Commission 6

Prefabrication

Chair:	Menegotto (Univ. La Sapienza, Roma, Italy)
Deputy-Chair:	Fernández Ordoñez (Prefabricados Castelo S.A., Spain)
Secretary:	Ronchetti (ASSOBETON, Italy)
Members:	Albert (Hochschule Bochum, Germany), Barthou (CERIB, France), Beluzsár (Pfleiderer Labatlani Vasbetonipari Rt., Hungary), Bernardi (Rector Lesage, France), Cholewicki (Building Research Institute (ITB), Poland), Crisp (Crisp Consultants Pty. Ltd., Australia), Da Guia Lúcio (Univ. Nova de Lisboa, Portugal), De Chefdebien (LB7, France), Della Bella (Precompressi Centro Nord SpA, Italy), Derkowski (Cracow Technical Univ., Poland), Doniak (ABCIC, Brazil), Elliott (Univ. of Nottingham, United Kingdom), Engström (Chalmers Univ. of Technology, Sweden), Fernández Gómez (Laboratorio Central INTEMAC, Spain), Ferrari (Consulting Eng., Italy), Ferreira (Federal Univ. Sao Carlos, Brazil), Gasperi (Consulting Eng., Italy), Gylltoft (Chalmers Univ. of Technology, Sweden), Hegger (RWTH Aachen), Hughes (Hollow Core Concrete Pty. Ltd., Australia), Jones (CDC Ltd., UK), Kanappan (Larsen & Toubro Ltd., India), Karutz (CPI, Germany), Kelly (Bison Concrete Products Ltd., UK), Korander (Consolis Technology Oy Ab, Finland), Laliberté (BPDL Precast Concrete International, Canada), Lindström (Strängbetong, Sweden), Maas (Echo, Belgium), Murayama (Spancrete Corporation, Japan), Newby (Holmes Consulting Group, New Zealand), Rodriguez (National Univ. of Mexico), Romanes (Unicast Cladding Systems Ltd., New Zealand), Saha (L&T, ECC Division, India), Sasek (Mott MacDonald Praha, Czech Republic), Skjelle (Construction Products Association, Norway), Suikka (Confed. of Finnish Construction Industries RT, Finland), Tsoukantas (Greece), Vambersky (Corsmit Consulting Engineers, The Netherlands), van Acker (Belgium), van Paassen (VBI Ontwikkeling BV, The Netherlands)
Corr. Members:	d'Arcy (The Consulting Engineers Group, Texas, USA), El Debs (Univ. de Sao Paulo, Brazil), Krohn (PCI, USA)
Recent Meetings:	Athens (May 03), Antwerp (Oct. 03), Avignon (April 04), Verona (Oct. 04), Budapest (May 05), Melbourne (Oct. 05), Naples (June 06), Zoetermeer (Oct. 06), Cavtat (May 07), Cracow (Oct. 07), Amsterdam (May 08), Orlando (Oct. 08), London (May 09), Paris (Oct. 09)
Recent Bulletins:	***fib*** Bulletin 29: ***Precast concrete bridges*** (State-of-art report prepared by former TG 6.4, published 2004) ***fib*** Bulletin 37: ***Precast concrete railway track systems*** (State-of-art report prepared by former TG 6.5, published 2006) ***fib*** Bulletin 41: ***Treatment of imperfections in precast structural elements*** (State-of-art report prepared by former TG 6.8, published 2007) ***fib*** Bulletin 43: ***Structural connections for precast concrete buildings*** (Guide to good practice prepared by TG 6.2, published 2008)

Terms of reference

Scope

Precast concrete construction is evolving continuously to keep pace with current society's habits and needs. The Commission wants to enhance its progress by internationally stimulating, guiding and coordinating research and development on precast concrete and by disseminating the knowledge.
The scope of the work covers not only issues directly related to precast concrete - i.e. elements, connections, systems, production, handling and assemblage - but also indirect matters such as materials, structural analysis, building physics, equipment, etc.
The work in the Commission is linked to the state of art within the profession, which in its turn is based on the current marked demands.

Areas of interest

Structural efficiency
Structures occupying less volume inside the building and easily hosting equipments are increasingly requested. Structural efficiency helps also to save weight, which results in subsequent savings, namely in the foundations, and, particularly for seismic constructions, in the whole resisting system. This applies also to structures other than buildings, e.g. standard bridges, flyovers, etc.

