

# fib BULLETIN NO. 87

## TITLE: 2018 FIB AWARDS FOR OUTSTANDING CONCRETE STRUCTURES

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### Abstract:

Concrete has been profusely used throughout History in order to satisfy the real needs of humankind: housing, shelter, industry and infrastructure. Since its early applications, concrete has been undergoing a continuous evolution due, firstly, to the inventiveness of builders and, more recently, to persistent researchers. In fact, within the last two decades, progress in concrete technology has allowed numerous and innovative improvements for a classical material whose cost-effectiveness and versatility remain unrivalled. Nevertheless, new challenges continuously arise, thus requiring new answers.

Concrete is the second most-used material in the world (second only to water) – up to more than one cubic meter for every person on Earth, according to some statistics published shortly before the global crisis of 2008. The quantity of concrete produced is so large that, although it is, in fact, a relatively low-carbon product compared to other construction materials, it nevertheless accounts for about 5% of CO<sub>2</sub> emissions of the world. Not surprisingly, therefore, there are colossal research efforts being made across the globe by cement and concrete producers to reduce the carbon impact, with considerable success. It is clear that we will not significantly reduce the amount of concrete used on Earth in the near future. However, we can carefully examine the way we use it.

The current efforts towards sustainability take existing structures into account. Indeed, many concrete structures or facilities are nearing the end of their service life. Therefore, in order to keep their performance above acceptable threshold values, they must be assessed, refurbished or, in some cases, demolished. In this last case, many of the old materials – including concrete – may be recycled, as recent experiences have proved. The management of the life cycle of existing structures – erected when sustainability concepts were not yet considered – provides new opportunities in different fields of activities. These include conceptual attitudes and the basis of decision (maintenance engineering), new materials and techniques for repair and strengthening, as well as more interaction with other matters of concern, such as energy efficiency, reuse of materials or, among others, issues related to our cultural and historical heritage, considered from an updated perspective.

In this regard, a fundamental part of the mission of the fib is to synthesise the latest research in design and construction to facilitate innovation and the smart use of concrete. Our federation has produced outstanding contributions in the last years and is currently devoted to a new edition of the Model Code, expected to be completed in 2020. This huge task, based on the sound tradition of the past fib's Model Codes, provides to worldwide users a consolidated synthesis of recent knowledge. The Model Code 2020 addresses both the design of new structures and the assessment and refurbishment of existing constructions, whose service life can be extended – perhaps for different purposes. There is no doubt that the enormous challenge of preparing such a document will contribute to the increased and improved use of concrete in the near future, inspiring updated supra-national and regional codes.

Considered from the above-described perspective, our Awards seek to recognise the outstanding, whether the concrete is visible or not, whether it is a new or an existing structure, making true once again the Vitruvian virtues: *Firmitas* (bearing capacity and durability), *Utilitas* (functionality) and *Venustas* (beauty, aesthetical adequacy) in mutual equilibrium.

I encourage you to leaf through this book, which contains some of the outstanding achievements of the worldwide Structural Concrete community during the past four years. I hope you will enjoy reading about the best new Concrete Structures as we present the Outstanding Concrete Structures Awards at the 5th fib's Congress in Melbourne in October 2018.



# fib BULLETIN NO. 88

## TITLE: SUSTAINABILITY OF PRECAST STRUCTURES

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### Abstract:

Sustainability is a crucial concept. Sustainability was first introduced in the fib by creating a Special Activity Group under the convenorship of Prof Sakai. This group encouraged and helped all fib commissions to create their own groups dealing with sustainability. The fib Commission 6 “Prefabrication” took up this challenge and created a Task Group called “Sustainability of Structures with Precast Elements” in 2012. The group was created as a joint group with PCI (Precast Concrete Institute of USA), with the then-active fib Commission 3 “Environmental aspects of design and construction”, and the fib’s SAG8 on Sustainability. Therefore, this Bulletin 88 is a joint publication between PCI and fib.

The aim of the work was to gather and study the most recent work that has been developed regarding sustainability – and more particularly Life Cycle Assessment – of structures in which precast elements are used. The final aim of the group would be to provide recommendations for the study and assessment of structures built with precast elements. It will cover all aspects of this kind of structure, from planning, design, execution, use, maintenance and remedial activities to deconstruction, reuse, demolition and recycling.

The fib holds sustainability as a high priority, which triggered the creation of a new Commission 7 “Sustainability” during the 2015 fib commissions reorganisation. This commission has been chaired since then by Prof Hájek. Sustainability concepts were already introduced in the Model Code 2010 and are a key part in the elaboration of the Model Code 2020.

Experts from many parts of the world contributed to this fib Bulletin 88 which gives the document a broad overview of sustainability sensibilities across different continents.

Bulletin 88 starts with a description of the importance of environmental concepts and developments in the world today and the reason why sustainability is a crucial concept that will be even more important in the future. The document then focuses on the different advances of standards and regulations that have been developed or are in the process of being implemented. ISO, European regulations, North American regulations, Brazilian implementation in real precast companies and the developments of the fib Model Codes have been considered in this bulletin.

After that, the bulletin examines life cycle aspects of precast structures, taking former fib bulletins as a basis. Then, it moves on to an in-depth study of specific sustainability aspects of precast structures.

Then, the bulletin deals with the special methodologies and tools that are available around the world to handle sustainability in general and with precast structures in particular. A selection of tools is described in this chapter. The Task Group also developed proposals about how to deal with the sustainability of precast structures. Some of the proposals are described conceptually in the text.

The final chapter compiles several case studies or examples of sustainability applications of precast structures. The examples differ and are grouped by category: buildings, infrastructure and special works.

The task group continues to work on developing other documents that will focus on the detailed practical application of some of the sustainability models described in this document.

The Commission is grateful to all the Task Group members for this accomplishment, particularly to David Fernández-Ordóñez, who convened and led the Group successfully.

