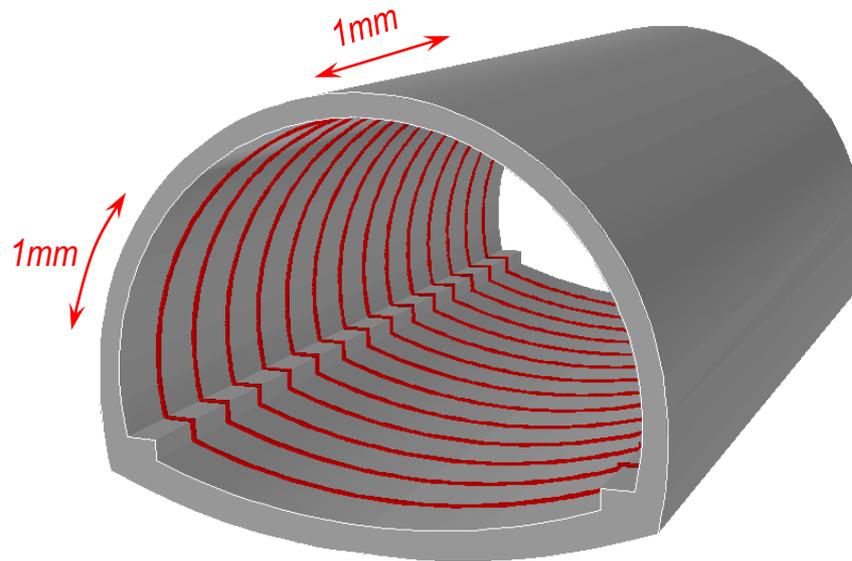


TUNNELINGS

TUNNEL LINNING AND RAIL INSPECTION

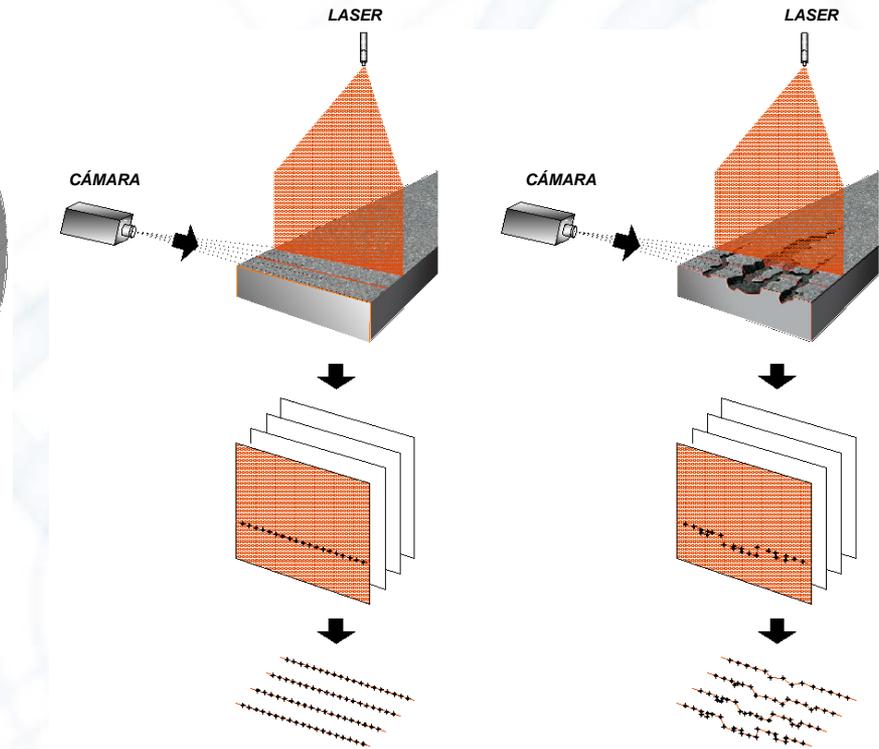
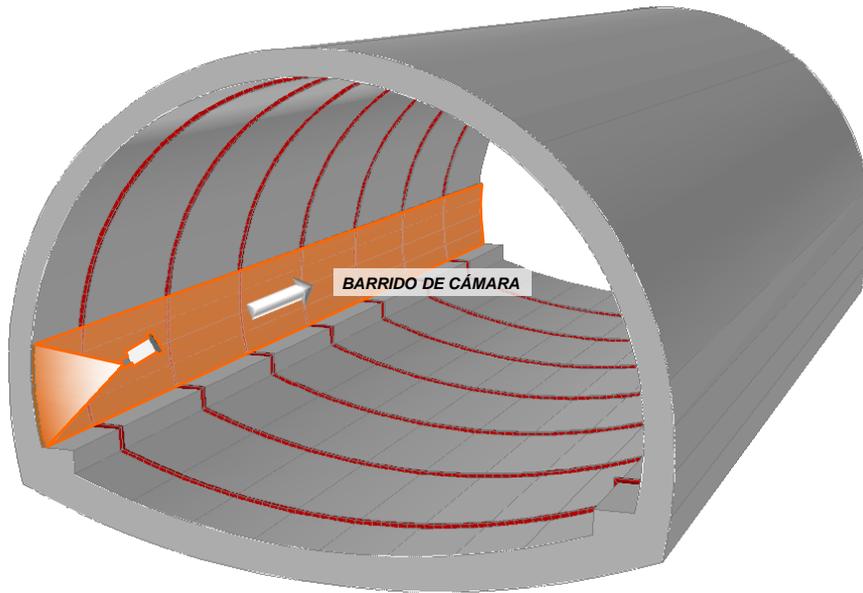
1.- Tunnelings system specifications