Flexibility in use
Buildings are frequently required to adapt to variable user's needs, obtainable by creating large free internal spaces, without restrictions by possible subdivisions. Also, the typology of the elements must be open to variations.

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 area by creating noise and dust and disturbing the traffic; therefore their duration must be as short as possible.

Quality consciousness
The quality of materials and execution but also of user-friendliness, comfort, aesthetics, duration are considered to be of increasing importance, as well as the quality within production, starting from the work conditions, to continue with the working effectiveness, and up to the output results.

Adaptability
Less demolition of entire buildings and more adaptation of older buildings to new requirements will be demanded. The design concept should facilitate such renovations, e.g. changing façades without demolition of the rest of the structure.

Preservation of the environment
Preserving the environment is becoming increasingly important on global scale. In addition to encouraging the reuse of structures for adaptability, further issues include emissivity of materials, shortage of raw materials, waste dumping, noise and dust, etc.

Working programme

Basic research
- structural behaviour of precast elements, connections, assemblies, by means of experimental testing and analytical modeling;
- overall structural behaviour, durability, robustness;
- resistance to fire, fatigue and accidental actions, repair and retrofit;
- innovative materials.

Application of new materials (in co-operation with Commissions 8 and 9)
- high-performance concrete;
- high-strength lightweight concrete;
- self-compacting concrete;
- fiber-reinforced concrete;
- non-metallic reinforcements.

Production technologies and products
- production technologies and optimization of processes;
- hollow-core floors;

- railway track systems;
- affordable cost construction.

Normative and pre-normative work
- pre- and post-normative studies aimed at supporting the development of codes and standards;
- interaction with ***fib*** commissions and participation in the elaboration of the New Model Code;
- elaboration of recommendations and guides to good practice on production, handling, erection and maintenance of precast elements and structures.

Dissemination of knowledge
- publication of technical reports, state-of-art reports, recommendations, handbooks, etc.;
- organization of short courses in cooperation with universities and high-schools;
- seminars and workshops for professionals;
- dedicated sessions in congresses and symposia.

Task Group

TG 6.1 Prestressed hollow-core floors

Convener:	van Paassen (VBI Ontwikkeling BV, The Netherlands)
Members:	Barthou (CERIB, France), Bernardi (Rector Lesage, France), Cholewicki (Building Research Institute (ITB), Poland), Crisp (Crisp Consultants Pty. Ltd., Australia), Della Bella (Precompressi Centro Nord SpA, Italy), Elliott (Univ. of Nottingham, United Kingdom), Ferrari (Consulting Engineer, Italy), Ferreira (Federal Univ. Sao Carlos, Brazil), Hegger (RWTH Aachen, Germany), Kanappan (Larsen & Toubro Ltd., India), Korander (Consolis Technology Oy Ab, Finland), Lindström (Strängbetong, Sweden), Maas (Echo, Belgium), Murayama (Spancrete Corporation, Japan), Suikka (Confed. of Finnish Construction Industries RT, Finland), Tsoukantas (Greece), van Acker (Belgium)
Recent Meetings:	as Commission

Terms of reference

The FIP Commission on Prefabrication published in 1988 design recommendations for 'Precast prestressed hollow core floors' (Th. Telford, London 1988), in which the following items were treated: transfer of stresses at the support zone, shear capacity, transverse load distribution, diaphragm action, fire safety and connections. In the meantime the Task Group has finalised complementary guidelines for the design which have been published in 1998 as FIP/***fib*** guide to good practice *Composite floor structures* and in 2000 as ***fib*** Bulletin 6 (guide to good practice) *Special design considerations for precast prestressed hollow core floors*. The document gives the latest state of knowledge concerning transfer of prestressing, restrained composite supports, non-rigid supports, floor diaphragm action and floors under seismic action.

Revision of the FIP design recommendations on precast pre-stressed hollow core floors
Since the first publication of the FIP Recommendations in 1988, the knowledge on the performances of pre-stressed hollow core floors in various applications has progressed much and a number of new topics have already been dealt with in two complementary reports.
The main goal for the next two years is to make a complete revision of *Design recommendations for precast pre-stressed hollow core floors*.

The content of the chapters will be revised to today's state of the art. Supplementary new subjects will be added to the Recommendations, based on several projects in which members of the Task Group were involved.

