International Federation for Structural Concrete
Fédération internationale du béton

The *fib*, organisation and the Model Code

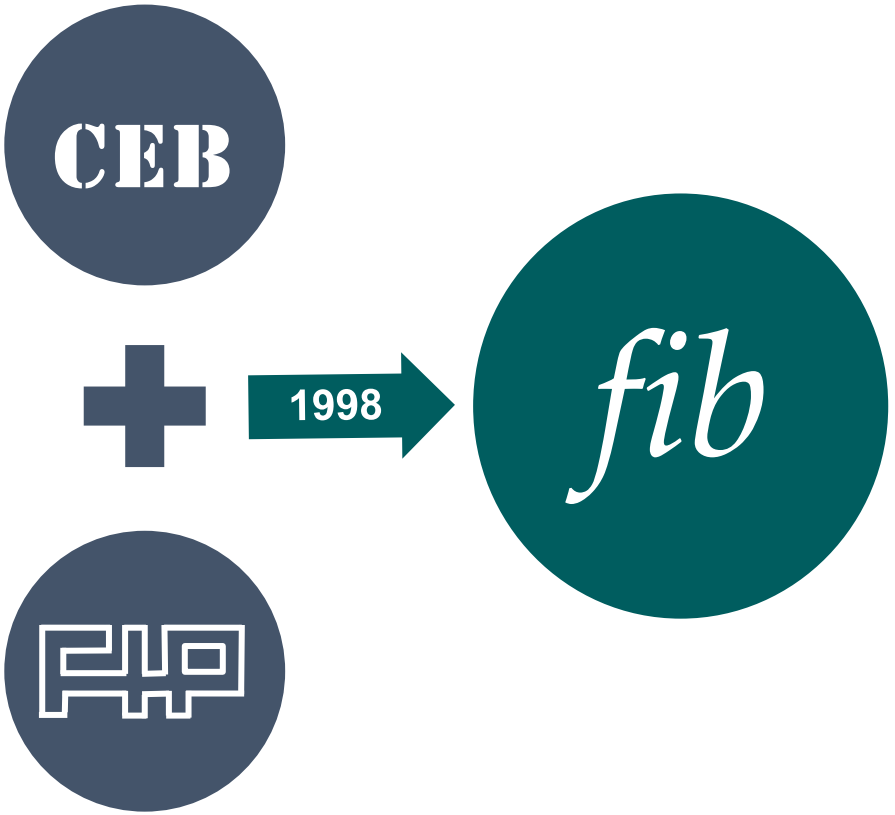
Photo ©Loic Gardiol

David Fernández-Ordóñez
fib Secretary General
September 2016

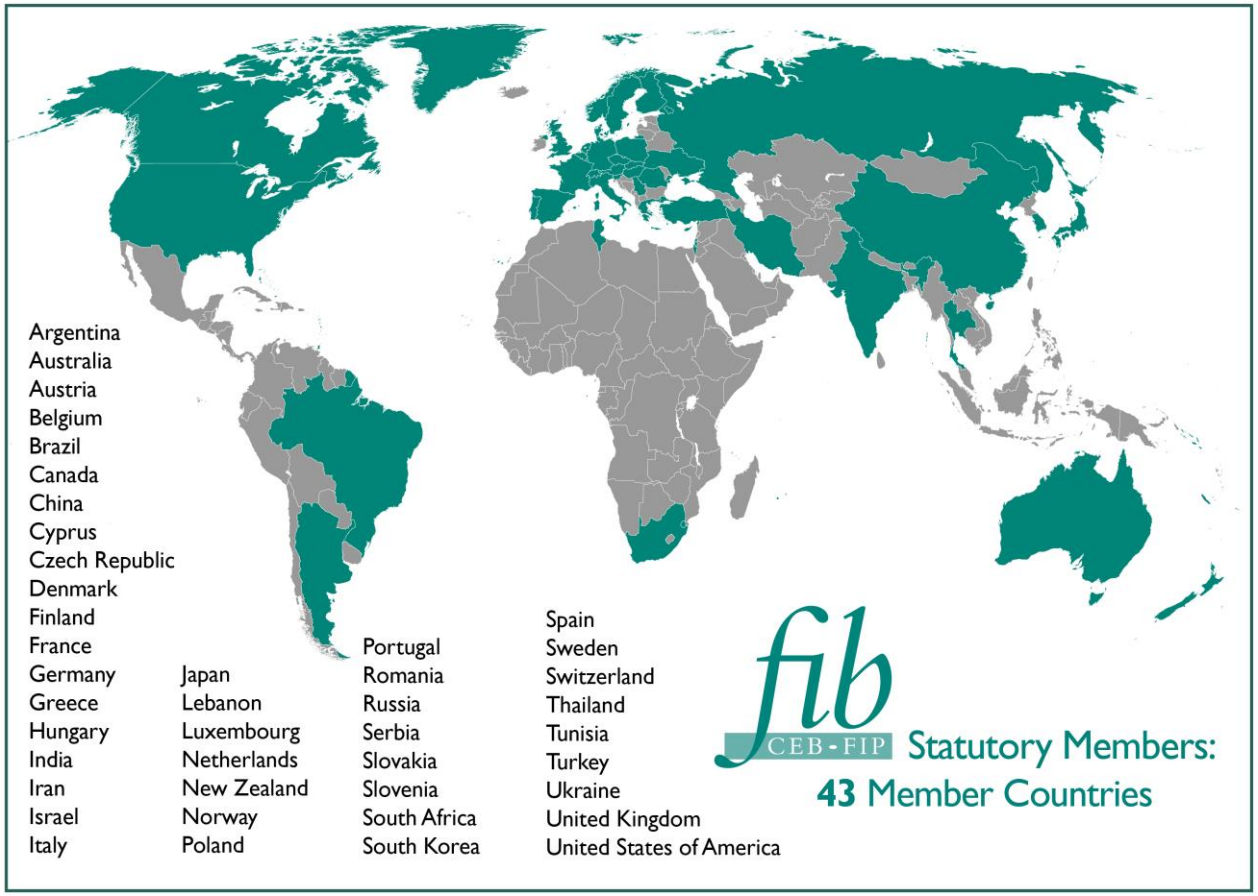
Creation of the *fib*

Euro-International
Committee for Concrete
Comité euro-internationale du béton
1953

International Federation
for Pre-stressing
Fédération internationale
de la précontrainte
1952



2016 Statutory member countries



Brazilian National Member Group associations:

- **ABCIC**
- **ABECE**

Brazil in *fib's* structure

The National Member Group of Brazil is composed by:

