How latest developments in diagnostics can improve asset management

Maintenance to support performance

Pietro Pace
MER MEC
A worldwide leading Transportation and Aerospace Group

SYNERGIC HIGH-TECH COMPANIES WITH +1000 HIGHLY SKILLED EMPLOYEES
About MERMEC

We help railways worldwide to increase safety saving time and money

**World's leading supplier** of integrated solutions for railways infrastructure inspection and automatic train protection
Worldwide MERMEC Presence

HEADQUARTERS
ITALY – Monopoli

BRANCHES
ITALY – Treviso
FRANCE – Marseille
UK – Derby
SPAIN – Madrid
NORWAY – Oslo
MACEDONIA – Skopje
TURKEY – Ankara
MOROCCO – Casablanca
INDIA – New Delhi, Kolkata
CHINA – Beijing
AUSTRALIA – Sydney
JAPAN – Tokyo
USA – Columbia

140+ customers
1500+ diagnostic systems
500,000+ km of track monitored
Agenda

- Key Infrastructure Asset Management Challenges
- Support from Asset Inventory and Diagnostic Solutions
- Examples of Improvements
- Conclusions
Millions of elements to be managed
DATA FINAL USERS AND STAKEHOLDERS

- Condition Monitoring
- Maintenance
- Passengers
- Information Technology
- Rolling Stock Operators
- Construction
- Signalling
- Decision Boards
Infrastructure Asset Management Challenges

Challenge #1
Data fragmented within the single departments, sometimes inaccurate, missing, …

Challenge #2
Need of new information from available data

Challenge #3
Final users ask for immediate access to information generated
Main Data for Analytics and Decision Support

**ASSET INVENTORY**
- Layout
- Linear Characteristics
- GPS / Kilometer Points
- Infrastructure Assets

**OPERATIONAL**
- Max Speed
- Speed Restrictions
- Tons & Trains
- Delays
- Rolliing Stock

**CONDITION DATA**
- Track/Rail/Ballast
- Ultrasonic
- Catenary
- Vision Defect

**WORKS**
- Historical and Planned
- Locations and Costs
- Machine Productivity
- Quality before and after
Railway Corridor Data Acquisition

MM380 EVO

RAIL 3D

AERIAL SURVEY

HI-RAIL VEHICLES
Integrating Aerial and Trains Acquisitions

- Point of Clouds
- 360° Images
- Phogrametry RGB
- Stereoscopic Images
- DSM Model
- Colored Point of Cloud
- DTM Model
- Fotogrammetry Point of Cloud
Infrastructure Monitoring with dedicated cars

- POLE & TUNNELS DETECTOR
- PANTOGRAPH MEASUREMENTS
- OHL INSPECTION
- OHL GEOMETRY & WIRE WEAR
- VIDEO SURVEILLANCE
- CLEARANCE GAUGE & TUNNEL INSPECTION
- TRACK GEOMETRY & RAIL PROFILE
- RAIL FLAW DETECTION
- RAIL CORRUGATION
- TRACK INSPECTION
60+ different Objects/Defects from Vision

- Rail
- Fastening
- Head Check
- S&C
- Ballast
- Singularity
- Sleeper
- Catenary
- Fishplate
- Signalling
Infrastructure Monitoring via Rolling Stock

Unattended Systems

Commercial Trains
Rolling Stock Monitoring via Infrastructure

- Pantograph Defects
- Uplift
- Pantograph Strip Wear
- Train Profile
- Third Rail Wear
- Wheel Profile
- WILD
- Wheel Defects
- Brake Monitoring
- HBD/HWD
Integrated Different Data Entity Types
Information Extraction from Data

**AERIAL/FIELD**

Data Acquisition

**DATA CENTER**

Data Validation & Post Processing

**MAINTENANCE CENTER**

Data Analytics & Decision Support

Critical Alerts

On-Field Users

On-Field / Office Users

EAM/ERP Data Integration

GIS Dashboard
Syncronise different data classes

Planned Works

Key Indicator/Score

Work History

Track Quality Index

Defect History

Infrastructure Features

Video Frames

Geographical Data
Asset Inventory and Diagnostic Drivers

Data Quality
Data are consistent and complete ...

New Information
New defects, Quality Indicators, Performance Measurement, etc.

Integration
Process, Data and System Integration
Conclusions

- Current asset inventory and diagnostic services are increasing data availability, variety and quality
- Data is only part of the story
- Examples of improvements:
  - Increased accuracy in localisation/avoiding ambiguity
  - Get an objective list of assets
  - Verify and measure assets from the office
  - Recommend and Prioritize Maintenance & Renewal Works
- Railways should take advantages of these new capabilities
Future: Small Satellites for high resolution monitoring
Thanks for your attention …

Pietro Pace
pietro.pace@mermecgroup.com