

Chapter 2

Paving the Way for Better Construction Designs Aided by Information Technology Tools

ABSTRACT

With the dawn of the industrial age, construction and manufacturing methods have witnessed revolutionary engineering practices and methods. None have been more significant than that of the influence that information technology has had on civil construction engineering as in many other engineering disciplines and spheres. In this chapter, the authors discuss how computer-aided design and drawing software, the internet, building information modelling, and 4D and 5D CAD/CAM systems have revolutionized the way construction engineers, designers, and architects work. They also discuss the various types of software available in the market, each with a specific goal and engineering purpose. They also offer brief comparisons on several types of design software so that readers can grasp quickly the salient features that each have to offer.

Manufacturing methods have long since been influenced by developments in Information Technology. Especially since the 1970s and the 1980s, computer-aided design (CAD) and computer-aided manufacturing (CAM) systems have had a strong influence in manufacturing sectors. It was not long before companies began rethinking their manufacturing processes and redesigning these with the help of Information Technology. While manufacturing earlier

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involved tedious and often expensively complex processes to create working prototypes before moving on to actual production, with the help of Information Technology and tools today it is possible to simulate actual working model in 3D. Designs can now be created, tested, evaluated and modified all in digital space. The concept of Virtual Design and Construction enables engineers to build and test their designs in virtual space. This allows them to evaluate several designs and explore alternative routes to match stated objectives as defined by contracts. Virtual modelling and simulation become invaluable and indispensable as complexity of a construction project grows. Architectural designs require complex collaborative effort from all stakeholders. Use of digital simulation and virtual modelling are influence design process and help in higher productivity and throughput.

Rapid strides being made in Information Technology has now made it possible for improving business process and rethinking strategies. While traditional CAD software could earlier present information in spatial relationships, domain-specific information would usually be absent. With the help of advancements made in Information Technology, it is also possible to simulate thermal behaviour in addition to structural designs. Building Information Model (BIM) is a stellar example of building a database of information that includes a wide range of parameters with the goal of sharing information beginning from architects, engineers, contractors, and suppliers.

INFORMATION TECHNOLOGY AND DESIGN

Advancements made in the Information Technology constantly influences the manner in which business processes are structured and followed across industry verticals. Construction companies have been known to be reluctant in adopting change. Even when computers were being widely adopted by other industries and companies engaged in infrastructural activities, the construction sector was slow to embrace computerization. Computer-aided design software were already in circulation in other engineering branches before architects and civil engineers caught on to the idea of involving computers in their profession. Initially, computer-aided design (CAD) software began to be used by architects to transform their engineering drawings from paper to digital. As CAD software evolved, architects and civil engineers began to explore additional possibilities boosted by the knowledge and experience of their colleagues in aerospace engineering, mechanical engineering, etc. With the advent of 4D CAD modelling techniques, architects and civil engineers

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