Interdisciplinary interaction analysis at the realisation process of an exemplary retractable structure in Doha

André Ihde

PFEIFER Seil- und Hebetechnik GmbH, Memmingen, Germany; Technische Universität München, Chair of Structural Design Prof. Dr.-Ing Prof. R. Barthel, Germany

Thomas Hermeking, Christian Schlögl

PFEIFER Seil- und Hebetechnik GmbH, Memmingen, Germany

Dr.-Ing. Gregor Grunwald

PFEIFER Covertex, Shanghai, China

Dr.-Ing. Martin Jenni

PFEIFER Systems GmbH, Satteins, Austria

Contact: aihde@pfeifer.de

Abstract

The design process of retractable membrane structures is characterised by strong interactions between the different specialists and suppliers. Tracing back problems in the overall design and build process of these kinds of structures, not or late recognised interactions in the design process of different planning domains can be identified as the cause. For the correspondent involved planners and suppliers dependencies results in design loops and recesses and very often problems with the schedule. The aim of the article is to describe appropriate concepts for an early detection and analysis of indirect and non-obvious dependencies to overcome the above-mentioned problems.

Keywords: lightweight structures, moveable structure, membrane structures, cable structure, interactions, dependencies, graph theory

1 Introduction

Based on a brief description of the involved trades and functional requirements at the example structure, deeper insights into the dependencies and their consequences for the complete realisation process are given. The article shows concepts to get early overview into probable interaction during the design and building process. The concept is based on a functional analysis of the building, followed by a visualisation of responsibilities of the different involved parties. The initial analysis will be followed by the relation analysis between different building function and single structural parts of the overall structure. The used tools ground in graph theory and visualisation technics adapted from the fields of social network analysis. For this paper, the open source software Gephi[1] and Matlab[2] will be used.

212