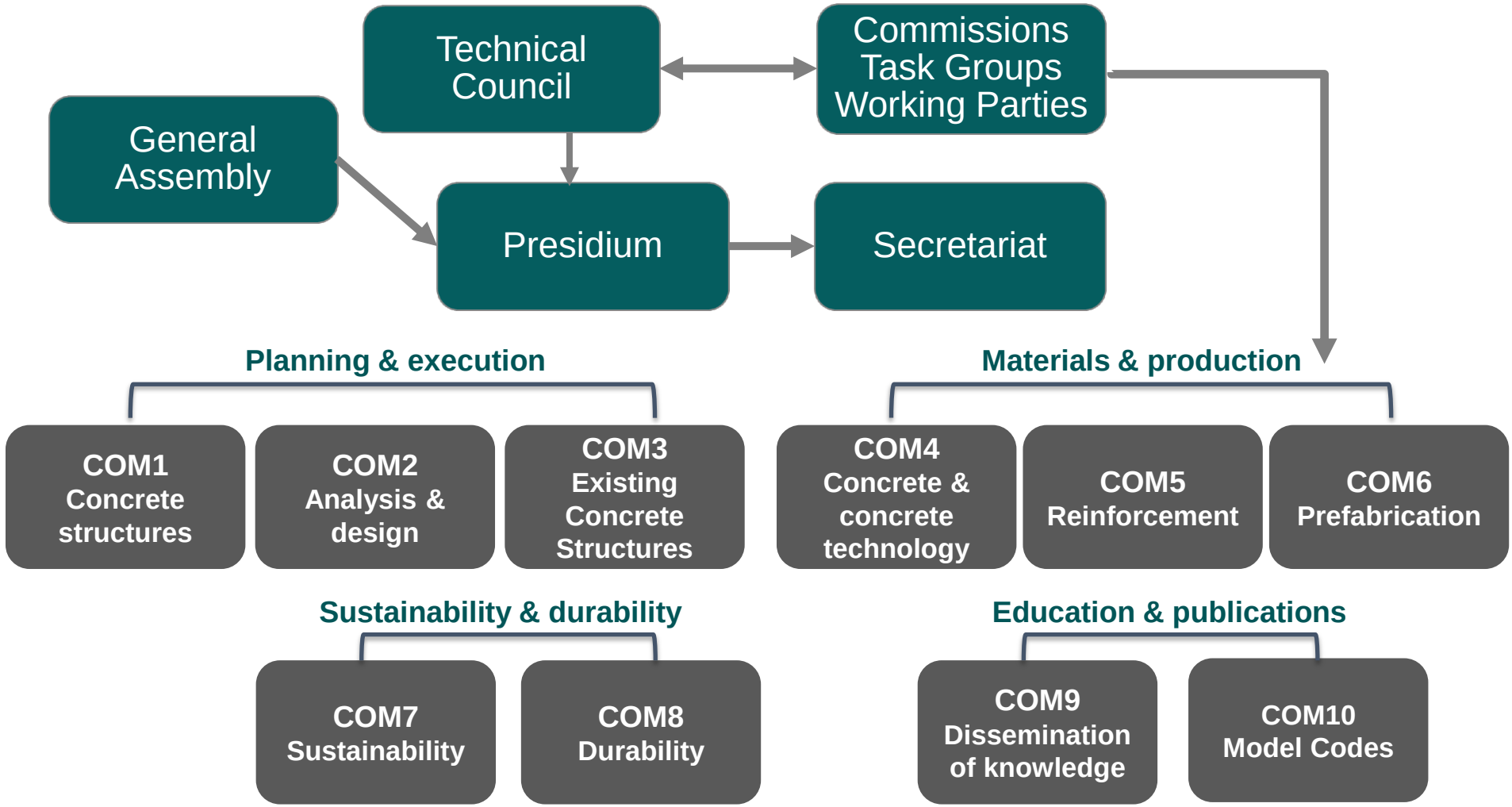
ABCIC and ABECE

- Fernando Stucchi is the Head of Delegation, he is fib Honorary Life Member and Chair of the Jury for Young Engineers Award for two mandates. He is representative in MC2020 for Brazil and South America
- Iria Licia Oliva Doniak is in the Presidium of *fib* and deputy proposed by Abcic
- Marcelo Ferreira is Delegate of Brazil in *fib* proposed by Abcic
- Lídia Shehata is Deputy of Brazil in *fib*, proposed by Abece
- Active members in Commissions and Task Groups
  - Eduardo Millen in Task Group 6.1 "Hollow core Slabs"
  - Iria Doniak in Commission 6 Prefabrication and Task Groups 6.2 "Quality control of precast concrete elements", 6.3 "Sustainability" and 6.7. "Precast concrete in tall buildings", Author of Bulletin 60 Affordable Housing.
  - Mounir Khalil El Debs in Commission 6 Prefabrication
  - Paulo Helene, in Task Group 6.3 "Sustainability of Precast Structures"
  - Marcelo Waimberg, in Task Group 6.5 " Precast Bridges"

Mission and Objectives of the *fib*

"To develop at an international level the study of scientific and practical matters capable of advancing the technical, economic, aesthetic and environmental performance of concrete construction." *Statutes of the fib*

The *fib's* structure



The *fib's* structure

New idea under revision: ***fib* Young Professionals Group**

Some countries have started to develop groups for young professional

Countries with organised groups;

- Spain
- UK

Other countries are starting to get connected:

- Norway
- Czech Republic
- Switzerland

Please get in touch with *fib* Secretariat to connect with other young professionals.

2015-16 *fib* presidium members

Harald S. Müller
Germany
President

Hugo Corres Peiretti
Spain
Dep. President

Gordon Clark
UK
Past President

Josée Bastien
Canada

Frank Dehn
Germany

Marco di Prisco
Italy

Iria Doniak
Brazil

Stephen Foster
Australia

Akio Kasuga
Japan

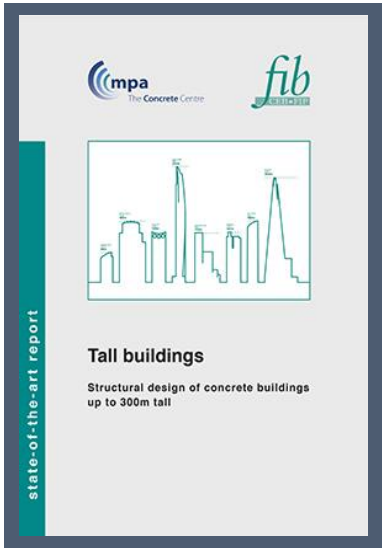
Aurelio Muttoni
Switzerland

Tor Ole Olsen
Norway

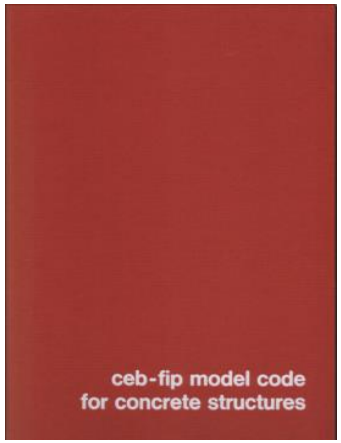
David Fernández-Ordóñez
Secretary General

Results of commissions and task groups are published as fib bulletins

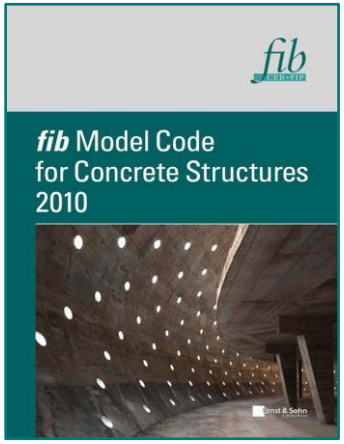
- Technical reports
- State-of-the-art reports
- Textbooks
- Manuals or guides
- Recommendations
- Model Codes



