

Commission 5

Structural service life aspects

- Chair: Matthews (Building Research Establishment Ltd, United Kingdom)
- Deputy-Chair: Pielstick (Eisman & Russo, USA)
- Secretary: McKenna (Halcrow Group Limited, United Kingdom)
- Members*: Andrade (Instituto de Ciencias de la Construcción "Eduardo Torroja", Spain), Appleton (Instituto Superior Técnico Lisboa, Portugal), Bartholomew (CH2M HILL, USA), Bevc (ZAG Ljubljana, Slovenia), Cairns (Heriot-Watt University, United Kingdom), Casas (Technical Univ. of Catalunya, Spain), Cleland (Queens University Belfast, Northern Ireland), Cremona (Développement-durable, France), Edvardsen (Cowi A/S, Denmark), Gehlen (TU Munich, Germany), Gulikers (Ministry of Public Works, Netherlands), Helland (Skanska Norge AS, Norway), Hosoda (Yokohama National Univ. Japan), Julio (Univ. Coimbra, Portugal), Kobayashi (Gifu Univ., Japan), Leon Gonzalez (Univ. Politecnica de Madrid, Spain), Marano (Technical Univ. of Bari, Italy), Markeset (SINTEF, Norway), Matthys (Ghent University, Belgium), Meda (University of Rome "Tor Vergata", Italy), Miyagawa (Kyoto Univ., Japan), Osterminski (Technical Univ. Munich, Germany), Paeglitis (Riga Technical University, Latvia), Ramezaniapour (Amirkabir Univ. of Technology, Iran), Rinaldi (Univ. of Rome "Tor Vergata", Italy), Stipanovic Oslakovic (Civil Engineering Institute, Croatia), Straub (Technical Univ. Munich, Germany), Strauss (Univ. für Bodenkultur, Austria), Subba Rao (Construma Consultancy Pvt. Ltd., India), Ueda (Hokkaido Univ., Sapporo, Japan), Vennesland (NTNU, Norway), Vimmr (STÚ-K plc, Czech Republic)
- Corr. Members: Alexander (Univ. of Cape Town, South Africa), Angst (Norwegian Univ. of Science and Technology, Norway), Bentz (Univ. of Toronto, Canada), Curtis (RTR Bridge Construction Services, Australia), Denton (Parsons Brinckerhoff, United Kingdom), El-Safty (Univ. of North Florida, USA), Ferreira (Univ. of Minho, Portugal), Hamilton (Univ. of Florida, USA), Ikeda (Hybrid Research Inst., Japan), Jacobs (BBRI, Belgium), Larsen (Norwegian Public Roads Administration, Norway), Lenkei (Pecs University, Hungary), Marie-Victoire (LRHM, France), Madaras (EMI-TÜV Bayern Ltd, Hungary), Otieno (Univ. of Cape Town, South Africa), Sandeford (GHD Brisbane, Australia), Sirivivatnanon (CSIRO Manufacturing and Materials Technology, Australia), Smith (Atkins, United Kingdom), Sterritt (Atkins, United Kingdom), van der Horst (BAM Infraconsult bv., The Netherlands)
- Recent Meetings: Lausanne (May 03), Garston (Feb. 04), Ljubljana (Oct. 04), Budapest (May 05), Zagreb (Nov. 05), Copenhagen (Dec. 06), Cavtat (May 07), Lisbon (Nov. 07), Amsterdam (May 08), Madrid (Nov. 08), London (May 09), Rome (Nov. 09)
- Recent Bulletins: *fib* Bulletin 22: **Monitoring and safety evaluation of existing concrete structures** (State-of-art report prepared by former TG 5.1, published 2003)
fib Bulletin 33: **Durability of post-tensioning tendons** (Recommendation prepared by former TG 5.4 in co-operation with Commission 9, published 2005)
fib Bulletin 34: **Model Code for Service Life Design** (Model Code prepared by former TG 5.6, published 2005)
fib Bulletin 44: **Concrete structure management: Guide to ownership and good practice** (Technical report prepared by TG 5.3, published 2008)

*Currently all active participants in Commission 5 work are considered to be C5 members. However, it is planned that in the future C5 members will be the C5 chair, deputy chair and technical secretary, TG conveners and technical secretaries, plus other selected individuals.

