



## ALLPLAN Bridge - A new BIM tool tailored for Bridge Engineering

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### Abstract

BIM application in bridge engineering is becoming more and more requested. However, many solutions do currently not yet address the special needs of bridge construction.

The paper explains the relevant features of the new approach, developing the bridge structure for detailing and analysis purposes in one parametrical model by using appropriate mathematical prescriptions. Specific characteristic of this solution is the combination of an intelligent database and a user interface tailored for engineers.

**Keywords:** Bridge Engineering, BIM, Data management, Visualization, Composite structures, Post-tensioning, Parametric description.

### 1. Introduction

Increasingly, digitization is pervading all areas of life. Working with digital models is also in the construction industry becoming more and more relevant, branded with the acronym BIM (Building Information Modelling). While BIM technologies in building construction are already well advanced, the widespread introduction in the infrastructure sector is currently still in the starting phase. For example, the Federal Ministry of Transport and Digital Infrastructure in Germany has recently published a phase plan for the introduction of modern, IT-based processes and technologies in the planning, construction and operation of infrastructure, and refers to the great economic benefits in terms of planning accuracy, security, and optimization of costs in the life cycle [1]. It calls for the application of BIM (1<sup>st</sup> proficiency level) from mid-2017 in pilot projects and from 2020 onwards in all infrastructure projects of public authorities.

Bridge construction is the focus of this request, apart from road construction and tunneling.

However, up to now, many solutions for supporting the use of BIM technology in bridge engineering have been seriously affected by applicability restrictions, especially in case of a complex bridge geometry. Large bridges – where the great benefits of BIM application are apparent – are often so complex that general BIM approaches are not useful anymore and specialist tools be required.

To close this gap, Shim et al. [2] proposed in 2011 an extensible information schema based on 3D parametric modelling and simulation technique. The presented solution follows this idea to focus on the actual requirements of bridge design engineers which go beyond purely geometric descriptions of the bridge object, up to design objectives, constructability constraints and parameters relevant for structural analyses. This includes for instance detailed information on materials and connectivity in case of composite structures, as well as on prestressing tendons and stressing procedures. Therefore, the solution has an embedded database containing intelligent design and construction parameters instead of low-level