
Structural Reassessment for Lifetime Extension

Christian Bucher, Prof.; Center of Mechanics and Structural Dynamics, Vienna University of Technology, Wien, Austria, **Maik Brehm**, Dr. Ing.; Division Director Structural Mechanics, Merkle & Partner GbR, Heidenheim, Germany, Contact: christian.bucher@tuwien.ac.at; me@maikbrehm.com

8.1 Introduction

As existing structures are modified, as engineering knowledge advances, and as the requirements to extend life increase, it must be demonstrated that operations can continue safely and economically. There is a general recognition not only in structural engineering but actually also across all industrial sectors that this reassessment process is different from the design process. As a minimum, the known conditions and the specific functional requirements of existing structures need to be taken into account (with design uncertainty factors removed where site-specific parameters are available from as-built information and inspections). Nowadays, several highly specific rules and guidelines for certain problems are available. However, most of them are neither general enough to use in another context, nor do they reflect the complete state of the art. Due to an increasing number of ageing structures, there is a high potential to save a substantial amount of money with a more comprehensive approach. This section presents a framework for the cost optimal reassessment of existing structures consistent with the available information and such that any requirement for the safety of the structure is achieved. It is formulated as general as possible so as to be useful for each reassessment problem. The guideline presented here should help engineers, managers and owners to undertake their assessment of existing structures. Of course, the specific knowledge about the particular object being reassessed and the numerical and experimental assessment methods are indispensable. The following sections are based on a review paper [1], from which several passages are taken.

In contrast to *Chapter 6*, where the cost optimal continuous assessment and maintenance of the structure during its normal lifetime is addressed, this section concentrates on the reassessment of existing structures in the case of serious doubts on its safety level. Therein, three main scenarios can be distinguished: