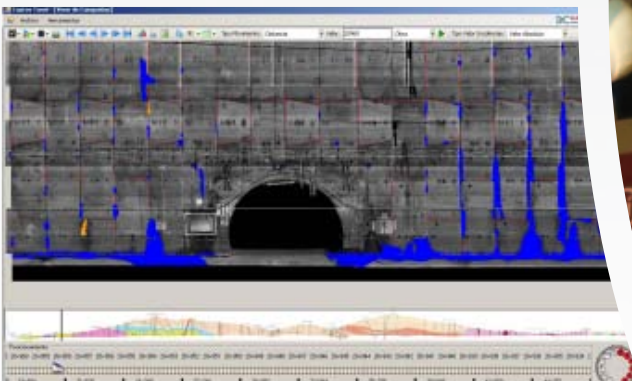


Laser Tunnel Scanning System (LTSS)

KEY FEATURES

- Full vault scanning.
- 1mm resolution images and 3D data.
- 100 times faster and 10 times more accurate than lidar scanning.
- Measure tunnel features with sub millimeter accuracy.
- Visualize 1mm surface defects from any point of view without leaving the office.
- Scanning speeds up to 20km/h.
- Automatic analysis software of voussoir type tunnels available.
- Rail scanning options also available.



Laser Tunnel Scanning System (LTSS)

The Laser Tunnel Scanning System (LTSS)

uses multiple high speed laser scanners to acquire both 2D images and high resolution 3D profiles of tunnel linings.

This system can scan a full tunnel vault (24m) at 1mm resolution image and 3D data at acquisition speeds up to 20km/h. Once digitized the tunnel data can be viewed and analyzed offline by operators using multi-resolution 3D viewing and analysis software that allow the high precision measurement of virtually any tunnel feature. Automatic analysis software is available to detect and rate the condition of joints, faulting, cracks, degraded concrete, wet as well as wet and humid area tunnel linings.

The LTSS technology was used to scan high speed TGV rail tunnels such as the 28km long Spanish Guadarrama tunnel in full one millimetre resolution (x,y,z) in just 3 hours. The system was also used to acquire data on the Tokyo Metro System in Japan. Vaults are scanned one half going forward and the second half coming back.

The LTSS is one hundred times faster and 10 times more accurate than typical LIDAR technology. The LTSS can acquire 120,000,000 3D and 2D image points per second at an accuracy of 0.5 mm compared to typical LIDAR accuracies of 5.0 mm for just a few 100,000 points. The standard LTSS configuration (6 sensors) allows for the scanning of a full 12 m of tunnel surface perimeter in a single pass. Larger surfaces can be captured through multiple passes (and the images and data "stitched") or scanning width can be increased through the addition of sensors.



SYSTEM SPECIFICATIONS

- Number of laser profiles : 6 sensors (standard)
- Sampling rate : 5,000 profiles/s
- Points per profile : 12,000 points (2D and 3D)
- Total sampling rate : 120,000,000 points/s (2D and 3D)
- Transversal field of view : 12m
- Transversal resolution : 1mm
- Vertical accuracy : 0.5mm
- Laser profiler dimensions : 428mm (h) x 265mm (l) x 139mm (w)
- Weight : 10 kg