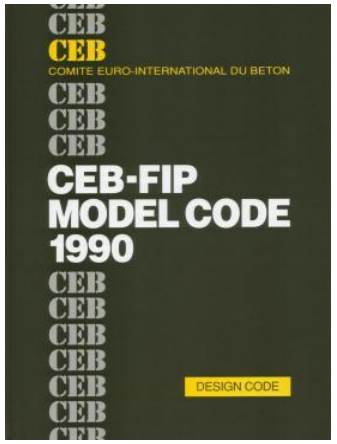
Evolution of Model Codes



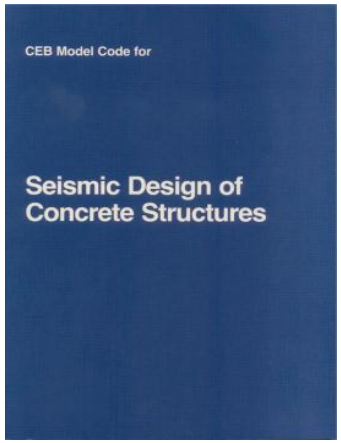
Model Code 1978



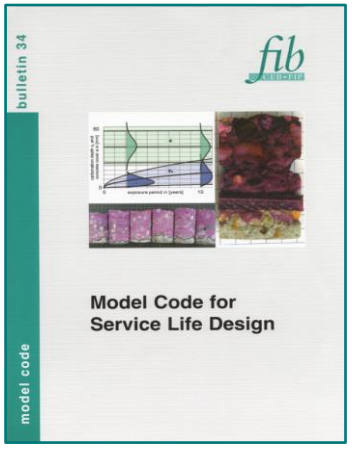
Model Code 2010



Model Code 1990



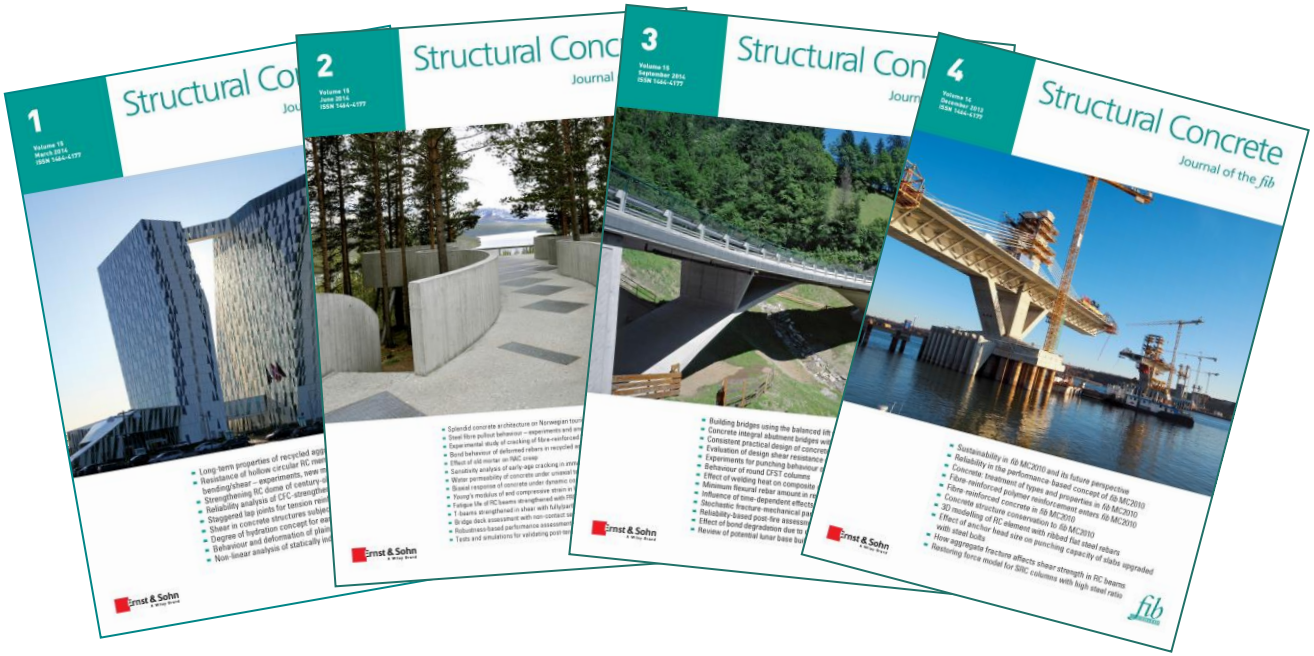
CEB Bull. 165 Seismic Design



fib Bull. 34 Service Life Design

The *fib's* Structural Concrete journal

Impact factor 2015: 1.023



Upcoming symposia, congresses and supported events

2016 Symposium
Performance-based approaches for concrete structures

2017 Symposium
High tech concrete: Where technology and engineering meet!

Maastricht
June 12-15, 2017
***fib* symposium 2017**

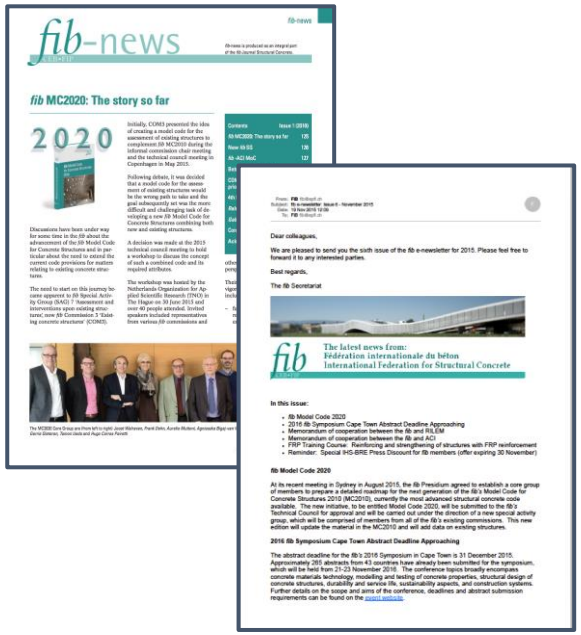
2018 Congress
5th Congress of the International Federation for Structural Concrete
8-11 October - Melbourne, Australia

2018 PhD Symposium
12th International PhD Symposium in Civil Engineering
28-29 August – Prague, Czech Republic

2019 Symposium
Concrete: Innovations in materials, design and structures
27-29 May - Krakow, Poland

Staying informed about the *fib*

- *fib*-news
  - Quarterly newsletter published in the *fib's Structural Concrete* journal
- e-newsletter
  - Sent by e-mail every 6 weeks
- Follow-us on social media
  - LinkedIn
  - Facebook



Website: www.fib-international.org
e-mail: info@fib-international.org

International cooperation

- Memoranda of cooperation signed in 2015 with:
  - ACI 

  - RILEM 

- Promote coordination between the organizations
- Arrange relevant joint activities
- Ensure effective coverage of fields of interest
- Find suitable solutions for joint publications

International cooperation (cont'd)

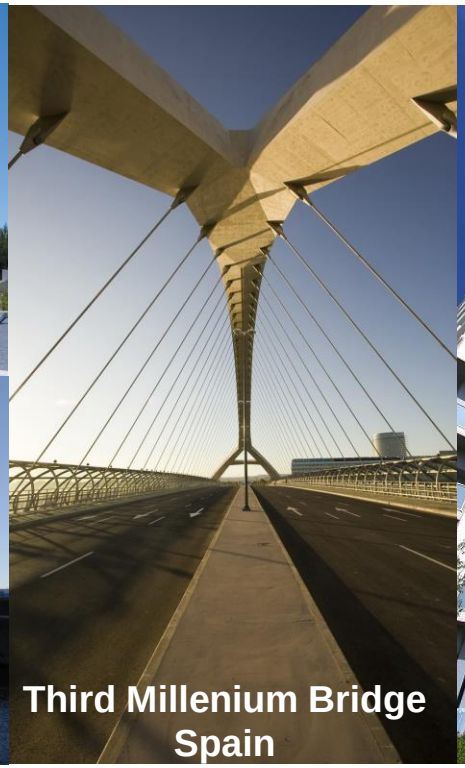
Members of the Liaison Committee for Associations for Civil Engineering

CIB International Council for Research and Innovation in Building and Construction	**ECCS** European Convention for Constructional Steelwork	***fib*** International Federation for Structural Concrete	**IABSE** International Association for Bridge and Structural Engineering	**IASS** International Association for Shell and Spatial Structures	**RILEM** International Union of Laboratories and Experts in Construction Materials, Systems and Structures

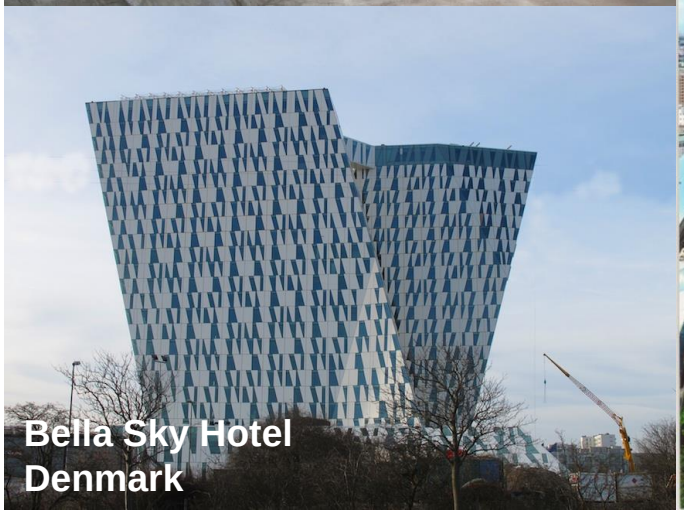
fib Awards and honours

Freyssinet Medal	**Recognizes outstanding technical contributions in the field of structural concrete**
Medal of Merit	**Recognizes outstanding contributions to structural concrete and to the *fib***
Honorary Life Members	**Recognizes significant personal contributions to the work of the *fib***
Awards for Outstanding Concrete Structures	**International recognition for concrete structures which demonstrate the versatility of concrete as a structural medium**
Achievement Award for Young Engineers	**Recognizes engineers younger than 40 years old**

