

Case study

MT Højgaard

Background

MT Højgaard are a large Danish company with expertise in construction, civil engineering, marine works and mining. Their portfolio includes the Hardanger Bridge in Norway, the Øresund Bridge between Denmark and Sweden, and – more recently – a concert hall in Aalborg and a new corporate HQ for Novo Nordisk outside Copenhagen.

The company systematically use BIM – both open and proprietary – in construction and civil works. Indeed, under Danish regulations they are required to do so in public sector projects. In a majority of projects they dedicate a central co-ordinating role to ICT (information and communication technology), formulate a BIM execution plan and provide a BIM model at handover when required to do so by the client. MT Højgaard use IFC for a multiplicity of purposes, including bidding, quality assurance, procurement, planning and the management of construction projects.

The research

MT Højgaard publish a short but relevant list of BIM publications, written by employees in production and production support functions. In 2014, they published a white paper, 'A driver for design quality in the AEC industry', a piece of research based on extensive experiences of using BIM. For this research project, MT Højgaard analysed 153 construction projects they had been involved in to establish if and how IFC influences the quality of design. To do this, MT Højgaard compiled a dataset, using quality assessments from these 153 construction projects. The projects had been procured in five different ways and were at different stages of design development. The source material for the study took the form of 3D models, drawings and project specifications, which had been scored on a scale from 1 to 100. Each discipline-specific contribution to the complete project was also broken down, duly assessed and an average taken.

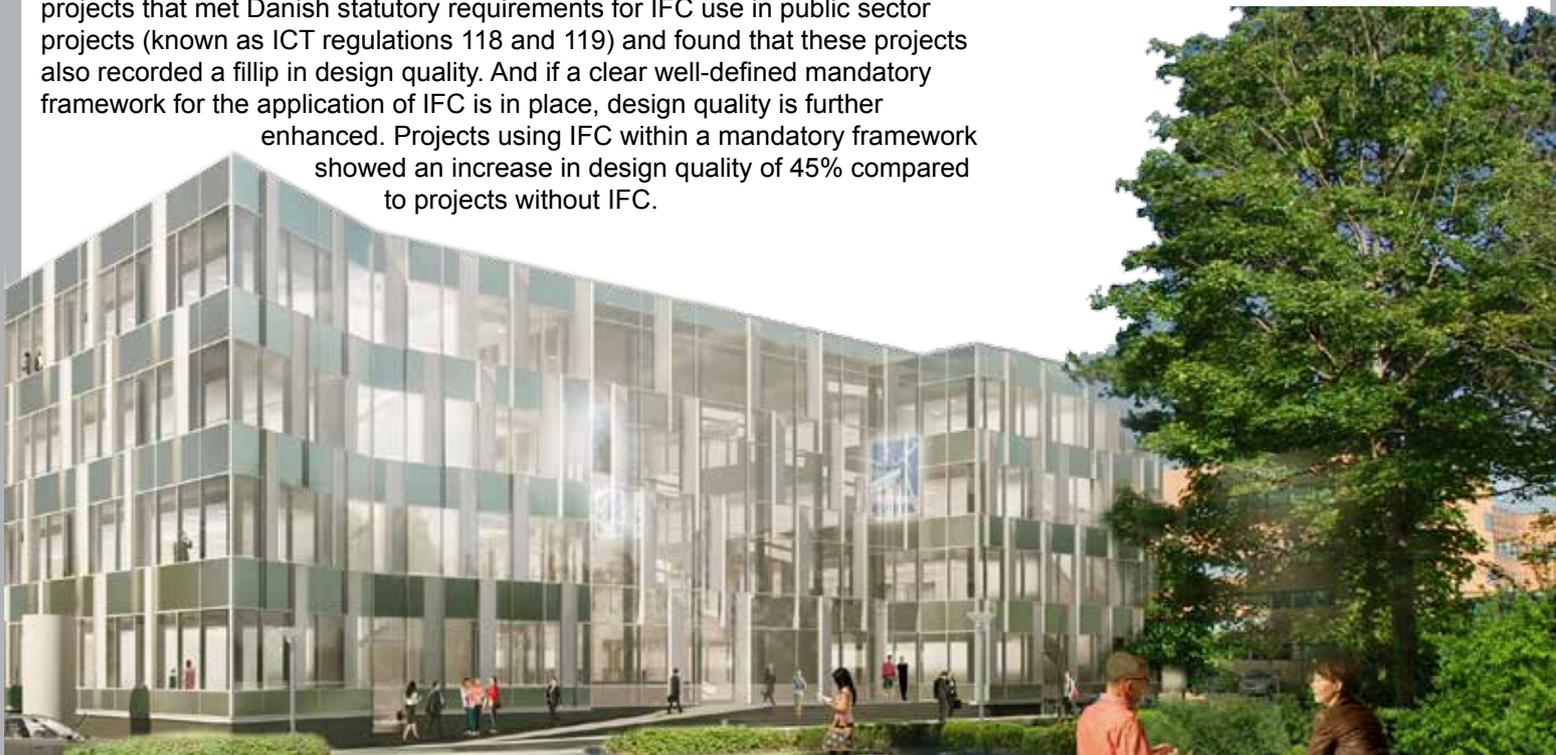
The research showed that construction projects using IFC recorded a 33% increase in design quality.

