

# A Review of Advantages and disadvantages of self-compacting concrete

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## ARTICLE DETAILS

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## ABSTRACT

*Self-compacting concrete represents just about the most significant developments in concrete technology for years. This concrete can flow and also to pack probably the most restricted spots of the framework with no vibration. An idea of self compacting concrete, a substance which passes, that's placed into framework and compressed under influence of self weight only, with no vibration and also added processing emerged. As the longevity of concrete buildings evolved into a crucial issue in japan, a sufficient compaction by skilled labours was needed to get durable concrete structures.*

## 1. Historical development of self-compacting concrete

Self-compacting concrete, in concept, is not new. Specific uses such as for instance underwater concreting have generally needed concrete, that will be positioned without the demand for compaction (Bartos, 2000). In such conditions vibration was just impossible. Early self compacting concretes relied on extremely high contents of cement paste and, after very plasticizers started to be available, were added in concrete mixes. The mixes required special and properly controlled placing techniques to be able to stay away from segregation, and also excessive contents of cement paste made them vulnerable to shrinkage. The general costs were extremely high and applications remained extremely limited. The launch of contemporary self levelling concrete or maybe self compacting concrete is linked with the drive towards better quality concrete pursued in japan around 1983, the place that the absence of uniform and finish compaction was labeled as the main component accountable for the very poor performance of concrete buildings (Dehn et al., 2000). As a result of the point that there was no sensible ways by which total compaction of concrete on site was actually being completely assured, the emphasis thus turned onto the elimination of the importance to compact, by vibration or perhaps by some other ways. This led the improvement of the very first practicable SSC by researchers Okamura & ozawa, around 1986, at the faculty of Tokyo along with a sizable Japanese contractors easily took up the concept. The contractors used their big in-house development and research facilities to develop their very own SSC technologies. Each company produce their very own mix designs and trained their very own staff members to serve as specialists for screening on site their SSC mixes. A really important part was that every one of the giant contractors produce their very own testing equipment and evaluation methods (Bartos, 2000). During the early 1990's there's just a small public information about SSC, largely in the Japanese language. The practical and fundamental know how was kept secret by the giant companies to keep business advantage. The SSC's were utilized under trade labels for example the NVC (nonvibrate concrete) of Kajima Co., SQC (super quality concrete) of The Biocrete or maeda Co. (Taisei Co.). Concurrently with the Japanese improvements in the SSC area, research & development continued in mix style and also placing underwater concrete where new admixtures have been

producing SSC mixes with performance matching that of the Japanese SSC concrete (Ferraris, 1999)

## 2. Need for self-compacting concrete

For many years starting in 1983, the issue on the durability of concrete buildings was a significant subject of attention in japan. To make long lasting concrete structures, sufficient compaction by skilled employees is required. However the gradual decrease in the amount of skilled workers in Japan's construction sector has resulted in similar reduction in the caliber of construction work. A remedy for the accomplishment of strong concrete structures outside of the quality of construction job may be the work of self compacting concrete, that may be compressed into every corner of a framework, solely using its own fat and without the demand for compaction. The basic need of the concrete type was purposed by Okamura in 1986. Research to build self compacting concrete, incorporating an essential research on the workability of concrete, were performed by Maekawa and also Ozawa at the Faculty of Tokyo.

In 1983 the prototype of self compacting concrete was created by using materials already on market. The prototype performed satisfactory with regard to hardening and drying shrinkage, heat of hydration, and denseness after hardening along with other qualities. This concrete was named "high performance concrete" plus was described as follows at the 3 phases of concrete, at nearly exactly the same time high end concrete was identified as a concrete with high durability because of very low water cement ratio by professor Aitcin. Since that time, the phrase very high performance concrete was been implemented around the world to relate to high durability concrete. Therefore, Okamura has transformed the phrase for purposed concrete to "Self Compacting Performance Concrete."

## 3. Advantages and disadvantages of self-compacting concrete

### Advantages

- No vibration of new concrete is needed during placement into forms.
- Placement of concrete is much easier.

- More and faster effective placement of new concrete is achieved. Total concreting time is reduced.
- Noise level on building site is reduced. Hence the quantity of working hours over the building site could be elevated and also the night shift within the urban zones is enabled.
- Energy use is reduced.
- Required amounts of employees on building site are reduced.
- Safer as well as better working environment is obtained.

Upon self-compacting concrete hardening in structures:

- High quality of placed concrete is attained, no matter the ability of the employees.
- Good bond between concrete and reinforcement is obtained, maybe even in congested reinforcement.
- High quality of concrete surface finish is acquired with no requirement for the following repair.
- With a much better last look of concrete surface, sleek wall surfaces and flat floor surfaces which need no additional finishing are obtained.
- Improved longevity of components is achieved.
- Maintenance cost is reduced.

#### Disadvantages

- A complex element of SCC creation is that mix should be especially created based on components that are free, required performance specifications and also production methods. Nearly every elements of manufacturing process should be examined to fully

capitalize on the benefits connected with the application of SCC.

- One of limitation of SCC is the fact that there are no identified mix design procedures as yet.

There are several drawbacks in the attributes of concrete which have been found for example the cement content exceeded a specified value. To reduce these damaging consequences, the necessity to increase powder content in SCC is generally met by the application of additions. For the purpose, considerable scientific studies are done on the use of various additions for partial replacement of cement in SCC or maybe self-compacting mortar like marble powder, fly ash, limestone powder, slag.

#### 4. Conclusion

The idea of self-compacting concrete was purposed in 1986 by Professor Hajime Okamura (1997) and also the prototype of self-compacting concrete was first completed in 1988 at faculty of Tokyo, so that durability of concrete structure could be enhanced. Since then different investigations are performed and the concrete is utilized in practical buildings in Japan, primarily by huge construction companies. Investigations for starting a mix design method and also self-compatibility testing methods were taken out.

Self-compacting concrete was initially used by Japan in bridge, building, tunnel building since the early 1990s and also the amount of SSC bridges was built in Europe. SSC has potential that is high for broader structural applications in highway bridge construction.

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