Tunnel Inspection Resolution and Speed



1.- Tunnelings system specifications

Tunnel Inspection Resolution and Speed

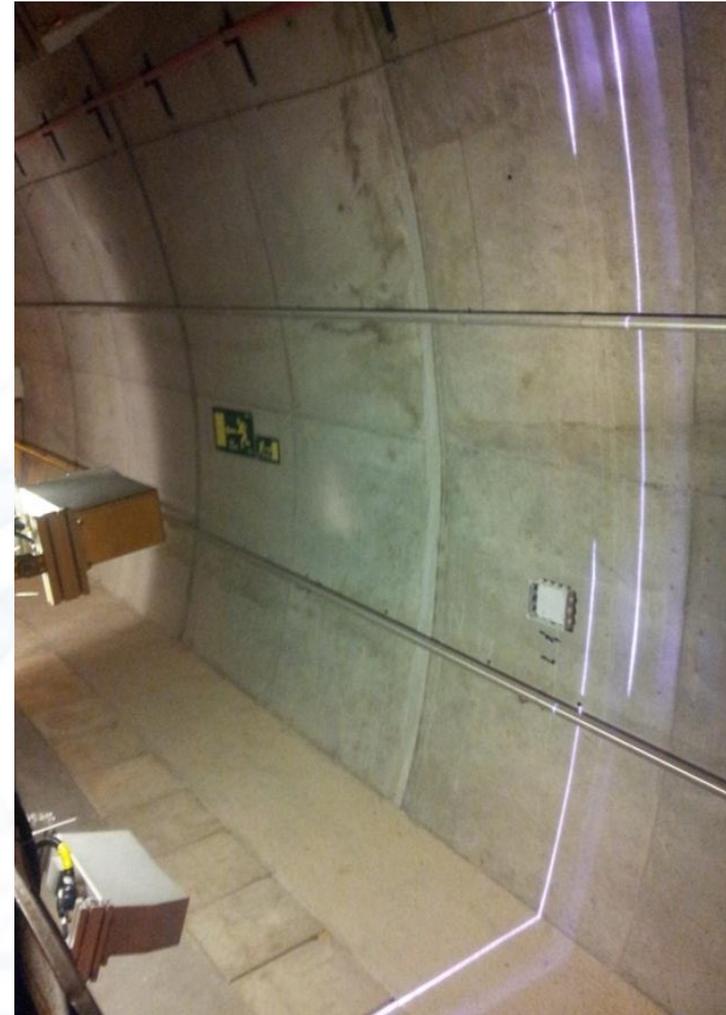


1.- Tunnelings system specifications

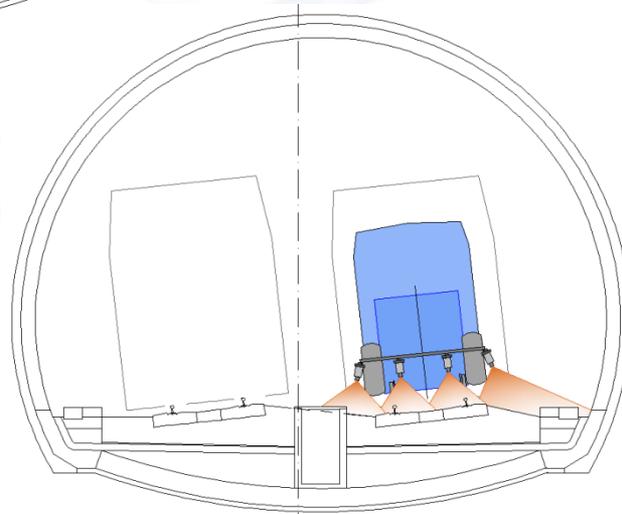
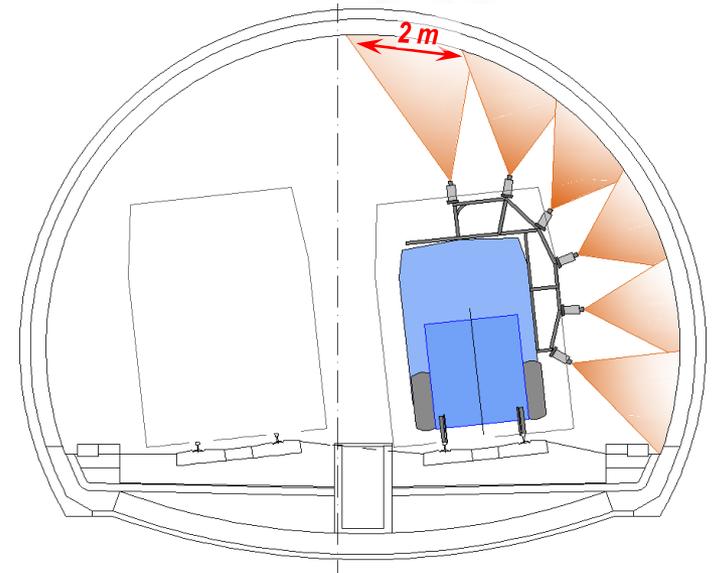
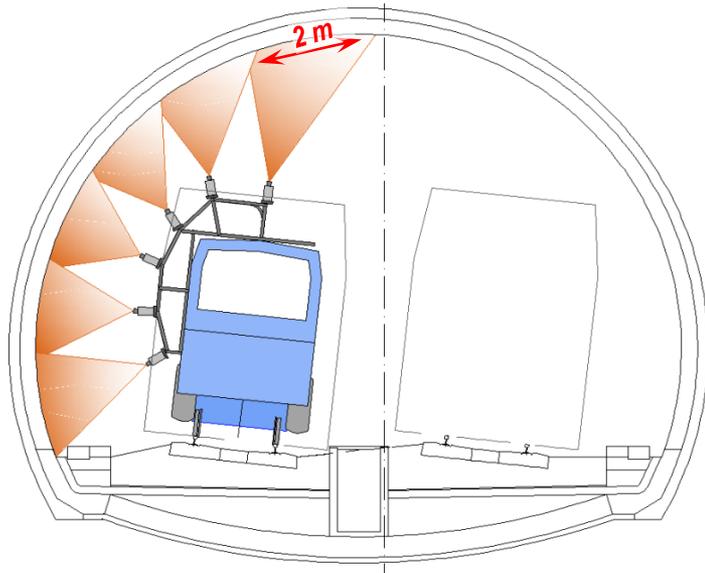
Tunnel Inspection Resolution and Speed



1.- Tunnelings system specifications



2.- Sensors, vehicle and structure



2.- Sensors, vehicle and structure

Bimodal Truck



2.- Sensors, vehicle and structure



2.- Sensors, vehicle and structure



2.- Sensors, vehicle and structure

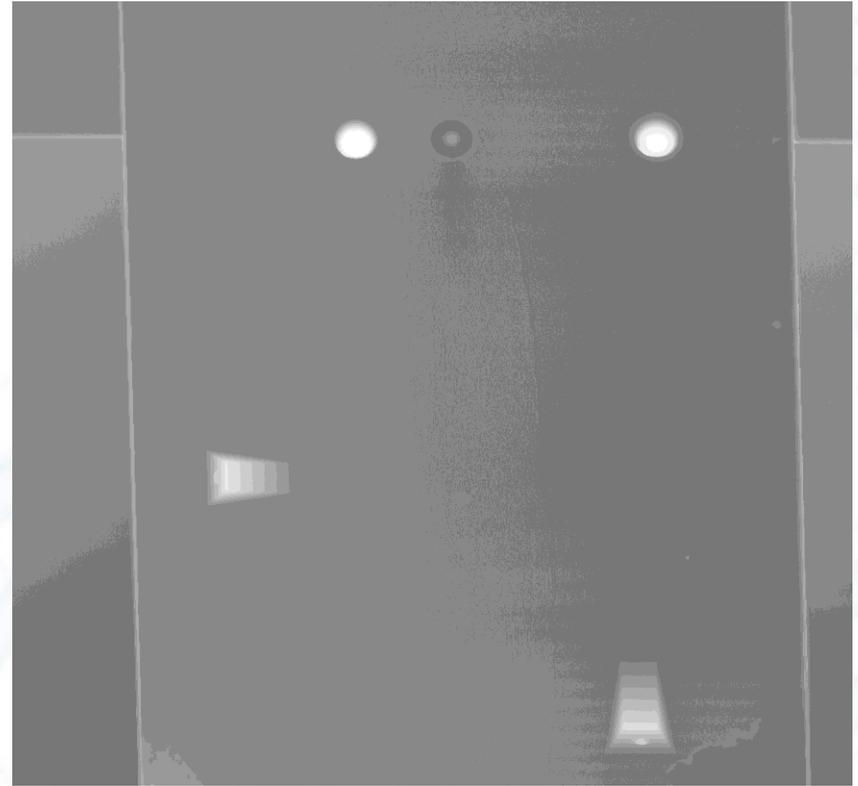
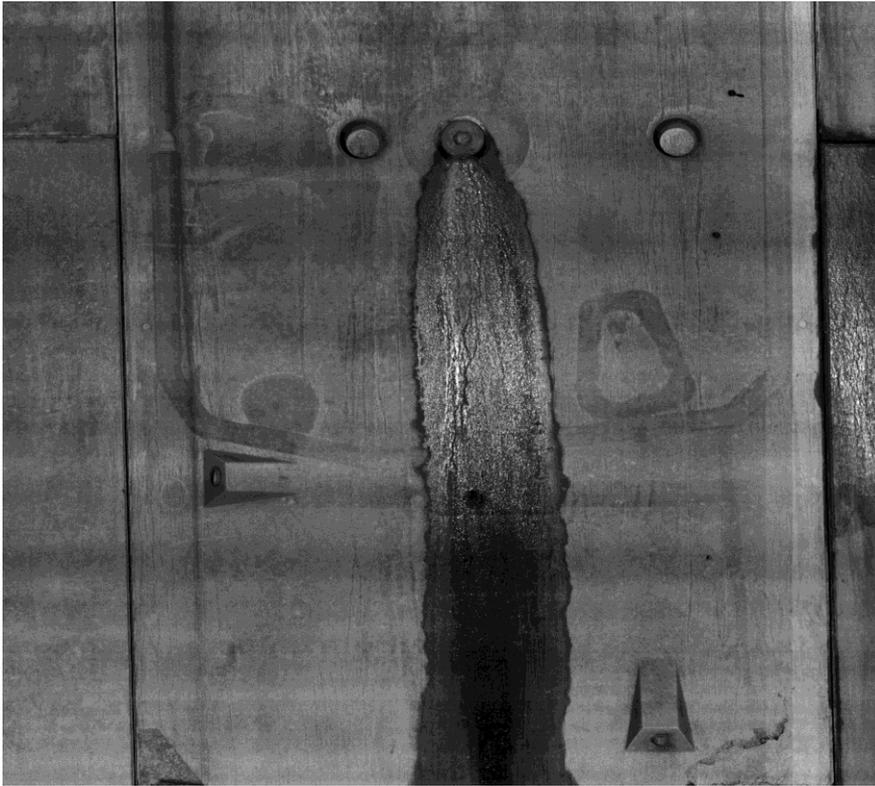


3.- Data acquisition



Panoramic images are taken by using a camera located on top of the vehicle at the front, which is synchronized with the data collection from the laser sensors.

