An Empirically Verified System for Quality and Reliability Management

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Abstract

From experience with structural failures, one can see that human error, in design and execution, is the major cause for these incidents. However, human error is not covered by any approach to structural reliability. Therefore, a system for quality and risk management is required that accounts for human error. Such systems are mostly organized on a national level and exhibit significant differences.

This paper compares corresponding international approaches on how to handle human error and evaluates them.

A proposal for an adequate quality and risk management system covering human error will be presented. The proposal will be composed of the best parts of several available systems to provide an empirically verified, widely accepted approach.

Keywords: design checking, reliability, human error, structural integrity.

1 Introduction

The protection of human life and its physical integrity are fundamental human rights and consequently a crucial part of a nation's legal framework. Structural failure is a catastrophic event that may cause severe injuries and loss of human life as well as damages to surrounding structures and the environment. In case of infrastructure, the impact of structural failure on society and economy is especially significant. Thus, structural failure must be effectively prevented by suited means.

However, total safety corresponding to a complete absence of structural failures is impossible. To provide the utmost safety without making structures inefficient and unaffordable, different approaches for building control have been chosen by various countries. In this paper, the causes for structural failure and the existing approaches for the avoidance of structural failure during design and execution will be assessed and an optimized approach will be proposed.

2 Approaches to the Verification of Structural Integrity

In design, sufficient structural integrity is thought to be achieved through application of partial safety factors which are deemed to define the necessary distance of the design values of the actions and the design value of resistances. Safety factors are derived from prediction models and

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