## TECHNICAL SPECIFICATION

| | |
|---|---|
| RADAR ACQUISITION UNIT | DAD SRS PLUS, with interleaved multiplexing 1800 scans/sec |
| NUMBER OF COLLECTED PROFILES | Up to 4 |
| ANTENNA FREQUENCY | Typical configuration: 400 MHz Different frequency upon request |
| POSITIONING | - Doppler Radar - GPS (optional) |
| COLLECTION SPEED | > 190 Km/h  (4 profiles simultaneously) |
| MAXIMUM SCAN LENGTH | Unlimited collected profile length, no need to stop the train |
| POWER SUPPLY | 10-15 Volts |
| VIDEO CAMERA | Synchronized radar and video data |
| ENVIRONMENTAL | IP65 |

## SOFTWARE SPECIFICATION

| | |
|---|---|
| RADAR PROCESSING SOFTWARE | SRS DPA including: SRS DP (Data Processor) SRS DA (Data Analyzer and Reporting)<br><br>- Elimination of disturbances due to the sleepers<br>- Automatic data processing according to a predefined macro<br>- Management of GPS data and video frames<br>- Automatic detection of layer interfaces<br>- Automatic calibration of radar propagation velocity with core data<br>- Insertion of assets along the track (e.g. switches, crossings, etc)<br>- Assists the operator in evaluating track characteristics:<br>  • Ballast fouling<br>  • Ballast bed moisture<br>  • Moisture distribution within the ballast<br>  • Evenness of track bed basis |
| OUTPUT DATA | Immediate visualization of ballast characteristics along the track:<br>- Stratigraphy<br>- Ballast fouling levels<br>- Ballast moisture levels<br>- Undulation levels<br>- Position of assets<br>- Core samples<br>- Video data |

**Railway experience**

The SafeRailSystem is an integrated product based on more than 10 years experience in railway ballast surveying.
More than 50,000 Km of railway track surveyed by this system worldwide.

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**STANLAY**™

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**Transport Engineering**

# SafeRailSystem (SRS)

The fastest train borne system for **railway ballast inspection**



- FASTEST ACQUISITION SPEED
- FASTEST PROCESSING WITH AUTOMATIC DATA INTERPRETATION

SLEEPER
TOP BALLAST
BOTTOM BALLAST
SHOULDER
SUB BALLAST
SUBGRADE

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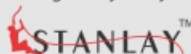
*IDS: The leader in multi-frequency and multi-channel Ground Penetrating Radar*

## Benefits

- Easy interpretation of ballast status through automatic tools
- Improved track maintenance decision making
- Reduces current costs for track investigation procedures, maintenance and renewal operations
- Continuous monitoring increases rail network management profitability
- Improved work specifications leads to less reworking.

## Application

High speed radar system for the inspection of ballast quality:

- Continuous mapping of ballast thickness
- Locates areas with insufficient bearing capacity (e.g. ballast pockets)
- Differentiates between clean and fouled ballast
- Detects sections with drainage problems.

## What is SRS

SafeRailSystem is an integrated solution allowing the user to autonomously inspect railway ballast for renewal and maintenance. SafeRailSystem includes:

- A radar system composed of:
  - A 3 or 4 antenna array
  - High speed radar control unit
  - Data logger and visualization system
  - Doppler radar position-encoder
  - Video camera synchronized to radar data
- A dedicated post-processing software module for the easy and efficient interpretation of SRS data
- A customer training and support program to introduce the user to the autonomous and efficient operation of SRS.
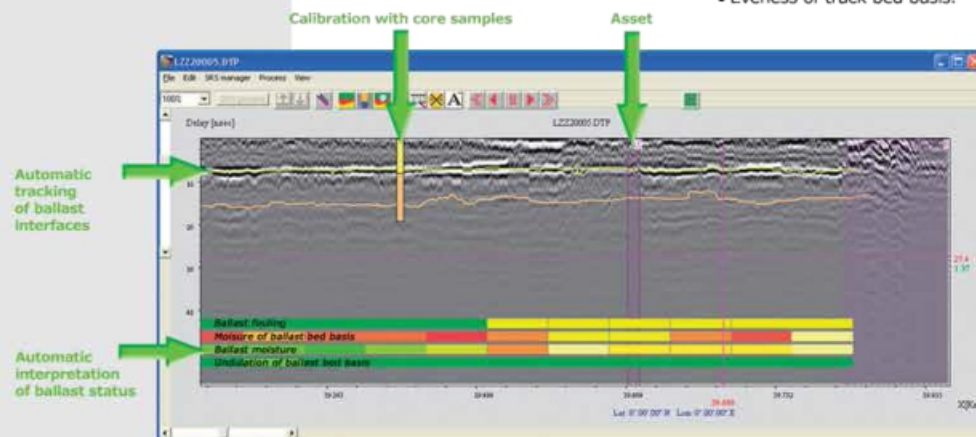
## System Features

- 3 or 4 simultaneous profiles covering the whole track
- Only scans between the sleepers to provide best data quality
- Accurate positioning through doppler encoder and SRS interface
- Integrated radar and video data.

## Processing Features

- Automatic detection of layer interfaces
- Automatic calibration of radar data and core samples
- Automatic and operator assisted evaluation of ballast status:
  - Fouling
  - Moisture distribution
  - Eveness of track bed basis.

Calibration with core samples    Asset

Automatic tracking of ballast interfaces

Automatic interpretation of ballast status

SRS integrated radar and video data

**MAXIMUM SPEED\* (Km/h)**

*Values refer to 384 samples per scan*

| SCANNING STEP | SRS |
|---|---|
| 12 Cm | 190 |
| 60 Cm | >300 |

| Layer | Moisture | Ballast fouling | Undulation of ballast bed basis | Assets |
|---|---|---|---|---|
| Top ballast | No ballast | No ballast | No ballast | Bridge |
| Ballast | Dry | Clean | Even | Level crossing |
| Sub ballast | Mostly dry | Mostly clean | Undulated | Switch |
| Subgrade | Dry to humid | Slightly fouled | Settlement | Tunnel |
| | Humid | Fouled | | |
| | Humid to wet | | | |
| | Wet | | | |

Ballast stratigraphy map

Ballast fouling
Ballast moisture
Moisture of ballast bed basis
Moisture of intermediate layer
Undulation of ballast bed basis
Undulation of intermediate layer

Map of ballast status

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