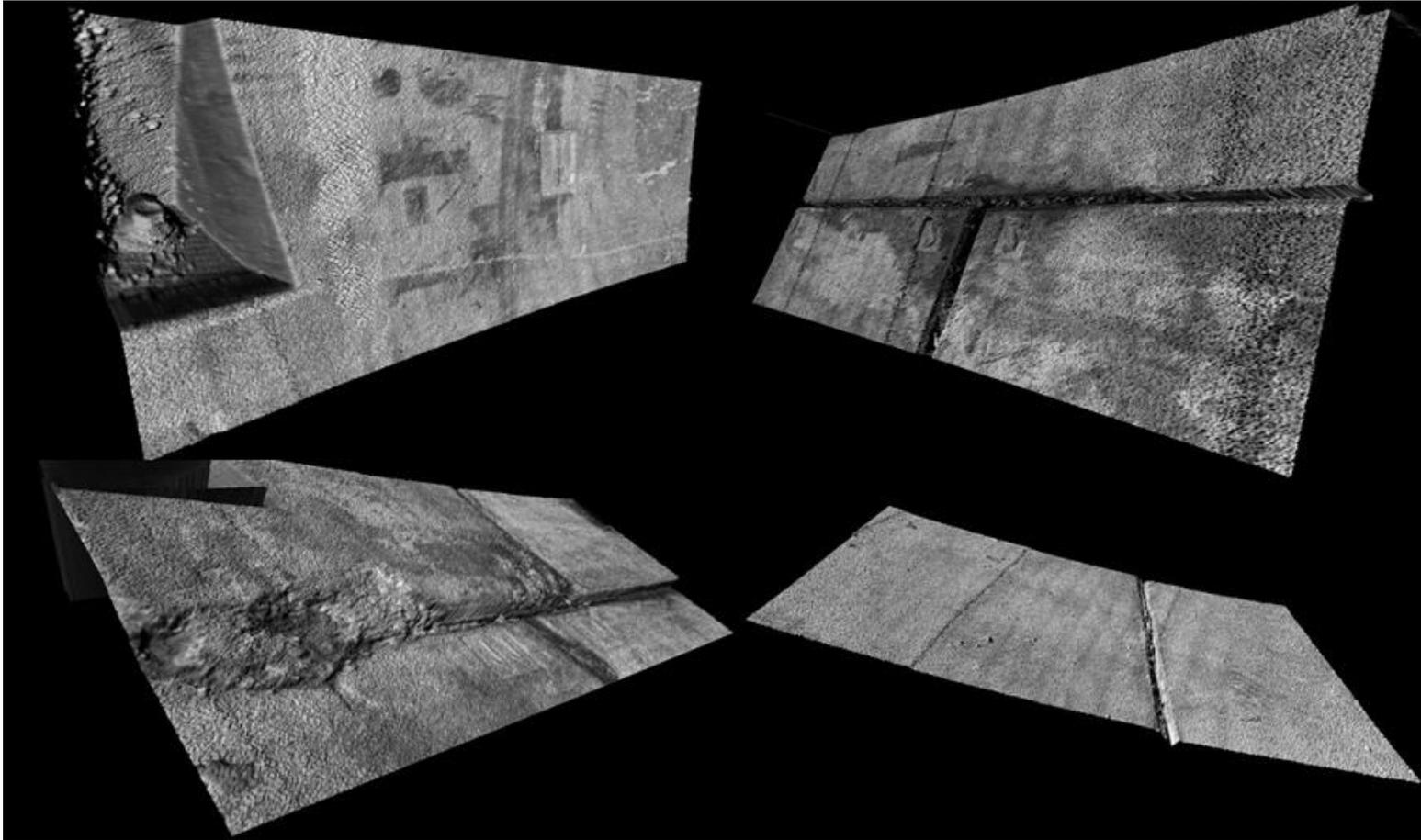
3.- Data acquisition



High-quality digital images of the tunnel's lining or railtrack with a resolution of 1 mm.

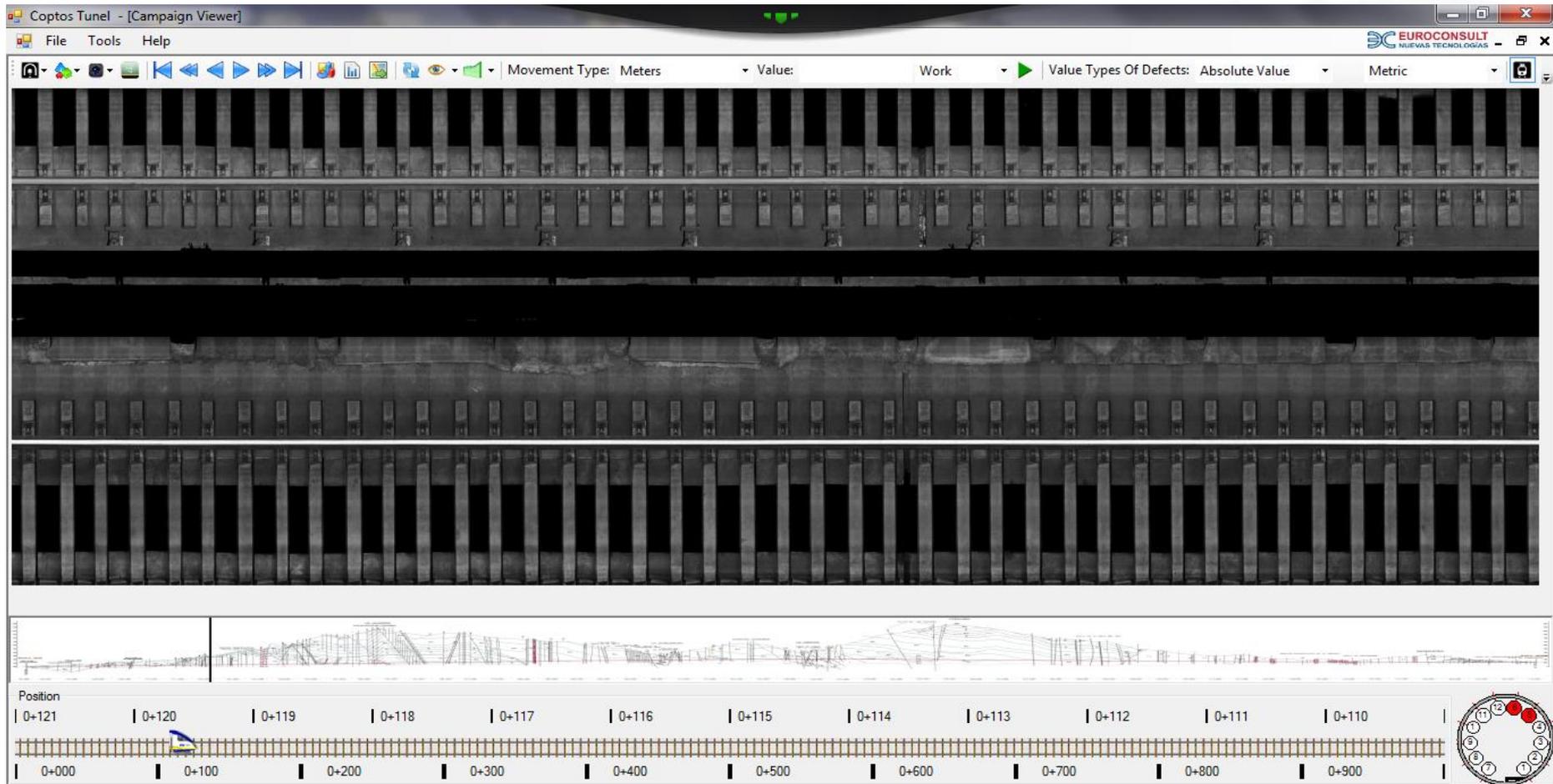
Images showing the representation of the distance between the sensor, as it moves along the tunnel, and the lining every millimeter.

3.- Data acquisition

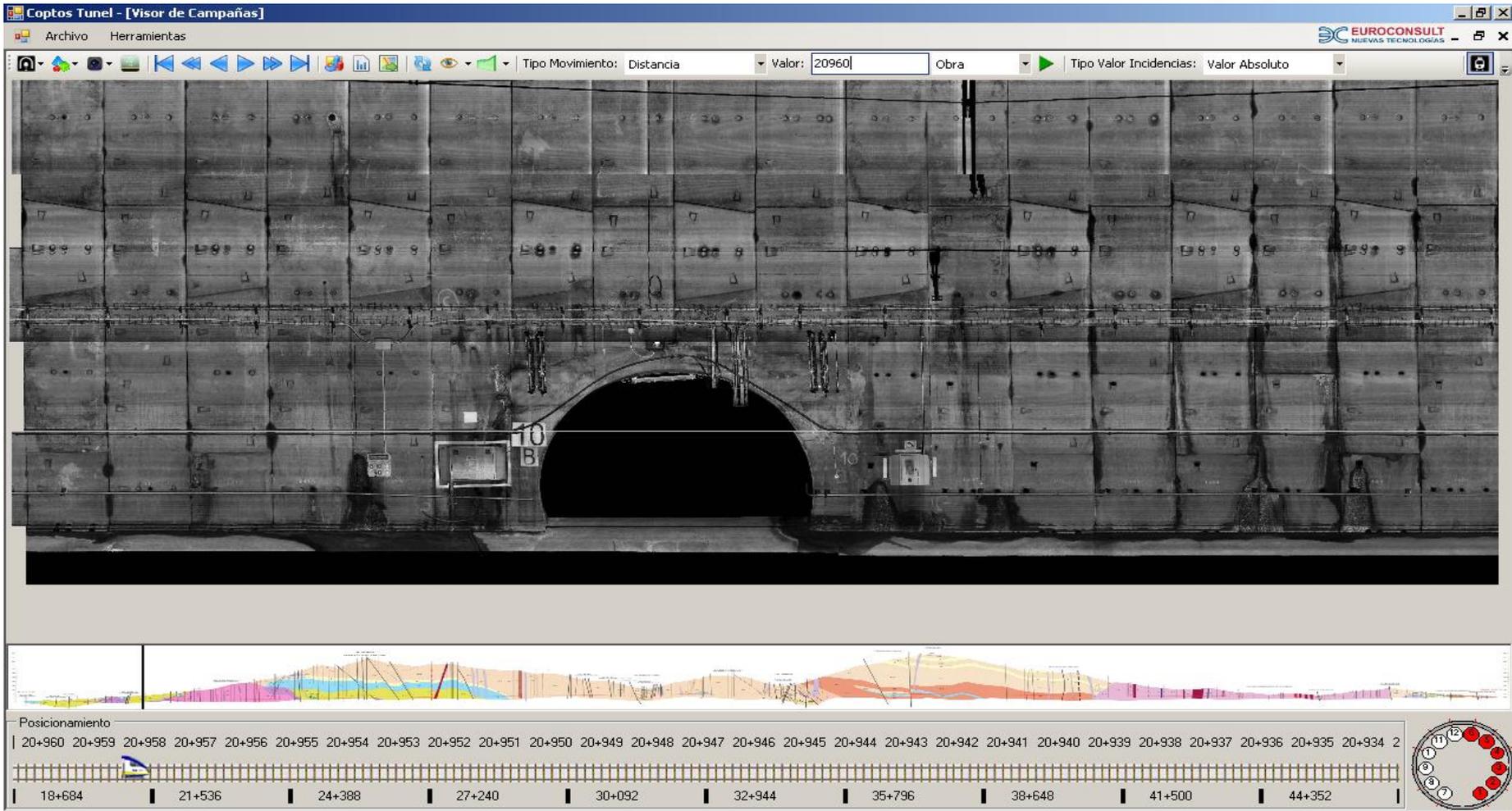


3D Reconstruction

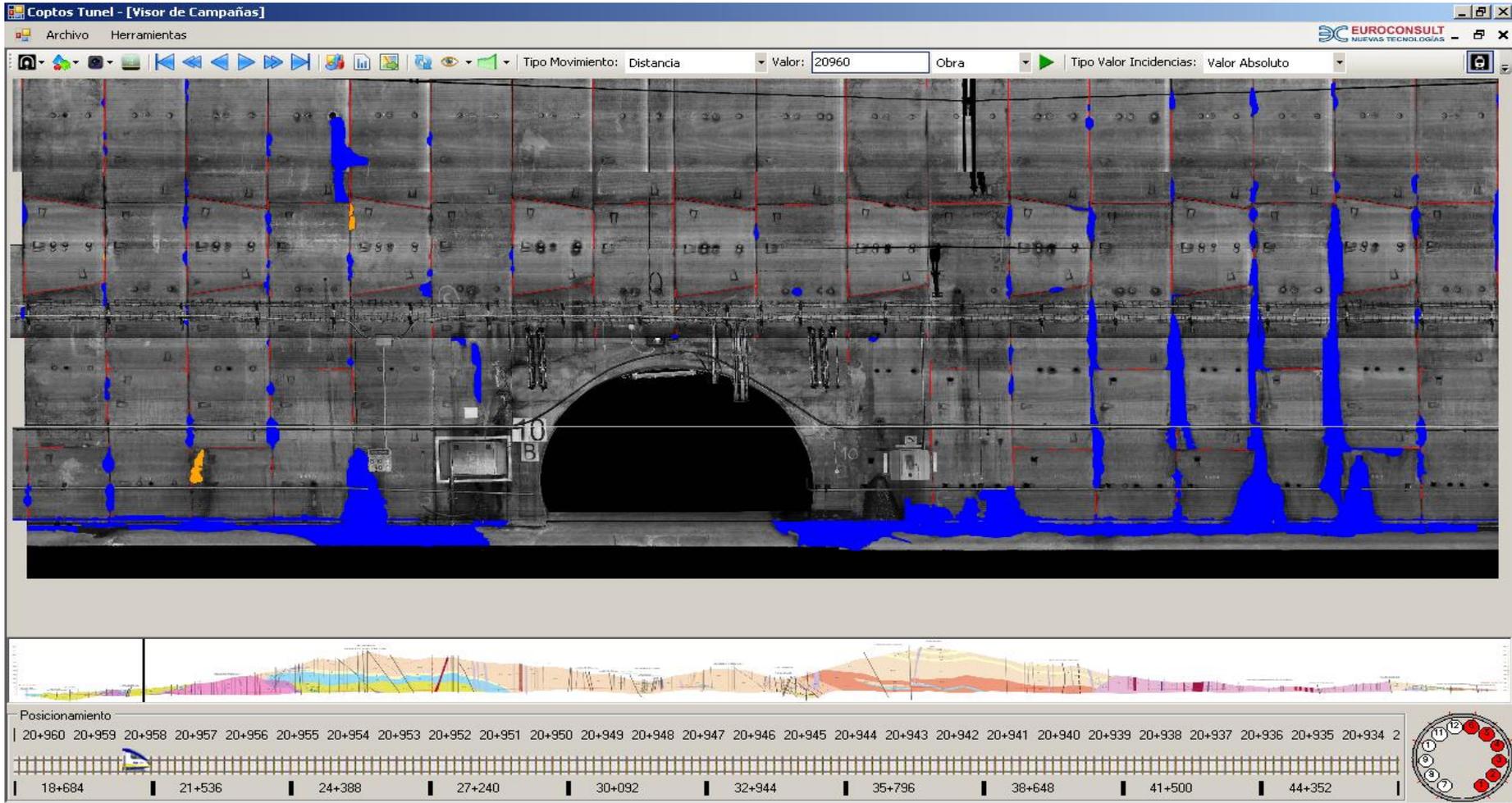
4.-Tunnel visualization software



4.-Tunnel visualization software

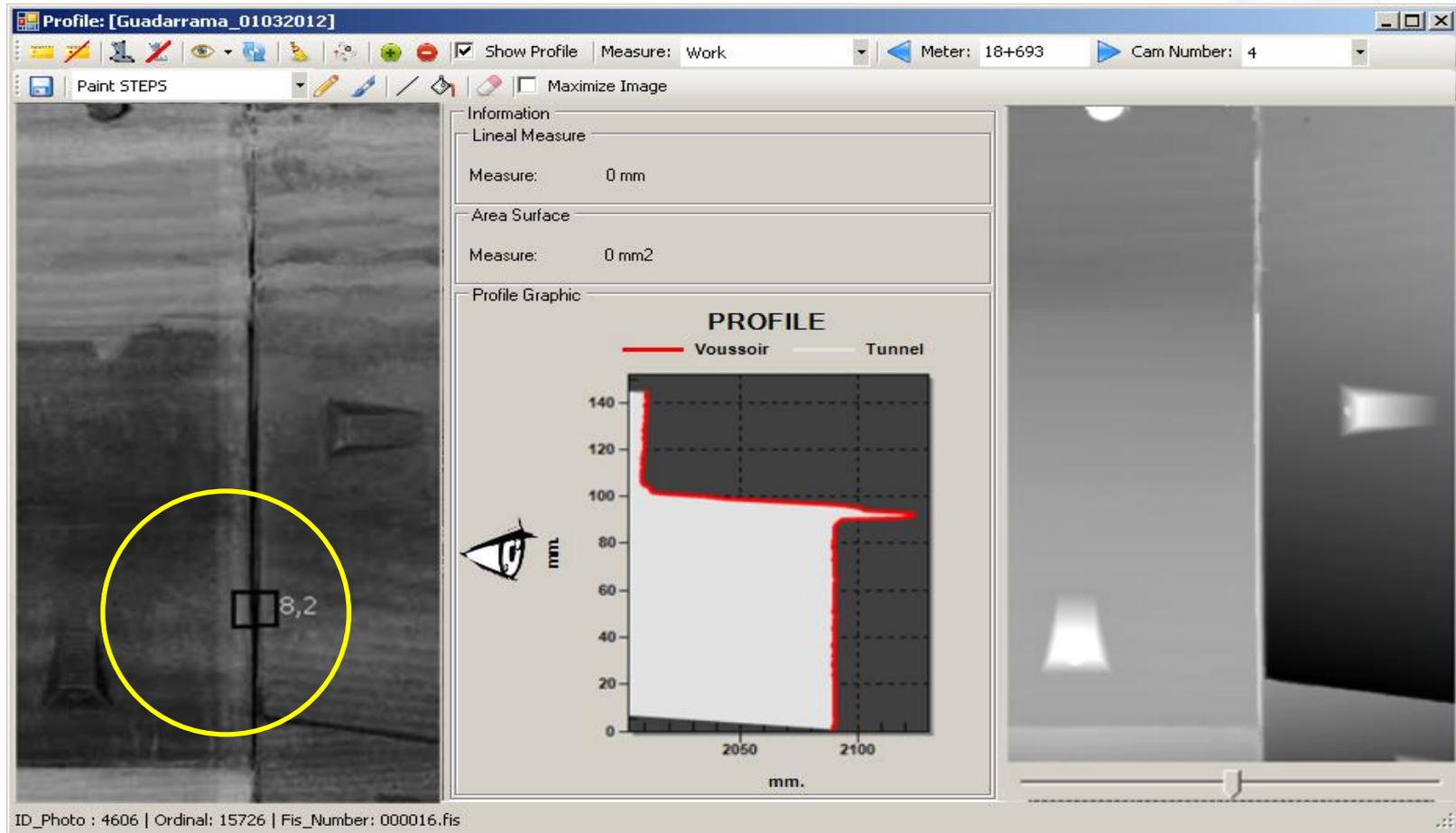


4.-Tunnel visualization software

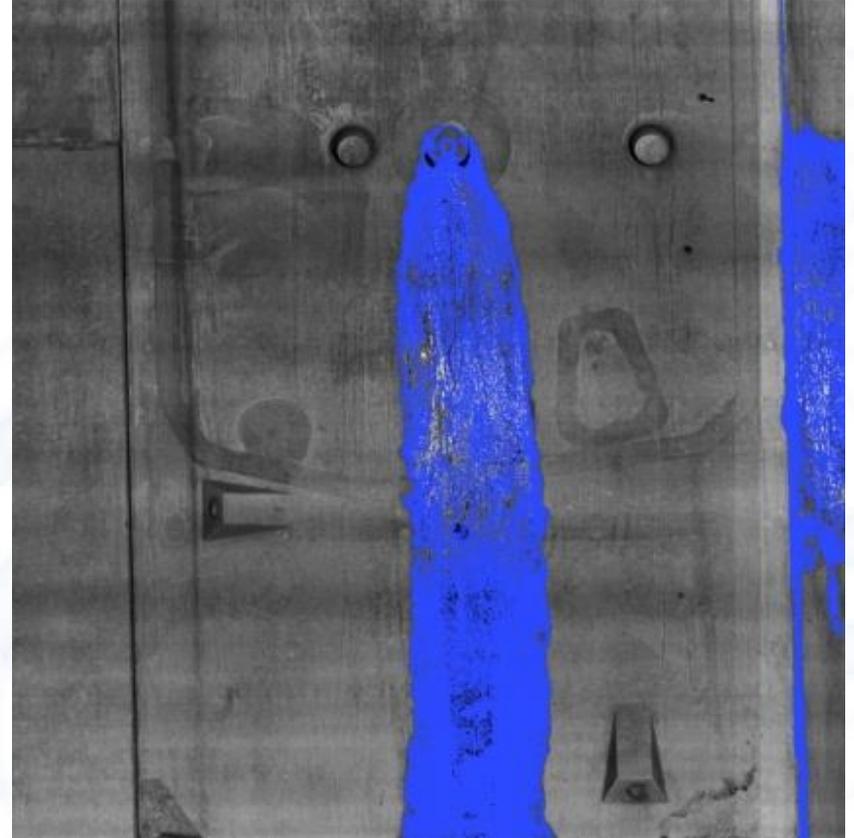
