

Using the Maturity Method During Cold Weather

The maturity method is very useful in cold weather paving because it is a non-destructive approach for estimating concrete's strength.

Maturity measurements can identify whether concrete is still hydrating and curing properly, even while covered under insulating blankets.

Maturity accounts for the combined effects of time and temperature on concrete strength development. The strength of a given concrete mixture that has been placed properly, consolidated, and cured is a function of its age and temperature history.

If the temperature of a freshly-placed concrete pavement is measured over time, and then those data points are plotted on a graph, the area under the curve can be called the time-temperature factor (TTF), which is a measurement of the concrete's maturity. The logarithm of the TTF correlates directly to the strength of the concrete.

For example, a concrete sample maintained at an average temperature of 50 degrees F for 8 hours has a TTF of 400 degree hours.

In developing the maturity curve for a particular concrete mixture, multiple specimens must be cast, their temperatures measured over time, and their strength determined by conventional destructive testing (flexural or compressive) at various intervals to determine the maturity-strength relationship. This relationship is then valid for that mixture in any condition.

The benefits of maturity include:

- Identifies earliest possible opening to both construction and public traffic.
- Allows determination of optimum time to sawcut joints.
- Facilitates both fast-track and cold-weather construction operations.
- Requires fewer specimens to fabricate and test thereby reducing QC/QA costs.
- Facilitates earlier agency acceptance and contractor payment.

Modern maturity devices contain computer chips that can retain information for analysis or reporting.

For more information on maturity testing, see ACPA's publications, PL518P and IS257P, at www.pavement.com, or contact [Mike Ayers](#) at 847-966-2272.