

The purpose and target group of the Newsletter

The SCC-Consortium is a large Danish R&D project financed by the participating industrial parties and the Danish Ministry of Science, Technology and Innovation under the subsidy of Innovation Consortia. The SCC-Consortium initiated the work in the autumn of 2003.

A part of the project is to disseminate the results and activities to the concrete industry. Therefore a number of newsletters will be published during the three years period of the project of which this newsletter is the first.

The newsletters will be accessible at the homepage of the SCC-Consortium

www.scc-konsortiet.dk/newsletters

What is the objective of the SCC-Consortium?

The SCC-Consortium is a three-year innovation project with the objective to bring the Danish cement and concrete industry up front as far as manufacturing of the so-called self-compacting concrete concerns. The total budget of the SCC-Consortium is approx. 2.7 mill EURO and the project will be carried out as a co-operation among 17 participating companies and knowledge centres. The seven main parties in the project are 4K Beton A/S, MT-Højgaard a/s, Aalborg Portland A/S, Videometer A/S, Betonelement a/s, DTU/IMM and Danish Technological Institute, Concrete Centre who is in charge of the project.

A part of the objective of making Denmark one of the leading countries within the use of SCC is the ambitious goal of making SCC the most used type of concrete within the next five years. Figure 1 illustrates the development of the use of SCC in different countries during the last 12 years.

The figures show that Denmark has not been one of the pioneers, however, the amount of SCC in Denmark has reached a higher level over time. The objective of the SCC-Consortium is to impart the technology brush-up that will enable the industry to continue the positive development and bring the use of SCC up to above 50%.

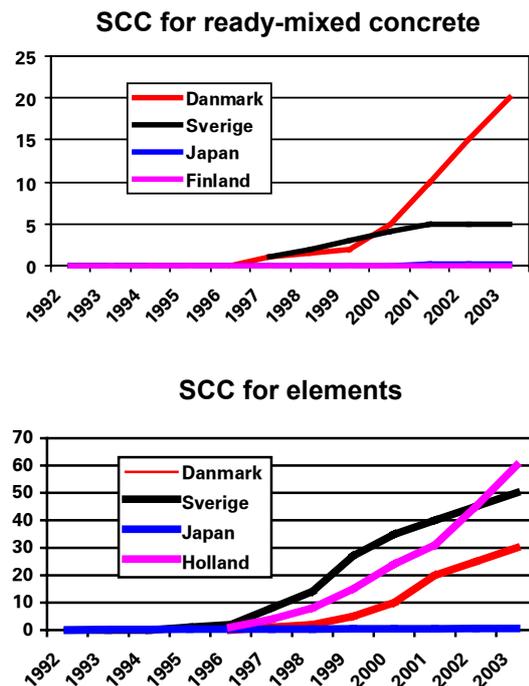


Figure 1. Trends in the use of SCC for ready-mixed concrete and for elements in different countries since 1992.

The plan of action of the SCC-Consortium

The SCC-Consortium is divided into the projects activities P1, P2, and P3, in which the necessary technology on material innovation, production management and execution are developed. Furthermore, the interdisciplinary activities D1 and D2 collect the results transversely and draw up the necessary documentation on the social returns in using SCC, cf. figure 2.

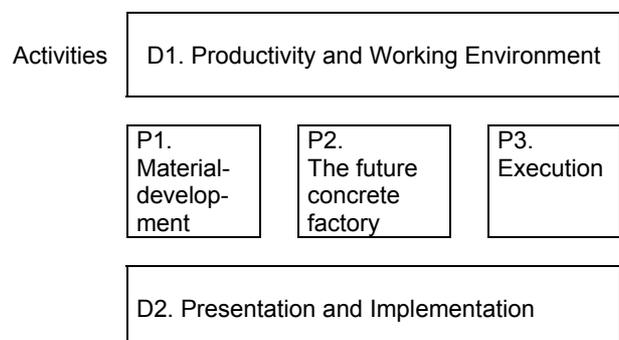


Figure 2. General structure of the SCC-Consortium

Danish experience of SCC

As an important part of establishing a common infrastructure of the work in the SCC-Consortium an internal seminar on collection of experience was held on February 5, 2004. The seminar dealt with the general status of the use of SCC in Denmark, design principles, and constituents for SCC, measuring/control methods, and experience in using SCC.

The most substantial results of the seminar are as follows:

- The majority approved that by definition SCC is a type of concrete that can be used without any vibration. However, at the same time there was a general agreement that varieties of SCC are used today allowing some vibration but they should be given another product name.
- Generally, SCC is optimised by "trial and error" based on traditional types of concrete, which are then adjusted using chemical additives. At first hand it seems that the best results are achieved when the composition of the aggregate resembles the one used in traditional packing optimised types of concrete.
- Depending on the requirements for the composition it is possible to use different types of cement, in combination with other powder types as well. As for SCC with white cement there are special requirements to colours if combinations with other powder types are desired.
- Mainly aggregates classified in the environmental category aggressive or extra aggressive are used.
- Generally the chemical additives are the most important parameter compared to the ability to flow, stability, and sturdiness. The process of achieving the most optimal content demands considerable resources, which complicates a replacement of the supplier of additives.
- SCC is lacking in sturdiness, which indicates that even small variations especially in the water content require intensified management and control. At the same time it may be difficult to control the stability over time.

- It is most difficult to obtain the necessary stability at high slump flows because the tendency to separate increases. It may for one thing result in formation of a slurry layer, which may cause different types of problems such as "rubber skin" and spallings at trowelling of the surface.
- The use of SCC has actually improved the working environment especially when manufacturing concrete elements as the noise from the vibration can be avoided.

Study of workability of Danish binder systems – among others effect of chemical additives

A large study on parameters of the effect of three commercial superplasticizers types on the rheological properties of Danish cement pastes has been initiated. The tests are carried out by one of the foreign parties, the Swiss Institute EMPA in Zürich. The selected materials are rapid CEM I, 52.5 N (MS/LA/≤ 2), low alkali CEM I 42.5 N (HS/EA/≤ 2), basis CEM II/A-LL 52.5 (IS/LA/≤ 2), and white CEM I 52.5 N (HS/EA/≤ 2) cement as well as fly ashes, micro silica, silica sand, fine sea sand, and lime filler. This gives an opportunity to decide systematically the effect of some of the most used superplasticizers types in Denmark. By getting an insight into the composition of the used materials and possible other polymers, the study also gives an opportunity to understand how they work.

Further information

www.scc-konsortiet.dk

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