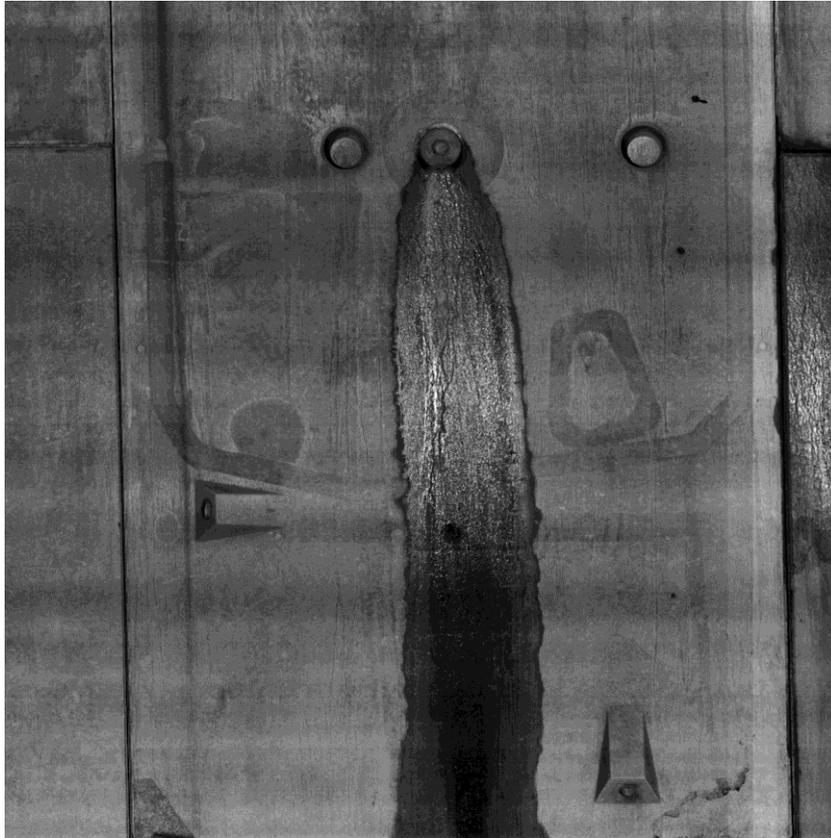


5.- Automatic Analysis – Joints between segments

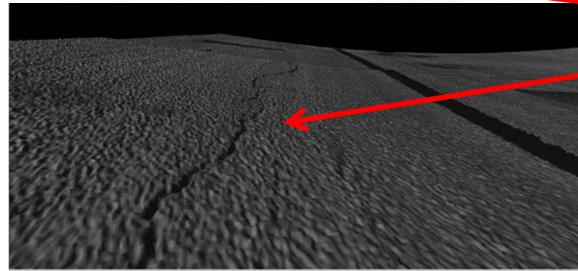
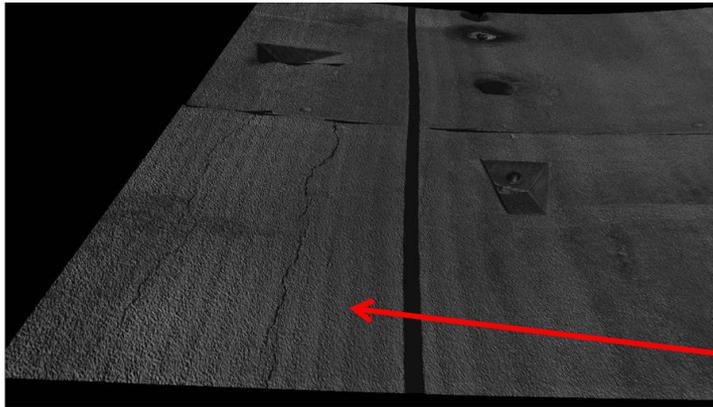
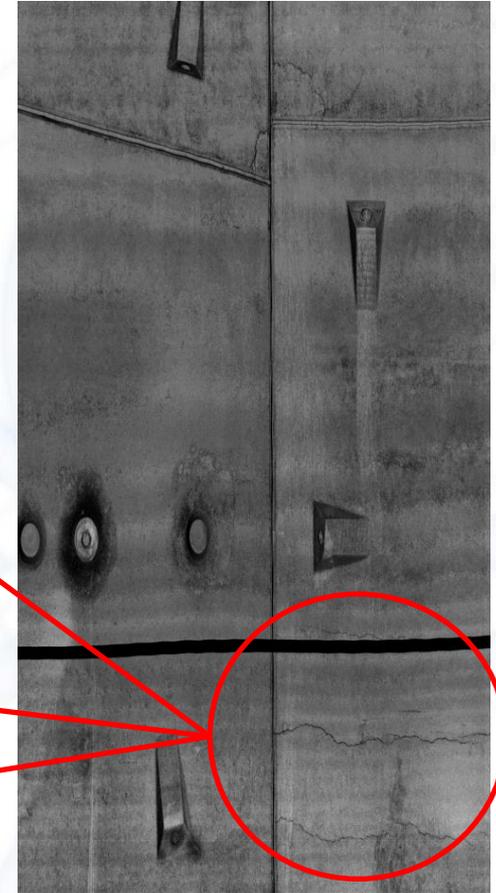
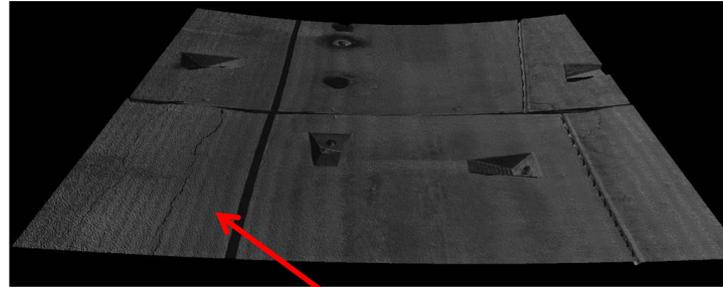
Protruding edges between assembled segments (> 50 mm)



