

Leica Geosystems **TruStory**

China: Leica HDS3000 captures 3D Data of the Palace Museum



Taihe palace in the "Forbidden City"

The Palace Museum in the "Forbidden City" in Beijing is the biggest and most comprehensive ancient palace complex in the current world, and it is a valuable cultural heritage for human being. In 1925, the Palace Museum completed its historical change from an imperial palace to a museum, and became the biggest museum of ancient cultures and arts in China. At the 80th anniversary of the Palace Museum in 2005, the Palace Museum and CCTV jointly launched a full-length TV documentary named "The Palace Museum". While enjoying the huge complex with a history of over 500 years, Chinese ancient architectural traditions and unique Chinese styles, as well as how it is preserved, have you ever noticed the role of Leica HDS3000 3D laser scanner?

The main purpose for the measurement of ancient architectures is to obtain their structure and geometrical data. Traditional and commonly-used measuring methods are almost the same, where steel rulers, measurement tapes, plumbs, theodolites, and even total stations etc are indispensable. But as the measured information is based on single points, they are usually inefficient. It was a very tough task to get all the 3D geometric data of such a huge complex as the Palace Museum. However, with increasing application of 3D laser scanning technologies, especially in the ancient architecture protection sector, using 3D laser scanners to get the 3D data of such architectures for storage, analysis and processing has become a more and more common

■ Challenge

The "Forbidden City" with its over 500 years history is the world's largest construction complex. It is a cultural treasure heritage not only for China, but also for the whole world. In order to keep this world-leading construction heritage, some key palaces need to be restored, such as the Hall of Supreme Harmony, etc. How to keep all the data reserved and also be used in the restore project is a challenge for the engineers involved in this project. Beijing Institute of Architecture and Engineering is in charge of all geometric data collection and processing works.

■ Customer

Beijing Institute of Architecture and Engineering, P.R. China

■ Date

The project started in November of 2005, not completed yet.

■ Project Summary

Instruments

Leica HDS3000 scanner
Leica HDS4500 scanner
Leica TCRP1201 total station

Software

Leica Cyclone 3D data processing Software
Leica CloudWorX Software for AutoCAD®

Field

Leica HDS3000 is used to scan the outside of all palaces in the "Forbidden City", and HDS4500 for interiors. Leica TCRP1201 total station collects the coordinates of all targets, which are utilized in the latter scan registration.

Office

Leica Cyclone Software processes the scanning data, to register all scans based on the coordinates from total station, to create 2D drawings and output. All the deliveries can meet the needs of the "Forbidden City" retrofit project.

- when it has to be **right**

Leica
Geosystems



■ **Benefits:**

- Leica HDS systems can meet the requirement from 3D data capturing to create a complex structure, such as this "Forbidden City" restore project. From the accuracy, efficiency, time and cost saving, customers can enjoy the diversified advantages with Leica HDS new technologies.
- Combined use of Leica HDS3000 and Leica HDS4500 on site is the first time in China to acquire so many scanning data. With its ultra fast speed, the Leica HDS4500 can quickly get the 3D data.
- With the Leica Cyclone software is easy for users to create the 3D model of the architecture, on the other hand, with Leica CloudWorX, customers can draw 2D perspectives on point cloud.

On site scanning

approach. In July 2005, Beijing Institute of Civil Engineering and Architecture purchased a Leica HDS3000 pulse 3D laser scanner and a Leica HDS4500 phase-based 3D laser scanner for the capture of 3D data of the Palace Museum, and has reached initial success by now.

Leica HDS3000 can be used for easy capturing of high-definition data for surveying and mapping as well as engineering projects and play a critical role in the restoration and preservation of the Palace Museum. 3D laser scanning is a new arising measuring technology that is integrated with 3D data modeling and processing software. We are sure that this technology will have broader applications in the future.

*Point clouds
by Leica
HDS3000*

