



Exploring improvements for structural safety

Karel Terwel

Delft University of Technology, Delft, the Netherlands

Coenraedt B.V., Rotterdam, the Netherlands

Dik-Gert Mans

Meged Engineering & Consultancy, Zoetermeer, the Netherlands

Contact: k.c.terwel@tudelft.nl

Abstract

Research has shown that 80-90% of failure cases is caused by human and organizational factors, like communication errors. A national survey in the Netherlands revealed that critical factors within Dutch building process are: safety culture, communication and collaboration, allocation of responsibilities, risk management, control and knowledge infrastructure. This paper explores how the critical factors within building industry might be improved for both design and construction stage.

Keywords: structural safety, building process

1 Structural safety: is improvement necessary?

The last few years the Dutch building industry has been shocked by some major structural failures, often during construction, for instance with the collapse of a temporary scaffold for construction of the floor of the B-tower in 2010 and the partial collapse of the roof of an extension for the FC Twente stadium in 2011 resulting in several injuries and fatalities [1].

Fortunately, the number of fatalities caused by structural collapses is currently very limited in the Netherlands, resulting in probabilities of dying for workers in the construction sector of $7,5 * 10^{-6}$ to very low probabilities of dying for residential end-users ($1,1 * 10^{-8}$) [2]. These numbers are low, although the risk of dying should be limited to a level that is As Low As Reasonably Practicable (ALARP).



Figure 1: Collapse of temporary scaffold for construction of the floor of the B-tower

Apart from the number of fatalities and injuries, a reduction of failure costs can be an important driver to improve structural safety. The failure costs in the Netherlands are estimated at 10% of the yearly turnover, which results in a total sum of approximately 5 billion euros. This number needs