CONCRETE PATCHING GUIDE

Final Report

SPR 334

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16. Abstract

Maintenance personnel often select a material for patching concrete based on what they have used in the past. However, each patching job has particular demands, which may be different from what was required in past applications. Also, the list of available products changes often with manufacturers producing new patching materials, discontinuing some products and changing the name of products.

The Oregon Department of Transportation recognized the difficulty in selecting the right patching material and developed a patching guide to help maintenance personnel determine which product to use. The selection tool is based on a Microsoft Excel spreadsheet and matches the attributes of specific products to the needs of a particular patching job. An output report is then generated and provides a list of qualified and conditional products from the QPL (Qualified Products List).

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	millimeters squared	mm^2
ft^2	square feet	0.093	meters squared	m^2
yd^2	square yards	0.836	meters squared	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	kilometers squared	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	ml
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	meters cubed	m^3
yd^3	cubic yards	0.765	meters cubed	m^3
NOTE: Volumes greater than 1000 L shall be shown in m^3.				
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
		TEMPERATURE (exact)		
°F	Fahrenheit	(F-32)/1.8	Celsius	°C

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	millimeters squared	0.0016	square inches	in^2
m^2	meters squared	10.764	square feet	ft^2
m^2	meters squared	1.196	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	kilometers squared	0.386	square miles	mi^2
		VOLUME		
ml	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	meters cubed	35.315	cubic feet	ft^3
m^3	meters cubed	1.308	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams	1.102	short tons (2000 lb)	T
		TEMPERATURE (exact)		
°C	Celsius	1.8C+32	Fahrenheit	°F

*SI is the symbol for the International System of Measurement

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1.0 CONCRETE PATCHING GUIDE

Maintenance personnel often select a material for patching concrete based on what they have used in the past. However, each patching job has particular demands, which may be different from what was required in past applications. Also, the list of available products changes often with manufacturers producing new patching materials, discontinuing some products, changing the name of products, and adjusting the formulation of others. A state's qualified products list (QPL) is supposed to incorporate the changes into a list of products that can be used for patching. However, the QPL typically does not have much information to assist personnel in selecting an appropriate product for a particular job.

Oregon DOT recognized the difficulty in selecting the right patching material and developed a patching guide to help maintenance personnel determine which product to use. The selection tool, based on a Microsoft Excel spreadsheet, matches the attributes of specific products to the needs of a particular patching job. Material manufacturers were asked to complete questionnaires for specific products in order to develop a matrix of product attributes. To use the guide, a user checks off on a list of spreadsheet statements that describe the requirements for a particular patching job. The patch descriptors include what material the patch will be in contact with, the orientation, the size, the needed working time, the amount of time before the patch is exposed to further construction or traffic, the need for formwork, and others. The selection tool compares the requirements of the user to the attributes of the various patching materials to find matches.

The output report includes qualified products from the QPL and conditional products which require field experience before being listed as qualified. In Oregon, personnel are asked to submit product performance feedback for any conditional products that are used. In the patching guide the output report reminds the user to provide the ODOT Materials Laboratory with the performance feedback for any conditional products listed. The information will then be used to help determine the products acceptance or denial to the QPL.

An example of the patching guide resides on ODOT's Research Unit web site. This allows visitors to the site an opportunity to view the guide. Also included is the manufacturers' questionnaire which is used to collect product information. A documentation file is also available on the website which describes how the selection tool works, and how to make changes to it. The version on the web site is specific to Oregon and may be saved and adapted to an individual state. The ODOT Research Web site is at www.odot.state.or.us/tddresearch/.

The active and updated patching guide will reside on ODOT's intranet and will only be accessible to ODOT users. The guide will be updated and maintained by the QPL Administrator.