5.- Data Analysis – Presence of dampness

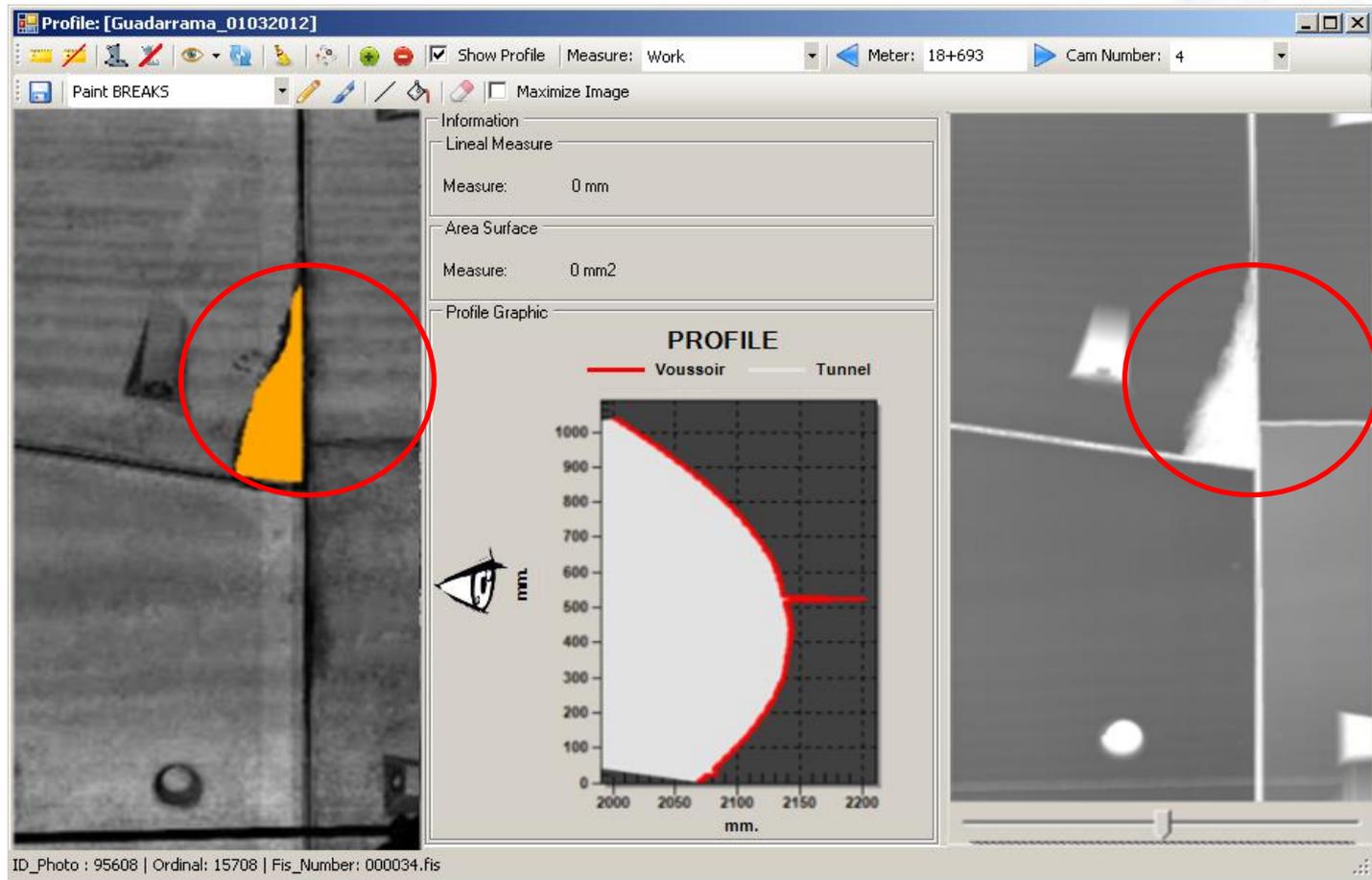


5.- Data Analysis – Fissures and cracks

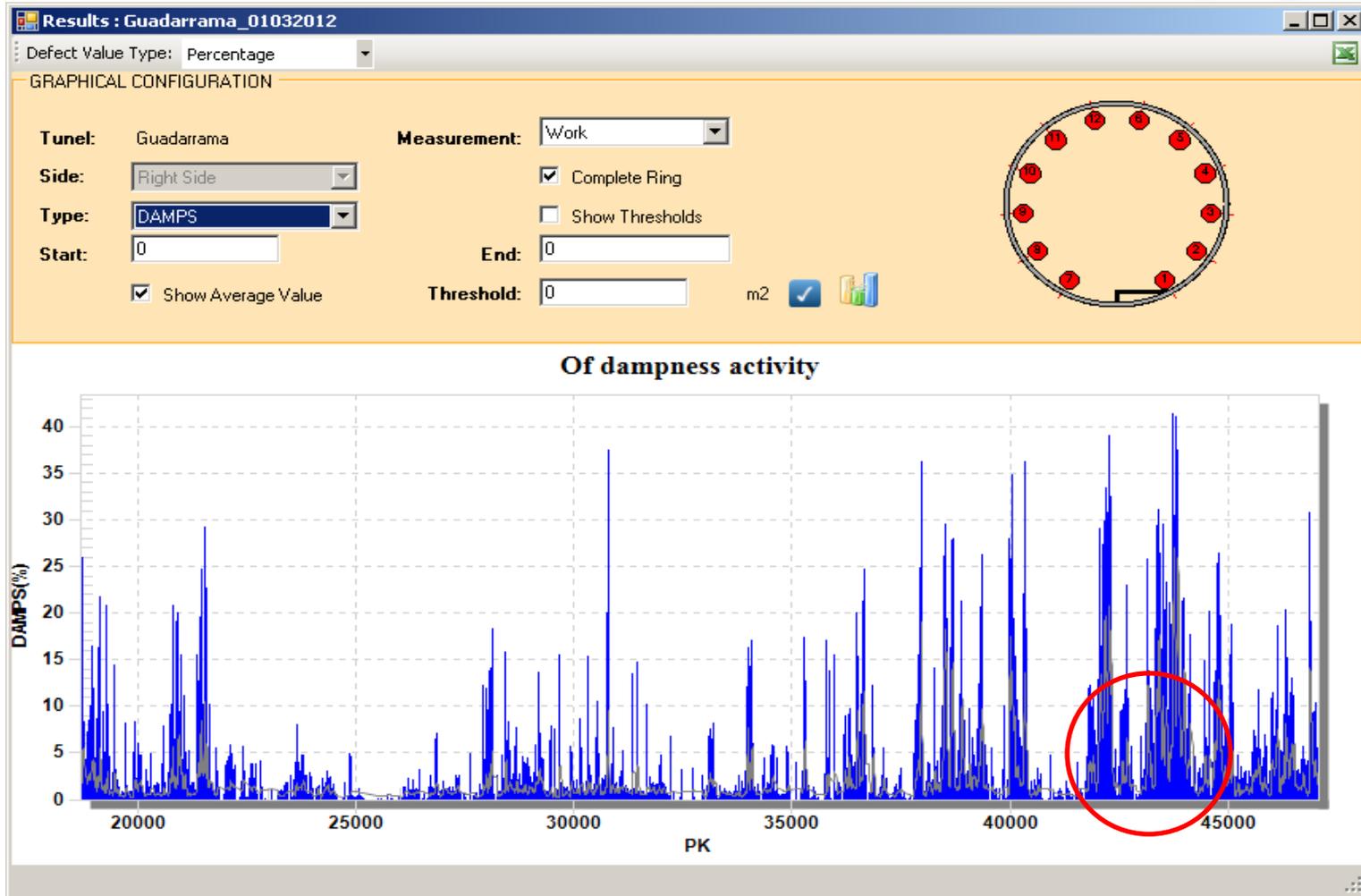


5.- Data Analysis – Chipping Detection

Area Occupied Level 1



6.- Statistical Analysis – Dampness



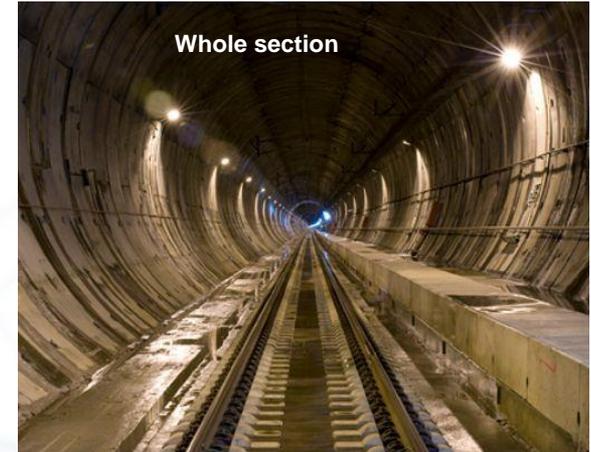
7.- Experience in tunnel inspection



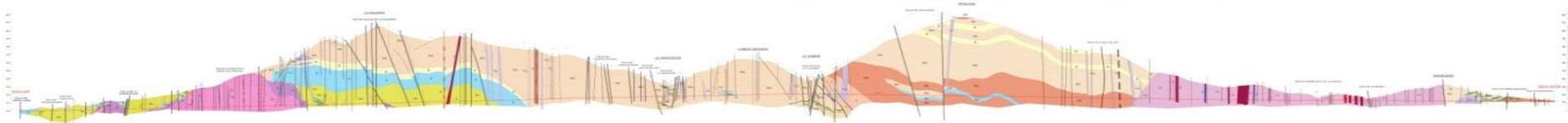
Inspection linear lasers



Measuring equipment over the track



Whole section



Project:
High speed Railway
Madrid - Segovia - Valladolid
Section: Soto del Real- Segovia. Subsection 2