Terms of reference

Scope

The aim of the Commission is to provide rational procedures to obtain an optimal technical-economic performance of concrete structures in service and to ensure that sustainability, whole-life cost and associated through-life perspectives are taken into account as part of the process by which experience gained from practice is fed back to the design, execution, maintenance and rehabilitation stages.

Areas of interest

- Probabilistic performance based service life design.
- Service life management and cost optimisation on object level (e.g. bridges) and on network level (e.g. transport lines as road systems), taking due account of environmental aspects of the creation and maintenance of concrete structures.
- Inspection, assessment and validation of structural performance including performance monitoring.
- Re-evaluation and reliability updating.
- Development and validation of deterioration mechanisms on meso and macro level, profiting from micro level research, considering the structure - environment interaction.
- Maintenance, repair and strengthening materials including materials performance and co-action with the base material and parent structure.
- Identification of the main influences of current design and execution procedures being non-optimal to subsequent performance, and provide feedback of experience gained.
- Develop rational strategies, procedures and criteria for assessment, maintenance and remediation of concrete structures, including reliability based methods, to ensure whole-life cost optimal and sustainable structures, by considering:
 - Assessment and residual service life evaluation of maintained and repaired structures;
 - Maintenance, repair, strengthening and performance upgrading methods, and selection of materials and systems for the effective management of structures;
 - Selection of durability and structural performance criteria based on whole-life and residual-life cycle costing and sustainability considerations;
 - Execution of maintenance, repair and strengthening, including procedures for quality assurance.
- Disseminating, lecturing and teaching activities on an international scale.

Task Group

TG 5.8

Probabilistic durability assessment of existing concrete structures

Convener: Gehlen (TU Munich, Germany)
Secretary: Osterminski (Technical Univ. Munich, Germany)
Members: Andrade (Instituto de Ciencias de la Construcción "Eduardo Torroja", Spain), Bartholomew (CH2M HILL, USA), Cairns (Heriot-Watt University, United Kingdom), Gulikers (Ministry of Public Works, Netherlands), Leon Gonzalez (Univ. Politecnica de Madrid, Spain), Matthews (Building Research Establishment Ltd, United Kingdom), McKenna (Halcrow Group Limited, United Kingdom), Paeglitis (Riga Technical University, Latvia), Straub (Technical Univ. Munich, Germany)

Terms of reference

Preparation of a Technical Report on the subject of the probabilistic durability assessment of existing concrete structures with the goal of achieving publication as a *fib* Bulletin in 2010.

The document provides tools and procedures for managing durability aspects of reinforced concrete structures (service life for structures exposed to carbon dioxide and/or chlorides), following the outline:

- Introduction (motivation, terms: through-life-management/proactive-/reactive strategies/economic considerations),
- Summary of ageing phenomena and their models (initiation period due to carbonation or chloride ingress and degradation due to reinforcement corrosion),
- Spatial modelling (definition of “hot-spots” in a structure - deciding where to measure/design),
- Condition control (gathering and analysing existing data, condition assessment, planning of inspection and monitoring, documentation) and
- Examples for the application of the above mentioned models and procedures

Other observations:

The first draft document was presented to TG 5.8 on 20th June 2009. On the basis of comments received the document is being revised and the basis of the application examples are being changed and developed in order to be more coherent with other aspects of the report so that themed topics are portrayed consistently through all parts of the document. These revisions are expected to be completed in February 2010 and sent for further comment by *fib* Com5. As a result the document is not now expected to be finalised until mid-2010.

