

Inxpect Safety Radar Equipment

Inxpect Ibérica implements the SBV System in Barcelona underground

- Inxpect Ibérica has completed the project to implement the Intrusion Detection System (IDS) at one of the stations of Transports Metropolitans Barcelona (TMB).
- The project, carried out for Construcciones Rubau and with a budget of more than 100,000 euros, has had the collaboration of AQD Industrial Safety and tec.nicum for the installation and validation.



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The Intrusion Detection System (IDS) is an active protection system, based on radar technology, whose objective is to guarantee the tightness of one line and its border with other line so that the operation of the trains in driverless mode of one of them is safe. Specifically, the implementation of the IDS prevents intrusions from one line to the other in the station's maneuvering queue. This project has represented a challenge for Inxpect Ibérica since it has been its first safety solution for the railway sector in Spain.

This implementation shows that the radar system is perfect for this type of application and that it has several advantages over other safety systems. For example, unlike safety fencing or other mechanical solutions, it can be installed without occupying spaces needed for other uses, and, compared to optoelectronic systems, it reduces false alarms and performs volumetric detection (3D) capable of distinguishing between different targets in changing scenes. In addition, the radar system improves the relationship between machines and people, and eliminates human error.

System architecture and components

The SDI consists of: 12 SBV-01 sensors, 4 ISC-B01 controllers, the Inxpect Safety Application, 1 Control Cabinet and 1 Operator Panel.

At the field level, two independent detection points have been established, one on Track 1 and the other on Track 2.

In order to this, 6 sensors have been installed per track: 4 for the detection of trains (muting function) and 2 for the detection of people (anti-intrusion function).

The sensors send the signals to the controllers, which are in the main cabinet located in the control room of the station.

The operator panel cabinet allows the display of information about the status of the system and its control from the platform and remotely.

The IDS exchanges signals with the TMB control system (Westrace) through potential-free contacts and with safe and standard inputs.

System features

Anti-intrusion function

For the anti-intrusion function, two sensors per track have been installed, one in front of the other, to get a volumetric virtual gate.

This function allows that, when a human presence is detected on the tracks, the system is disarmed and TMB (Westrace) can disable the driverless driving mode and apply the corresponding auxiliary actions (emergency braking, controlled stop, etc.).

To reset the system, the Westrace must send a reset order. This action can be done remotely (after visual inspection of the area and confirmation) or on the Operator Panel, using the key and the reset button.

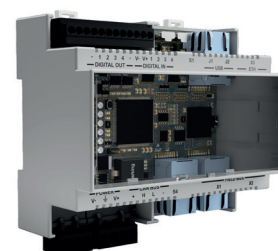
Once the IDS is rearmed, and if the rest of the conditions are met, the Westrace will enable driverless driving.

Muting function

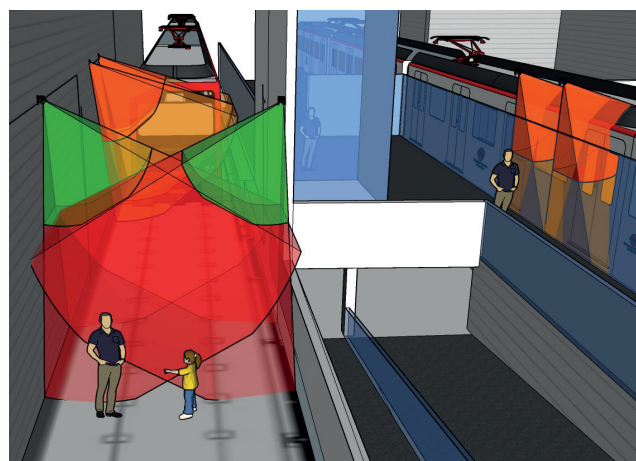
For the muting function, 2 sensors have been installed on both sides of the virtual anti-intrusion gate (4 in total per track). In this case, the detection has had to be configured not for a human body but for train carriages.



