B-197 Option 4 IRI local calibration results – no sampling

Parameter	Global	Local
SEE	11.339	7.949
Bias	-7.555	0.268
R^2	0.729	0.754
t-test pvalue	0.000	0.795
Intercept = 0	0.002	0.000
Slope = 1	0.000	0.000
C1	0.820	0.001
C2	0.442	2.541
C3	1.493	1.493
C4	25.240	25.240

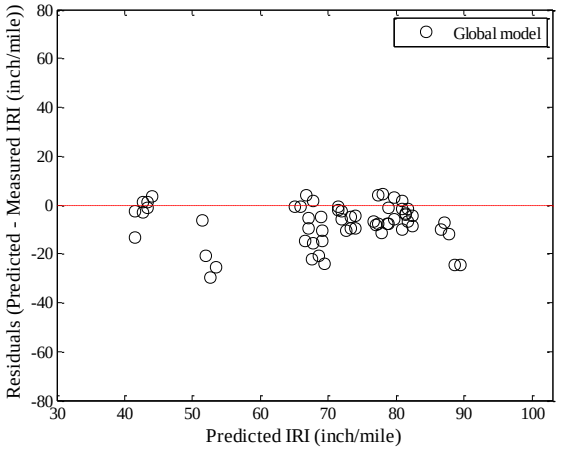


(a) Global model

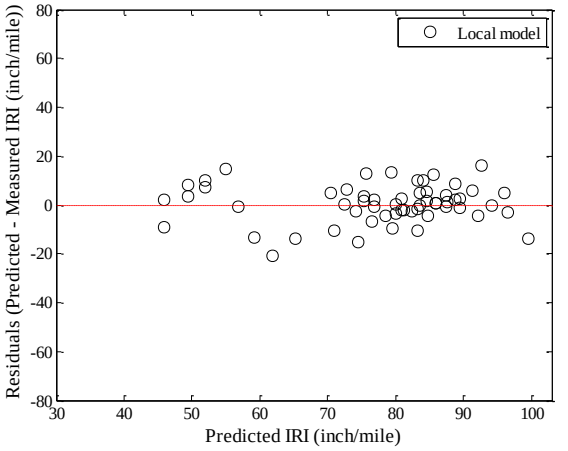


(b) Local model

Figure B-467 Option 4 IRI local calibration measured versus predicted – no sampling



(a) Global model



(b) Local model

Figure B-468 Option 4 IRI local calibration residual plots – no sampling

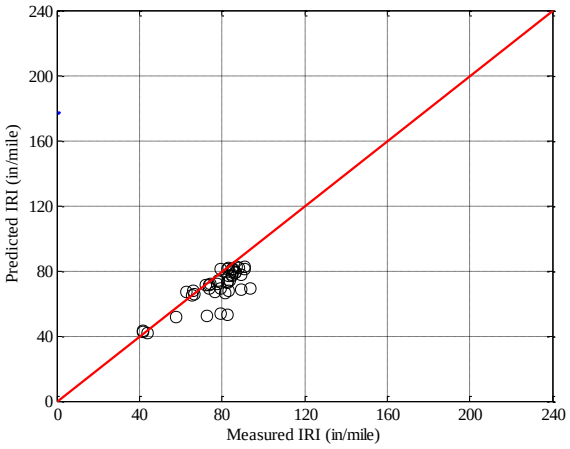
Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

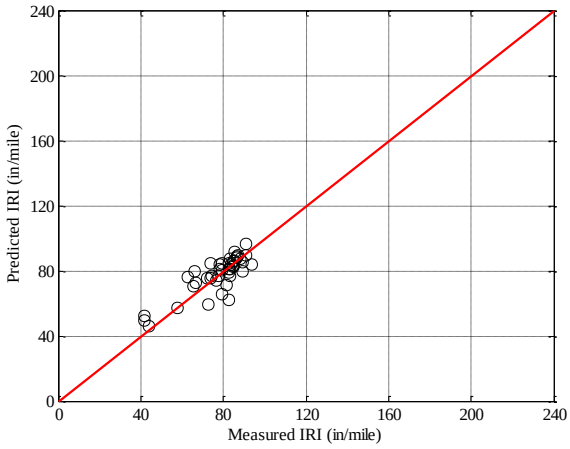
Split sampling

Table B-198 Option 4 IRI local calibration results – split sampling

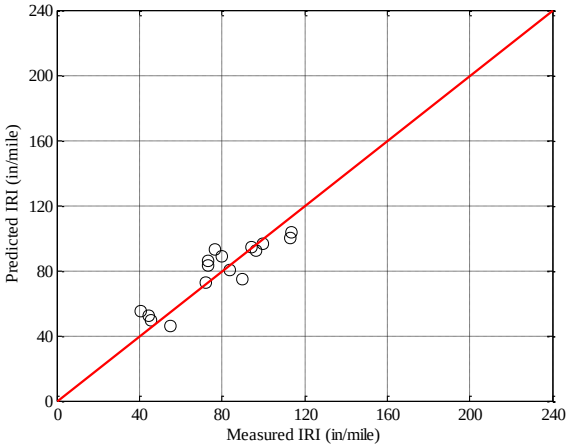
Parameter	Global model	Local model	Validation
SEE	10.872	7.128	10.483
Bias	-7.494	0.302	1.055
R^2	0.642	0.692	0.816
t-test pvalue	0.000	0.780	0.681
Intercept = 0	0.037	0.005	0.016
Slope = 1	0.002	0.005	0.017
C1	0.820	0.001	0.001
C2	0.442	2.601	2.601
C3	1.493	1.493	1.493
C4	25.240	25.240	25.240



(a) Global model

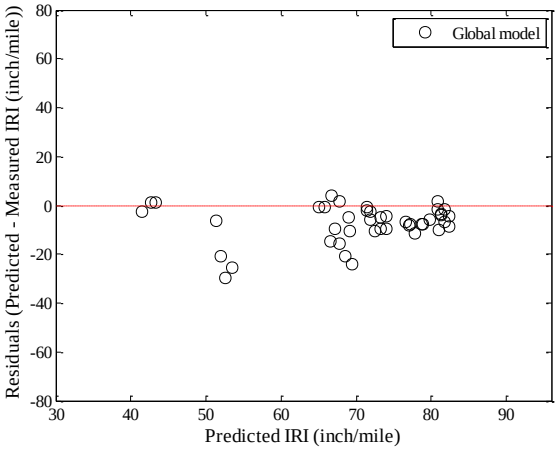


(b) Local model

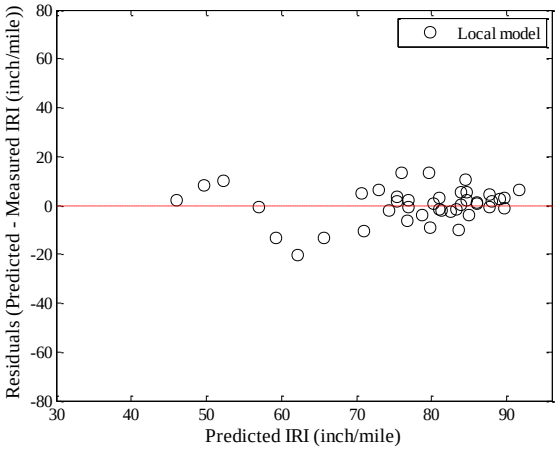


(c) Local model validation

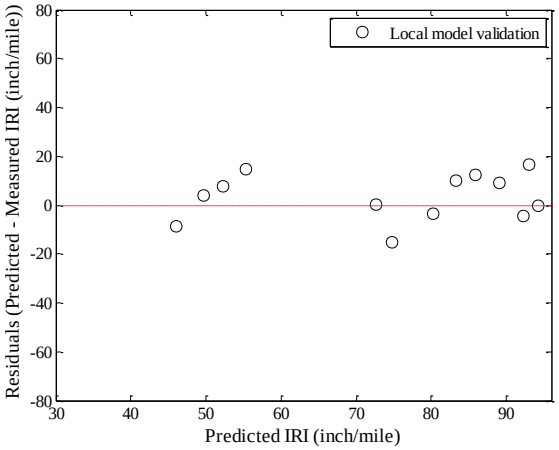
Figure B-469 Option 4 IRI local calibration measured versus predicted – split sampling



(a) Global model



(b) Local model



(c) Local model validation

Figure B-470 Option 4 IRI local calibration residual plots – split sampling

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

Repeated split sampling

Table B-199 Option 4 IRI local calibration results – repeated split sampling

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	11.395	11.573	8.934	13.129
Bias	-7.575	-7.604	-9.768	-5.430
C1	0.820	0.820	-	-
C2	0.442	0.442	-	-
C3	1.492	1.492	-	-
C4	25.240	25.240	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	7.901	7.984	6.419	8.931
Bias	0.280	0.265	-0.085	0.686
C1	0.001	0.000	0.000	0.000
C2	2.554	2.551	2.003	3.164
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240
Local Model validation				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	8.754	8.740	4.798	12.622
Bias	0.393	0.352	-7.649	8.570
C1	0.001	0.000	0.000	0.000
C2	2.554	2.551	2.003	3.164
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240

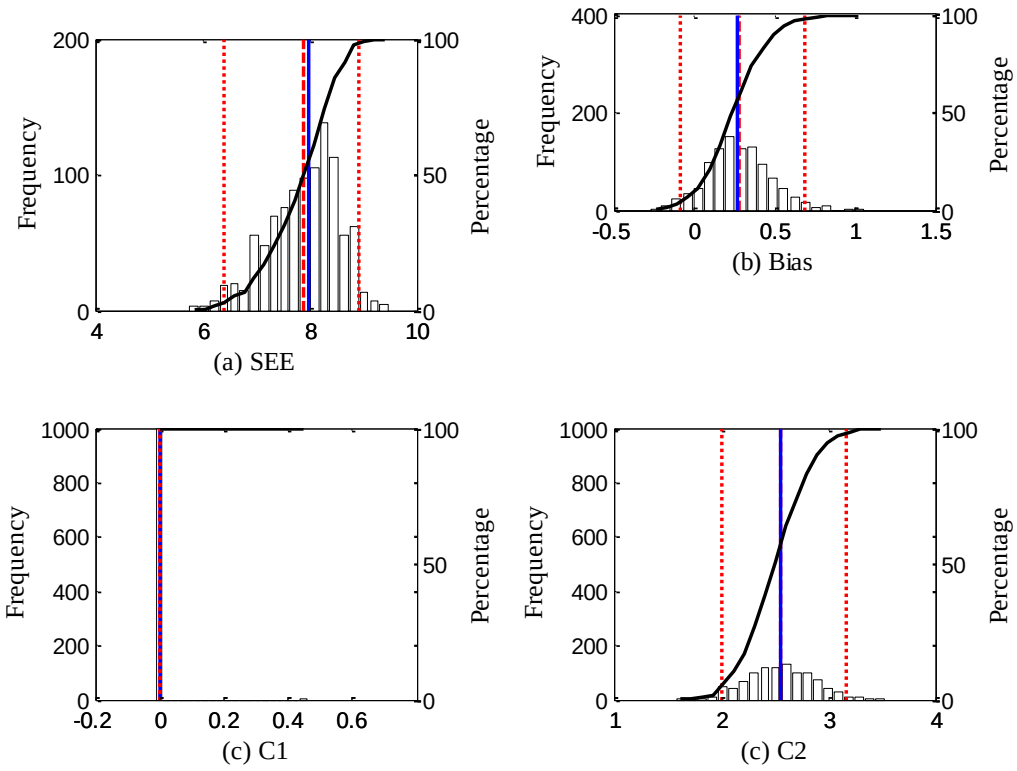


Figure B-471 Option 4 IRI repeated split sampling frequency distributions – calibration

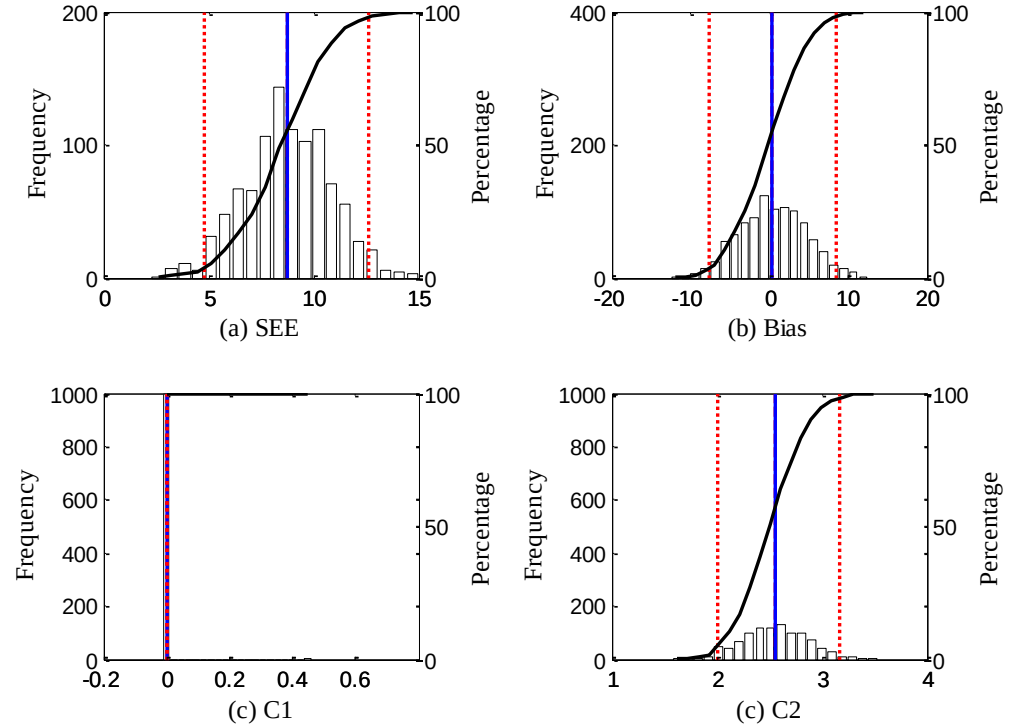
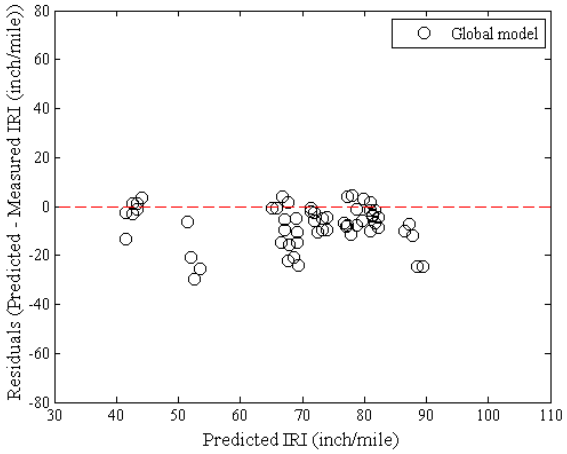
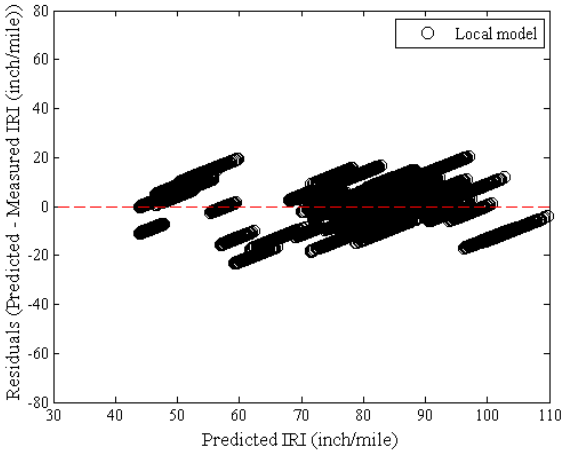


