

Application of Maturity at a precast segment Factory.

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To produce concrete segments to build a series of tunnels. A precast factory was Settle in Cooma for the production of 135.000 concrete components. The Factory is composed of two lines, each one with a steam curing chamber that allows accelerated curing of the concrete segments to achieve the desired production. The main target was to reach 10 MPa at 8 hours without exceeding the peak temperature in the steam curing chamber to no more than 70 °C to avoid DEF.

The Maturity method is a technique for estimating concrete strength based on the assumption that samples of a specific concrete mixture get equal strengths if they achieve similar values of the maturity index. The use of maturity to estimate the early strength development of the concrete allows us to select a suitable mix design to achieve the desired outcome. A simulation of the concrete thermal behaviour of the mix design set helps us estimate the concrete's performance before the Factory was built.

Verification between theoretical thermal behaviour and actual performance of the steam curing chamber was done at the beginning of the production to confirm initial assumptions successfully.

The technology used was adapted in different ways to fit carrousel systems. Using smart sensors to collect in-place temperatures inside the segments from concrete maturity allows us to establish strength versus maturity relationships and targets efficiently and remotely. The data analysis was made remotely and in real time, allowing us to provide reliable support for the production of the segments.