# Research on the Application of Information Technology in Cultivating the Core Competence of Intelligent Construction Talents

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**ABSTRACT.**BIM technology is an active application and innovation of the new generation of information technology in the civil engineering industry, playing a positive role in project planning, design, construction, and operation maintenance.Numerical simulation technology can replace experiments, such as analyzing the ultimate bearing capacity, failure modes, and deformation characteristics of structures or components through ABAQUS software, which greatly saves manpower and costs.This article compares and analyzes cold-formed thin-walled steel columns and cold-formed thin-walled steel-wood composite columns through this technology, reflecting the good seismic performance and high bearing capacity of the composite columns.

**Keywords:** Intelligent construction; BIM technology; Numerical simulation technology; Intelligent design

## 1 Introduction

The deep integration of new generation information technology, artificial intelligence, and manufacturing is triggering profound changes.With the implementation of China's "new infrastructure", "new urban construction", "the Belt and Road", "dual carbon goals" and other strategies, the market potential of intelligent construction applications is huge, the advantages of improving quality and efficiency are obvious, and the demand for professional and technical personnel is urgent[1].

The cultivation of new engineering talents requires the integration of a new generation of information technology, with the characteristics of interdisciplinary integration such as big data, cloud computing, BIM technology, artificial intelligence, etc., and requires a broad knowledge system for talents[2]. The introduction of new concepts and disciplines lags behind other industries, and students' awareness of innovation and entrepreneurship is relatively weak. These have become obstacles on the path of talent cultivation in emerging intelligent construction majors[3].

Intelligent construction is an innovative transformation and upgrading of the traditional construction industry, which requires continuous expansion of the engineering construction industry chain and reform of the traditional industrial structure to achieve


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high-quality engineering construction that is people-oriented, green and sustainable. Therefore, the cultivation of intelligent construction talents cannot simply overlap or directly piece together information technology courses. The cross integration of subject knowledge puts forward high requirements for students' practical abilities. The traditional cultivation of civil engineering talents is limited by educational models, knowledge systems, and ideological concepts, resulting in poor hands-on ability and weak practical ability of students, especially the lag in innovation awareness, which cannot meet practical requirements. In the context of the new engineering discipline, universities actively grasp the cultivation of core abilities for intelligent construction talents, broaden their knowledge system, deepen curriculum reform, strengthen practical and innovative ability cultivation[4], and it is urgent to upgrade and transform civil engineering majors.

## 2 The Core Connotation of Intelligent Construction and the Requirements for Talent Core Competence

### 2.1 The Core Connotation of Intelligent Construction

Intelligent construction is an innovative mode of engineering construction formed by the integration of new generation information technology and engineering construction. It is a new generation of information technology characterized by digitization, networking, and intelligence, as well as data, computing power, and algorithms[5]. On the basis of digitizing the resources of engineering construction elements, through standardized modeling, networked interaction, visual cognition, high-performance computing, and intelligent decision support, we achieve the integration and efficient collaboration of engineering project planning, planning and design, construction production, and operation and maintenance services driven by the digital chain. We continuously expand the engineering construction value chain, transform the industrial structure, and deliver people-oriented services to users Green and sustainable intelligent engineering products and service.The technical core of intelligent construction mainly includes BIM technology, engineering digital simulation technology, construction robots, 3D printing technology, human-machine interaction[6], and so on.

### 2.2 Cultivation of Core Competence for Intelligent Construction Talents

At present, the cultivation of intelligent construction talents follows two basic routes: "Intelligent Construction+X" and "X+Intelligent Construction"[7]. Intelligent Construction+X "refers to adding models or methods from other fields to the intelligent construction profession to complete corresponding application scenarios."X+Intelligent Construction" is the organic integration of relevant technologies from other fields or disciplines into intelligent construction, providing new ideas and references for solving problems in other disciplines.The core competencies of intelligent construction talents include the abilities of intelligent engineering construction, project management,

and technical and economic analysis, as well as the ability to solve professional problems using information technology.

# 3 The Application of Information Technology in the Cultivation of Intelligent Construction Talents

The cultivation of intelligent construction talents must be guided by course objectives and closely adhere to the requirements of cultivating core abilities of intelligent construction talents in the context of new engineering. Reconstruct the course content system by combining the core technologies of intelligent construction such as prefabricated building, BIM technology, virtual simulation technology and numerical simulation technology[8].