Client
GIF - ADIF

Main consultant:
EUROCONSULT-ESTEYCO-ICYFSA

Date:
2002-2009

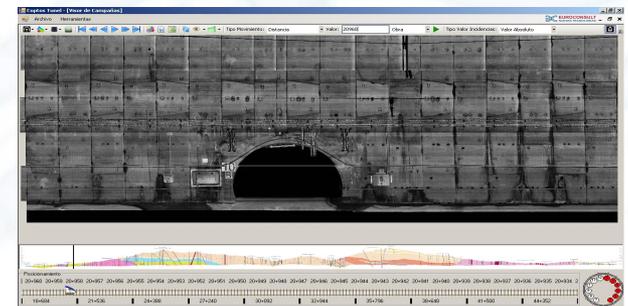
Services:
Tunnel's automatic inspection.

Rock mass characteristics:
Preordovicic metasediments
Granites
Gneisses

Construction method:
TBM

Cross section:
Doble tube. Circular inner diameter 8,50 m

Main features:
Total length: 2 x 28.400 m
Excavation diameter: 9,45 m
Longitudinal axes separation: 30 m



GUADARRAMA Tunnels

7.- Experience in tunnel inspection



Liner segments manufacturing plant



Tunnel boring machine



View of the inside of the tunnel already finished



Project:
 High Speed Railway
 Madrid - Segovia - Valladolid
 Section: Soto del Real- Segovia. SubSection 2

Client:
 GIF – ADIF

Main consultant:
 EUROCONSULT-ESTEyCO-ICyFSA

Date:
 2002-2009

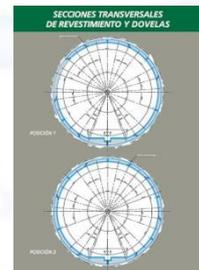
Services:
 Control and surveillance of the works
 Measurements survey

Rock mass characteristics:
 Metamorphic rocks and
 Granite

Construction method:
 Tunnel boring machine

Cross section:
 Double tube. Inner \varnothing of 8.50 m

Main characteristics:
 length: 2 x 28.400 m
 Boring diameter: 9,45 m
 Separation between axes: 30 m
 Bored material: approximately 4 million of m^3 .
 Recycled material during the manufacturing of
 liner segments, platforms and fillings : 22% off
 total



GUADARRAMA Tunnels

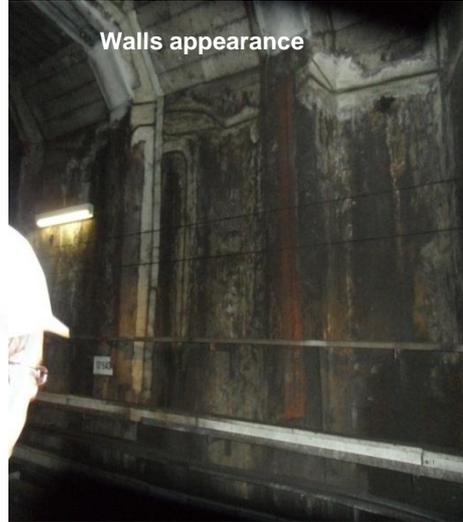
7.- Experience in tunnel inspection

Ginza Line TOKYO METRO

Installation of Tunnelings system on a wagon



Walls appearance



Walls 3D image

Project:

Tunnel inspection Ginza line section. Tokyo Underground

Cliente:

TOKYO METRO

Main consultant:

EUROCONSULT New Technologies

Date:

2011

Services:

High resolution lining inspection and rail monitoring

Construction method:

Cut and cover. Diaphragm-walls

Cross section:

Square

Main characteristics:

1mm x 1mm resolution inspection at 20 Km/h

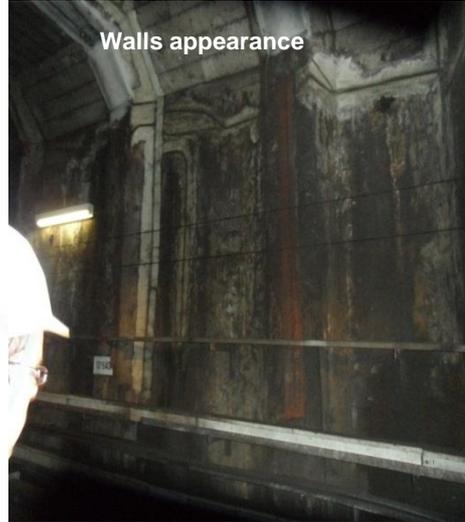
7.- Experience in tunnel inspection

Ginza Line TOKYO METRO

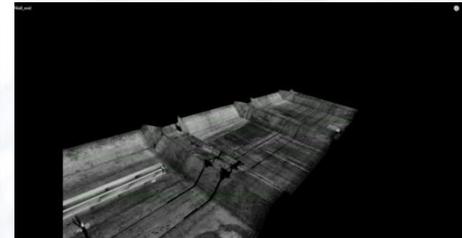
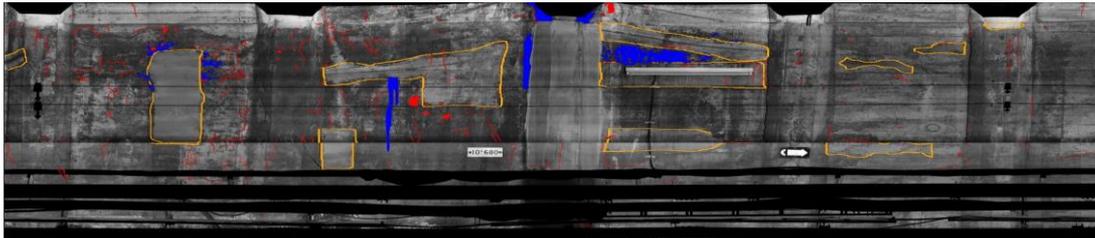
Installation of Tunnelings system on a wagon



Walls appearance



Walls 3D image



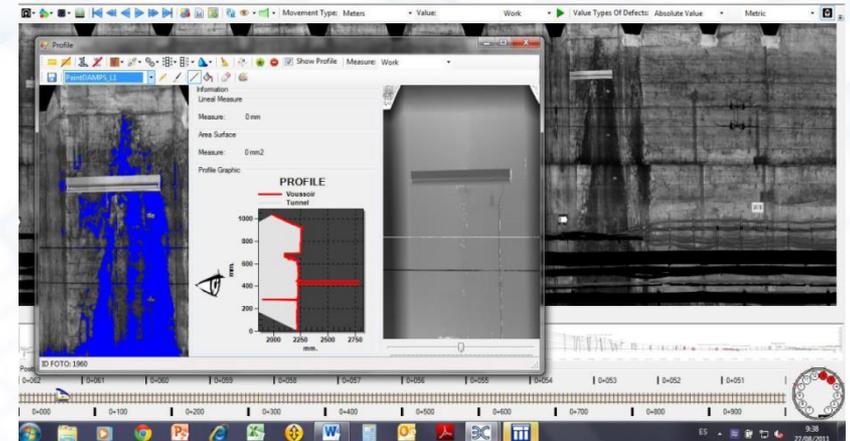
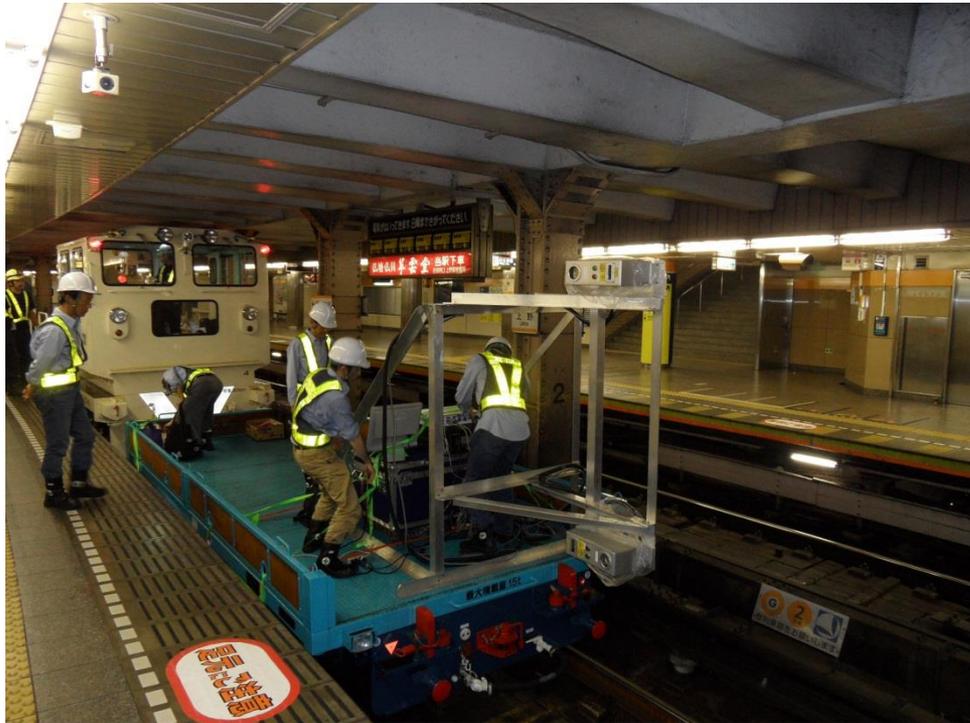
Track inspection



