



ATLAS 70™

Multisensor System For Tunnel Inspection

INTRODUCTION

ATLAS 70 is a complete sensors/software package which enables through diagnose of tunnel wall conditions. The data collected locally are stored on a computer hard disk for subsequent analysis in a remote location via an elaborate dedicated software. The sensors and local computer are to be fitted to a rail and/or road vehicle of specific design, i.e. with even travelling speed of say 5 km/h.

SENSORS

- **Laser scanner**

The laser beam emitted by the instrument sweeps the tunnel wall over a 270° angle at a speed of 16 700 rpm. Its precision and intensity amplifies the tunnel wall surface anomalies, makes the system insensitive to surrounding lighting and enables seeing minute cracks as small as 0.1 mm gap at a distance of 6 m.

- **Infrared scanner**

The infrared beam enables detection of surface temperature differences within 0.02 °C. The high thermal resolution of the system enables detection of very small infiltration of liquid or air within the concrete work. The image precision is such that it enables checking of drain conduits inside the concrete structure and of other equipment such as electric cables, ventilation ports, etc.

- **Telemeters**

In order to record the exact position of the readings taken by the other sensors, two telemeters enable tunnel profile evaluation within 5 cm precision.

- **Odometer**

This records the carriage position along the tunnel. It comprises a precision encoder wheel (within 5 m precision per km) mounted on the carriage and positioned over one of the track rails or road.

Positioning of distance marks on the image can be done during site check, thus making sure that the kilometre markers inside the tunnel coincide with that of the displayed ones.

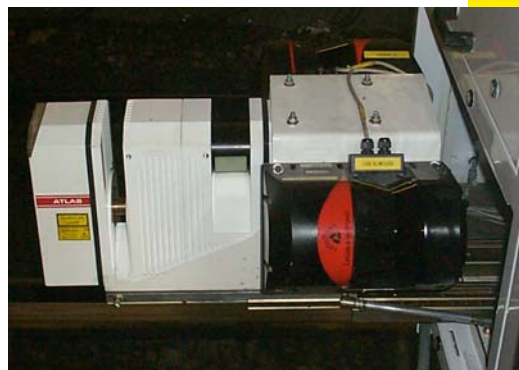
DATA PROCESSING

The sensor output signals are stored locally on a removable hard disk for subsequent analysis by a dedicated software which performs in 3 steps :

- **Signal optimisation**, taking into account contingency stops during inspection, vibration of mechanical components such as rotary mirrors, etc. This enables reduction of the electronic file size.



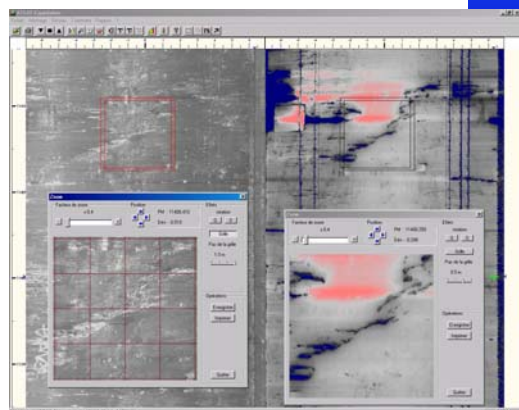
Inspection vehicle for subway



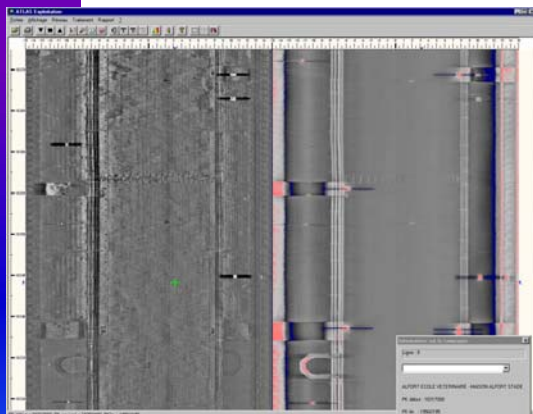
Scanner package



Inspection vehicle for road tunnels



Crack with information seen on infrared image



Scanner head utility connections

- **Signal linearization**, for tunnel surface image display to the correct scale in all directions. This enables measurement of exact length of cracks, etc.
- Image analysis with tools such as zoom, surface area and distance calculations. This enables to detect any possible anomalies, to report them, to plan repairs and evaluate their cost, to keep a record.

The software selected information is analysed by specialists who compare the various images with the actual drawings or reference images from the computer library. This way, the maintenance team can detect cracks or water infiltration and follow their evolution by comparing images taken at various intervals.

TECHNICAL DATA

Scanner for visible and infrared spectral bands

Acquisition angle :	270°
Sensor/tunnel wall distance at full resolution :	1.2 to 6 m
Traveling speed at full resolution :	0 to 5 km/h
Digital dynamic range :	12 bits / 4096 levels
Protection class :	IP 63
Dimensions :	600 X 300 X 155 mm
Weight :	30 kg

Visible channel

3B class laser diode up to 2 m distance, 3A class beyond	
Laser power :	30 mW
Wave length :	660 nm
Head rotation speed (scanning rate) :	16 800 rpm (280 Hz)
Illuminating spot size :	5 mm dia.
Spatial resolution :	Detection of cracks smaller than 0.1 mm at 6 m distance when contrast against background is higher than 30%

Infrared channel

Instantaneous field of view :	2 mrad
Thermal sensitivity :	0.02 °C at 20 °C
Head rotation speed (scanning rate) :	4 200 rpm (70 Hz)

Tunnel Profile Plotting

The instruction makes a rough measurement of the wall distances for comparison with several pre-established tunnel network profiles, enabling selection of the actual tunnel profile.

Above information is subject to changes without notice



SYSTEMES INFRAROUGES

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