Task Group

TG 6.2 Structural connections for precast concrete

Convener:	Engström (Chalmers Univ. of Technology, Sweden)
Members:	Cholewicki (Building Research Institute (ITB), Poland), De Chefdebien (CERIB, France), Della Bella (Precompressi Centro Nord SpA, Italy), Elliott (Univ. of Nottingham, United Kingdom), Fernández Ordoñez (Prefabricados Castelo S.A., Spain), Menegotto (Univ. La Sapienza, Roma, Italy), Newby (Holmes Consulting Group, New Zealand), Skjelle (Construction Products Association, Norway), Tsoukantas (National Techn. Univ. of Athens, Greece), Vambersky (Corsmit Consulting Engineers, The Netherlands), van Acker (Belgium), Vinje (Spenncon AS Trondelag, Norway)
Recent Meetings:	as commission
Recent Bulletins	***fib*** Bulletin 43: ***Structural connections for precast concrete buildings*** (Guide to good practice prepared by TG 6.2, published 2008)

Terms of reference

The proper design of structural connections is one of the keys to successful prefabrication. Existing studies and literature on the subject are always dealing with classical solutions, known to everybody, but a general design philosophy is missing. The engineer, confronted with particular problems in his daily practice, has no theoretical basis to solve the problems. The group's study will deal with basic principles for the transfer of forces through connections and elaborate guidelines for their design and calculation treating the following topics:

- precast structural systems and structural interaction;
- flow of forces;
- transfer of compressive, tensile and shear forces;
- transfer of bending and torsion moments;
- unintended restraint, need for movement;
- other design aspects such as excessive loading due to progressive collapse, seismic loading, fire;
- design examples.

Task Group

TG 6.6 New Model Code – precast concrete

Convener:	Menegotto (Univ. La Sapienza, Roma, Italy)
Members:	de Chefdebien (CERIB, France), Engström (Chalmers Univ. of Technology, Sweden), Fernández Ordoñez (Prefabricados Castelo S.A., Spain), Gasperi (Consulting Eng., Italy), Lindström (Strängbeton, Sweden), Suikka (Confed. of Finnish Construction Industries RT, Finland), Tsoukantas (Greece)
Recent Meetings:	Athens (May 03), Helsinki (June 03), Verona (Oct. 04), Rome (Mar. 06), Rome (Dec. 06)

TG 6.6 interfaces the works of SAG 5 *New Model Code* and contributes actively by setting proposals, discussing provisions and checking drafts on issues concerning prefabrication directly or indirectly.

Task Group

TG 6.7 Affordable housing

Convener:	Fernández Ordoñez (Prefabricados Castelo S.A., Spain)
Members:	Cholewicki (Building Research Institute (ITB), Poland), Crisp (Crisp Consultants Pty. Ltd., Australia), Della Bella (Precompressi Centro Nord SpA, Italy), Fernández

	Gómez (Laboratorio Central INTEMAC, Spain), Gasperi (Consulting Eng., Italy), Kanappan (Larsen & Toubro Ltd., India), Karutz (CPI, Germany), Menegotto (Univ. La Sapienza, Roma, Italy), Salas (Ministerio de Ciencia y Tecnologia, Spain), Tsoukantas (National Techn. Univ. of Athens, Greece)
Corr. Members:	Cladera Bohigas (Univ. of Balearic Islands, Spain), Fonseca de Campos (Precast Consultoria, Brazil), Gettu (Indian Institute of Technology Madras), Marcaccioli (Piccini, Italy), Patel (Shirish Patel & Assoc. Consult. Ltd., India), Peña (OTIP, Venezuela), Skjelle (Construction Products Association, Norway)
Recent Meetings	Delhi (Nov. 04), Budapest (May 05), Naples (June 06), Zoetermeer (Oct. 06), Cavtat (May 07), Cracow (Oct. 07), Amsterdam (May 08)

Terms of reference

The Task Group is developing a state of the art report on prefabricated housing, taking into account in particular the cost and the means of construction. The housing is intended to be cost effective, fast and easy to build, while maintaining the main housing characteristics. The main performances taken into account are load carrying capacity, earthquake and adverse weather resistance, but also very important shelter performances like waterproofing and insulation. The report will give an overview and detailed information on present and past precast concrete housing systems. The members of the Task Group come from many parts of the world and have brought to the document the different experiences and requirements from their respective regions.