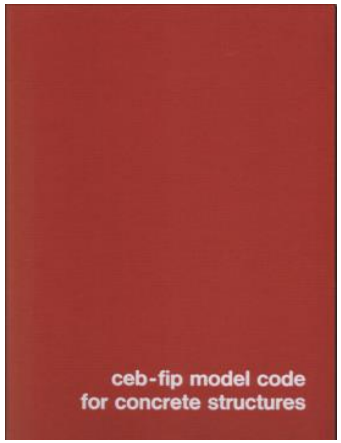
2010 Award-winning concrete structures



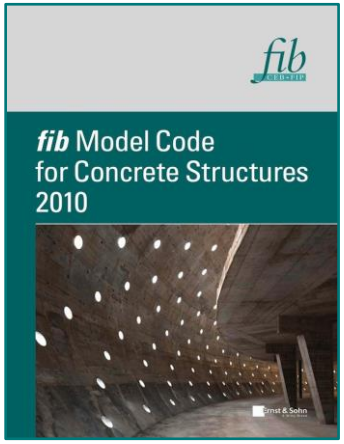
2014 Award-winning concrete structures



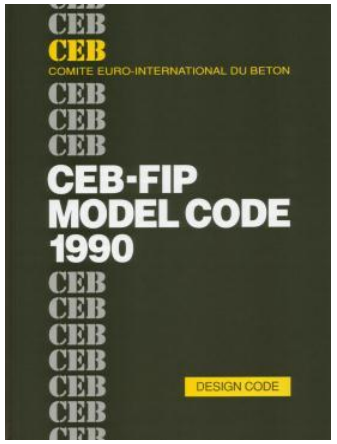
Evolution of Model Codes



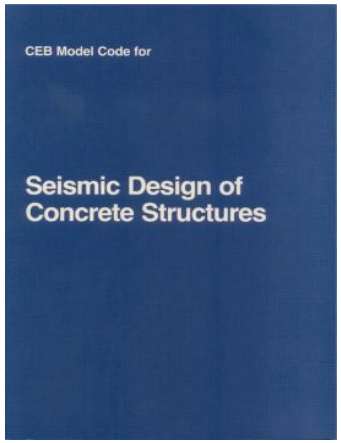
Model Code 1978



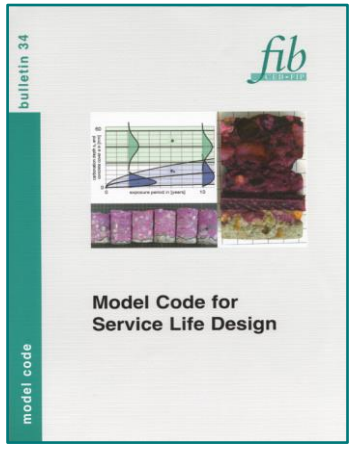
Model Code 2010



Model Code 1990



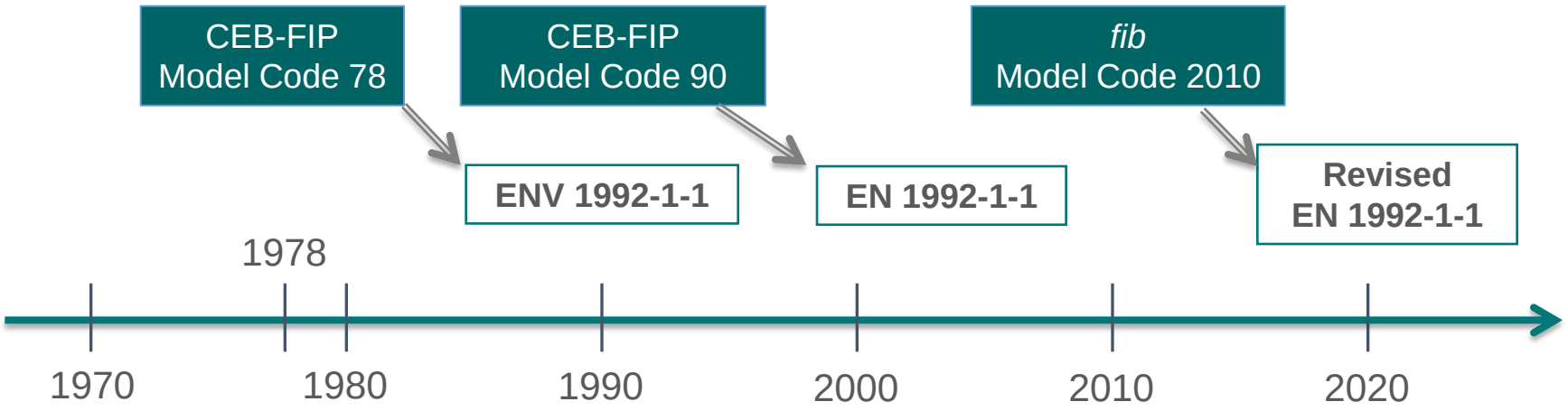
CEB Bull. 165 Seismic Design



fib Bull. 34 Service Life Design

Impact of *fib* (CEB-FIP) Model Codes

Strong influence on Eurocodes



Pronounced influence on Asian and African Model Codes

Model Codes are used as reference documents both in research and in design

Background and motivation for *fib* MC2020

Need to extend *fib* MC2010 for matters relating to existing concrete structures

Initiative launched by *fib* COM3 Existing concrete structures

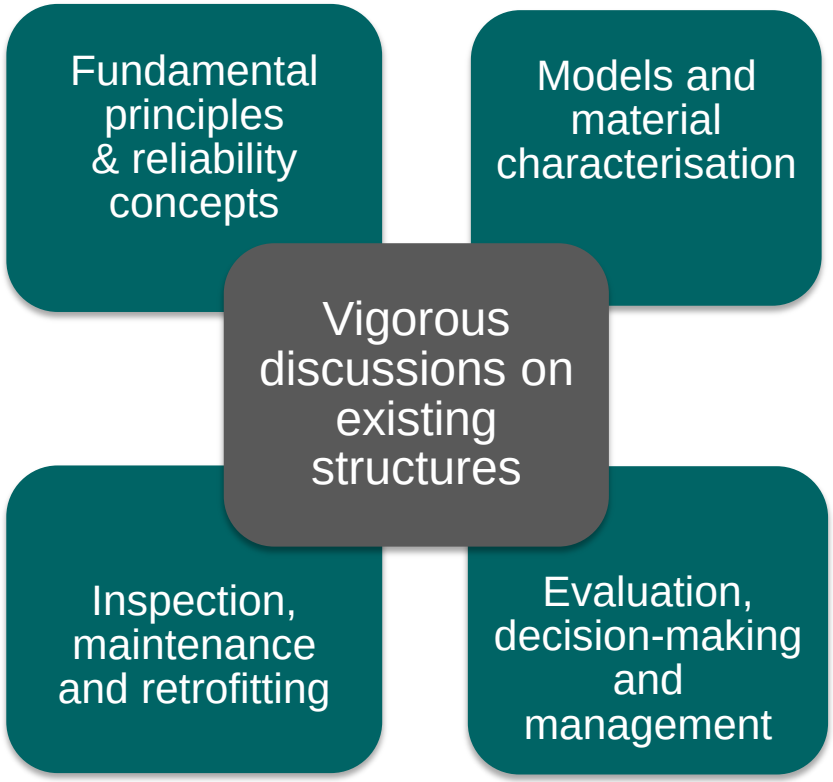
Brainstorming at TC Meeting in Copenhagen 2015

Major outcome of the TC Meeting in Copenhagen:
Decision to develop a new, combined Model Code for Concrete Structures dealing with both new ***and*** existing structures
MC2020

MC2020 Workshop in The Hague

- Hosted by TNO in June 2015
- Over 40 participants
- Invited speakers from *fib* commissions and other organisations

YouTube videos of Presentations



Workshop Summary:
Possible ways forward and aspirations for linking and addressing the requirements for new and existing structures

MC2020 – *fib* Presidium in Sydney

- Presidium members considered summary findings from the workshop in The Hague
- Formed a core group to develop a detailed roadmap for the MC2020 initiative

MC2020 Core Group

Agnieszka Bigaj-van Vliet	Hugo Corres Peiretti	Frank Dehn	Gerrie Dieteren	Giuseppe Mancini
Stuart Matthews	Aurelio Muttoni	Tamon Ueda	Joost Walraven	

MC2020 Core Group Meeting
Madrid – December 2015

Identified overarching goals for the publication:

- MC2020 will be a single, merged structural code for new *and* existing structures
- Will be an operational model code and oriented towards practical needs
- Include worldwide knowledge with respect to materials and structural behaviour
- Recognize the needs of engineering communities around the world

MC2020 Content

- Take an integrated life cycle perspective
- Provide a holistic treatment of structural safety, serviceability, durability and sustainability
- Define fundamental principles and a safety philosophy based on reliability concepts
- Use performance based concept to remove specific constraints for novel types of concrete and reinforcing materials

MC2020 Content (cont'd)

- Include fully integrated provisions based on generalized models and implementation of the level of approximation approach applicable for both the design of new structures and assessment activities
- Take full advantage of information that can be acquired by testing and monitoring of existing structures
- Address robustness and redundancy
- Consider material degradation and insufficient or deficient detailing of material and behaviour models

MC2020 Content (cont'd)

- Consider needs for model improvement and treatment of uncertainties in models and model parameters for existing structures and (phased) construction of interventions
- Address through-life management aspects
- Give attention to new types of concrete/repair materials
- Address end-of-service-life issues such as demolition, disposal, recycling, etc.

