



# RESEARCH PROJECT CAPSULE [ 14-2C ]

January 2015

TECHNOLOGY TRANSFER PROGRAM

## Implementation of Maturity for Concrete Strength Measurement and Pay

### JUST THE FACTS:

**Start Date:**  
November 1, 2014

**Duration:**  
18 months

**End Date:**  
April 30, 2016

**Funding:**  
SPR: TT-Fed/TT-Reg

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### POINTS OF INTEREST:

Problem Addressed / Objective of  
Research / Methodology Used  
Implementation Potential

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### PROBLEM

Current construction contracts continually require a more rapid response time for form removal, early age strengths, and opening strengths. Concrete maturity can assist the Department in meeting the needs of both the contractor and Department personnel in the field. Maturity is a concept where concrete strength can be non-destructively measured using a relationship between strength and a temperature time factor. In order for maturity to work, a maturity curve must be developed either before the first day's production, or with the first day's production. Typically, ASTM C1074 is used and cylinders are cast, cured, and tested in a laboratory setting to determine the relationship for that particular set of materials. Once the curve has been developed (typical to the one shown in Figure 1), subsequent concrete placements are monitored using maturity loggers and once the designated time-temperature factor equivalent to the specified strength is reached, the area is opened up, forms removed, pay is allowed, etc. Maturity is especially beneficial to both contractors and Department personnel in early age strength requirement types of jobs including rapid patching, emergency bridge repairs, etc.

### OBJECTIVE

The objective of this implementation project is to pilot the maturity concept on three ongoing structural and concrete paving projects. Maturity curves will be developed using rapid patching material or high early strength concrete in a laboratory setting. The project will provide assistance to districts and proof of the maturity concept to the Department.

### METHODOLOGY

To complete the objectives of this implementation study, a review of the state-of-the-practice will be completed. Three structural and three paving projects will be selected and instrumented with maturity loggers. A maturity curve will be developed according to ASTM C1074 and subsequent work will be documented using the maturity method. In a laboratory setting, maturity curves will be developed for rapid patching materials as a proof of concept. An implementation plan will be developed with a recommended procedure for quality control and acceptance.

### IMPLEMENTATION POTENTIAL

Implementation of the maturity method for form removal may lead to an increase in construction speed. Early opening of pavements to traffic will reduce the time delay between testing and opening, especially for rapid patching applications. This will result in less user delay for the traveling public, lower cost of operating for contractors, and a lower cost of testing and acceptance for the Department.

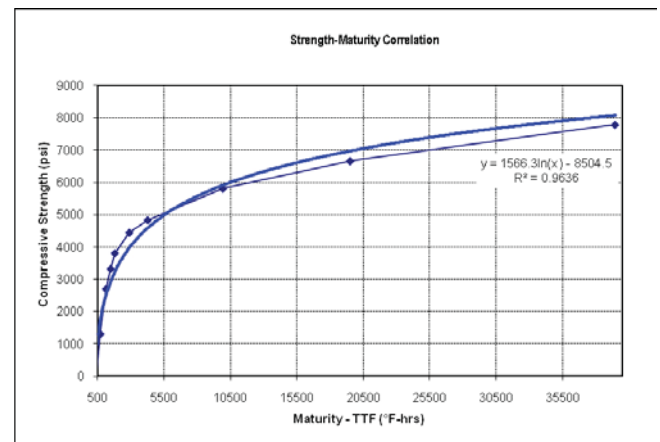


Figure 1  
Maturity Curve