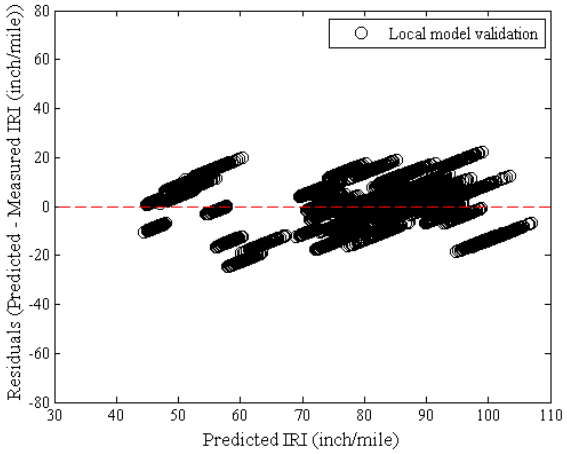
Figure B-472 Option 4 IRI repeated split sampling frequency distributions – validation



(a) Global model



(b) Local model



(c) Local model validation

Figure B-473 Option 4 IRI local calibration residual plots – repeated split sampling

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

Bootstrapping

Table B-200 Option 4 IRI local calibration results – bootstrapping

Global Model				
Parameter	Global Model Mean	Global Model Median	Global model lower CI	Global model upper CI
SEE	11.179	11.203	7.518	14.591
Bias	-7.539	-7.501	-11.264	-4.032
C1	0.820	0.820	-	-
C2	0.442	0.442	-	-
C3	1.492	1.492	-	-
C4	25.240	25.240	-	-
Local Model				
Parameter	Local Model Mean	Local Model Median	Local model lower CI	Local model upper CI
SEE	7.602	7.613	5.470	9.510
Bias	0.295	0.281	-0.250	0.881
C1	0.041	0.000	0.000	0.000
C2	2.540	2.559	1.577	3.513
C3	1.493	1.493	1.493	1.493
C4	25.240	25.240	25.240	25.240

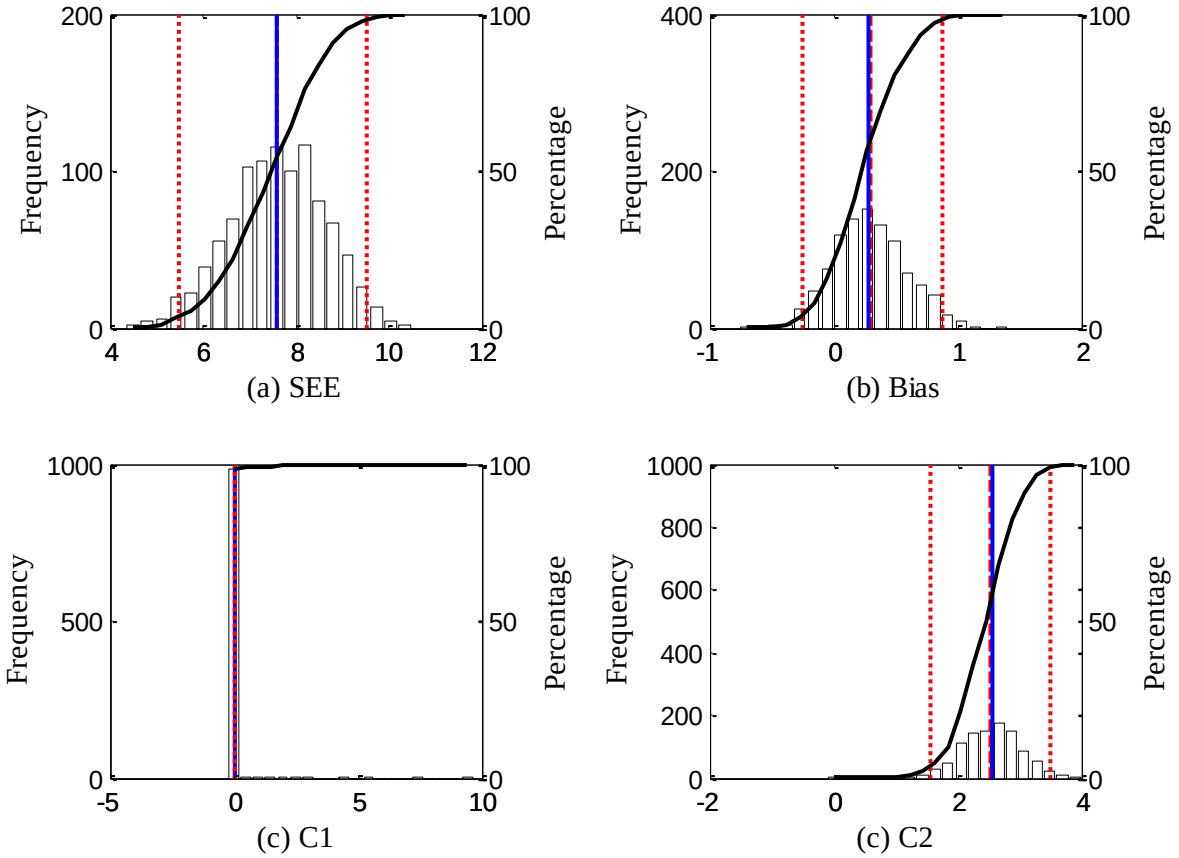


Figure B-474 Option 4 IRI bootstrapping frequency distributions

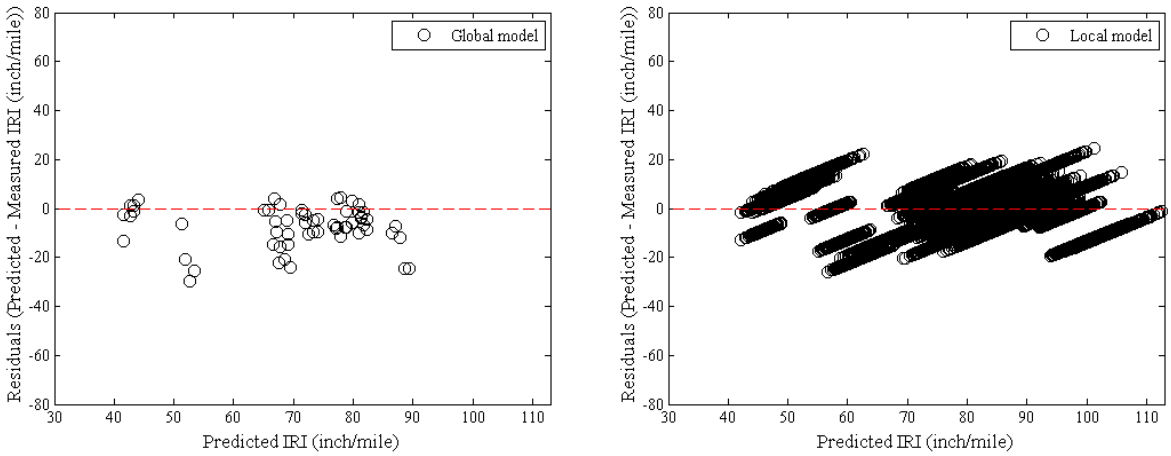


Figure B-475 Option 4 IRI local calibration residual plots – bootstrapping

Reliability

The IRI reliability is internally estimated by the software, and uses an initial IRI standard deviation of 5.4 inch/mile.

B.3 Validation

B.3.1 Fatigue cracking model – Bottom-up

B.3.1.1 Option 1a

Table B-201 Option 1a alligator cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	7.447	6.269	6.946
Bias	-4.282	-0.716	-1.952
C1	1.000	0.496	0.496
C2	1.000	0.560	0.560

Table B-202: Option 1a hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.016
Intercept	0.000
Slope	0.000

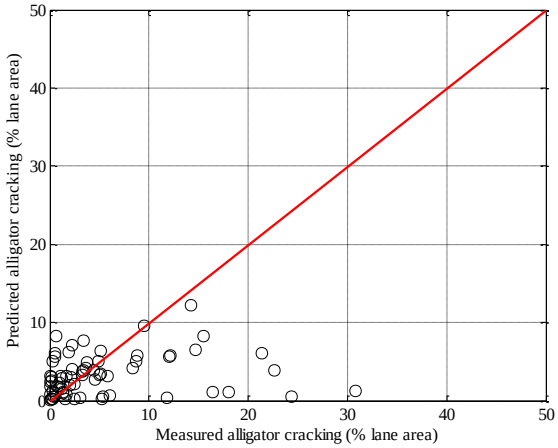
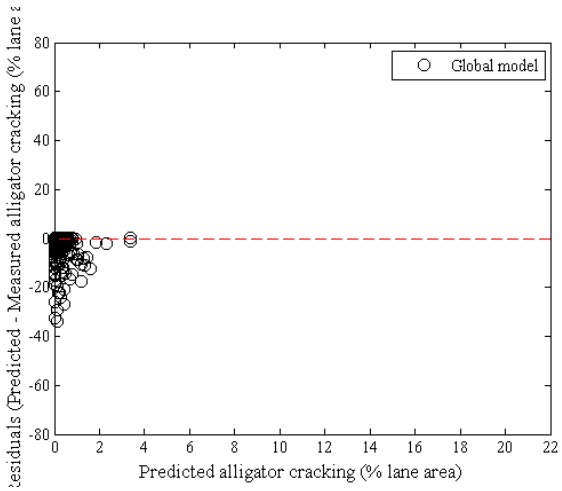
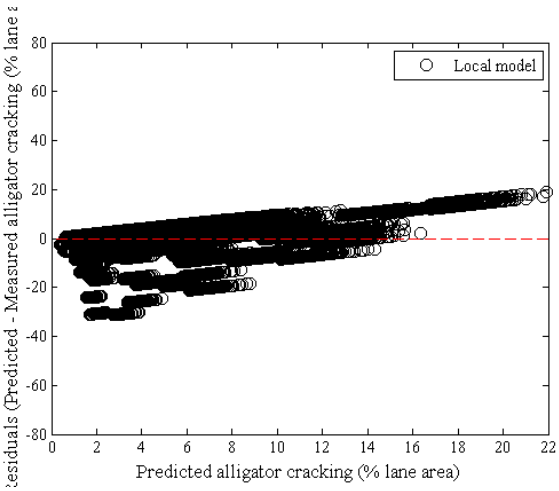


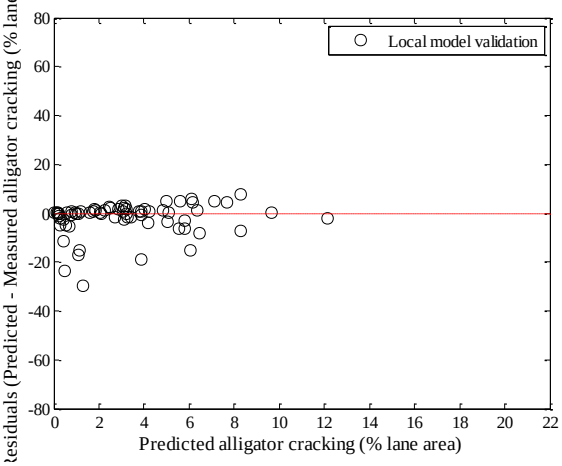
Figure B-476 Option 1a validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-477 Option 1a residual plots

B.3.1.2 Option 1b

Table B-203 Option 1b alligator cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	4.379	3.960	5.099
Bias	-2.366	-0.819	-1.558
C1	1.000	0.672	0.672
C2	1.000	0.560	0.560

Table B-204: Option 1b hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.283
Intercept	0.023
Slope	0.000

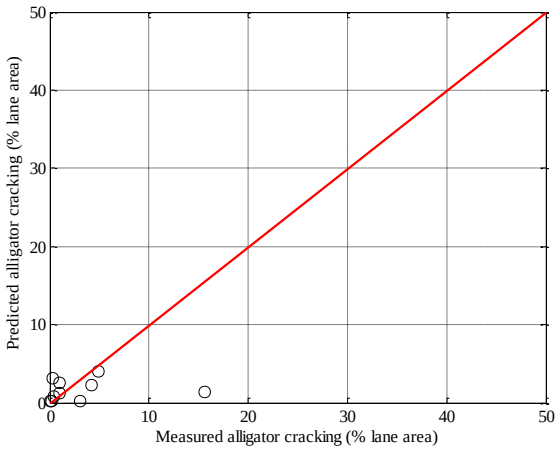
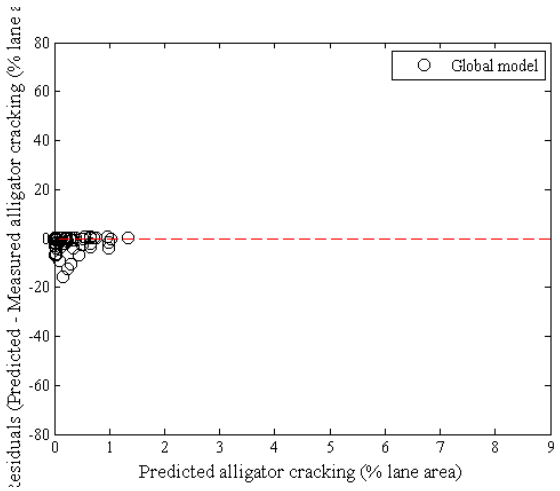
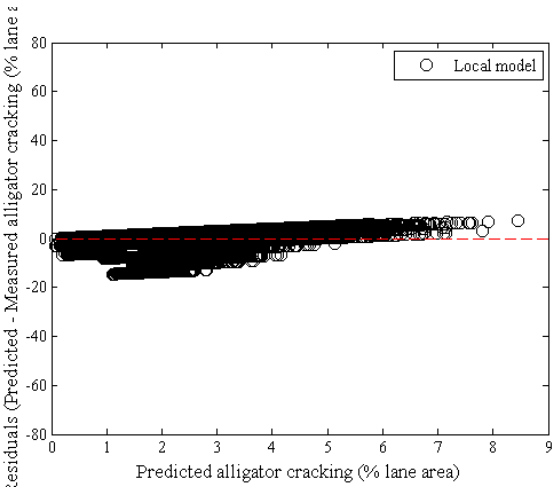