## 3.1 The Application of BIM Technology in the Cultivation of Intelligent Construction Talents

BIM is a building information model, which is becoming a new technology that drives technological progress and management innovation in the construction industry after CAD. It will be an important means to further enhance the core competitiveness of enterprises. By establishing a BIM information model, the delivery speed of engineering projects can be accelerated, coordination strengthened, cost reduced, production efficiency improved, work quality improved, and so on. Information technology represented by BIM technology can provide technical support for the transformation and upgrading of the construction industry, as well as support for the transformation of industrial production methods and management models. At the same time, BIM is applied in engineering quantity calculation, cost control, progress control, structural deepening design, construction scheme simulation, collision inspection, prefabrication processing, and other aspects. BIM technology has strong visibility and can observe structures from various angles, making it highly intuitive. In the teaching of concrete structures, complex structures that require high spatial imagination and difficult to present flat drawings can be displayed by establishing BIM three-dimensional models and using multimedia facilities to show them to students, thereby reducing teaching difficulty and improving students' learning outcomes[9].

Teachers combine BIM technology in professional teaching to intuitively express complex and difficult professional knowledge and stimulate students' interest. This not only enables students to have a better grasp of professional knowledge, but also enhances their intelligent design and construction abilities, laying a solid foundation for future practice and work. Taking a prefabricated monolithic concrete column beam frame structure as an example, students are required to create a structural BIM model and deepen the design of components. The students used the software to complete the modeling. The 3D building model is shown in Figure 1, and all steel bars have been checked for avoidance, as shown in Figure 2. By completing this practical project, students have gained a deeper understanding of the structural stress characteristics, steel

reinforcement arrangement, and national standards, which has improved their professional level.

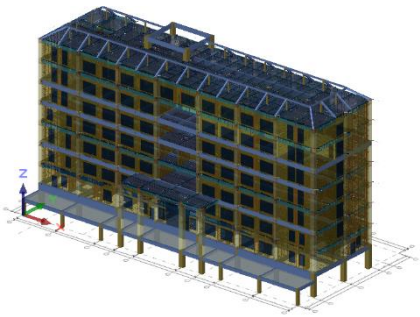

**Fig. 1.** 3D building model

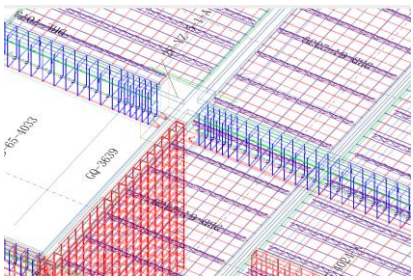

**Fig. 2.** Collision inspection of steel bars

### 3.2 The Application of Numerical Simulation Technology in the Cultivation of Intelligent Construction Talents

Civil engineering is a major with strong theoretical and practical aspects, and most of the teaching process is based on traditional teaching methods with manual calculation as the main content.Relevant numerical simulation analysis software, such as finite element analysis software Abaqus, is introduced in the teaching process[10].Taking the research of a student research group as an example, they analyzed the seismic performance of steel columns (SC members) and steel wood composite columns (SWC members). Figure 3 shows the stress diagram of the SWC component model after stress analysis.

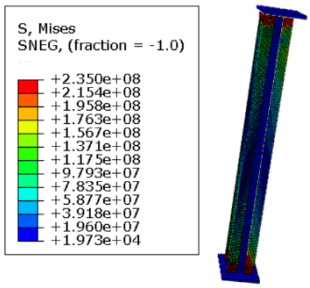


**Fig. 3.** Stress of SWC components

### 3.3 The Application of Structural Design Software in the Cultivation of Intelligent Construction Talents

In the teaching process, based on the cultivation of students' personalities, discipline competitions and research teams are formed to guide students in learning and using architectural structural design software, and to enhance students' intelligent design abilities. Students used software to design and drew a three-dimensional diagram (explosion diagram) of a certain floor of the structure, as shown in Figure 4.

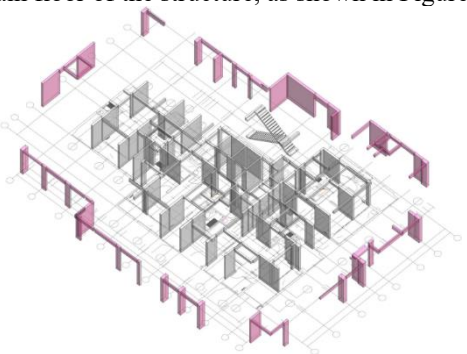

**Fig. 4.** 3D view of the floor

## 4 Conclusion

The deep integration of new generation information technology and artificial intelligence is triggering profound changes in the construction industry. Through the application of BIM technology, the separation of prefabricated components, reinforcement collision inspection and component construction detail design of prefabricated building are realized.

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