

While for the composition and properties of concrete and its raw materials numerous publications of rules and guidelines are available, the actual process of concrete producing, the mixing, is largely left to the user. However rheological properties are significantly influenced by mixing procedure. The raw materials are to be mixed in such a way during mixing that the mixture appears to be uniform. As a matter of principle, the mixing duration is to be selected in such a way that sufficient mixing of the raw materials takes place. It is important that water and superplasticizer are evenly distributed and sufficiently disintegrated. If mixing energy is insufficient, the properties will not be achieved, which could be possible, according to the mixture proportion of the concrete. The necessary mixing duration depends mainly on the mixer design, as well as the mixture proportion. Due to the low water contents relative to the powder contents and high additive dosages, more energy is required for the production of self-compacting concrete to distribute the raw materials evenly. Mixing times of 240 s are not rare in a ready mixed concrete plant.

First investigations at the cbm of Munich TU revealed a large optimising potential. An intensive mixer of the machine factory Gustav Eirich with controllable tool velocity was made available to cbm for these examinations. It was also possible, to record the power input at the mixing tool and the mixing plate during the mixing process. Initially, the influence of mixing time (Figure 1), mixing intensity (Figure 2) and mixture proportion of the concrete on the initial consistency, as well as the time-dependent development of the fresh concrete properties of self-compacting concretes were systematically investigated. Based on these results, the mixing procedure could be optimised and the mixing time significantly reduced.

It was possible, by increasing the mixing tool velocity, to reduce the mixing time to 60 s, including time for water and superplasticizer addition. Due to this, the mixing time for the production of self-compacting concretes lies in the range of common vibrating concrete. The productivity of the production can be considerably increased by this significant reduction of mixing time and, due to this, the production costs for self-compacting concrete can, eventually, be reduced.

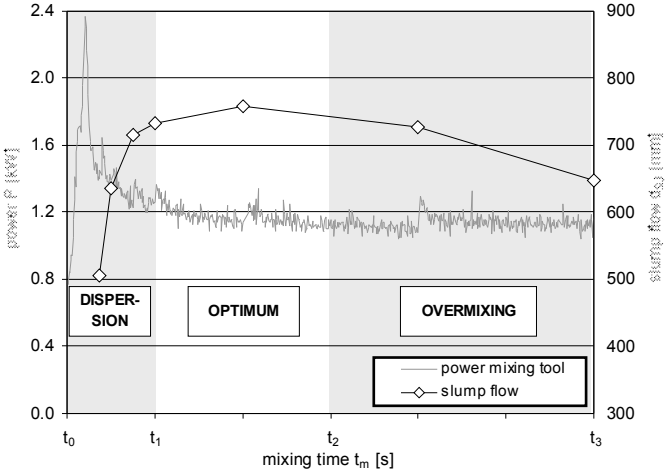


Figure 1: Effect of mixing time

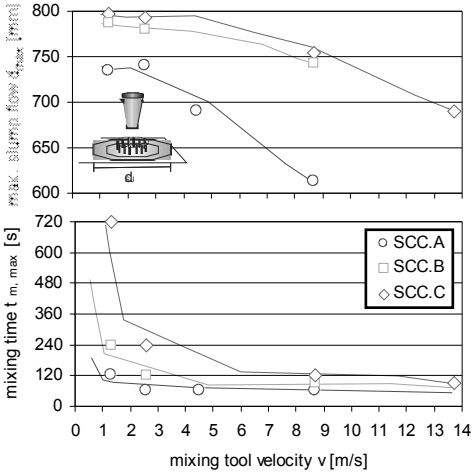


Figure 2: Effect of mixing tool velocity to maximum slump flow and mixing time