First Invitation and Call for Papers

RILEM / CIB / ISO
International Symposium

Integrated Life-Cycle Design
of Materials and Structures
(ILCDES 2000)

22 - 24 May 2000

Helsinki, Finland

Co-sponsored by:
IABSE International Association for Bridge and Structural Engineering
ECCE European Council of Civil Engineers

Local Organisers:
RIL Association of Finnish Civil Engineers
VTT Technical Research Centre of Finland, Building Technology

Symposium Themes

1. Framework and Process of Integrated Life-Cycle Design

Within the framework and process models of design, the combination and organisation of multiple methods are presented. Information flows are modelled in the design process from product information data through the design documents, and also during the entire life cycle in the phases of use, repairs, changes and even demolition, recycling and reuse. An important aspect is the possibility of a unifying framework to be provided by a Performance Standards System for Integrated Life-Cycle Design of Structures. Additionally interaction between the partners of construction and use, as well as their responsibilities during the design process and during the entire life cycle is considered.

2. Procedures, Methods and Guides of Life-Cycle Design

During the conceptual design phase different aspects are analysed, compared and optimised. The selection of final solutions between alternative structural systems, materials and products can be achieved by applying the methods of multiple requirement decision-making. During the detailed design phase, safety, mechanical and hygrothermal life-cycle serviceability are guaranteed by static, dynamic, durability and physical design methods. Design for recycling is a special area with its own considerations and methods. All these methods are proposed for presentation under this theme.

3. Life-Cycle Accounting, Optimisation and Decision-Making

For life-cycle design, analysis and design are expanded into two economic levels: monetary economy and ecology, which means the economy of nature. Life-cycle expenses are calculated into present value or into yearly costs by discounting the expenses from manufacture, construction, maintenance, repair, changes, modernisation, reuse, recycling and disposal. The expenses of nature are the use of non-renewable natural resources, the production of air, water or soil pollution, and climatic global warming. To assist decision-making by owners, the designer has to calculate the life-cycle monetary and environmental expenses, and to make comparisons between alternatives for multiple requirement decision-making.

4. Life-Cycle Assessment

Life Cycle Assessment (LCA) has been generally accepted as the primary basis for comparing alternative materials, components and services. But there are important issues still to be resolved in the context of integrated life-cycle design. For example, how environmental impact should be calculated according to a unified principle; how results should be presented in standardised, easily interpreted summary measures and indices without losing their essential content or meaning; how the relative merits of different databases can be assessed and significant data disparities dealt with; and how different aspects of LCA results can be combined.

5. Service Life Design and Optimisation

The aim of service life design is to optimise economically the target service life of parts of the structural system as well as its modules and components, and to carry out the performance and durability design in order to guarantee the targeted service life for each structural module and component. The optimisation at the conceptual, creative design phase is essential in order to utilise the potential benefits of an integrated design process effectively. In this phase, the design is based mainly on system and module levels.

6. Durability Design and Prediction Models for Life-Cycle Performance

The objective of durability design is to guarantee that the specified target service life can be achieved in the working environment of each structure. Regarding concrete structures, the procedure of mechanical design with durability performance models most often can be applied. Often the durability design of steel structures concentrates on the surface treatment, but it may benefit from following the modelling procedure as well. The durability of wooden structures is connected to moisture and temperature and thus leads to the moisture control of structures in order to eliminate the danger of rotting. A possibility exists to apply deterioration calculation models also in the design of wooden structures.

7. Design for Recycling and Reuse

The primary aim is to keep the building materials or structures in their own cycle for as long as possible (direct usage) and to minimise the fraction of amounts with a low specification level (downcycling) introduced into another cycle. Another essential aim is to steer the use of building materials when building, such that reuse, according to the above mentioned basic rules, is possible. These basic rules have to be considered when evaluating contemporary structures and the further development of building materials and building material combinations, as regards their ability to be recycled. The recycling of structural components is environmentally and economically most effective, and should be one aim of design. As one tool, the demountable connections of prefabricated structures could be mentioned.

8. Computer Applications and Software Tools for Life-Cycle Design

One of the problems in life cycle design is the large number of calculations required to produce and update all the information needed. The current development of interoperable software tools will give possibilities to use the product information and to update the properties in the building database. This will create new markets for sophisticated applications, which can calculate, analyse, simulate, optimise and present the life-cycle economy, technical performance and environmental properties of different design solutions. Important also are tools for multiple criteria optimisation and decision-making, applying the life cycle financial and environmental accounting.

9. Examples of Life-Cycle Design

Integrated life-cycle design involves the interaction of many complex factors. Thus, many changes may be made for the effective use of those methods in practice. The presentation of examples, both successful and unsuccessful, will be very useful in assisting designers to develop practical and effective life-cycle

design procedures. The examples are requested to deal with practical structural design and to contain as many aspects of life-cycle design methods and procedures as possible.

Call for Papers

- 31 March 1999
  Submission of maximum 300 word abstract
- 30 June 1999
  Notification of acceptance
- 15 February 2000
  Submission of paper
  (in camera-ready form, accompanied by registration fee)

Participants wishing to present a contribution are invited to submit an abstract, relating to the Symposium themes. The abstract should be typewritten in English, not exceeding 300 words, on one A4 size page. It should be mailed to the Symposium Secretariat by 31 March 1999 (with the registration form).

Venue

The Symposium will be held at the University of Helsinki, in the centre of Helsinki. The neo-classical buildings, the historical Senate Square, and the Market Square, all in the centre, particularly fascinate visitors to the city.

Participants

The Symposium will bring together an international audience of building professionals:

Consultants, planners, owners, maintenance professionals, clients, manufacturers, contractors, government and municipal officials, researchers, scientists and building educators.

Symposium Language

The official language of the Symposium is English. No simultaneous translation will be provided.

Commercial Exhibition

An exhibition supporting the main themes will be arranged. Companies interested in exhibiting at this event should contact the organisers to discuss requirements.

Technical Tours

Technical tours to sites and prefabrication companies will be organised on Wednesday 24 May 2000 in the afternoon.

Social Programme

A social programme will be arranged for delegates and accompanying persons.

Post-Symposium Tours

Post-Symposium tours during 24-26 May 2000 will be provided for delegates and accompanying persons (Finnish lake district; Tallinn, Estonia; St. Petersburg, Russia).

Pre-Registration

Those interested in participating are asked to contact the Symposium Secretariat as soon as possible. The Final Invitation will be mailed in October 1999.

Contact Address

Symposium Secretariat
Association of Finnish Civil Engineers RIL
Meritullinkatu 16 A 5
FIN - 00170 HELSINKI, Finland
Tel: +358.9.6840 780
Fax: +358.9.1357670
E-mail: ril@ril.fi
Internet: www.ril.fi