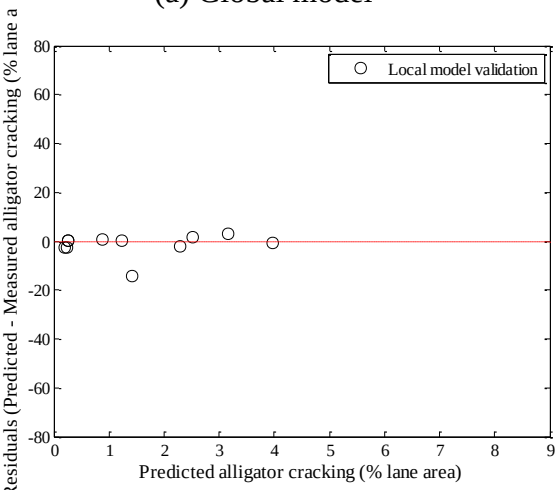
Figure B-478 Option 1b validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-479 Option 1b residual plots

B.3.2 Fatigue cracking model – Top-down

B.3.2.1 Option 1

Table B-205 Option 1 longitudinal cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	817.4715	696.8328	631.5130
Bias	-466.8421	-136.9143	-21.3558
C1	7.0000	3.1803	3.1803
C2	3.5000	1.2500	1.2500

Table B-206: Option 1 hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.7673
Intercept	0.0000
Slope	0.0000

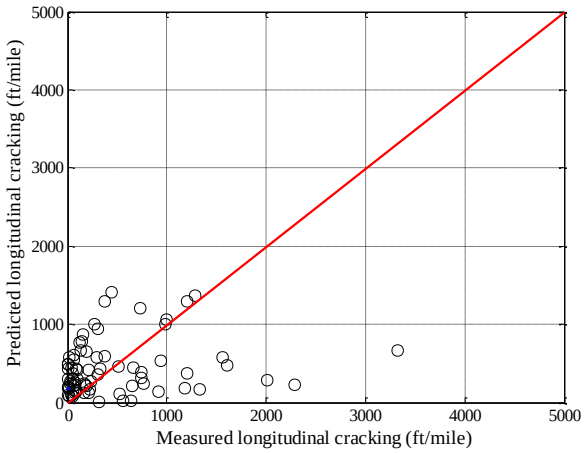
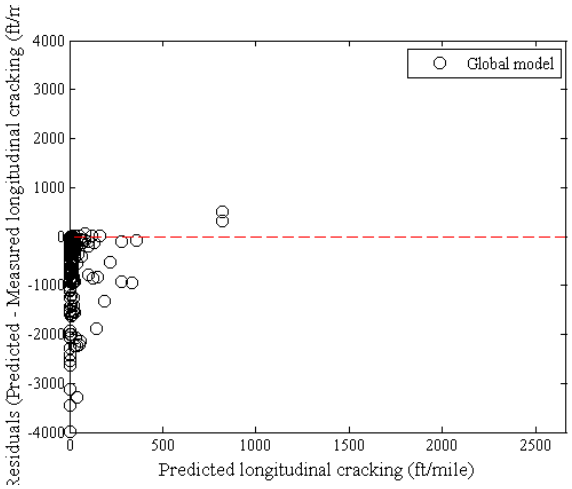
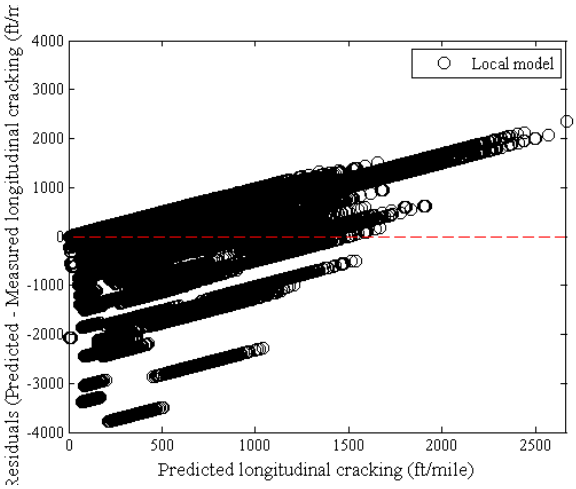


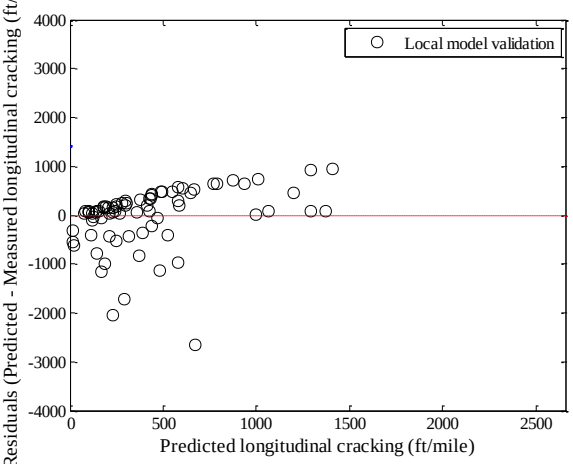
Figure B-480 Option 1 validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-481 Option 1 residual plots

B.3.2.2 Option 2

Table B-207 Option 2 longitudinal cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	729.1168	627.0209	892.3061
Bias	-405.5257	-111.3998	-439.1413
C1	7.0000	3.2846	3.2846
C2	3.5000	1.2000	1.2000

Table B-208: Option 2 hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.0000
Intercept	0.0000
Slope	0.0000

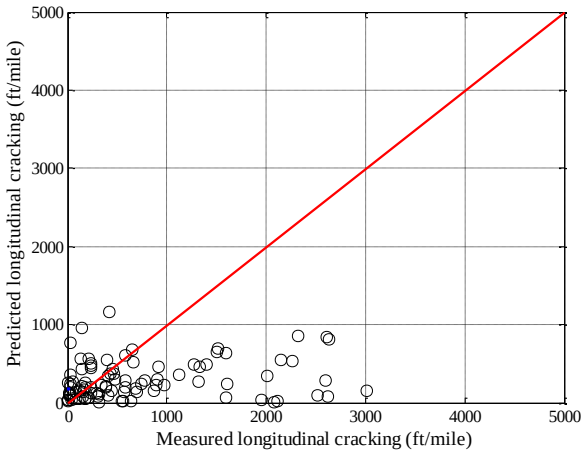
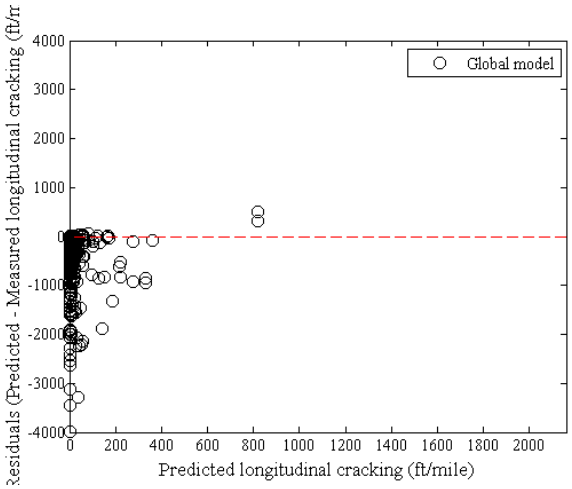
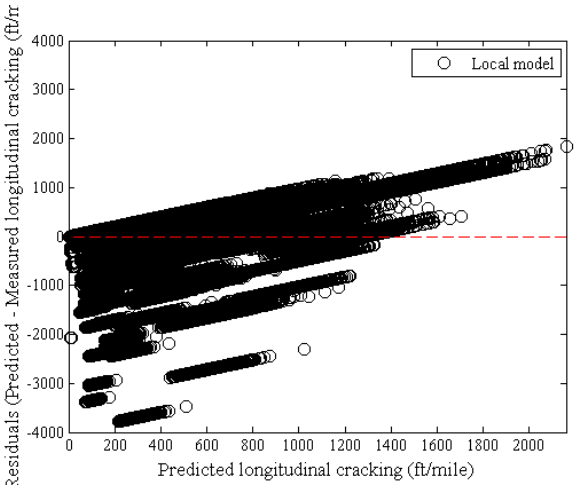


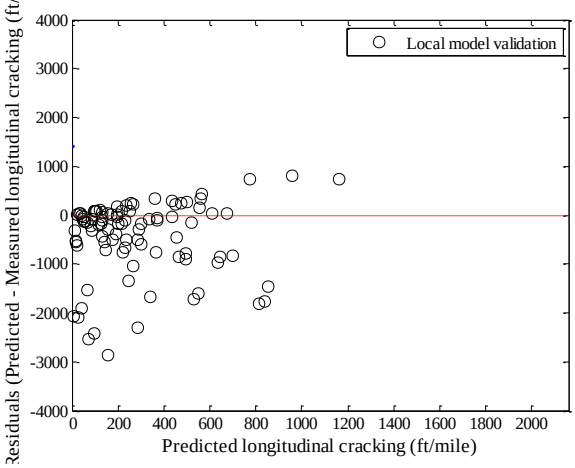
Figure B-482 Option 2 validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-483 Option 2 residual plots

B.3.2.3 Option 4

Table B-209 Option 4 longitudinal cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	1549.0513	1177.1581	629.3458
Bias	-1086.5433	-226.3333	201.7576
C1	7.0000	2.2118	2.2118
C2	3.5000	1.2114	1.2114

Table B-210: Option 4 hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.0952
Intercept	0.0001
Slope	0.0003

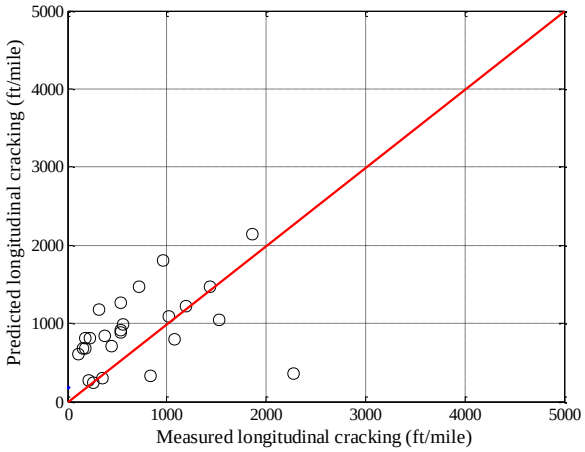
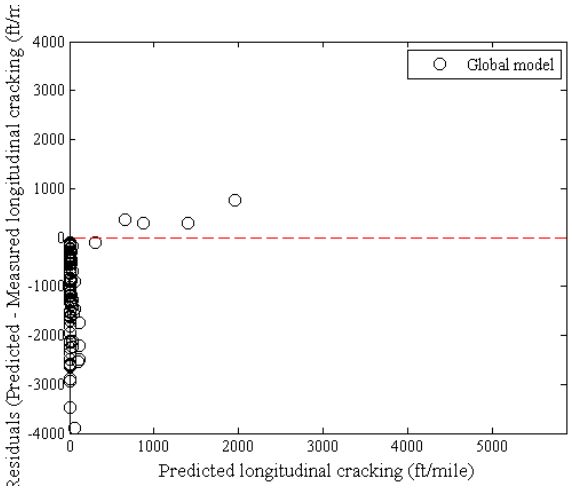
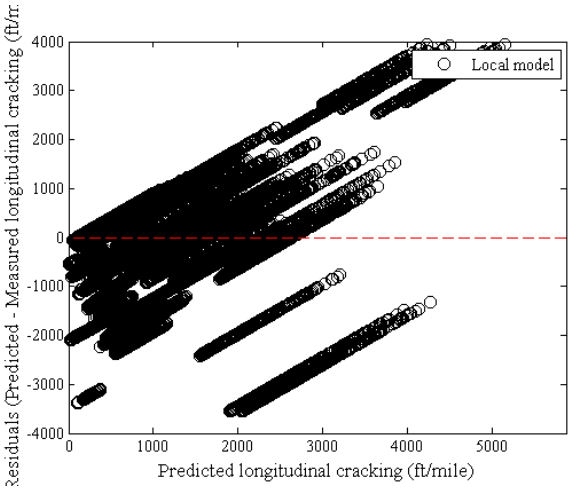


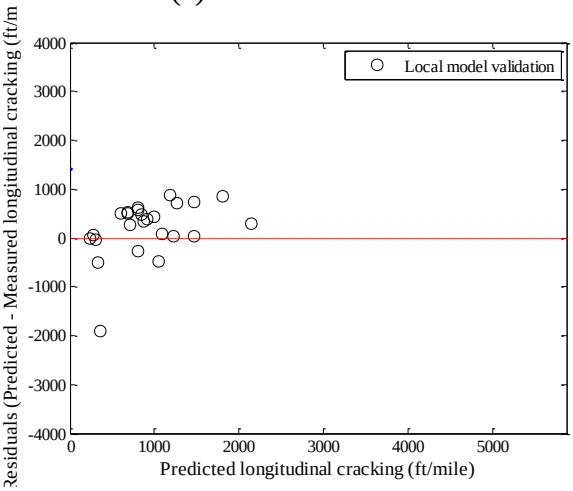
Figure B-484 Option 4 validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-485 Option 4 residual plots

B.3.3 Rutting model

B.3.3.1 Option 1 Method 1

Table B-211 Option 1 Method 1 rutting model validation

HMA layer	SEE			Bias		
	Global Model	Local model	Validation	Global Model	Local model	Validation
AC rut	0.0779	0.0772	0.0958	-0.0020	-0.0068	-0.0030
Base rut	0.1186	0.0291	0.0457	0.1021	-0.0040	-0.0073
Subgrade	0.2235	0.0252	0.0381	0.2138	-0.0003	-0.0053
Total rut	0.3369	0.0849	0.1102	0.3139	-0.0111	-0.0155

Table B-212 Option 1 Method 1 rutting model validation hypothesis test results

HMA layer	AC rut	Base rut	Subgrade	Total rut
t-test p-value	0.7634	0.1205	0.1786	0.1704
Intercept p-value	0.0000	0.0000	0.0000	0.0000
Slope = 1 p-value	0.0000	0.0000	0.0000	0.0000