MC2020 – specific aspects of concrete

- Makes use of the **performance based concept** to close the gap between material engineers and structural engineers and to **remove specific constraints for novel types of concrete and reinforcing materials**
- Gives **particular attention to new types of concrete and new techniques for construction and (remedial) interventions**, which include defining test methods and creating a framework for testing and performance evaluation of concrete with supplementary binding materials and novel types of aggregates

MC2020 - Materials

- More attention for measurement of certain parameters, mainly in existing structures
  - measurement methods
  - combination of methods
  - uncertainties
  - data evaluation
- Definition of tests methods to enable defined performance material design
- Combination of tests results with *a priori* knowledge
- New materials, old materials and deteriorating materials incl. materials for interventions
- Include interaction between old and new materials
- Seek cooperation with RILEM

MC2020 - Concrete

- Addition of new materials
  - Concrete with supplementary binding materials and novel types of aggregates
  - Create framework for testing and evaluation of results
  - Develop general approach from principles of different applicable limit states
  - Define testing methods
  - New materials including new materials interventions
- Assessment of concrete properties not only on the basis of concrete strength
- For old concrete mixtures addition of different creep and shrinkage models due to usage of different materials.

MC2020 Next Steps

- Submission of terms of reference for approval by the *fib* Technical Council in June 2016
- Kickoff Meeting of the newly formed COM10 and T10.1 on 14-15 October 2016
  - Establish a shared vision of tasks
  - Prepare a draft contents for MC2020
  - Identify authors and contributing groups
- Further workshops:
  - Tokyo 1 September 2016
  - Cape Town 24 November 2016
  - ACI convention March 2017
  - Maastricht June 2017

Commission 6. Prefabrication

Background and scope

Prefabrication plays an important role in structural concrete construction worldwide and is evolving continuously, to cope with current society's habits and needs related to housing, commercial buildings and civil engineering works. In fact, industrialized construction may bring cost efficiency, good quality and environmentally friendly solutions, able to adapt to market demands.

The basic goal of the Commission Prefabrication is to enhance the progress of precast concrete, linked to the state of art. The general scope is to promote the understanding, not only by the specialists, of design concepts, technology and use of precast concrete.

Commission 6. Prefabrication

fib Commission 6 Implied objectives are:

- to stimulate and coordinate R&D internationally;
- to transfer the output into planning, practical design and construction, by means of Technical Reports, State of Art Reports, Guides to Good Practice, Handbooks;
- to disseminate knowledge with seminars, courses, educational material;
- to contribute to recommendations, pre-normative documents and codes within standardization bodies.

Commission 6. Prefabrication

The areas considered in the scope of the technical work are all those of interest for structures in their application to precast concrete, namely:

- Structural efficiency: Structures that occupy less volume inside the building and can easily accommodate equipment are increasingly requested. Structural efficiency helps also to save material, weight and consequent savings in the whole resisting system, down to foundations.
- Flexibility in use: Buildings are frequently required to meet variable needs of users, achieved by creating large structure-free internal spaces, without restrictions for possible subdivisions. Also, the elements typology must be open to variations.
- Adaptability: Less demolition of entire buildings and more adaptation of older buildings to new requirements will be increasingly required. The design concept should facilitate such renovations and modifications, e.g. changing partitions and closures without demolishing the main structure.

Commission 6. Prefabrication

The areas considered in the scope of the technical work are all those of interest for structures in their application to precast concrete, namely:

- Best use of materials: Each construction material possesses specific properties and optimal applications. The trend is to use a combination of different materials suited for the particular function among the structural and the architectural components.

- Speed of construction: Construction sites disturb the surrounding space, by increasing noise, generating dust and disturbing traffic; their duration must be as short as possible. The economic advantages of reduced construction time is obvious.

Commission 6. Prefabrication

The areas considered in the scope of the technical work are all those of interest for structures in their application to precast concrete, namely:

- Quality consciousness: Structural safety, robustness and durability, quality of materials and execution as well as user-friendliness, comfort, aesthetics are considered. Also, the quality within production, starting from the work conditions, continuing with the working effectiveness, and up to the end results.

- Sustainability: Preserving the environment is of paramount importance on global scale, by a conscious life-cycle design. In addition to encouraging the reuse of structures for adaptability, further issues are the use of raw materials, reduction of emissions, recycling elements and/or materials, waste dumping, etc.

Commission 6. Prefabrication

Description of workflow and timeline:

COM6 work is performed within task groups, activated and disbanded as topics are defined and addressed. The relevant fields, possibly with the involvement of other groups, are:

Basic research:

- performance of elements, connections, assemblies, by experimental testing and analytical modeling;
- overall structural behaviour, durability, robustness;
- resistance to fire, fatigue and accidental actions, repair and retrofit.

Commission 6. Prefabrication

Description of workflow and timeline:

COM6 work is performed within task groups, activated and disbanded as topics are defined and addressed. The relevant fields, possibly with the involvement of other groups, are:

Application of new materials:

- high-performance concrete;
- high-strength lightweight concrete;
- self-compacting concrete;
- fibre-reinforced concrete;
- non-metallic reinforcements

Commission 6. Prefabrication

Description of workflow and timeline:

COM6 work is performed within task groups, activated and disbanded as topics are defined and addressed. The relevant fields, possibly with the involvement of other groups, are:

Production technologies and products:

- connections;
- optimization of processes;
- hollow-core floors;
- bridge components;
- railway track systems;
- cladding panels;
- towers for wind power generation
- seismic construction;
- affordable cost construction.
- sustainability

Commission 6. Prefabrication

Description of workflow and timeline:

COM6 work is performed within task groups, activated and disbanded as topics are defined and addressed. The relevant fields, possibly with the involvement of other groups, are:

Normative and pre-normative work:

- pre- and post-normative studies, aimed at supporting the development of codes and standards;
- interaction with fib commissions and contribution to the fib Model Code for Concrete Structures 2010;
- elaboration of Recommendations and Guides to Good Practice on production, handling, erection and maintenance of precast elements and structures.

Commission 6. Prefabrication

Description of workflow and timeline:

COM6 work is performed within task groups, activated and disbanded as topics are defined and addressed. The relevant fields, possibly with the involvement of other groups, are:

Dissemination of knowledge:

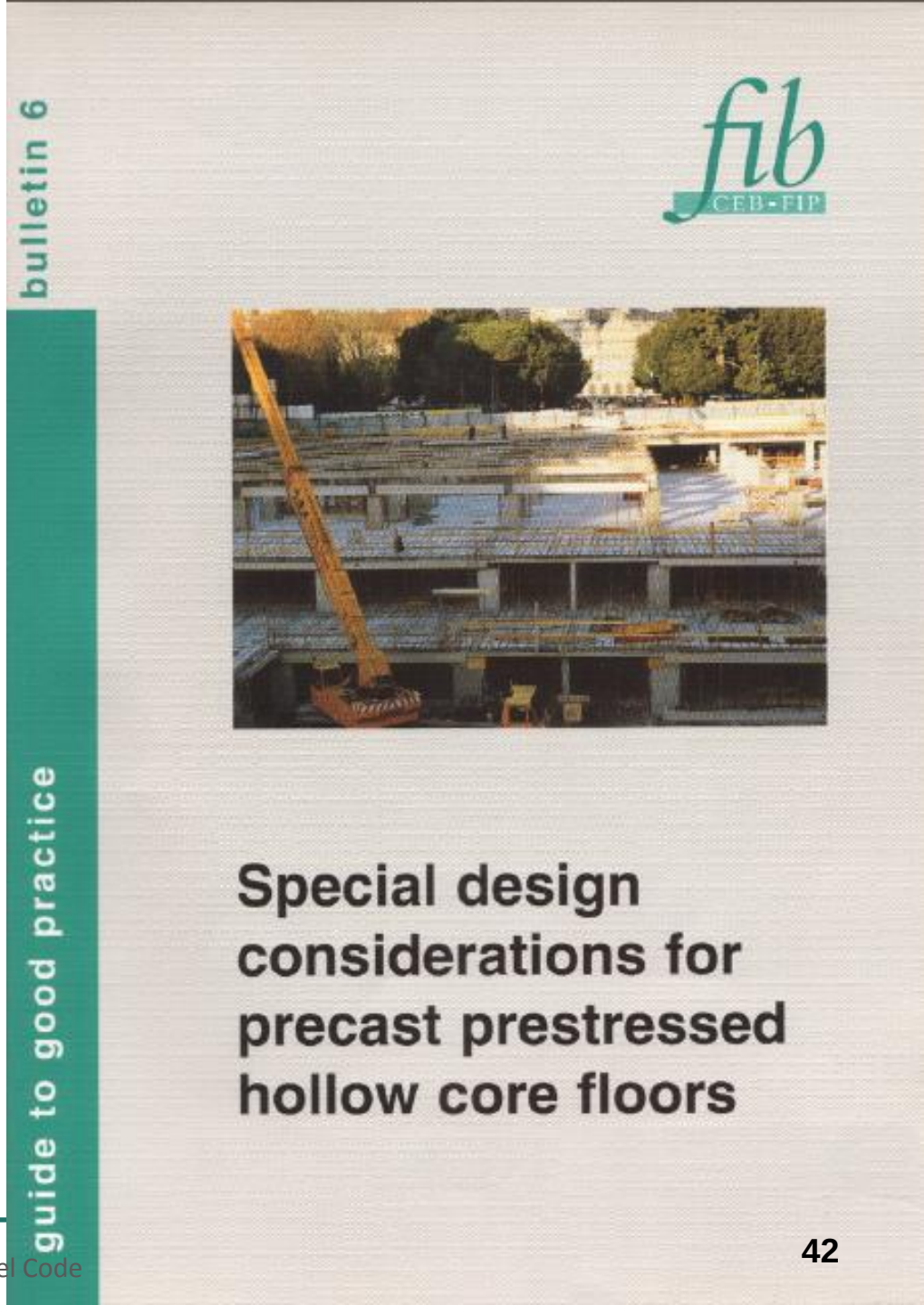
- publications;
- organization of short courses;
- seminars and workshops for professionals;
- dedicated sessions at congresses and symposia.

