

# Self-Compacting Concrete (SCC) as Standard Concrete

## Project Leader

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## 1. Objective

**This project is aimed at** mitigating the friction between solid particles in Self-Compacting Concrete (SCC) during deformation at the fresh stage so that SCC may be treated as a standard concrete. This can be achieved by reducing the cement content per unit and increasing the aggregate content per unit which also results in reducing the material cost. SCC concrete compacts purely under its own weight into every corner of a framework of reinforcing bars. There is no need for vibrating compaction. This method was first developed by Hajime Okamura, professor at University of Tokyo and a former president of Kochi University of Technology.

## 2. Project Outline

**To achieve the above-mentioned aim of** mitigating the friction between solid particles in SCC during deformation at fresh stage, the project will consist of the following topics:

- 1) Entraining fine air bubbles as ball-bearings between solid particles (developed as “Air-enhanced SCC (air-SCC) in 2015”)
- 2) Applying high molecular in order to mitigate friction in SCC
- 3) Combining fine air bubbles and high molecular in order to mitigate friction in SCC
- 4) Developing methods of testing the friction in SCC
- 5) Improving the manufacturing and construction systems for developing the SCC described above

## 3. Expected Performance

**In this project, the successful candidate would be expected to:**

- (a) Play a significant role in the research project: setting up a hypothesis and an experiment plan for verifying it
- (b) Take the initiative in the mixing and testing of mortar/concrete

## 4. Required Skills and Knowledge

**The successful candidate for this project will have the following knowledge and skills:**

- (a) A fundamental knowledge of concrete engineering
- (b) The knowledge and skills required for basic concrete testing

## References

- 1) Sovannsathya Rath, Masahiro Ouchi, Nipat Puthipad, Anuwat Attachaiyawuth: Improving the stability of entrained air in self-compacting concrete by optimizing the mix viscosity and air entraining agent dosage, *Construction and Building Materials*, Vol.148, pp.531-537, September, 2017.
- 2) Nipat Puthipad, Masahiro Ouchi, Sovannsathya Rath, Anuwat Attachaiyawuth: Enhanced entrainment of fine air bubbles in self-compacting concrete with high volume of fly ash using defoaming agent for improved entrained air stability and higher aggregate content, *Construction and Building Materials*, Vol.144, pp.1-12, July, 2017.
- 3) Sovannsathya Rath, Nipat Puthipad, Anuwat Attachaiyawuth, Masahiro Ouchi: Critical size of entrained air to stability of air volume in mortar of self-compacting concrete at fresh stage, *Journal of Advanced Concrete Technology*, The Japan Concrete Institute, Vol.15, pp.29-37, January, 2017.
- 4) Masahiro Ouchi, Kenta Kameshima, Anuwat Attachaiyawuth: Improvement in self-compacting properties of fresh concrete by eliminating large air bubbles using an antifoaming agent, *Journal of Advanced Concrete Technology*, The Japan Concrete Institute, Vol.15, pp.10-18, January, 2017.
- 5) Nipat Puthipad, Masahiro Ouchi, Sovannsathya Rath, Anuwat Attachaiyawuth: Enhancement in self-compactability and stability in volume of entrained air in self-compacting concrete with high volume fly ash, *Construction and Building Materials*, Vol.128, pp.349-360, December, 2016.
- 6) Anuwat Attachaiyawuth, Sovannsathya Rath, Kazunori Tanaka, Masahiro Ouchi: Improvement of self-comapctability of air-enhanced self-compacting concrete with finer entrained air, *Journal of Advanced Concrete Technology*, The Japan Concrete Institute, Vol.14, pp.55-69, March, 2016.

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