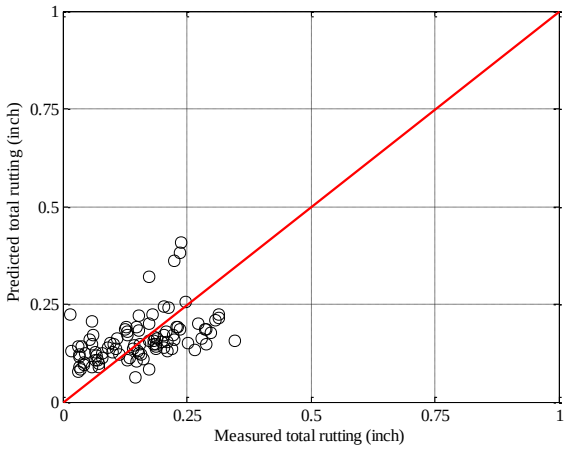
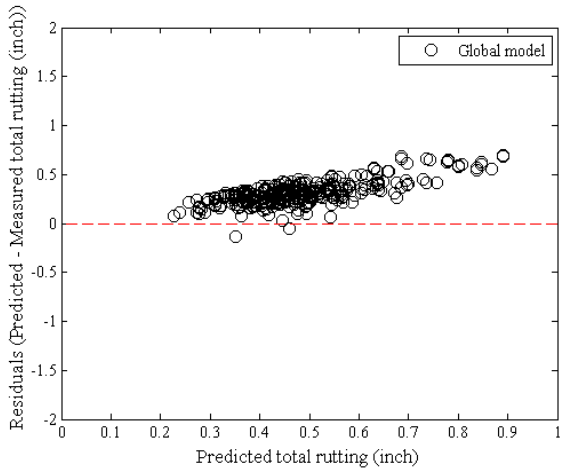
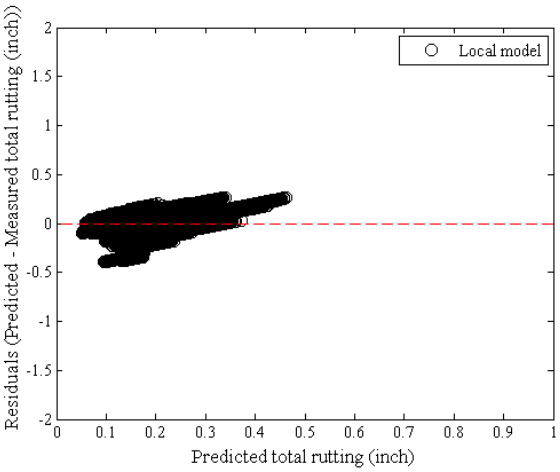


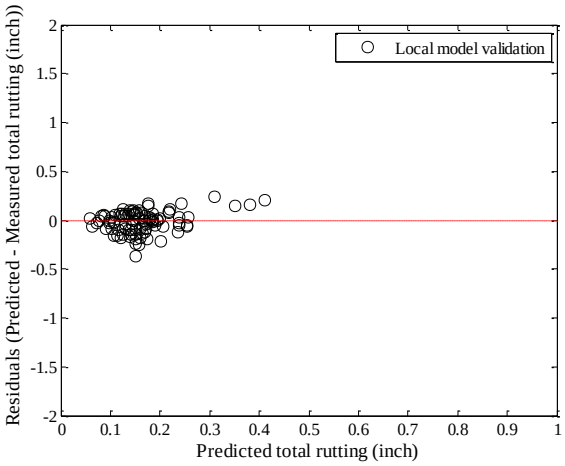
Figure B-486 Rutting model validation – option 1 method 1



(a) Global model



(a) Local model



(a) Local model validation

Figure B-487 Rutting model residual plots – option 1 method 1

B.3.3.2 Option 1 Method 2

Table B-213 Option 1 Method 2 rutting model validation results

HMA layer	SEE			Bias		
	Global Model	Local model	Validation	Global Model	Local model	Validation
AC rut	0.0780	0.1160	0.1151	-0.0017	-0.0852	-0.0886
Base rut	0.1182	0.0341	0.0267	0.1019	0.0063	0.0120
Subgrade	0.2233	0.0855	0.0876	0.2136	0.0775	0.0797
Total rut	0.3368	0.0810	0.0745	0.3138	-0.0014	0.0031

Table B-214 Option 1 Method 2 rutting model validation hypothesis test results

HMA layer	AC rut	Base rut	Subgrade	Total rut
t-test p-value	0.0000	0.0000	0.0000	0.6904
Intercept p-value	0.0000	0.0000	0.0000	0.0000
Slope = 1 p-value	0.0000	0.0000	0.0000	0.0000

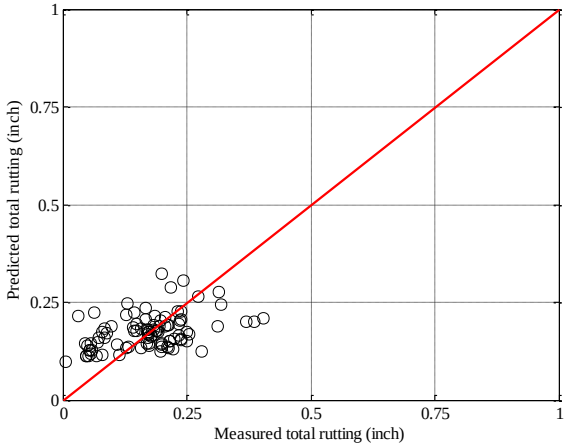
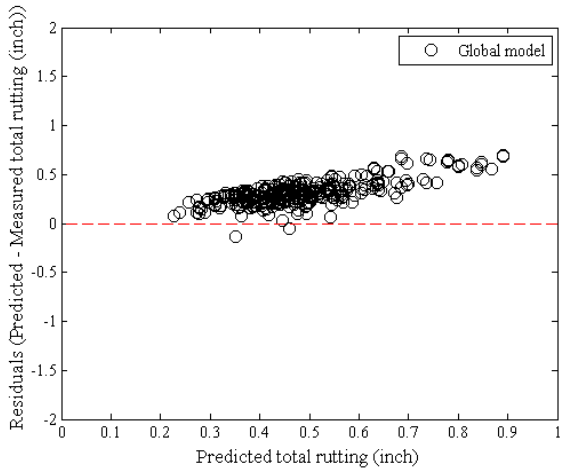
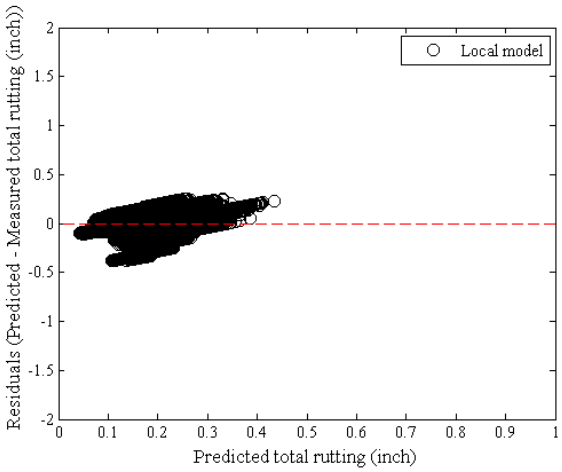


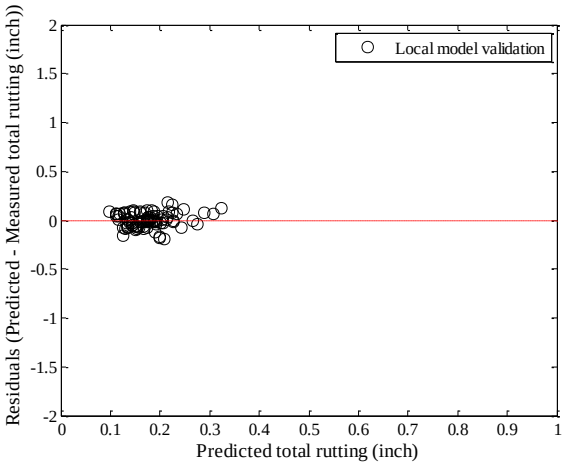
Figure B-488 Rutting model validation – option 1 method 2



(a) Global model



(a) Local model



(a) Local model validation

Figure B-489 Rutting model residual plots – option 1 method 2

B.3.3.3 Option 2 Method 1

Table B-215 Option 2 Method 1 rutting model validation results

HMA layer	SEE			Bias		
	Global Model	Local model	Validation	Global Model	Local model	Validation
AC rut	0.0775	0.0768	0.0796	-0.0014	-0.0085	-0.0323
Base rut	0.1399	0.0272	0.0207	0.1118	-0.0059	-0.0013
Subgrade	0.2223	0.0226	0.0088	0.2076	-0.0006	0.0030
Total rut	0.3567	0.0858	0.0853	0.3180	-0.0151	-0.0306

Table B-216 Option 2 Method 1 rutting model validation hypothesis test results

HMA layer	AC rut	Base rut	Subgrade	Total rut
t-test p-value	0.0000	0.4968	0.0001	0.0001
Intercept p-value	0.0000	0.0000	0.0000	0.0000
Slope = 1 p-value	0.0000	0.0000	0.0000	0.0000

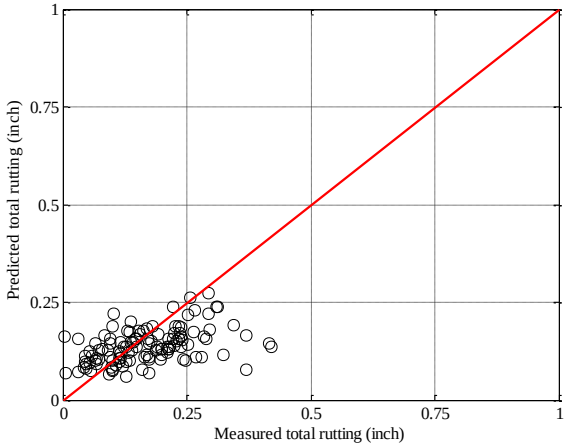
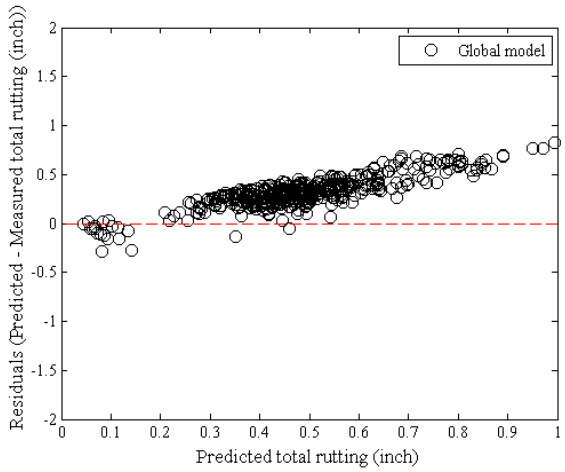
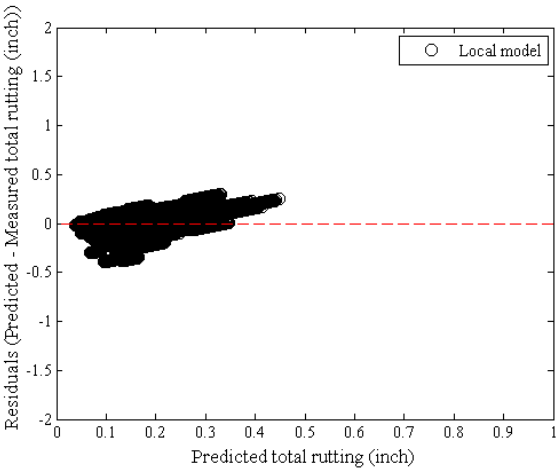


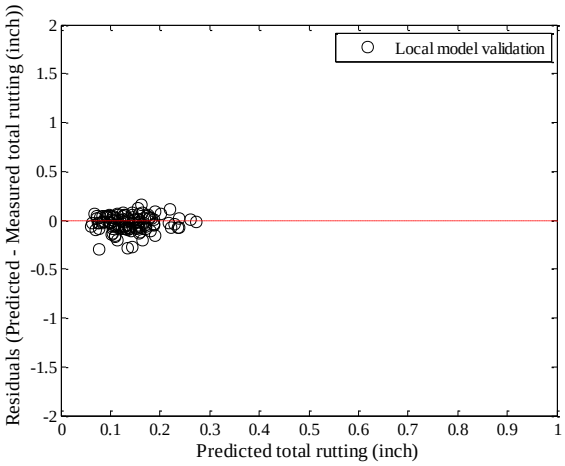
Figure B-490 Rutting model validation – option 2 method 1



(a) Global model



(a) Local model



(a) Local model validation

Figure B-491 Rutting model residual plots – option 2 method 1

B.3.3.4 Option 2 Method 2

Table B-217 Option 2 Method 2 rutting model validation results

HMA layer	SEE			Bias		
	Global Model	Local model	Validation	Global Model	Local model	Validation
AC rut	0.0778	0.1147	0.1239	-0.0016	-0.0836	-0.0974
Base rut	0.1182	0.0345	0.0230	0.1019	0.0066	0.0172
Subgrade	0.2232	0.0837	0.0837	0.2136	0.0756	0.0796
Total rut	0.3368	0.0809	0.0808	0.3139	-0.0014	-0.0006

Table B-218 Option 2 Method 2 rutting model validation hypothesis test results

HMA layer	AC rut	Base rut	Subgrade	Total rut
t-test p-value	0.0000	0.0000	0.0000	0.9431
Intercept p-value	0.0000	0.0000	0.0000	0.0000
Slope = 1 p-value	0.0000	0.0000	0.0000	0.0000

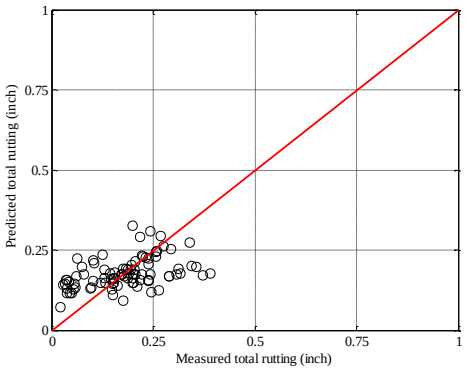
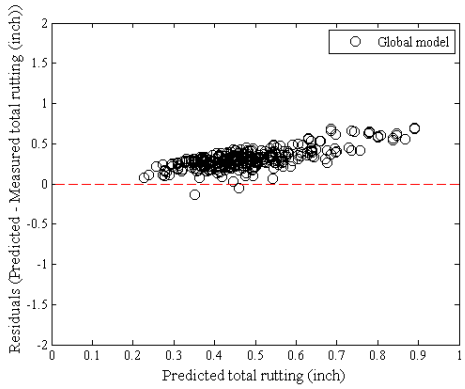
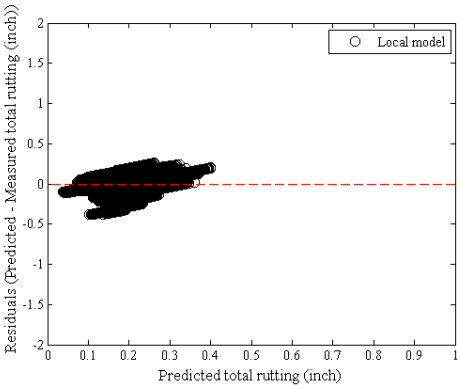


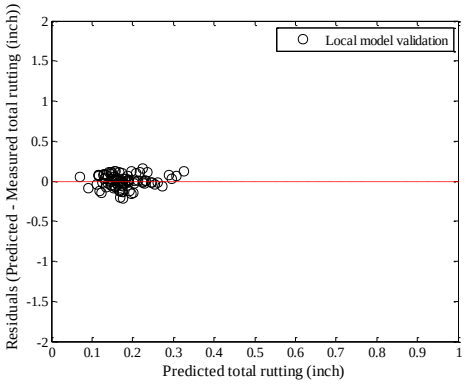
Figure B-492 Rutting model validation – option 2 method 2