Of particular interest to a local audience, the analysis also looked at projects that met Danish statutory requirements for IFC use in public sector projects (known as ICT regulations 118 and 119) and found that these projects also recorded a fillip in design quality. And if a clear well-defined mandatory framework for the application of IFC is in place, design quality is further enhanced. Projects using IFC within a mandatory framework showed an increase in design quality of 45% compared to projects without IFC.

***'We have used IFC to export our models from Revit to Solibri and to check for changes between two versions of the same model. This showed that not only had the geometry been changed but also the naming of the objects and families in Revit. We wouldn't have noticed this otherwise.'* –MT Højgaard BIM co-ordinator on a large construction project in Denmark**



Above: Health centre, Albertslund Centrum, Copenhagen (Image: JJW Arkitekterne);
below: Knud Højgaards Vej 7, Søborg (Image: DesignGroup Architects)



The research then divided the 153 construction projects into three groups: low scoring (those with a score of 0–39), mid-scoring (40–69) and high scoring (70–100). Only 15% of projects that did not use IFC achieved a top score above 70. However, among the projects that were using IFC, 46% were top scorers. And for the low-scoring group, non-IFC projects represented 32% of the total, against a figure of 5% for IFC projects. In other words, a well-defined framework for applying and using an open format, IFC, practically eliminates low-scoring projects with a lesser design quality. These findings are shown in the two charts.

Benefits of open technology

- The use of IFC on projects increases design quality by 33%, according to this study of 153 construction projects.
- The use of IFC within a well-defined mandatory framework further enhances design quality.
- These quantitative findings confirm the qualitative assessments of MT Højgaard's BIM co-ordinators, who report the benefits of clash detection, viewing the model on-site on an iPad and the overall reduction of errors.

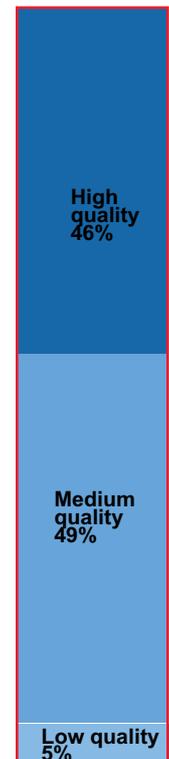
Going forward

MT Højgaard already treat IFC as best practice. The research findings continue to confirm their belief that the investment costs of IFC outweigh the implementation costs. The company have a strong commitment to strengthening efficiency and profitability. The use of open BIM is helping them to offer better solutions to their customers, which is further stated in their most recent white paper, 'Value drivers in the Danish national ICT regulations' (December 2014). MT Højgaard continue to conduct research into BIM-related topics and to share their findings

Non-IFC



IFC



Above: Bar charts showing quality improvements with IFC; below left: Patient hotel at Rigshospitalet, Copenhagen for patients nearing recovery and family members (Image: Aarhus Arkitekterne); Entrance to the new psychiatric hospital, Vejle, Denmark (Image: Arkitema)



Heroes of Interoperability

This project gained a special mention for its analysis of the contribution of IFC to design quality in the 2014 Business Gain through Open Technology awards.



Acknowledgments

Thanks are made to MT Højgaard for the content of this case study. The white paper is available at: <http://mth.com/> under methods.

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