Commission 6 Prefabrication

Bulletins, published

Bulletin 06

Hollow Core Floors

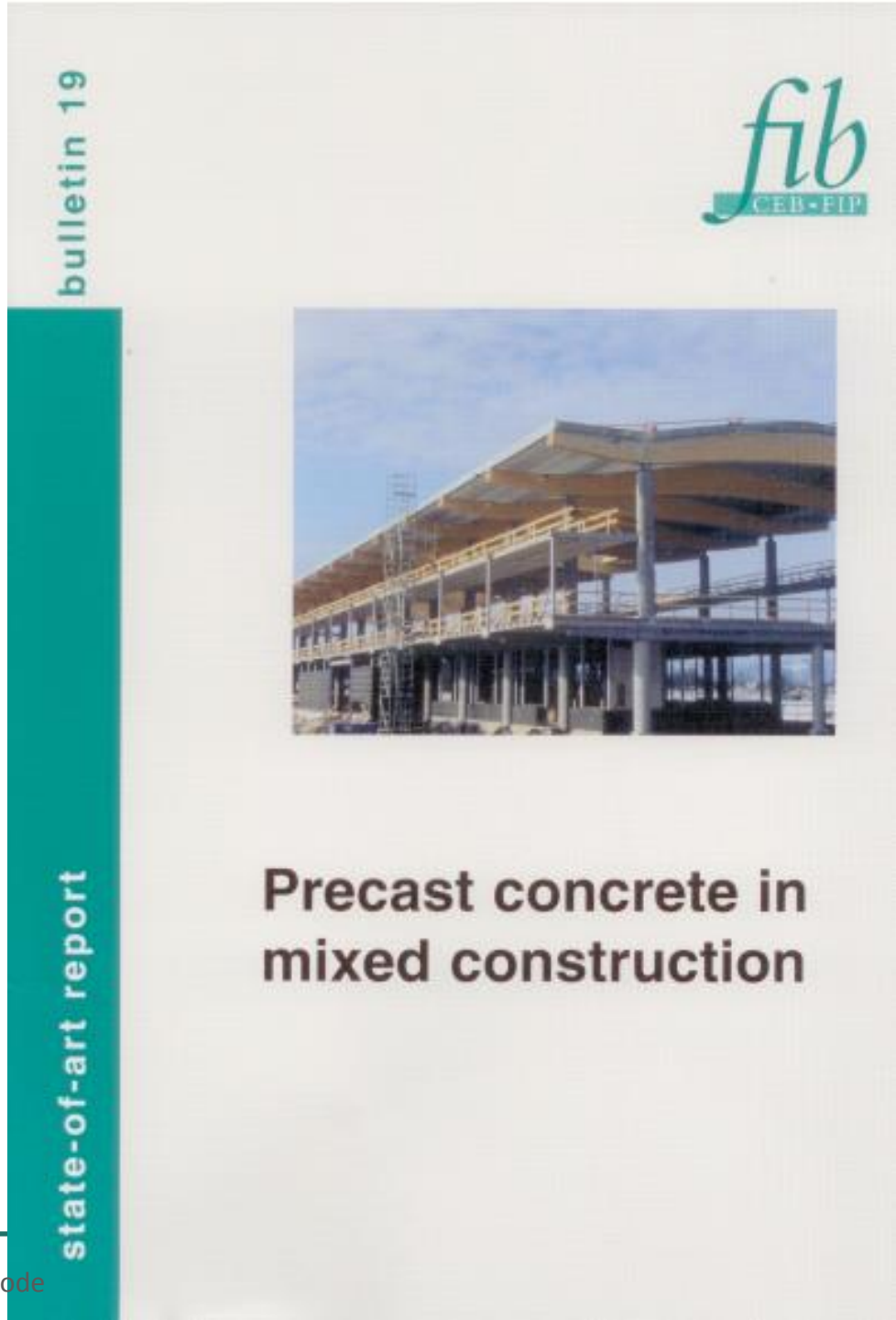


Commission 6 Prefabrication

Bulletins, published

Bulletin 19

Precast concrete in mixed construction

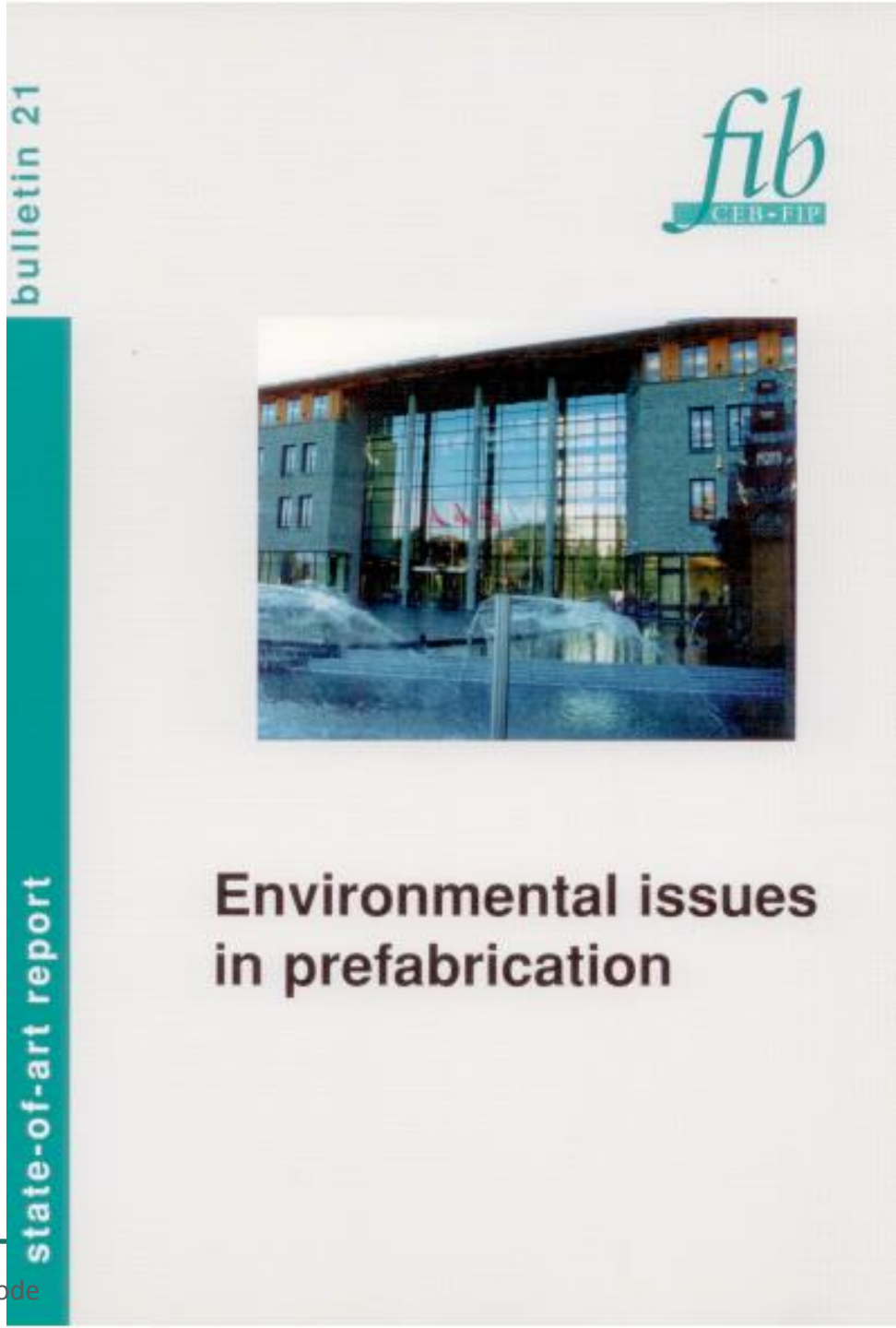


Commission 6 Prefabrication

Bulletins, published

Bulletin 21

Environmental issues in prefabrication

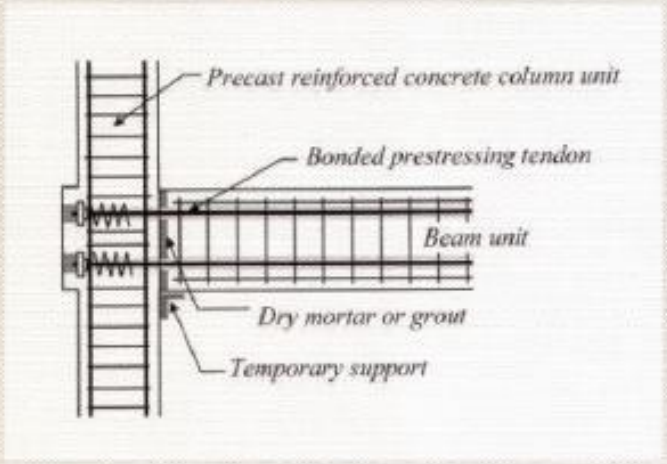


Commission 6 Prefabrication

Bulletins, published

Bulletin 27

Seismic design of precast concrete structures



Commission 6 Prefabrication

Bulletins, published

Bulletin 29

Precast concrete bridges

Commission 6 Prefabrication

Bulletins, published

Bulletin 37

Precast concrete railway track systems

Commission 6 Prefabrication

Bulletins, published

Bulletin 41

Treatment of imperfections in precast structural elements

