# DESIGN AND PROPERTIES OF SELF COMPACTING CONCRETE BASED ON RECYCLED FINE PARTICLES

▶ BOUARROUDJ Mohamed El Karim
SUPERVISED BY : Prof. Luc COURARD
Prof. Sébastien REMOND

## ▶ RESEARCH INFORMATION

### KEYWORDS
Aggregate, fine recycled concrete aggregates, self-compacting concrete.

### INTRODUCTION / CONTEXT
Large quantities of construction and demolition wastes (C&DW) are generated annually. Meanwhile large quantities of natural aggregates and sands are needed for the construction industry. Therefore, it is very important to reuse C&DW in order to protect the environment and save natural resources.

Even if the C&DW are usually inert and heterogeneous, the properties of this waste vary on its origins (concretes from buildings, bridges, roads, …). The use of a specific sorting method permits to separate the streams for purifying them and improving their properties. The fine particles of C&DW are mainly composed of adherent hardened cement paste and aggregates, which can be used in the design of new concretes, such as self-compacting concretes.

Self-compacting concrete (SCC) is a concrete mixture that is able to consolidate under its own weight, and which contains between 500 and 600 kg/m$^3$ of fine particles (cement + limestone fillers) for a good workability.

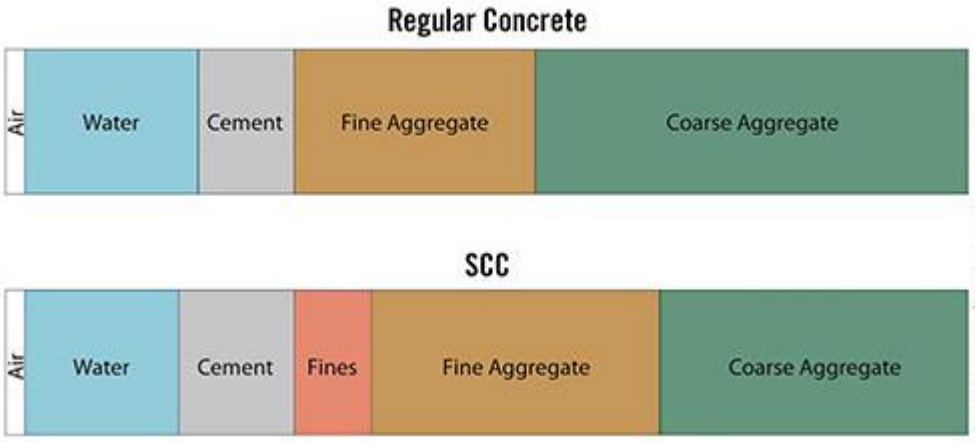
### QUESTION / GOAL
Designing and studying the properties of SCC when using fine recycled materials from a mobile sorting and recycling center. Firstly, precise physical and chemical characterization of fine particles are carried out. Secondly, the properties of SCC (mechanical and durability) are studied.

### HYPOTHESIS / METHODOLOGY
The fine particles in the range 0/4 mm are used for a physical and chemical characterization (XRF, XRD, TGA, particle size distribution, porosity, water absorption…).

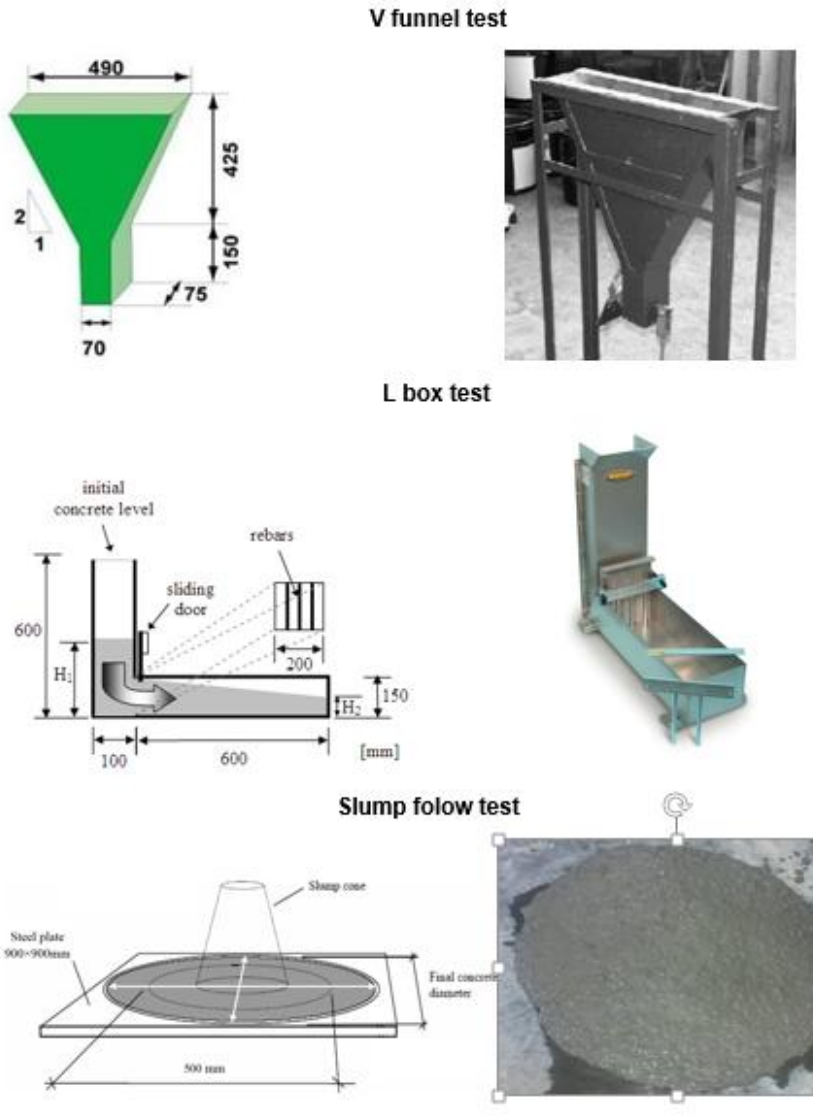
A design of self-compacting concrete based on packing density measurements (experimental tests and simulations) is studied with different substitutions of limestone fillers by the fine recycled materials. The properties of fresh concrete (rheological properties measured by slump test, V funnel test and L box test, …) and hardened concrete (tensile strength, compressive strength, elastic moduli, drying shrinkage…) will be investigated. A comparative approach (mechanical physical and environmental) between SCC and classical concrete will be afterwards determined.

### CONCLUSION / PROSPECTIONS
In this study, the use of fine recycled materials for designing a self-compacting concrete is investigated. The following prospections can be drawn:

- Better knowledge about physical and chemical characteristics of fine recycled materials;
- Use fine recycled materials as a substitution for limestone fillers in a formulation of self-compacting concrete;
- Durability of self-compacting concrete designed with fine recycled particles.




▶ **Fig. 1:** The volumetric ratio proportions of regular concrete versus self-compacting concrete [1]




▶ **Fig. 2:** Specific test of self-compacting concrete [2]

## ▶ REFERENCES
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## ▶ CONTACT
University of Liège
GeMMe Research Group
Urban and Environmental Engineering
Phone: +32 4 85 892 395
Email: mohamedelkarim.bouarroudj@student.ulg.ac.be