

# Long Span Structure Design of Beijing Daxing International Airport Terminal Building

Zhongyi Zhu, Weinong Shu, Zhongfa Zhou, Lin Zhang, Chenyu Liang, Yi Wang, Zhe Wang, Xuyang Deng

Beijing Institute of Architectural Design, Beijing, China

Contact: [1027311973@qq.com](mailto:1027311973@qq.com)

## Abstract

Beijing Daxing International Airport Terminal has been named as the top of the New Seven Wonders by the Guardian. The 8 C-shaped columns in the central area of the terminal are organically combined with the roof structure to achieve the amazingly architectural effect. The new base and interlayer combined seismic isolation system is proposed to build the world's largest seismic-isolation building which also becomes a new benchmark of isolated structure. This terminal is the first completed project in the world that integrated high-speed rail transit and terminal, and vibration caused by high-speed trains is also controlled to an acceptable level.

**Keywords:** long-span structure design; parametric surface forming; seismic isolation; base-interlayer isolation; C-shaped column; progressive collapse; vibration control.

## 1 Introduction

Beijing Daxing International Airport Terminal (BDIAT) is located in the Daxing District of Beijing. The terminal is 996m long from north to south and 1144m wide from east to west.



Figure 1 Aerial View of the Terminal Building

The floor area of this terminal is around 800,000m<sup>2</sup> with a direct roof projection area of 350,000m<sup>2</sup>. It is the world's largest airport terminal and has been

named as the top of the New Seven Wonders by the Guardian. BDIAT is the first completed project in the world that integrated high-speed rail transit and terminal.

## 2 Free-formed surface space steel structure supported by C-shaped columns

The roof of the terminal is an irregular free-formed surface. A set of multi-disciplines fully-parametric curved surface forming system which integrates roofing, skylight, curtain wall, and steel structure has been developed to solve the difficulty of forming and position roof steel structure primary control grids on the curved surface. In the central area of the terminal, 6 groups of C-shaped columns with centrifugal openings and the roof of the central zone create an arch-shell structure, which offers a 180-meter-diameter column-free space and realizes a perfect integration of architecture and structure. The combined supporting system