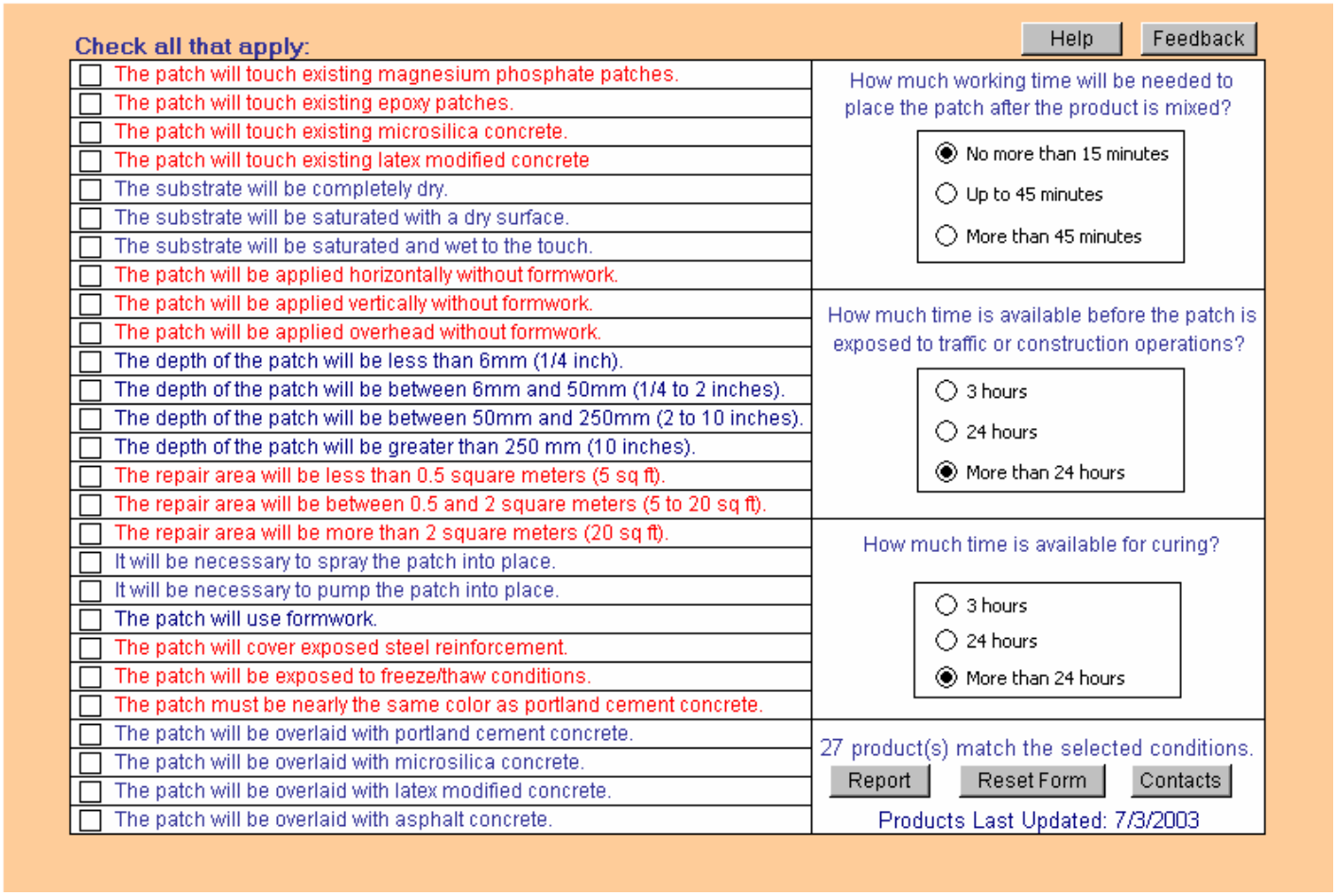

Figure 1.1: User Input Form

Manufacturer	Product
ITW Resin Technologies	Permatop Liquid Binder
Sika Corporation	SikaTop 111
Sika Corporation	SikaTop 122 Repair Mortar

The products listed below are conditionally approved. If a conditional product is used, the user must complete a form describing the performance of the product. The form is available from Mike Dunning (503-986-3059) at the Materials Lab.

Burke by Edoco	Burke Fast Patch 928
ChemRex a division of Degussa	Thoroc 10-61 Rapid Mortar
CTS Cement Company	Rapid Set D.O.T. Repair Mix
CTS Cement Company	Rapid Set Mortar Mix
CTS Cement Company	Rapid Set Non Shrink Grout

- ☐ The patch will touch existing magnesium phosphate patches.
- ☐ The patch will touch existing epoxy patches.
- ☐ The patch will touch existing microsilica concrete.
- ☐ The patch will touch existing latex modified concrete
- ☐ The substrate will be completely dry.
- ☑ The substrate will be saturated with a dry surface.
- ☐ The substrate will be saturated and wet to the touch.
- ☑ The patch will be applied horizontally without formwork.
- ☐ The patch will be applied vertically without formwork.
- ☐ The patch will be applied overhead without formwork.
- ☐ The depth of the patch will be less than 6mm (1/4 inch).
- ☑ The depth of the patch will be between 6mm and 50mm (1/4 to 2 inches).
- ☐ The depth of the patch will be between 50mm and 250mm (2 to 10 inches).
- ☐ The depth of the patch will be greater than 250 mm (10 inches).
- ☐ The repair area will be less than 0.5 square meters (5 sq ft).
- ☑ The repair area will be between 0.5 and 2 square meters (5 to 20 sq ft).
- ☑ The repair area will be more than 2 square meters (20 sq ft).
- ☐ It will be necessary to spray the patch into place.
- ☐ It will be necessary to pump the patch into place.
- ☐ The patch will use formwork.
- ☐ The patch will cover exposed steel reinforcement.
- ☐ The patch will be exposed to freeze/thaw conditions.
- ☐ The patch must be nearly the same color as portland cement concrete.
- ☐ The patch will be overlaid with portland cement concrete.
- ☐ The patch will be overlaid with microsilica concrete.
- ☐ The patch will be overlaid with latex modified concrete.
- ☐ The patch will be overlaid with asphalt concrete.

