

Adding Value through Innovation in Structural Design: 5 – Digital Workflows and Emerging Computational Design Tools

Jon Leach MEng CEng FIStructE MICE

Director and Technical Practice Group Leader, AECOM, UK

Contact: jon.leach@aecom.com

Abstract

This paper is part of a series on the subject of adding value through innovation in structural design – the theme of an open forum discussion seminar organised at the conference by the Institution of Structural Engineers.

Digital workflows and computational design are revolutionising the way we design, build, operate and experience structures and the built environment. Interoperability and changes in how we use software are key to the successful implementation of these workflows, and this is explored further in this paper through two case studies.

Keywords: digital workflows, parametric design, interoperability, augmented reality

1 Introduction

Digital workflows and computational design are revolutionising the way we design, build, operate and experience structures and the built environment. In this paper we will explore two contrasting case studies, an international airport project and a small-scale pavilion, which both adopt our latest generation of parametric design tools.

The use of Building Information Modelling (BIM) in some form is now relatively common on projects, though perhaps not as mainstream as intended. The early focus of BIM has been largely client-led, and the direct benefits for the design consultant have perhaps been less obvious to many. However, these issues are probably more reflective of the need to restructure procurement in our industry, in terms of the roles of consultants, main contractors, the supply chain and facilities management teams. The need to move digital information seamlessly not only within a single organisation, but through the whole project life cycle, is the bigger picture of

BIM which can sometimes get lost in the noise of clash detection reports, weekly data drops and extravagant visualisations.

Something the BIM revolution has driven is the need to develop new working methods. The creation of more detailed and coordinated design information, and the management of the associated data, places much more emphasis on the use of software and developing efficient methods of moving this volume of information around without error. Therefore one of the greatest challenges with BIM is that of interoperability, and enabling the simple exchange of this common data. Despite huge advances in recent years, the lack of common file formats and effective links between the hundreds of software packages used on a typical building project is still a key hurdle to overcome and will remain so for the foreseeable future, especially with the rapid rate of software development.

Our team in AECOM has used parametric design workflows for a number of years on some of our most complex projects. These workflows are adopted not only to define the geometry of the