

Special Activity Group 7

Assessment and Interventions upon Existing Structures (AIES)

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Recent Meetings:	Turin (expert workshop, Oct. 09)

Scope

The aim of SAG 7 is to define appropriate and reliable procedures to establish the safety of existing structures and any associated requirements for interventions to extend the safe operation or working life of such structures.

Terms of reference

To define, through a series of documents, the processes to be used for the assessment of present structural performance and the prediction of future structural performance of existing structures with or without damage and/or revised operational requirements, together with any associated interventions required to extend their service life. It is envisaged that the documents to be produced could include reviews of the state of the art and technical history / evolution, technical specifications and recommendations; leading to the preparation of a fib model code.

To seek to achieve these goals by:

- Defining appropriate and reliable procedures for (a) the assessment of the actual structural performance of existing structures and (b) to predict the evolution of actual structural performance with time.
- Identifying methods for selecting appropriate interventions required to preserve or establish the desired safety level or to extend the service life of the structures concerned.

Consideration is to be given to (a) structures which have/have not experienced structural deterioration/damage and (b) where the operational requirements have been modified, potentially requiring enhanced structural capacity.

A progressive and targeted approach should be adopted for structural assessment procedures.

The Special Activity Group will (initially) be organized in four workgroups:

- Reliability and safety evaluation
- Modelling of structural performance of existing structures
- Assessment / evaluation procedures for existing structures

- Selection and implementation of interventions

Ideally the safety level of existing structures should achieve a comparable minimum value to that required for new structures. However, when this objective cannot be achieved (e.g. due to economic, historical, heritage or intrinsic structural limits), a reduction in the minimum safety level, perhaps in terms of reduced operational limits or residual service life, may be acceptable / allowable in agreement with the owner, the authorities and / or other relevant bodies.

The definition of an appropriate safety format for existing structures is required.

The adoption of new probabilistic techniques for the definition of the safety format in existing structures could be very helpful. It is proposed that SAG 7 should first consider a full probabilistic approach, differentiated in terms of seismic and non-seismic actions, and then simplify the approach to a partial factors format viable for professionals. Account should be taken of both normal and accidental loads and actions. Use should be made of the Bayesian approach, including use of “a priori” knowledge.

The work will require the definition of a complete set of resisting models able to describe the structural behaviour and its evolution in time taking account of the presence of various forms of damage or deterioration.

As the resisting models currently used in design are not applicable to the circumstances associated with many existing structures, it will be necessary to use non-linear analysis methods (e.g. limit analysis, NLFEM) in order to undertake the safety verification. Guidance should be given on the definition of experimental test programs to evaluate and correctly use the mechanical parameters required by the analyses.

Another aspect of safety verification is the correct estimation of the external actions that could be applied the structure during the required service life. Guidance for a procedure for an updated evaluation of the actions should be prepared.

Consideration should also be given to other ways of establishing the relationship between actions and the effects of actions on the structure, e.g. by means of experimental tests on the structure (i.e. verification by testing).

On the basis of the assessment results and of their expected evolution in time, consideration should be given to approaches for preventive or necessary remedial / strengthening interventions to achieve the desired working life. In this phase of the conceptual design the sustainability of the different possible options might be considered to be part of the re-design and execution process.

An initial expert workshop was held in Turin on 16-17 October 2009. The workshop, involving the participation of experts in the field from around the world, was organised to discuss the set-up of a *fib* Special Activity Group (SAG 7) on the assessment of existing structures. It is anticipated that the main work of SAG 7 will start in 2010

It is also hoped that a publication containing papers on various aspects of the Assessment of Existing Structures can be produce to stimulate debate on the topic within the profession.