The group began after a successful seminar on low cost housing was held in Chennai, India, in November 2003, where the importance of this kind of housing for many developing economies was highlighted. It has also been noted that development of these systems is important for prompt housing construction after natural catastrophes like floods and earthquakes.

Task Group

TG 6.9 Design of precast concrete structures for accidental loading

Convener:	van Acker (Belgium)
Members:	Cholewicki (Building Research Institute (ITB), Poland), Crisp (Crisp Consultants Pty. Ltd., Australia), Elliott (Univ. of Nottingham, United Kingdom), Engström (Chalmers Univ. of Technology, Sweden), Suikka (Confed. of Finnish Construction Industries RT, Finland), Vambersky (Corsmit Consulting Engineers, The Netherlands)
Corr. Members:	Vantomme (Royal Military Academy, Belgium)
Recent Meetings:	Cavtat (May 07), Cracow (Oct. 07)

Terms of reference

Precast structures are more sensitive than cast in-situ structures to progressive collapse after explosions or other accidental action. A structure is normally designed to support loads caused by normal function, but there should be a reasonable probability that it will not collapse catastrophically under the effects of a moderate degree of misuse or an accident. No structure can be expected to be resistant to the excessive loads or forces that could arise from an extreme cause, but it should not be damaged to an extent that is disproportionate to the original cause.

The normal design procedure to cope with accidental loads consists of admitting the collapse of a limited local area of the framework, while ensuring that the adjacent areas of the structure surrounding the damage provide for an alternative load path, possibly in a distorted condition but without leading to collapse of the whole structure.

A lot of literature is available from the period immediately after the Ronan Point incident (1968). At present, only a few code prescriptions exists and their requirements are sometimes very different. The subject has become again important since the attack of 11 September 2001 in New York. Studies are now being carried out, for example at TU Delft, The Military Academy in Belgium, and other institutes. The objective of the Task Group is to assess the available material and to publish a Guide to Good Practice for the design of precast concrete skeleton and wall frame structures, designed to avoid the phenomenon of progressive collapse.

Task Group

TG 6.10 Precast concrete buildings in seismic areas – practical aspects

Convener:	Tsoukantas (National Techn. Univ. of Athens, Greece)
Members:	Coelho (Laboratorio Nacional De Engenharia Civil, Portugal), Da Guia Lúcio (Univ. Nova de Lisboa, Portugal), De Chefdebien (CERIB, France), Dritsos (Univ. of Patras, Greece), Fernández Ordoñez (Prefabricados Castelo S.A., Spain), Hughes (Hollow Core Concrete PTY LTD, Australia), Kremmyda (Greece), Marreiros (Univ. Nova de Lisboa, Portugal), Monino (Prefabricados Castelo S.A., Spain), Pampanin (Univ. of Canterbury, New Zealand), Psycharis (National Techn. Univ. of Athens, Greece), Pinto (Prefabricados Castelo S.A., Spain), Proenca (Instituto Superior Tecnico, Lisbon, Portugal), Rodriguez (Nat. Univ. of Mexico), Saha (L&T, ECC Division, India), Takorabet (CEVITAL, Algeria), Toniolo (Politecnico di Milano, Italy), Topintzis (National Techn. Univ. of Athens, Greece)
Corr. Members:	D'Arcy (Consulting Eng. Group INC, USA), Gasperi (Consulting Eng., Italy), Menegotto (Univ. La Sapienza, Roma, Italy), Santos (Prefabricados Castelo S.A., Spain)
Recent Meetings:	Athens (July 07), Lisbon (Nov. 07), Madrid (April 08)

Terms of reference

The goal of the Task Group is to prepare a technical report describing steps, procedures, rules and construction details for precast structures built in seismic areas to comply with the fundamental requirements of no-collapse and damage limitation, focused mainly on low-rise buildings.

The main purpose is to assist designers with designing precast structures under seismic actions complying with the above mentioned fundamental requirements, outlining among other things the following key features:

- particularities of the seismic design of precast structures;
- basic principles of conceptual design applied to precast systems;
- the role of connections on the seismic behaviour of the structure and construction details;
- the role of diaphragm action of floors on the structural behaviour and construction details;
- ductility requirements and related behaviour factors;
- detailing rules for precast elements and structures.