(a) Global model



(a) Local model



(a) Local model validation

Figure B-493 Rutting model residual plots – option 2 method 2

B.3.3.5 Option 4 Method 1

Table B-219 Option 4 Method 1 rutting model validation results

HMA layer	SEE			Bias		
	Global Model	Local model	Validation	Global Model	Local model	Validation
AC rut	0.0798	0.0757	0.0940	0.0059	-0.0129	-0.0428
Base rut	0.1421	0.0207	0.0197	0.0952	-0.0084	-0.0102
Subgrade	0.2143	0.0076	0.0062	0.1823	-0.0011	-0.0016
Total rut	0.3666	0.0865	0.1072	0.2833	-0.0224	-0.0546

Table B-220 Option 4 Method 1 rutting model validation hypothesis test results

HMA layer	AC rut	Base rut	Subgrade	Total rut
t-test p-value	0.0109	0.0033	0.1645	0.0038
Intercept p-value	0.0000	0.0039	0.0001	0.0000
Slope = 1 p-value	0.0000	0.0000	0.0000	0.0000

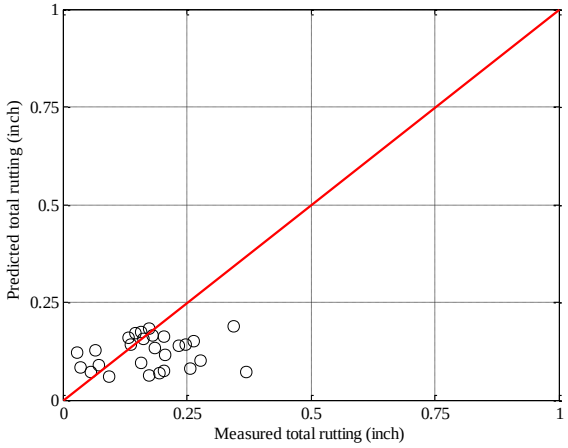
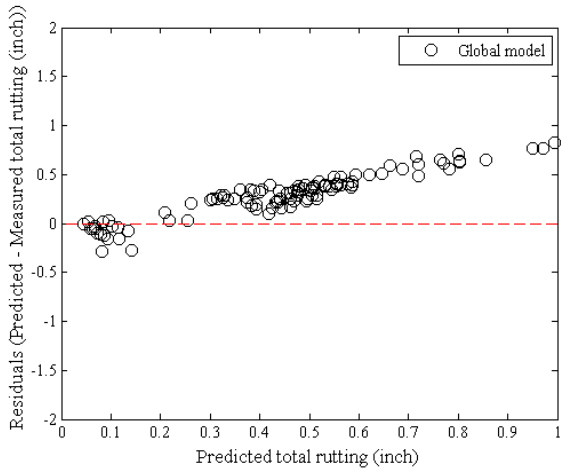
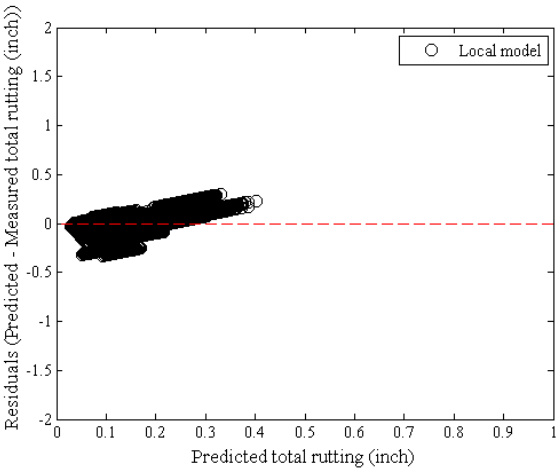


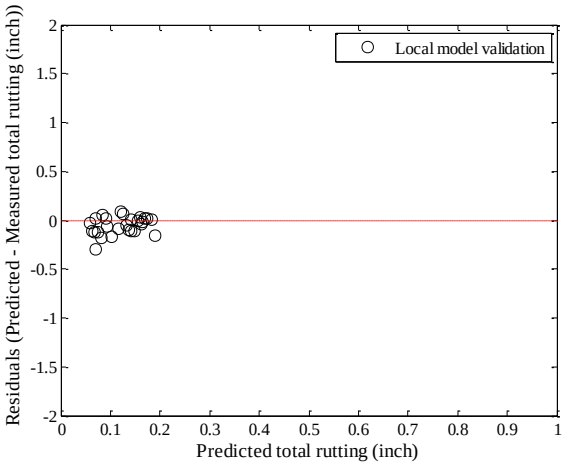
Figure B-494 Rutting model validation – option 4 method 1



(a) Global model



(a) Local model



(a) Local model validation

Figure B-495 Rutting model residual plots – option 4 method 1

B.3.3.6 Option 4 Method 2

Table B-221 Option 4 Method 2 rutting model validation results

HMA layer	SEE			Bias		
	Global Model	Local model	Validation	Global Model	Local model	Validation
AC rut	0.0780	0.1148	0.1036	-0.0019	-0.0833	-0.0745
Base rut	0.1180	0.0342	0.0240	0.1016	0.0059	0.0056
Subgrade	0.2232	0.0842	0.0852	0.2136	0.0761	0.0777
Total rut	0.3361	0.0810	0.0774	0.3132	-0.0013	0.0088

Table B-222 Option 4 Method 2 rutting model validation hypothesis test results

HMA layer	AC rut	Base rut	Subgrade	Total rut
t-test p-value	0.0000	0.0192	0.0000	0.2585
Intercept p-value	0.0000	0.0000	0.0000	0.0000
Slope = 1 p-value	0.0000	0.0000	0.0000	0.0000

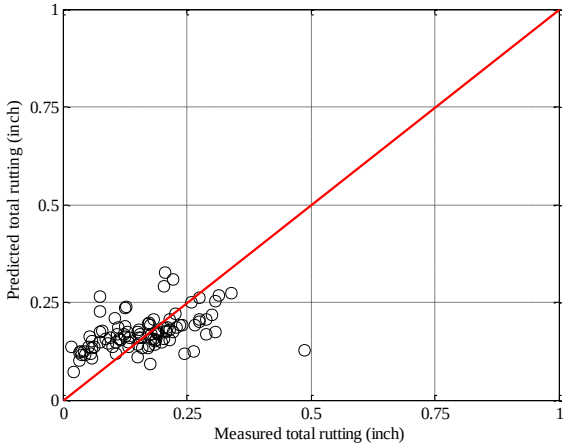
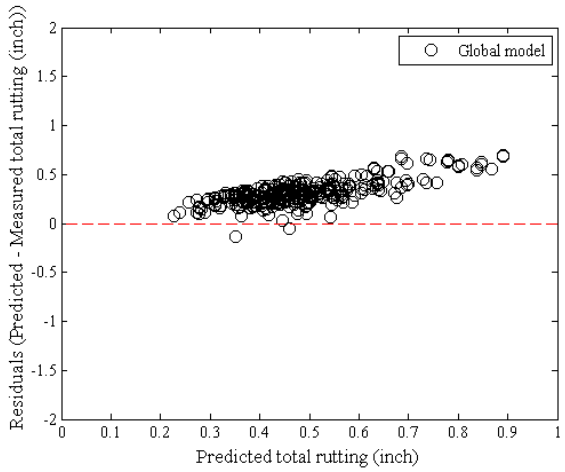
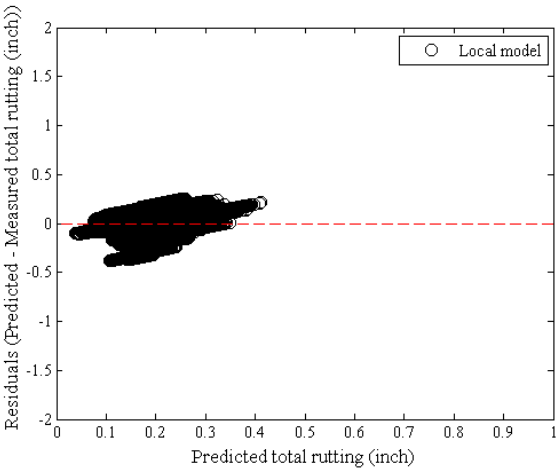


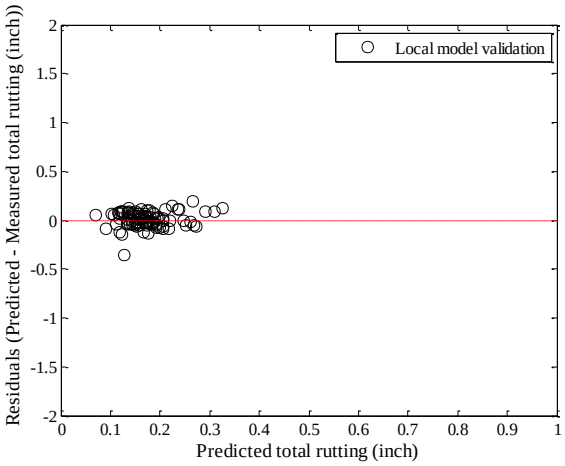
Figure B-496 Rutting model validation – option 4 method 2



(a) Global model



(a) Local model



(a) Local model validation

Figure B-497 Rutting model residual plots – option 4 method 2

B.3.4 Flexible IRI model

B.3.4.1 Option 1

Table B-223 Option 1 IRI model validation results

Parameter	Global Model Mean	Local Model Mean	Local Model Validation
SEE	15.2543	15.1863	10.9135
Bias	0.6137	-0.7226	1.0022
C1	0.0150	0.0072	0.8178
C2	0.4000	0.3911	0.4462
C3	0.0080	0.0080	0.0000
C4	40.0000	54.2690	0.0000

Table B-224 Option 1 IRI model validation hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.4462
Intercept	0.0000
Slope	0.0000

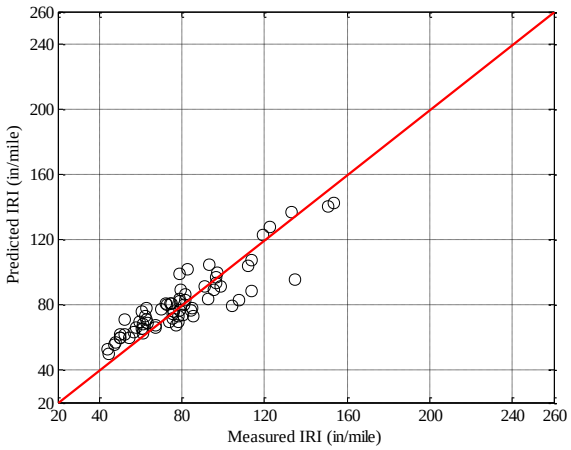
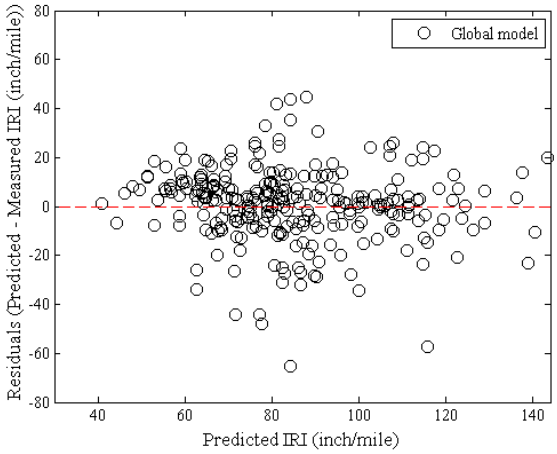
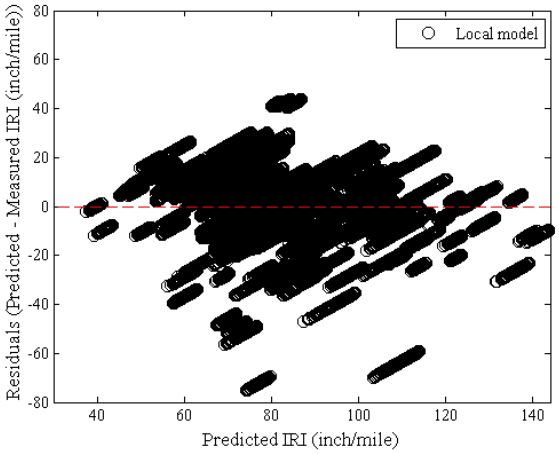


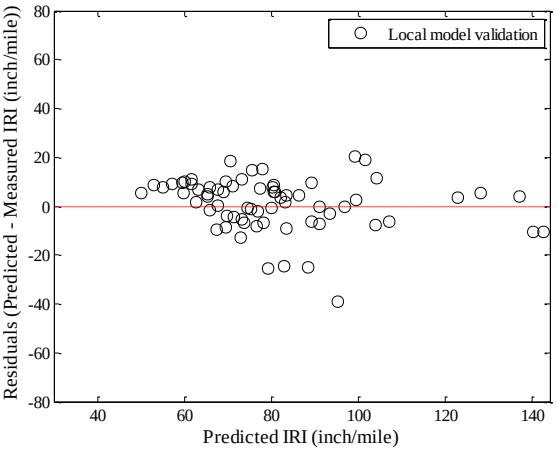
Figure B-498 IRI model validation – option 1



(a) Global model



(a) Local model



(a) Local model validation

Figure B-499 Option 1 residual plots

B.3.4.2 Option 2

Table B-225 Option 2 IRI model validation results

Parameter	Global Model Mean	Local Model Mean	Local Model Validation
SEE	15.2846	14.9275	18.2064
Bias	0.8357	-0.4715	0.0887
C1	0.0150	0.0157	0.0157
C2	0.4000	0.4043	0.4043
C3	0.0080	0.0064	0.0064
C4	40.0000	32.3044	32.3044

Table B-226 Option 2 IRI model validation hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.9603
Intercept	0.0000
Slope	0.0000

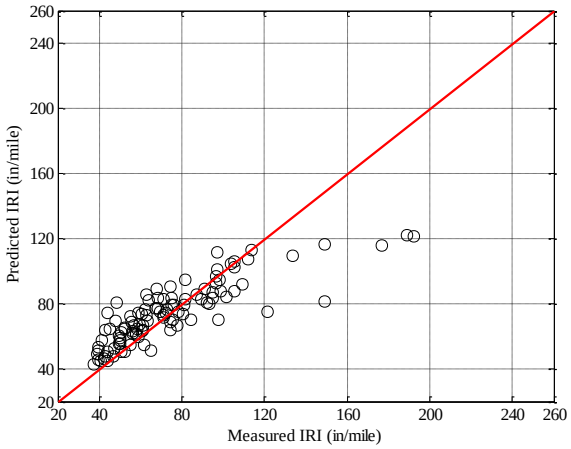
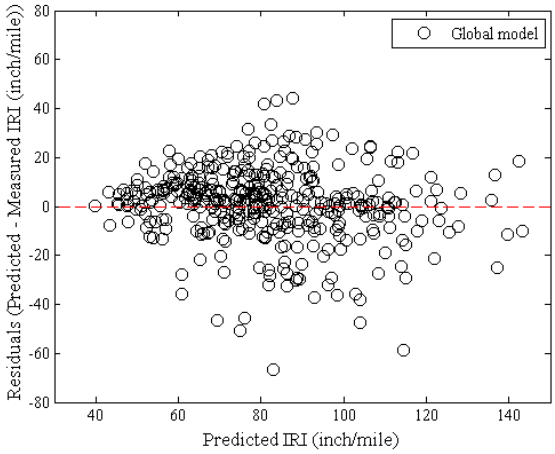
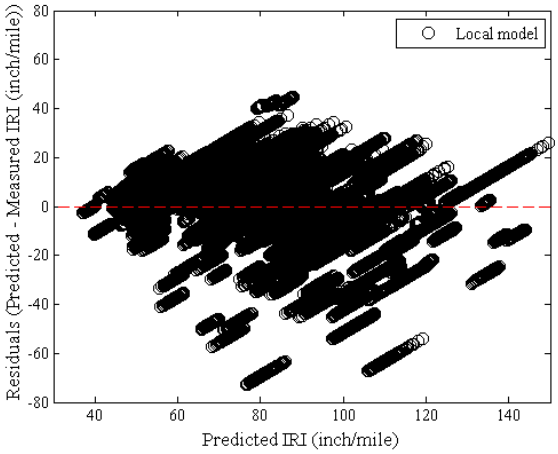