How much working time will be needed to place the patch after product is mixed?

[Up to 45 minutes]

How much time is available before the patch is exposed to traffic or construction operations?

[More than 24 hours]

How much time is available for curing?

[More than 24 hours]

8 product(s) match the selected conditions.

Products Last Updated: 7/3/2003

Figure 1.2: Product list based on user's input. The output includes the user's responses to the questions.

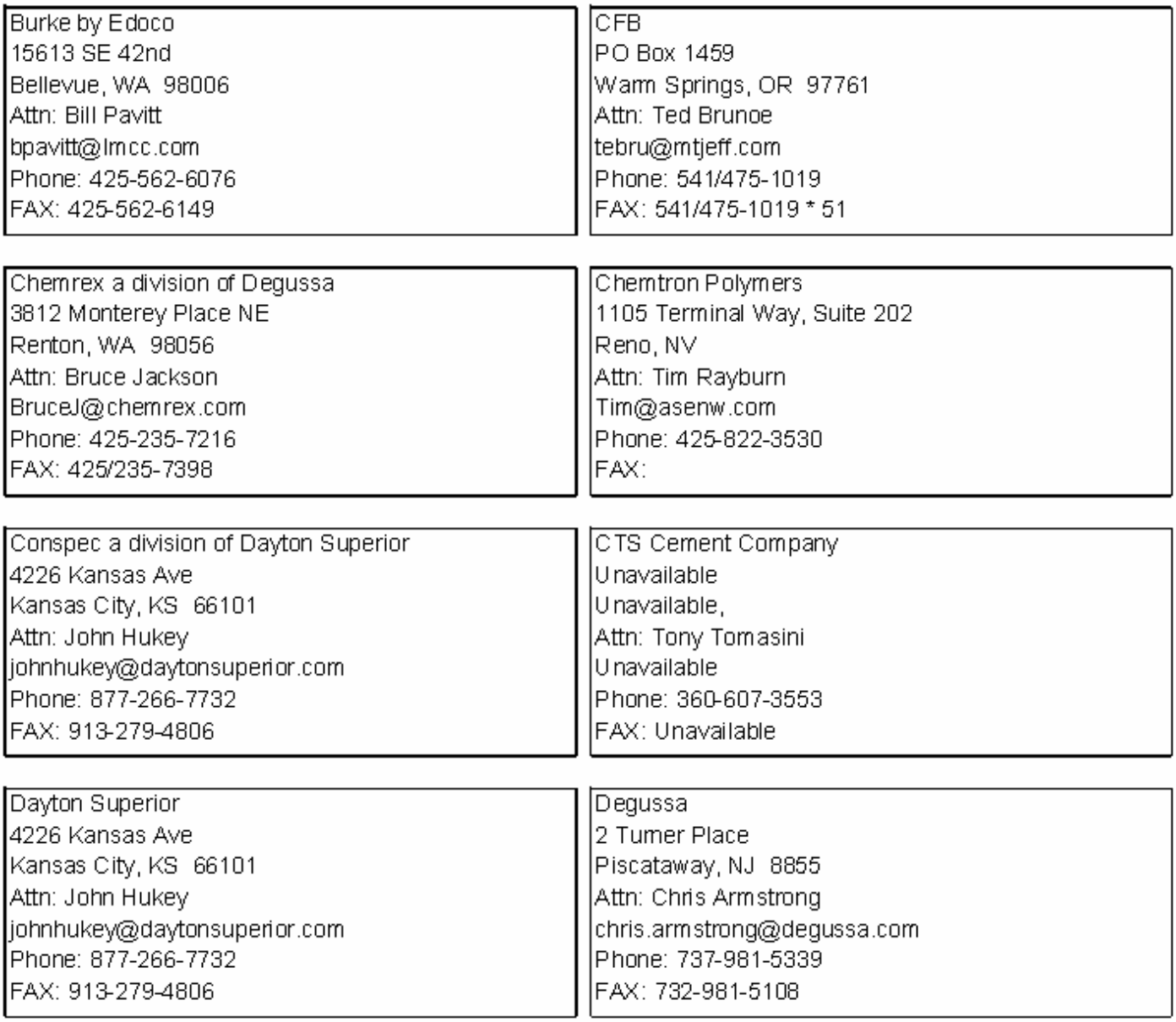

Figure 1.3: The user can get a list of vendor's contact information for the selected products.