Task Group

TG 5.9

Model technical specification for repairs and interventions

Convener: McKenna (Halcrow Group Limited, United Kingdom)
 Secretary: Leon Gonzalez (Univ. Politecnica de Madrid, Spain)
 Members: Appleton (Instituto Superior Técnico Lisboa, Portugal), Cairns (Heriot-Watt University, United Kingdom),

Terms of reference

Preparation of a Technical Report on the subject of the requirements for a model specification for repairs and interventions with the goal of achieving publication as a *fib* Bulletin in 2010. Consideration will be given as to whether this work should be taken forward as a future Guide to Good Practice / Model Specification (i.e. *fib* classification with the same standing as a Model Code), perhaps on the basis of the Technical Report expected in 2011.

Other observations:

This report is currently under development (McKenna, Appelton & Cairns). It has been decided to further develop the approach employed in a Norwegian document (this contains model technical specifications for a number of rehabilitation methods) and align it with the Eurocode convention. . In so doing it is envisaged this will contain model technical specifications for a number of rehabilitation methods, each underlined by their principles. Topics and techniques being considered for inclusion include: patch repair; realkalisation; chloride extraction; surface treatments and coating; cathodic protection; crack sealing; physical protection / barriers; cladding; inhibitors; electro-osmosis; sacrificial anode (in patch repair); strength; external reinforcement; jacketing; external pre-stressing and replacement and reconstruction of elements

To ensure the document has relevance to the end user each method will be supported with a case study.

Task Group
TG 5.10

Birth and re-birth certificates & through- life management aspects

Convener: Bartholomew (CH2M HILL, USA)
Secretary: McKenna (Halcrow Group Limited, United Kingdom)
Members: Bevc (ZAG Ljubljana, Slovenia), Cairns (Heriot-Watt University, United Kingdom), Edvardsen (CowI A/S, Denmark), Leon Gonzalez (Univ. Politecnica de Madrid, Spain), Marano (Technical Univ. of Bari, Italy), Paeglitis (Riga Technical University, Latvia), Pielstick (Eisman & Russo, USA), Subba Rao (Construma Consultancy Pvt. Ltd., Mumbai, India)

Terms of reference

Preparation of a Technical Report on the subject of Birth and re-birth certificates & related through-life management aspects. Consideration will be given as to whether this work should be taken forward as a Guide to Good Practice. The goal is to achieve publication of a *fib* Bulletin in 2011; taking account of the following points:

- Development of concepts for Birth and Re-birth certificates evolving into “Life Rating” of new and existing structures. This work will include recording data and environmental conditions as well as technical information required for through-life management of concrete structures.
- Consideration of the wider issues associated with the through-life management of concrete structures –with reference to technical, functional, economic, and sustainability issues [i.e. the wider framework].
- Development of a framework for documentation of:
 - the parameters used in a service life design,
 - measurements of actual parameters achieved during construction,
 - and measurements of the actual in-service behaviour against predicted behaviour.
- Development of a Conservation Plan for structures, including plans for routine maintenance and in-service inspection.

Other observations:

The goal of the Technical Report is to develop a template for the rational approach to the assessment of a “Life Rating” for individual structures. The template will organize and analyze design parameters and as-built data in an effort to predict the type and frequency for in-service inspections. This information will then provide a mechanism for owners and engineers to optimize the inspection frequency providing a cost saving over time.

Task Group
TG 5.11

Calibration of code deemed to satisfy provisions for durability

Convener: Gehlen (TU Munich, Germany)
Secretary: Gulikers (Ministry of Public Works, Netherlands)
Members: Andrade (Instituto de Ciencias de la Construcción "Eduardo Torroja", Spain), Bartholomew (CH2M HILL, USA), Cremona (Développement-durable, France), Edvardsen (CowI A/S, Denmark), Helland (Skanska Norge AS, Norway), Markeset (SINTEF, Norway),

Terms of reference

Undertake a review of the basis of deemed to satisfy options for concrete mixes for specified service life situations, with the work involving a calibration exercise on the reliability levels provided by

deemed to satisfy options. Prepare a Technical Report on this subject with the goal of achieving publication as a *fib* Bulletin in 2012.

