

Newsletter No 2 from the SCC-Consortium

January 2005

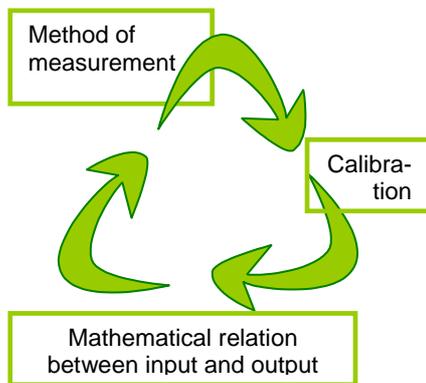
It is just about a year ago since the SCC-Consortium was initiated. The participants of the project were assembled in November to discuss the results of the first year's work. The present newsletter presents the results of three selected subjects.

Model for description of the flow ability of SCC

One of the activities during the first year of the Consortium is the project on development of a material model for SCC.

The objective is to develop a practical and applicable model that can be used to compose new mix designs (which, however, still has to be adjusted by testing). In the long term it is also the intention that the model shall be part of a decision support system for correction of concrete mix designs, while the concrete is still in the mixer.

It seems obvious that the model shall be practical and applicable e.g. to be used at a concrete plant and it implies that the model is more than just a theoretical formula. The model will be an interaction between the mathematical function and what can be measured at the concrete plant including the way the model will be introduced at the plant (calibration).

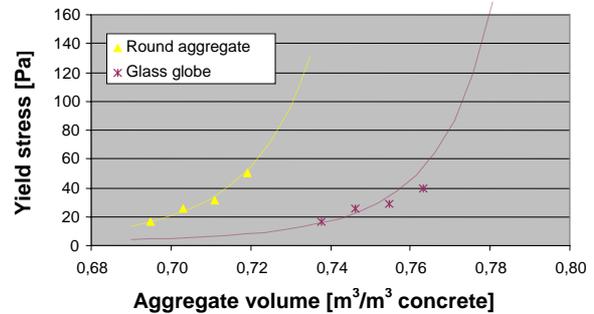


A model is more than just a mathematical formula – it is an interaction between several factors.

The actual model is based on information on the grain size distribution and the packing of the aggregate, the shape of the particles of the aggregate and the flow ability of the concrete paste.

Status is that the model has been tested on laboratory mixtures and it seems to be a useful tool. However, certain issues still need to be

clarified including a test method to determine the shape of the particles of the aggregate. The work is expected to be completed at the beginning of 2005.



Correlation between the amount of the aggregate in the concrete and the yield stress of the concrete, the latter being a measure for the concrete stiffness. (The broken lines are the prognoses of the model, while the dots represent the measurements)

Development of process equipment for the "future concrete plant"

Notoriously, SCC is far more sensitive to variations in e.g. the content of water than traditional slump concrete. Therefore, SCC also makes heavy demands on control of the dosage and mixing process.

Today, most concrete plants have a wattmeter connected to the mixer, which is used to control the dosage of additional water. The wattmeter describes the workability of the concrete with one single value. The method is, however, a bit too simple to describe the flow properties of SCC, where factors such as stiffness of the concrete, that is how much power is necessary to make the concrete flow, and how viscous the concrete is when it flows, are important. With the so-called two-parameter method both parameters can be measured directly in the mixer.

In the autumn a two-parameter equipment was installed in one of 4K's plants in the metropolitan area of Copenhagen. At present measurements are made analogously with the wattmeter and it is still the wattmeter-value that controls the dosage of additional water in the old-fashioned manner.

However, data on measurements are collected continuously with the new equipment which will be evaluated in the spring of 2005. It is the intention that based on the experiences with the

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new equipment a more precise control mechanism can be developed to regulate the workability of SCC based on two-parameter measurements.

Full scale testing in DR-byen

One of the intermediate aims of the SCC-Consortium is to assess different execution methods and based on assessments to prepare guidelines.

To fulfil the intermediate aim it is necessary to test different methods under comparable conditions. Fortunately for the SCC-Consortium, one of the main participants of the project, MT Højgaard, won the contract on the concrete work at Segment 3 of the DR-byen, and that DR-byen as building owner is positively disposed to carry out different tests at the construction site.

The full scale testing began in week 52 - 2004 with the casting of the interior walls of the basement.



Ready for casting the three first walls of the basement with SCC, DR-Byen, Segment 3.



Measurement of fresh concrete properties of fresh concrete of SCC with a J-ring, DR-Byen, Segment 3.

The following tests will among others be carried out at the construction site:

- Standard test to measure the flow ability while the flow ability of the concrete during casting is observed

- measurement of pressure on formwork
- testing of different methods on placing the concrete in the mould.

Afterwards it is assessed among others how the quality of the surface depends on the method of casting, the type of form oil etc.

Even though the walls are indoor walls, some of the about 5 m high walls will be cast with concrete for aggressive environmental class to test the air void structure and the frost resistance of high SCC-structures where air voids at the bottom of the structure are compressed due to the heavy pressure during casting.

CtO Beton-Teknik on SCC

The SCC-Consortium has prepared a publication on the knowledge on SCC that is available today. The publication is published in January 2005 as CtO Beton-Teknik with the title *Selvkompakterende beton – SCC (Self compacting concrete – SCC)*.

The publication deals among others with the following subjects:

- Short introduction of concrete rheology and explanations on how SCC differ from traditional concrete
- The influence of the individual constituents on the flow ability of SCC
- Practical guidelines on proportioning of SCC
- Good advise on manufacturing, control and execution with SCC

The publication can be purchased by sending an email to cto@aalborg-portland.dk or phone, + 45 99 33 77 54.

Further information

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