

# ADVANCING MEXICO'S TRANSPORTATION INFRASTRUCTURE



Imagine an airport featuring six runways and serving up to 120 million passengers per year, located approximately 25 kilometres from one of the largest metropolitan areas in the world. That airport, the Mexico City New International Airport (NAICM), is currently the largest Mexican infrastructure project and expected to open in 2020.

Millions of travellers are expected to fly into and out of NAICM, thousands of airport personnel will commute on a day-to-day basis, and hundreds of businesses will reside within or rely on the airport business district. All these airport users depend on transport infrastructure that provides an effective solution.



Mexico's Federal Secretariat of Communications and Transport (SCT) has developed a plan in which several international and Mexican companies are responsible for the design and construction of the NAICM. Besides the NAICM, a **57.7 km high-speed, modern, efficient and safe railroad** is planned for connecting the city of Toluca and Mexico City.

Consortium IUYET, a leading Mexican civil engineering services company with 40 years of experience, is actively involved in the construction of the new international airport and railroad.

## RESPONDING TO GLOBAL STANDARDS

The Interurban train will provide significant transport and economic benefits for the whole Mexico City region, and, along with NAICM, will be an important contributor to Mexico's economy. This new airport will not only facilitate tourism but also trade, and it will connect widely Mexico City to the rest of the world.

For this project, Consorcio IUYET uses a variety of Leica Geosystems solutions to capture, model and analyse the data, such as total stations, the SiTrack:One rail maintenance and refurbishment solution, GNSS receivers, digital levels and construction lasers combined with Leica Geosystems measurement software.

As part of the works performed by Consorcio IUYET for this project, **2,800 scans to cover 50 square km** were captured and unified in a record time of two months, using the Leica ScanStation P40. The point clouds from these scans were cleaned and registered using the Leica Cyclone 9.1 software for the most accurate generation of the Digital Terrain Model

(DTM) of the zone. These data were used to develop the land and air design of the NAICM.

***"The Leica ScanStation P40 enabled us to acquire 3D point clouds of the study area to generate a Digital Terrain Model and create planimetric maps,"*** said Guillermo Ortiz, CEO at Consorcio IUYET. ***"This allows us to gain reliable information and high precision data for the development of the Building Information Modelling (BIM)."***

The railroad line will have four stations and two main terminals, including a station in Metepec, close to Toluca International Airport. The train will have a maximum speed of 160 km/h. The project will also involve the construction of a 3.9 km, 30 m deep tunnel to secure environmentally protected zones; this is the most challenging task. Consorcio IUYET is the first company in North America to acquire the Leica SiTrack:One, the mobile mapping platform made especially for railroad documentation, which will be used for the construction of the high speed passenger train Toluca-Mexico City.

***"The SiTrack:One and its integrated P40 ScanStation will be used to obtain a highly accurate 3D point cloud of the railroad environment for applications such as rail geometry calculations, platform gauging and rail clearancing,"*** said Ortiz. ***"Rail's ability to compete with other modes of transport, in particular with road, is crucial for its competitiveness. New technology such as the Leica SiTrack:One can offer much to help modernise railways and develop a smarter and safer rail system that will benefit travellers and commuters."***



## USING THE MOST SUITABLE TECHNOLOGY

The The airport journey experience has a high impact on travellers' view of the quality of the airport. The route between the destination and airport will be the passengers first and last experience of Mexico.

The railroad project began construction in July 2014 and the new line is expected to open by 2018. It would be operated with a fleet of 15 trainsets giving an end-to-end journey time of 39 minutes. Using technology that allowed for easy access, the project is on track for a timely completion.

Consorcio IUYET combined several technologies in different stages of this project. The Aibotix X6 V2 unmanned aerial vehicle (UAV) was used for the photogrammetry and construction inspection while the Leica Viva GS15 GNSS antenna helped create the Geodesic Reference Network, and the Leica DNA03 digital level ensured altimetry control.

The flexibility and simplicity in the collection of the measurements allowed Consorcio IUYET to focus efforts on evaluating and analysing data rather than working out how to collect the required information.

***“Thanks to the Leica Geosystems products, our project goals are clear, realistic, feasible and designed to complete the project on schedule with high quality standards,”*** said Ortiz.

The firm also used the Leica Nova MS50 to integrate 3D point cloud measurements that enabled the collection and visualisation of topographic survey data together with detailed high-precision scans. Ensuring **fast and efficient transfer of information** from field to finish is vital for this demanding project.

***“The precision and compatibility between the Leica Geosystems equipment allows the best use of the resources for our company,”*** said Ortiz. ***“The need for accurate measurement is critical for our project; it supports precision and saves money and time. The reliability that our customers recognise in our work is a reflection of the quality of the Leica Geosystems solutions.”***

## MEASUREMENT SUPPORTS INNOVATION

Mexico City has an opportunity to enhance the development of the airport region, to ensure the airport's support to the local and national economy is increased.

For a number of reasons, the terrestrial transport is considered to play a significant role in sustainable airport access. An effective and efficient transport network is one of the most important elements to ensure that the airport is cohesively integrated in Mexico City.

***“The Mexico City New International Airport and Interurban Toluca-Mexico City train line will be a presentation for Mexican innovation,”*** said Ortiz. ***“Known as the ‘Airport of the future,’ it will be one of the world’s largest airports and will revolutionise airport design.”***

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