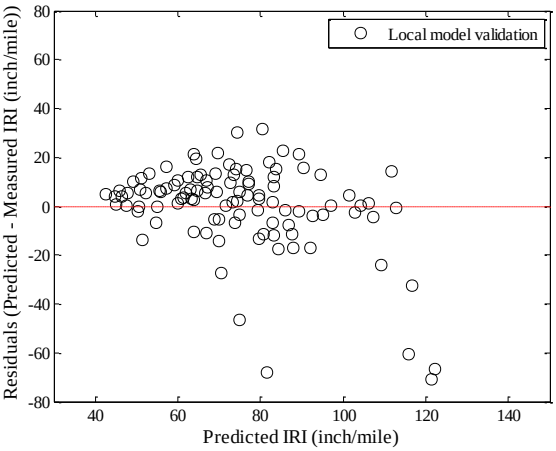
Figure B-500 IRI model validation – option 2



(a) Global model



(a) Local model



(a) Local model validation

Figure B-501 Option 2 residual plots

B.3.4.3 Option 4

Table B-227 Option 4 IRI model validation results

Parameter	Global Model Mean	Local Model Mean	Local Model Validation
SEE	22.6132	17.5204	14.0299
Bias	-9.4328	-0.4048	-1.8670
C1	0.0150	0.0294	0.0294
C2	0.4000	0.1606	0.1606
C3	0.0080	0.0052	0.0052
C4	40.0000	24.0057	24.0057

Table B-228 Option 4 IRI model validation hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.5750
Intercept	0.0362
Slope	0.0183

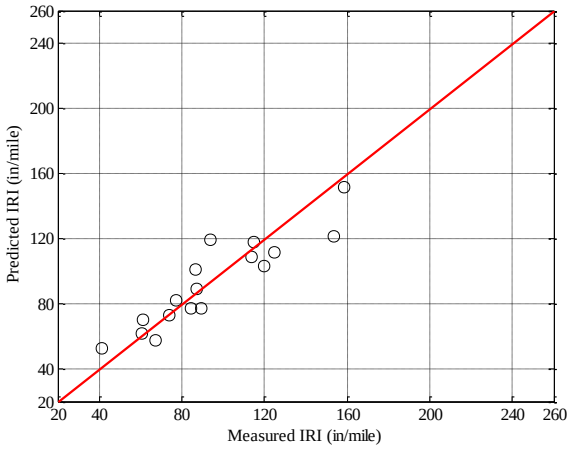
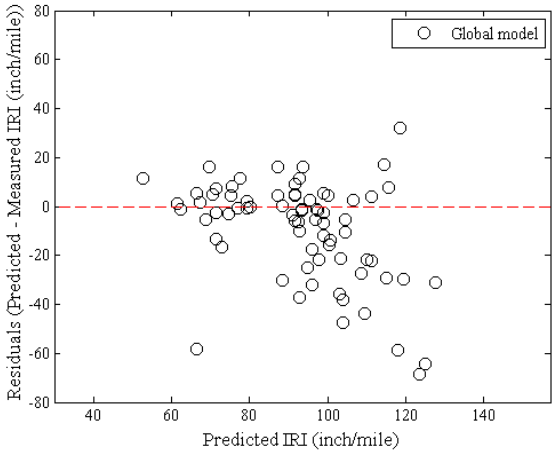
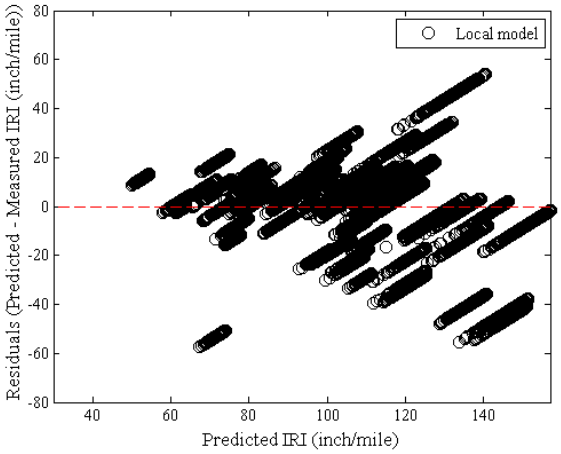


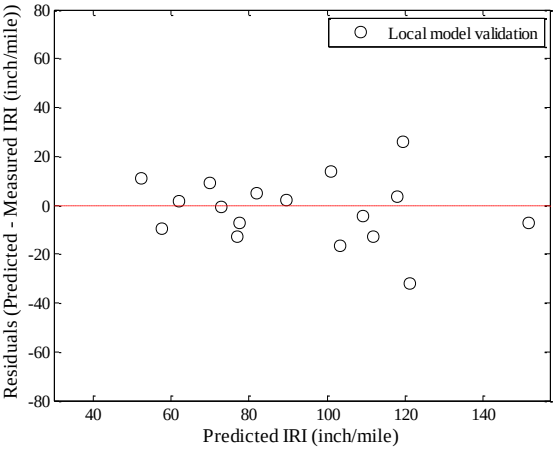
Figure B-502 IRI model validation – option 4



(a) Global model



(a) Local model



(a) Local model validation

Figure B-503 Option 4 residual plots

B.3.5 Transverse cracking model

B.3.5.1 Option 1

Table B-229 Option 1 transverse cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	22.8853	12.6026	22.4378
Bias	-13.9244	0.3197	-8.9434
C1	1.0000	0.2612	0.2612
C2	-1.9800	-1.6662	-1.6662

Table B-230: Option 1 hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.1358
Intercept	0.2466
Slope	0.0073

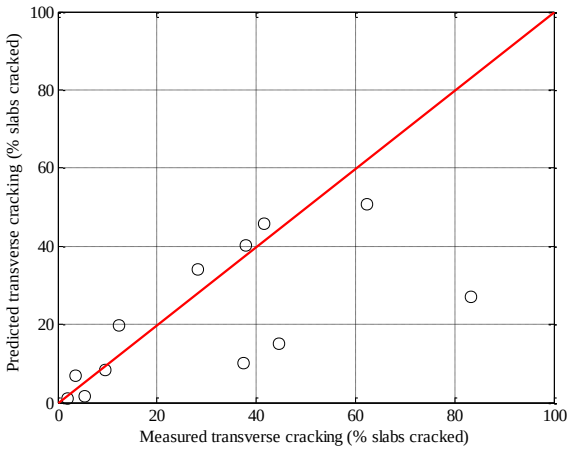
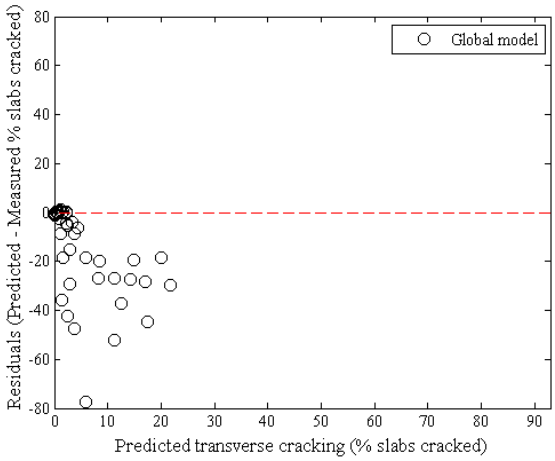
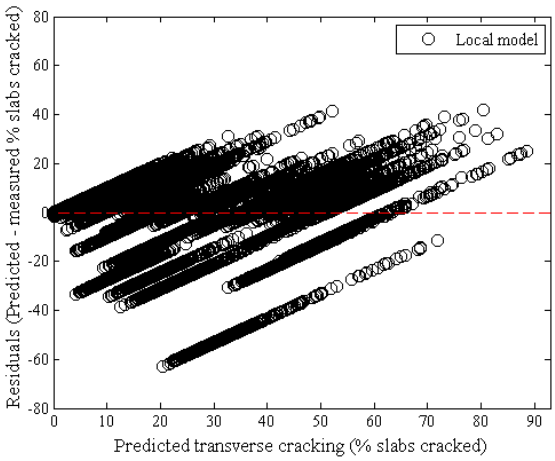


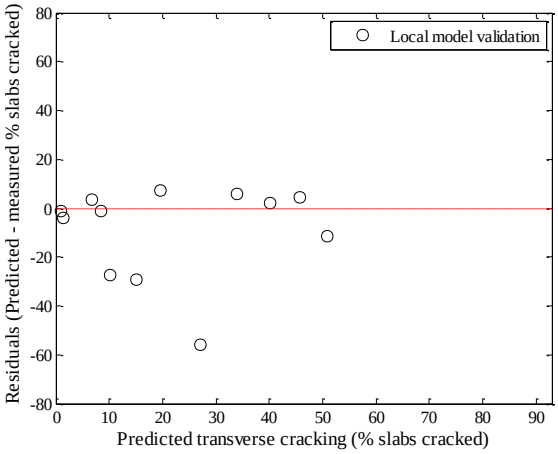
Figure B-504 Option 1 validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-505 Option 1 residual plots

B.3.5.2 Option 2

Table B-231 Option 2 transverse cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	16.0455	8.9093	12.2402
Bias	-7.5017	0.2667	-4.2322
C1	1.0000	0.2311	0.2311
C2	-1.9800	-1.7733	-1.7733

Table B-232: Option 2 hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.1225
Intercept	0.6342
Slope	0.0000

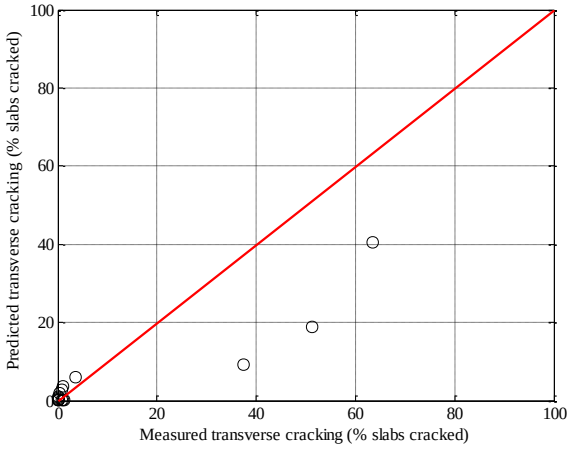
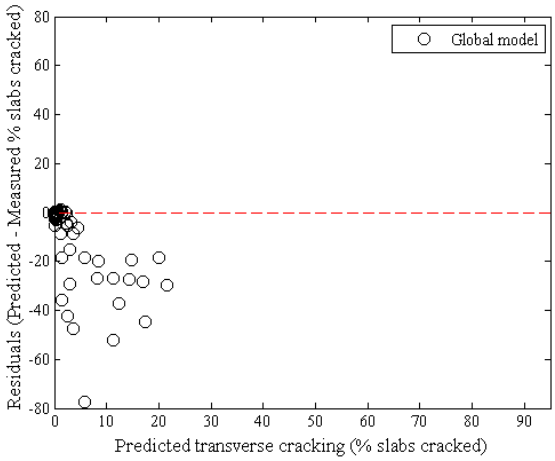
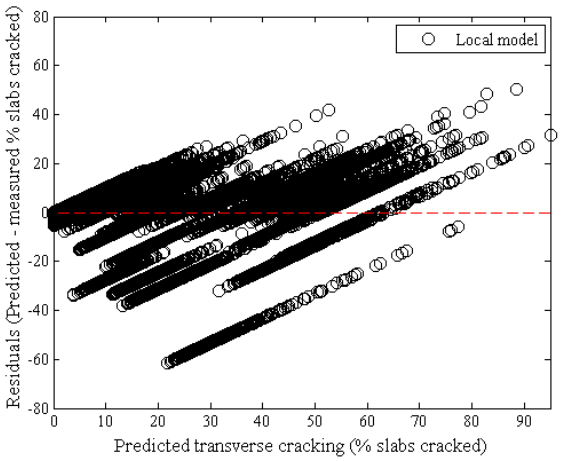


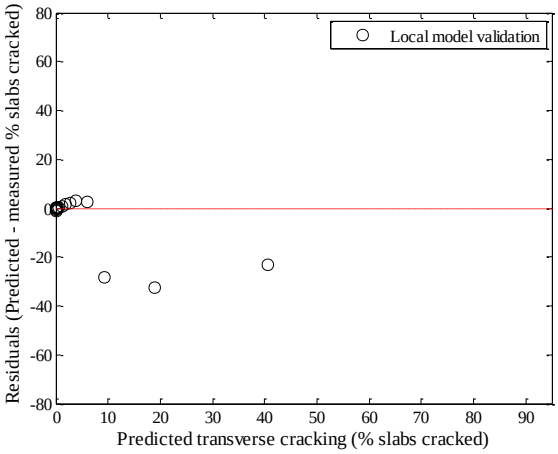
Figure B-506 Option 2 validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-507 Option 2 residual plots

B.3.5.3 Option 3

Table B-233 Option 3 transverse cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	14.0377	7.8001	13.7216
Bias	-5.9053	0.2924	-2.8180
C1	1.0000	0.2241	0.2241
C2	-1.9800	-1.8142	-1.8142

Table B-234: Option 3 hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.2032
Intercept	0.2231
Slope	0.0000