Commission 6 Prefabrication

Bulletins, published

Bulletin 43

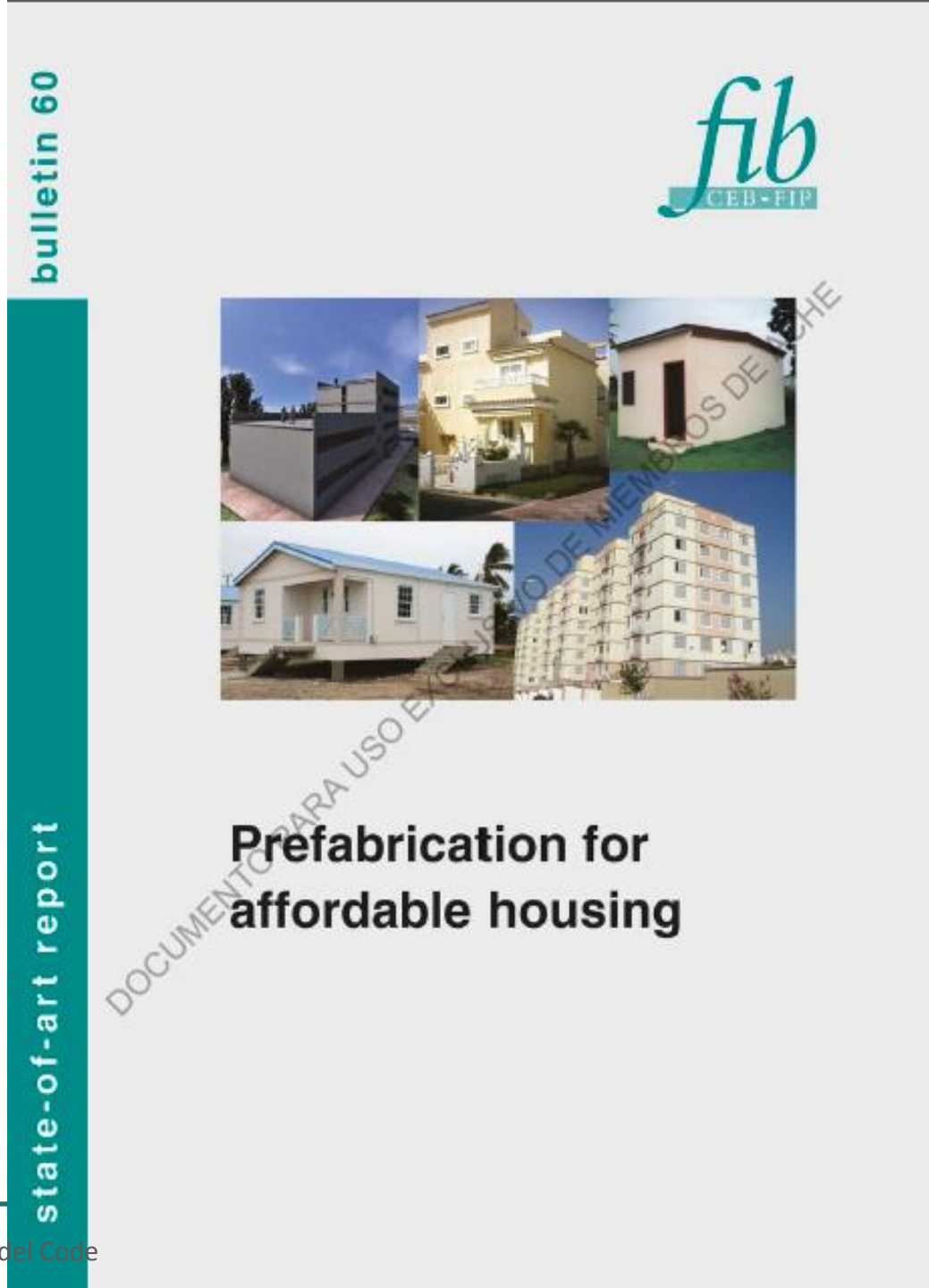
Structural connections for precast concrete buildings

Commission 6 Prefabrication

Bulletins, published

Bulletin 60

Prefabrication for affordable housing



Commission 6 Prefabrication

Bulletins, published

Bulletin 63

Design of precast concrete structures against accidental actions

Commission 6 Prefabrication

Bulletins, published

Bulletin 74

Planning and design handbook on precast building structures

Commission 6 Prefabrication

Bulletins, published

Bulletin 74

Planning and design handbook on precast building structures

ISSN 1562-3610
ISBN 978-2-88394-114-4

Planning and design handbook on precast building structures

Contents

Fédération internationale du béton
International Federation for Structural Concrete
www.fib-international.org