SBV-01 Sensor



ISC-B01 Control Unit



3D view of the radar detection system



Operator panel

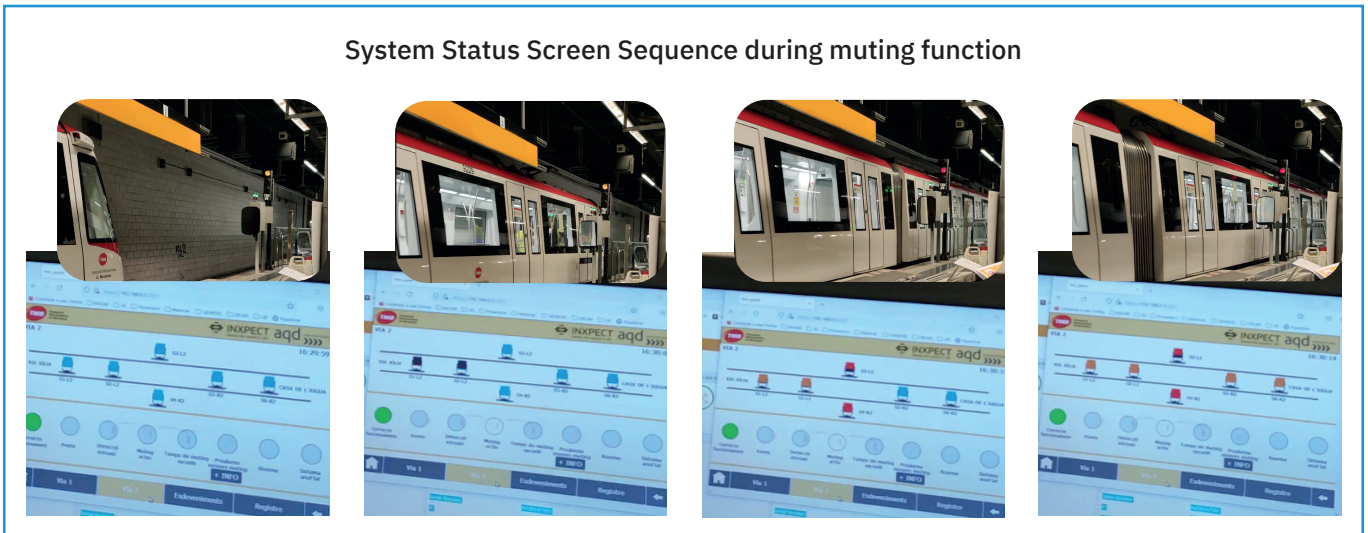
The combination of time, sequence and track occupancy signal enables the activation of the muting so that the train can interrupt the virtual gate without intrusion detection being performed. Once the train passes the second pair of sensors, the muting is disconnected.

Throughout this process, the intrusion detection safe signal remains unchanged, that is, if the muting is done correctly, the intrusion safety double signal will always remain active.

The muting function has been limited in time. If the muting time exceeds 4 minutes, the IDS will disconnect the intrusion signal on the affected track that is served by the Westrace interlock to disable the driverless driving mode.

The same happens if the muting sequence suffers a failure, either due to a breakdown, a system violation or due to maximum or minimum times between stages. In this way, safety in the area always prevails.

System Status Screen Sequence during muting function



Fault information

When any of the components of the IDS do not work correctly and due to the required reliability, the system will be disconnected and the safety function will prevail (disconnection of the safe outputs and disabling of the driverless). In this situation the IDS will provide a fault status signal to the Westrace interlock and will perform a light warning through the outside beacons and the Operator Panel. Once the fault has been solved, a reset must be carried out from the aforementioned points.

A system with safety certification

The Intrusion Detection System (IDS) complies with a SIL2 reliability level, according to EN 62061, and Pld Cat 3, according to EN 13849 and the different directives that affect it.

The design, installation and validation process of the project has lasted four months and has had the participation of more than a dozen internal and external professionals.

Inxpect Ibérica appreciates the collaboration of TMB technicians and staff; AQD Industrial Safety, a company specialized in safety engineering and adaptation of industrial machinery; and tec.nicum, a company specialized in consulting and training in industrial safety and CE marking.