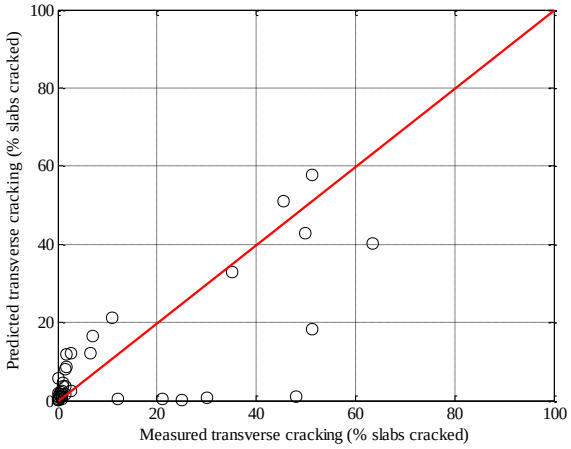
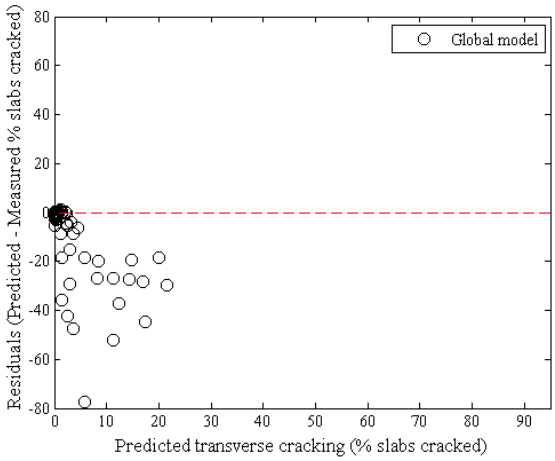
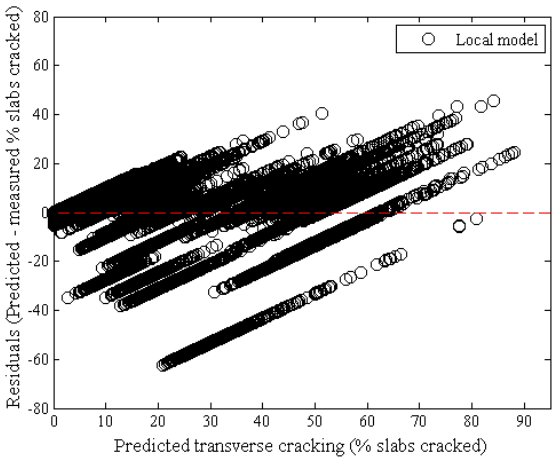


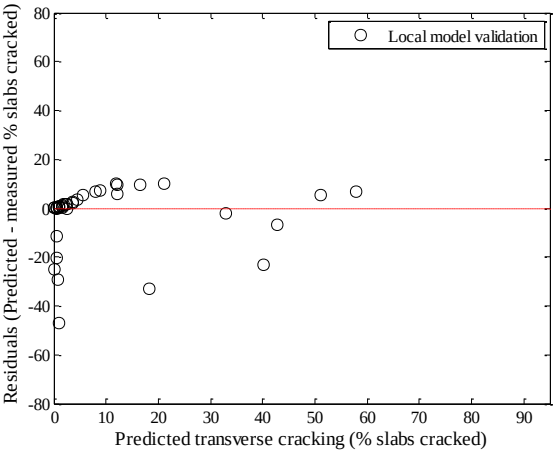
Figure B-508 Option 3 validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-509 Option 3 residual plots

B.3.5.4 Option 4

Table B-235 Option 4 transverse cracking model validation

Parameter	Global Model	Local Model	Local model validation
SEE	0.9947	0.7029	0.5744
Bias	-0.6707	-0.0251	0.0776
C1	1.0000	4.9113	4.9113
C2	-1.9800	-0.9666	-0.9666

Table B-236: Option 4 hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.5917
Intercept	0.0005
Slope	0.0002

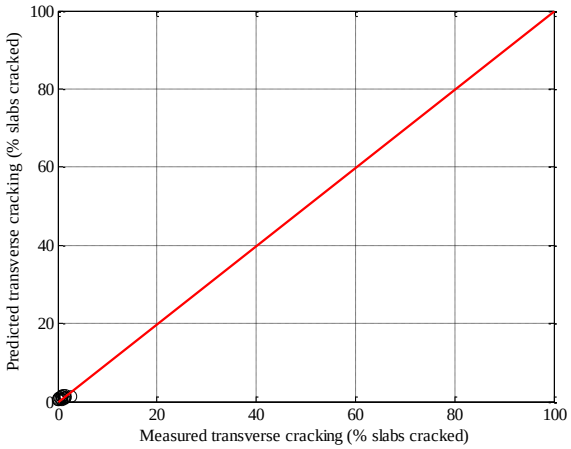
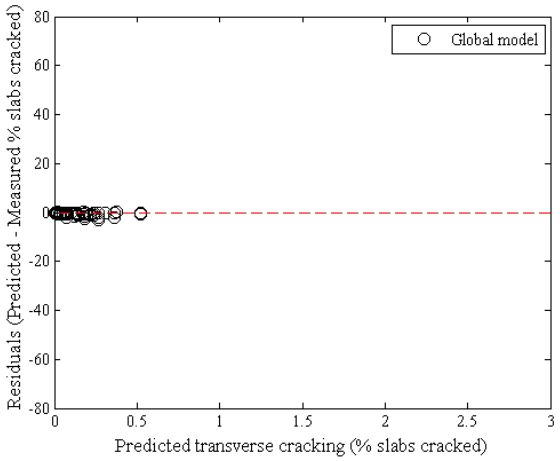
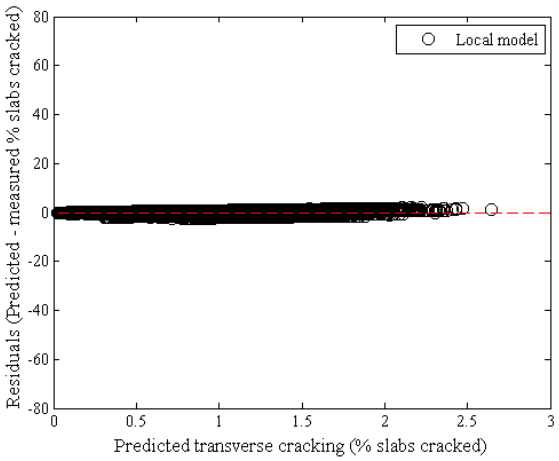


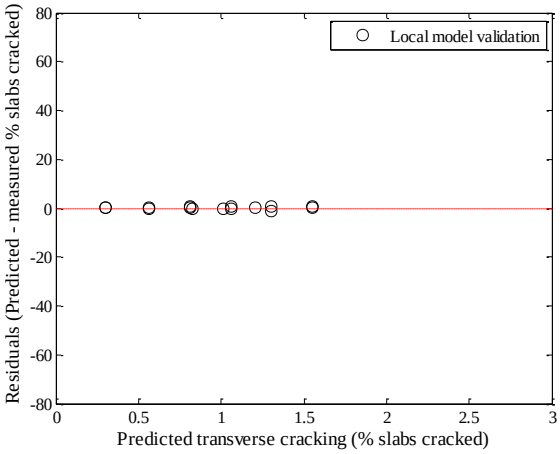
Figure B-510 Option 4 validation results



(a) Global model



(a) Local model



(a) Local model validation

Figure B-511 Option 4 residual plots

B.3.6 Rigid IRI model

B.3.6.1 Option 1

Table B-237 Option 1 IRI model validation results

Parameter	Global Model Mean	Local Model Mean	Local Model Validation
SEE	17.4759	15.2504	12.4435
Bias	-11.4262	4.3926	-2.4041
C1	0.8203	0.6059	0.6059
C2	0.4417	11.9325	11.9325
C3	1.4920	1.4929	1.4929
C4	25.2400	25.2400	25.2400

Table B-238 Option 1 IRI model validation hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.3334
Intercept	0.0007
Slope	0.0003

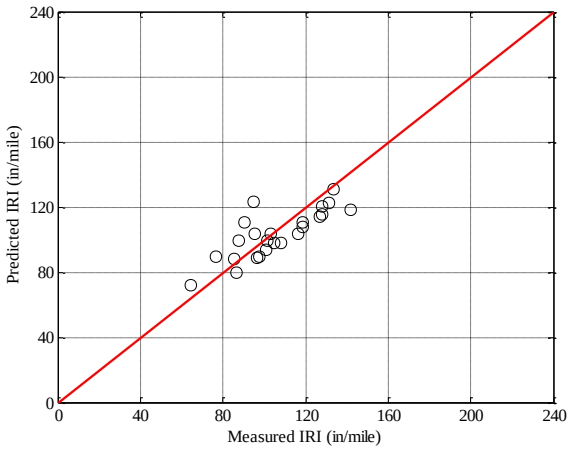
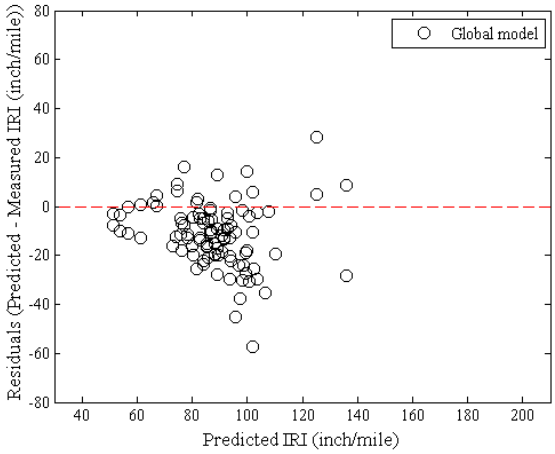
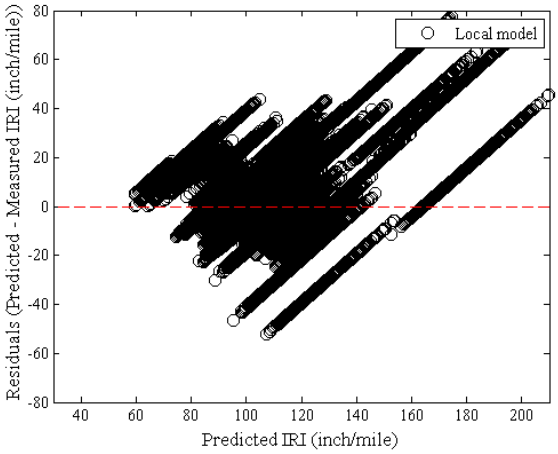


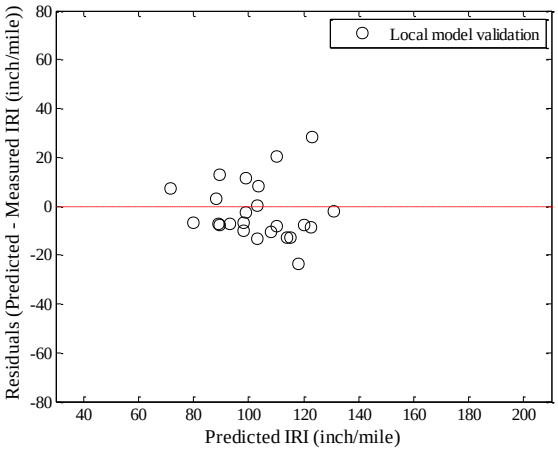
Figure B-512 IRI model validation – option 1



(a) Global model



(a) Local model



(a) Local model validation

Figure B-513 Option 1 residual plots

B.3.6.2 Option 2

Table B-239 Option 2 IRI model validation results

Parameter	Global Model Mean	Local Model Mean	Local Model Validation
SEE	16.3221	14.7545	14.4673
Bias	-10.5443	0.4799	7.5221
C1	0.8203	1.0704	1.0704
C2	0.4417	5.3282	5.3282
C3	1.4920	1.4929	1.4929
C4	25.2400	25.2400	25.2400

Table B-240 Option 2 IRI model validation hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.0002
Intercept	0.0001
Slope	0.0027

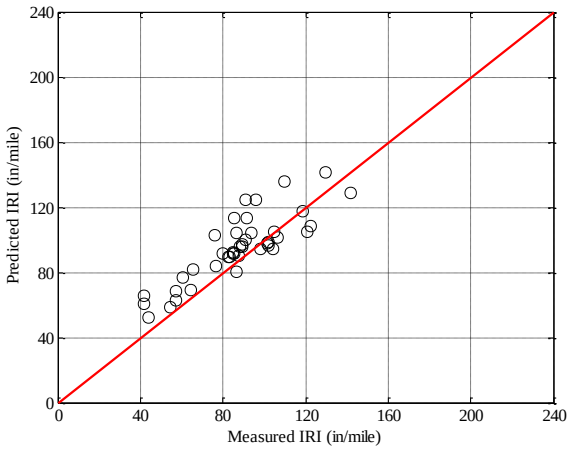
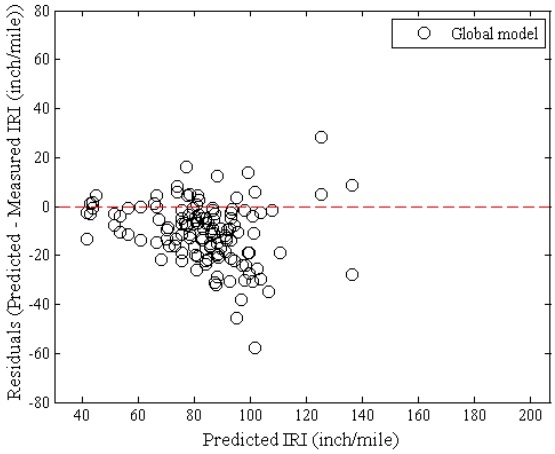
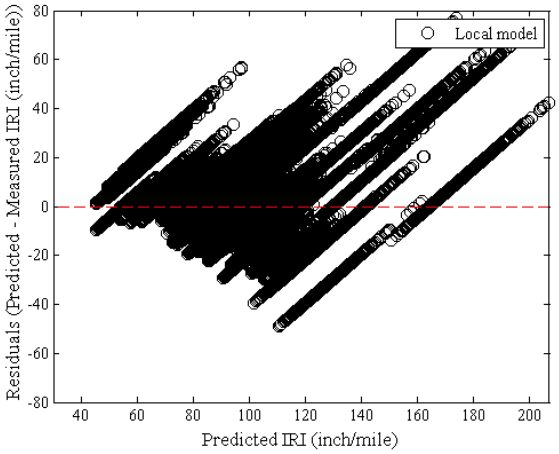


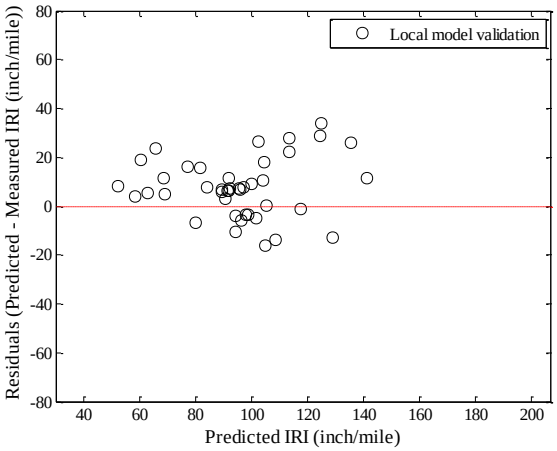
Figure B-514 IRI model validation – option 2



(a) Global model



(a) Local model



(a) Local model validation

Figure B-515 Option 2 residual plots

B.3.6.3 Option 3

Table B-241 Option 3 IRI model validation results

Parameter	Global Model Mean	Local Model Mean	Local Model Validation
SEE	17.4463	14.2258	16.9590
Bias	-10.3821	2.0902	-5.4326
C1	0.8203	2.2229	1.2656
C2	0.4417	1.6685	3.4776
C3	1.4920	1.4929	1.4929
C4	25.2400	25.2400	50.8002

Table B-242 Option 3 IRI model validation hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.2485
Intercept	0.0190
Slope	0.0285