Other observations:

As this task is strongly related and dependent on the work to be undertaken in TG5.13 upon the identification and definition of appropriate limit states, modelling of service life and associated input parameters; there needs to be effective and ongoing interaction between the two TG's on these and related matters in order to achieve a common understanding of the focus of their respective work activities, the interfaces between them and how these issues will be effectively managed.

Task Group

TG 5.12 Support group to new *fib* SAG on Assessment of Existing Structures

Convener: Matthews (Building Research Establishment Ltd, United Kingdom)
Secretary: Meda (University of Rome "Tor Vergata", Italy),
Members: Andrade (Instituto de Ciencias de la Construcción "Eduardo Torroja", Spain), Cairns (Heriot-Watt University, United Kingdom), Casas (Technical Univ. of Catalunya, Spain), Gehlen, Gehlen (TU Munich, Germany), Gulikers (Ministry of Public Works, Netherlands), Julio (Univ. Coimbra, Portugal), Leon Gonzalez (Univ. Politecnica de Madrid, Spain), Matthys (Ghent University, Belgium), Paeglitis (Riga Technical University, Latvia), Subba Rao (Construma Consultancy Pvt. Ltd., India), Ueda (Hokkaido Univ., Sapporo, Japan), Vimmr (STÚ-K plc, Czech Republic)

Terms of reference

To act as a support group to the new *fib* SAG 7 on Assessment of Existing Structures. The full scope of the Terms of reference for TG5.12 is to be decided once new *fib* SAG 7 scope has been resolved. Participation in the new *fib* SAG 7 is to be by invitation.

Other observations:

A *fib* Special Activity Group (SAG 7 - like the New Model Code Team) was set up to bring together input from all *fib* Commissions and elsewhere as required. This project and related activities promote and enhance *fib* Commission 5 activities.

The relevant Commission Chairs (C5 Matthews, C4 Foster, C2 Taerwe and Mancini) worked in 2009 to define how the activity could go forward and be co-ordinated. The work started with a two-day workshop of invited participants in Turin 16-17 October 2009 to define the scope and nature of the activities.

The workshop was divided into two stages. On the first day with the participants gave 15 minute presentations upon relevant topics of their choice. The second day was given over to group discussions. These focused on:

- Reliability and safety formats,
- Modelling of structural performance – with / without deterioration,
- Performance and assessment of existing structures.

These activities are summarised in the document "Report on Workshop to discuss the terms of reference for *fib* SAG 7: Assessment of Existing Structures in Turin, 16-17 October 2009".

It is anticipated that the main work will start in 2010 probably with a two day meeting held in conjunction with the 3rd *fib* Congress in Washington (29 May - 2 June 2010). The meeting will probably be held prior to the Congress.

Operational documents to support Service Life Design

Convener: Andrade (Instituto de Ciencias de la Construcción "Eduardo Torroja", Spain)
Secretary: Cleland (Queens University Belfast, Northern Ireland)
Members: Matthews (Building Research Establishment Ltd, United Kingdom), Cremona (Développement-durable, France), Edvardsen (Cowi A/S, Denmark), Gulikers (Ministry of Public Works, Netherlands), Kobayashi (Gifu Univ., Japan), Markeset (SINTEF, Norway), Miyagawa (Kyoto Univ., Japan), Rinaldi (Univ. of Rom "Tor Vergata", Italy), Vimmr (STÚ-K plc, Czech Republic)

Terms of reference

The scope of work will be developed from consideration of the following listed points, with the goal of developing Technical Reports on selected topics to provide operational guidance to support the practical implementation of *fib*/ISO service life design codes and standards, with the goal of achieving publication as a *fib* Bulletin(s) in 20xx (following the publication of relevant service life design codes and standards).