7.- Experience in tunnel inspection

Ginza Line TOKYO METRO

Wall inspection



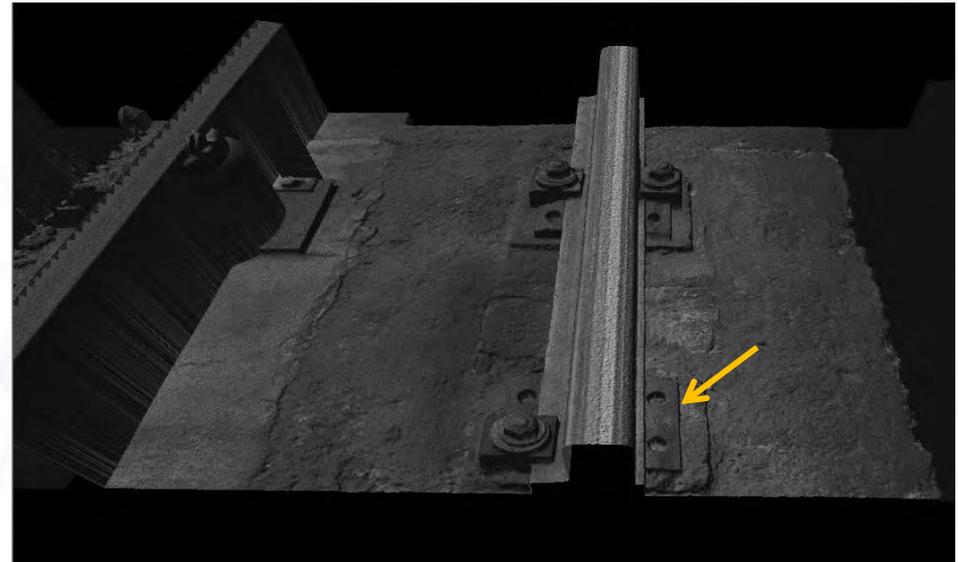
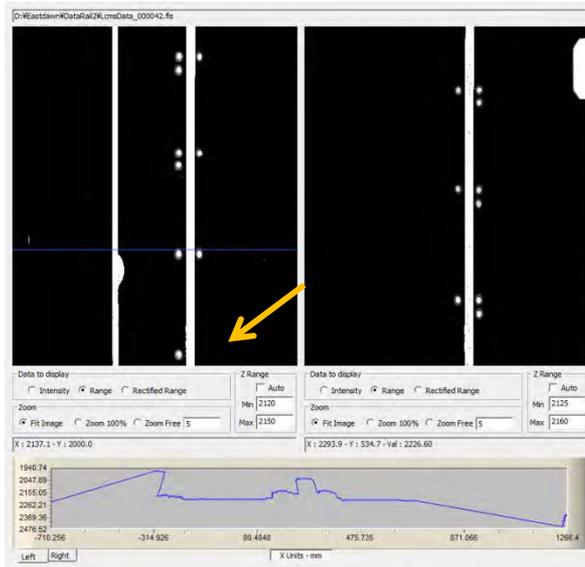
7.- Experience in tunnel inspection

Rail inspection



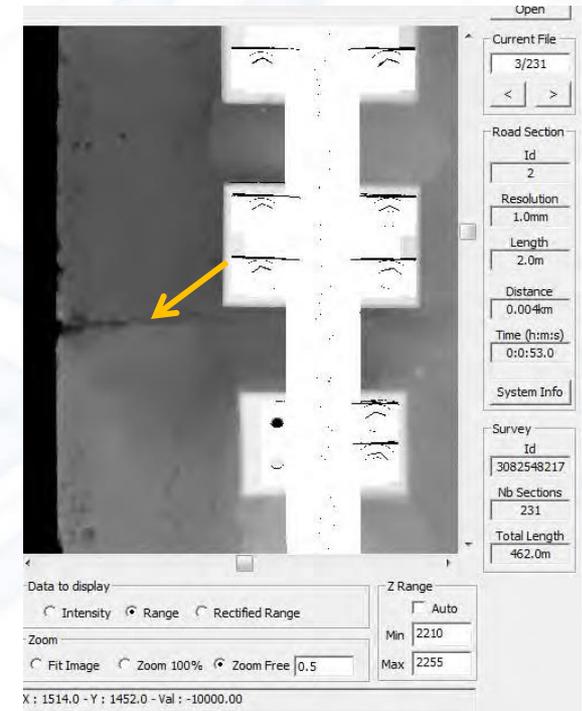
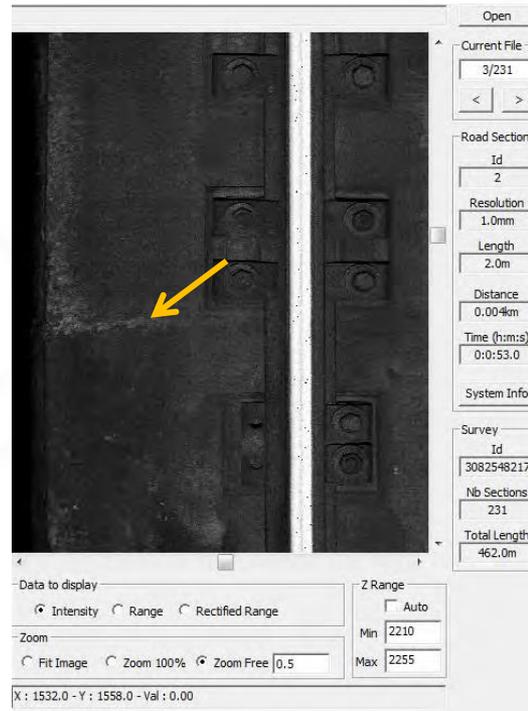
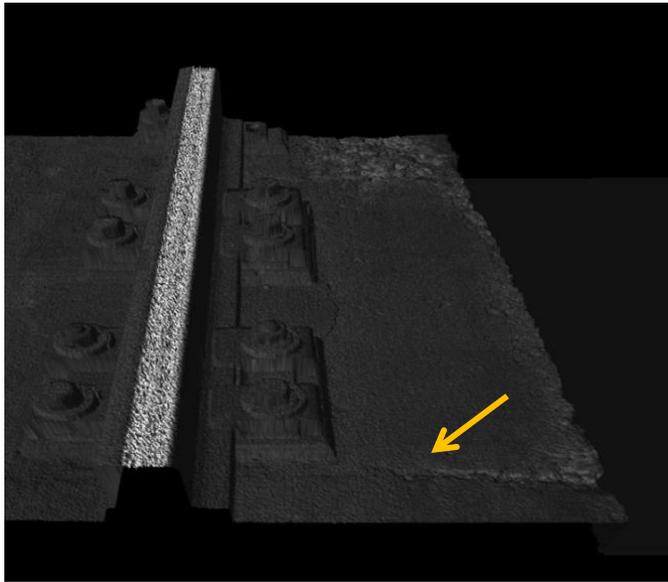
7.- Experience in tunnel inspection

Rail inspection – Automatic detection of missing elements



7.- Experience in tunnel inspection

Rail inspection – Automatic detection of cracks in platform



7.- Experience in tunnel inspection

Rail inspection – Automatic detection of rail track corrosion