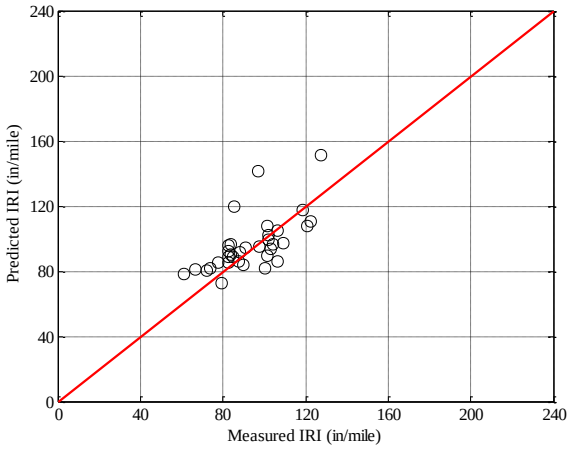
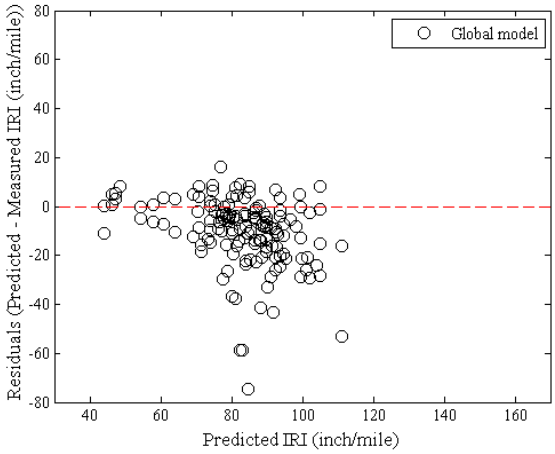
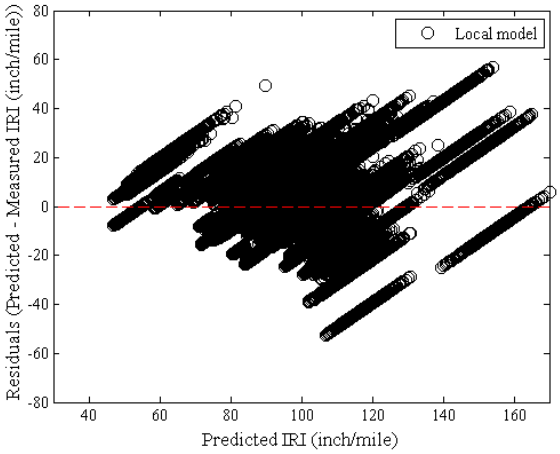


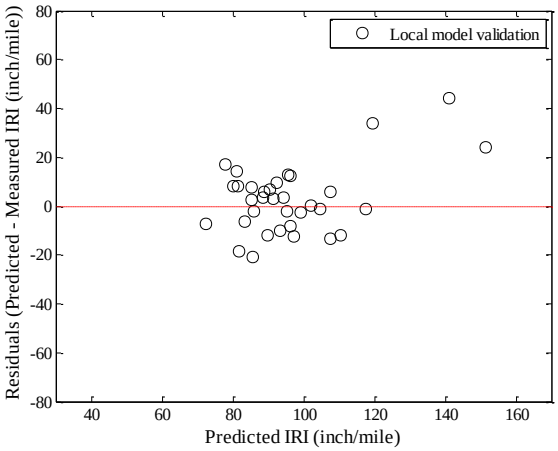
Figure B-516 IRI model validation – option 3



(a) Global model



(a) Local model



(a) Local model validation

Figure B-517 Option 3 residual plots

B.3.6.4 Option 4

Table B-243 Option 4 IRI model validation results

Parameter	Global Model Mean	Local Model Mean	Local Model Validation
SEE	10.5483	7.2943	11.2862
Bias	-7.1270	0.2066	1.4563
C1	0.8203	0.3637	2.1420
C2	0.4417	2.2600	2.6282
C3	1.4920	1.4929	1.4929
C4	25.2400	25.2400	5.7454

Table B-244 Option 4 IRI model validation hypothesis test results

Hypothesis test	*p*-value
Mean difference (paired *t*-test)	0.4266
Intercept	0.2262
Slope	0.2107

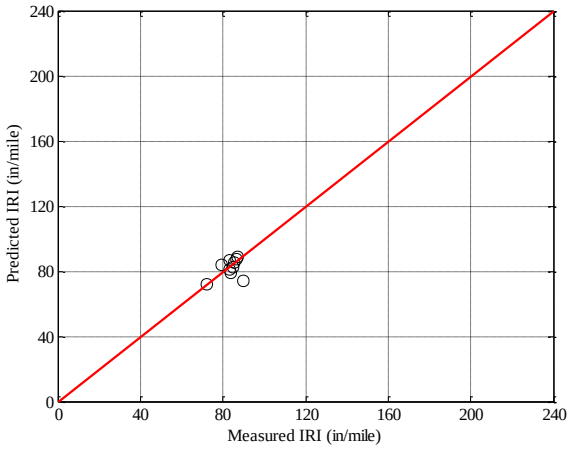
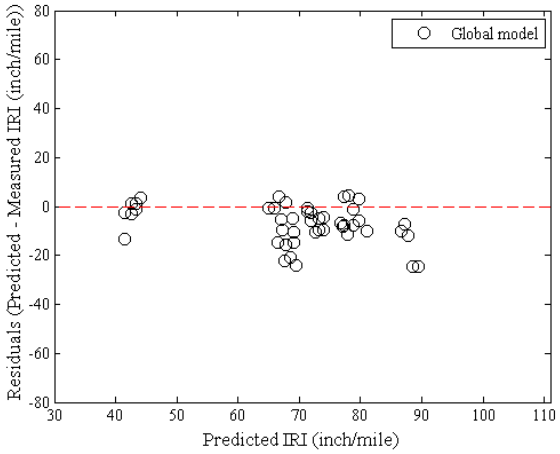
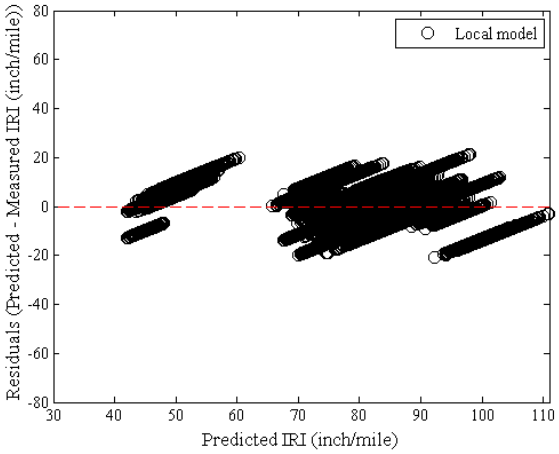


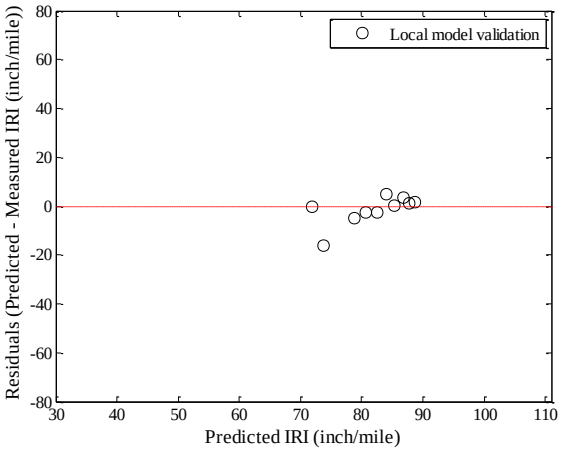
Figure B-518 IRI model validation – option 4



(a) Global model



(a) Local model



(a) Local model validation

Figure B-519 Option 4 residual plots

B.4 Use of local calibration coefficients

B.4.1 Flexible

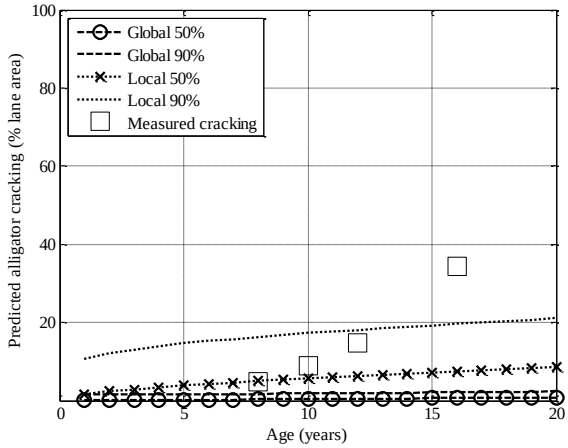


Figure B-520 Alligator cracking for Project 20046

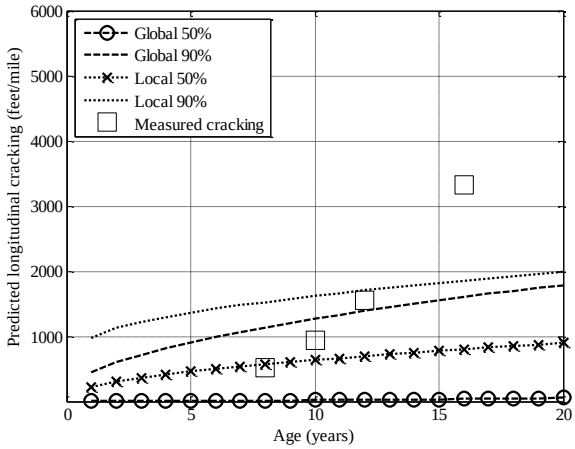


Figure B-521 Longitudinal cracking for Project 20046

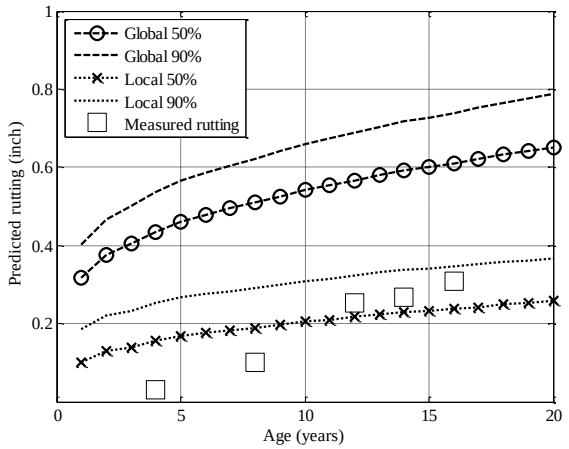


Figure B-522 Rutting for Project 20046

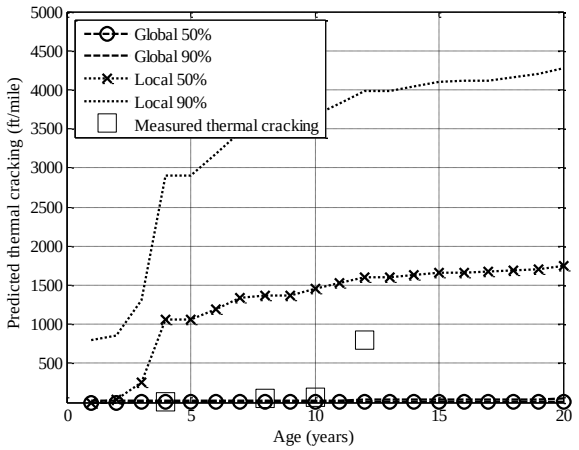


Figure B-523 Thermal cracking for Project 20046

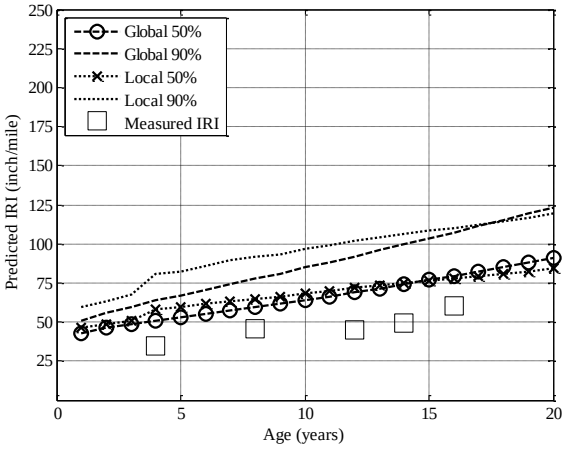


Figure B-524 IRI for Project 20046

B.4.2 Rigid

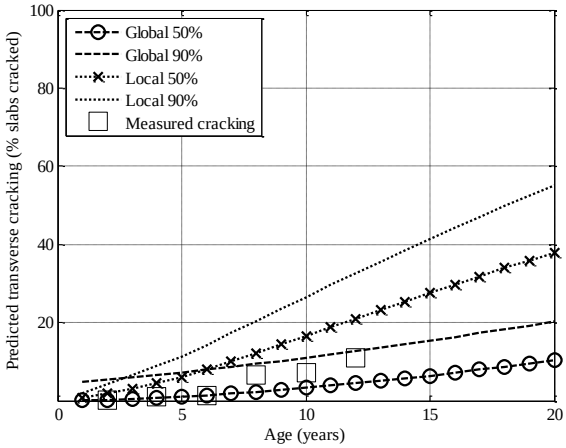


Figure B-525 Transverse cracking for Project 45855

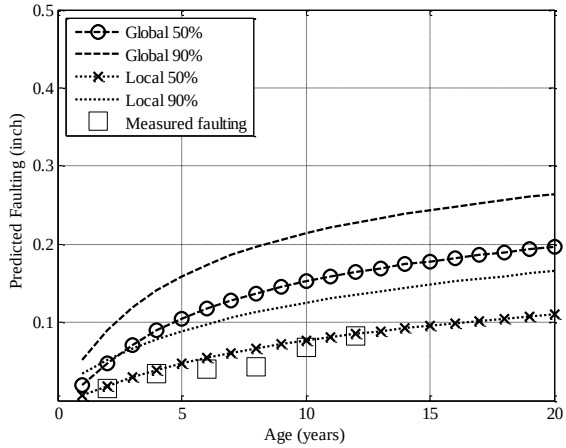


Figure B-526 Faulting for Project 45855

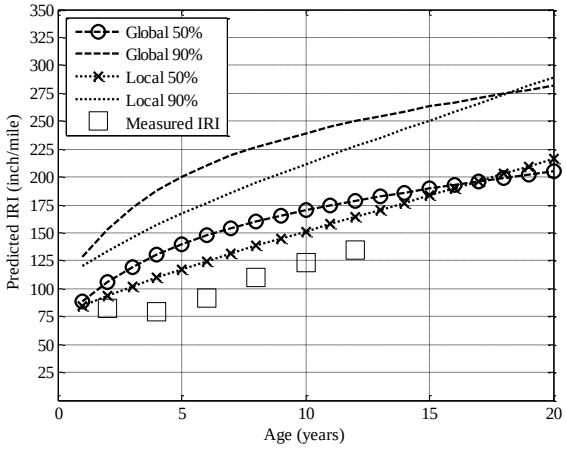


Figure B-527 IRI for Project 45855