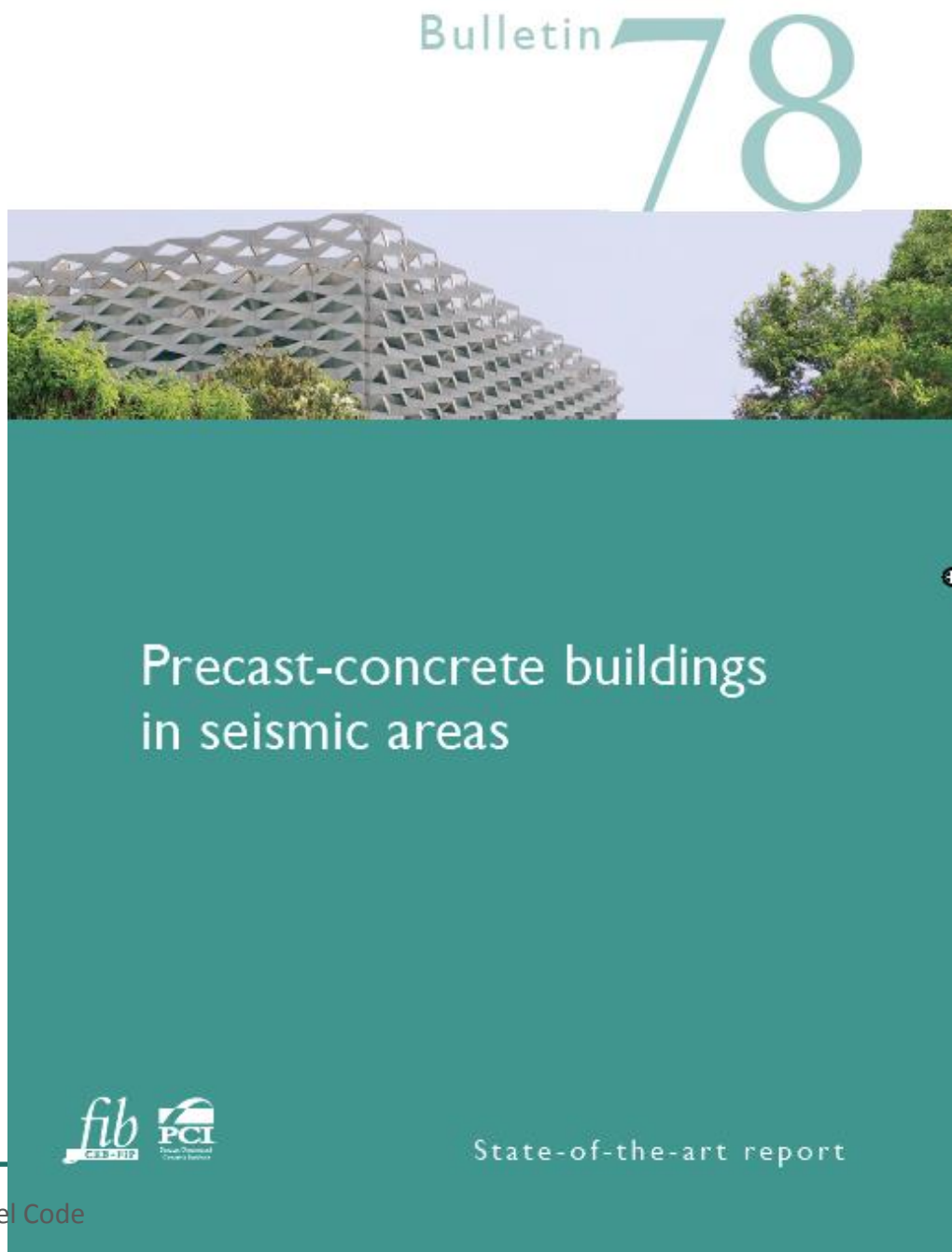
Commission 6 Prefabrication

Bulletins, published

Bulletin 78

Precast Concrete Buildings in Seismic Areas

In cooperation with PCI



Commission 6 Prefabrication

Bulletins, to be published

- **Precast concrete sandwich panels**
- **Hollow core floors**
- **Quality control of precast concrete elements**
- **Precast concrete towers for wind power generators**
- **Sustainability of structures with precast elements**
- **Retrofitting of precast seismic structures**
- **Precast concrete in tall buildings**
- **Terminology of precast concrete. Web application.**

The use of higher quality materials

- Self Compacting Concrete in production as a regular concrete
- The use of specially designed concrete for particular cases, like durability or fire resistance. In accordance with Performance Based Design
- The use of Ultra High Performance Fibre Reinforce Concrete to avoid mild reinforcement

The Future of Prefabrication

The use of higher quality materials

- **UHPFRC. Ultra High Performance Fibre Reinforced Concrete. Use in Bridges. Game Changer. 100m span bridge without stirrups.**

Sustainability

- **Sustainability will be the key decision aspect for the way to build in the future**
- **At first will be environmental aspects like EPD (Environmental Product Declarations) and other limitations**
- **It will be important to give value thermal mass and energy efficiency.**
- **Later will be decisions taking into account the whole life of the structure.**
- **Both Economic aspects in the whole life and social aspects will be considered.**

Sustainability

- EPD
- Brazil has a very good start with Sello Abcic of Quality Control in level 3 with includes Social and Environmental aspects. It will be included in the new publication of Sustainability of precast structures T6.3 in *fib.* To be published shortly.

Environmental Declaration ISO/DIS 14025 Type III

CONTIGA

Miljødekke

EPD

Næringslivets Stiftelse for Miljødeklarasjoner
NEPD nr.11N
Godkjent av Stiftelsens Verifikasjonskomité
Gyldig til 31.12.2005

Deklarasjonen er utarbeidet av
Stiftelsen Østfoldforskning

Miljødekke er produsert av:
Contiga AS
Kontaktperson: Jørn Injar
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Organisasjons nummer: No 917 507 837
EMAS/ISO-14001 reg.No.: -/-

Produktspesifikasjon:

	Andel av total [%]	*Data quality*	*Masse [kg/m2 element]*
Sand	48,5	Stedsspesifikke data	192,3
Pukk	11,5	Stedsspesifikke data	45,6
Miljøpukk	20,4	Stedsspesifikke data	81,1
Sement	12,5	Stedsspesifikke data	49,4
Additiver	0,1	Under cut-off	0,5
Vann	1,8		7,0
Slamvann	3,9	Fra egen produksjon	15,4
Armering	1,3	Generelle data	5,2
Total			396,6

Bakgrunns informasjon:
Studien omfatter hele livsløpet.
Funksjonell enhet: 1m^2 hulldekkelement HD265, basert på element 12 m med 8 spenntau.
Årstall for studien: 2000
Datagrunnlag: Råvaredata fra 1998-01
Antatt levetid: 100 år
Produksjonssted: Contiga AS, Moss
Antatt markedsområde: Østlandsområdet.

Leverandørers miljøstyringssystem

- Contiga har for tiden ingen krav til leverandører om

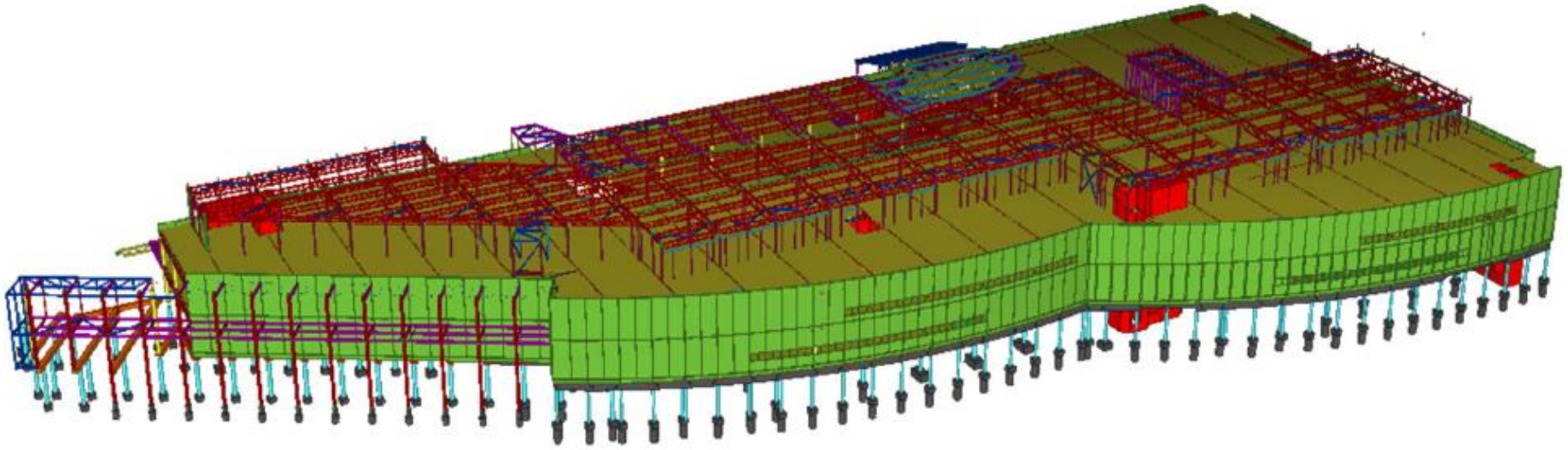
Annen bedriftsspesifikk informasjon

Contiga AS er leverandør av stål- og betongelementer.

The use of advanced production methods

- Most of the advancements in production for construction have been implemented in prefabrication first
- Automation and individualisation.
  - Automatization of reinforcement
  - Individualization of reinforcement
  - Individualization of element production
- Robotization of element production
  - Change in design of factories
  - New possibilites for design of elements

New design tools. BIM Systems



New design tools. BIM Systems

- BIM systems applied to structure and element definition
- BIM systems applied to shop drawings
  - Reinforcement definition
  - Accessories definition
  - Connections
- BIM systems in coordination with design and calculation
  - Design in BIM models
  - Calculations made in coordination with BIM geometry
  - Other tasks in accordance with structure. Heating, ventilation, air conditioning. Architecture
- BIM systems for management. 4D, 5D
  - 4D. Schedule. Production control. Erection control
  - 5D. Economic control
  - 6D? and more

International Federation for Structural Concrete
Fédération internationale du béton

David Fernández-Ordóñez

fib Secretary General