2024 European Light Rail Congress

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Globalvia

mainspring

Future-Forward Asset Management Globalvia's approach

Metro de Sevilla experience

March 14th, 2024

globalvia

Globalvia overview

Who are we?

- Worldwide leader in managing transport infrastructure concessions and mobility solutions.
- Focus on continuous improvement, ensuring compliance with defined RAMS requirements.
- Globalvia owns six rail and light rail concessions in Spain.

Railways:

- Metro Barajas
- Metro de Sevilla
- Metros Ligeros de Madrid
- Tramvia Metropolità
- Tramvia Metropolità del Besòs
- Transportes Ferroviarios de Madrid

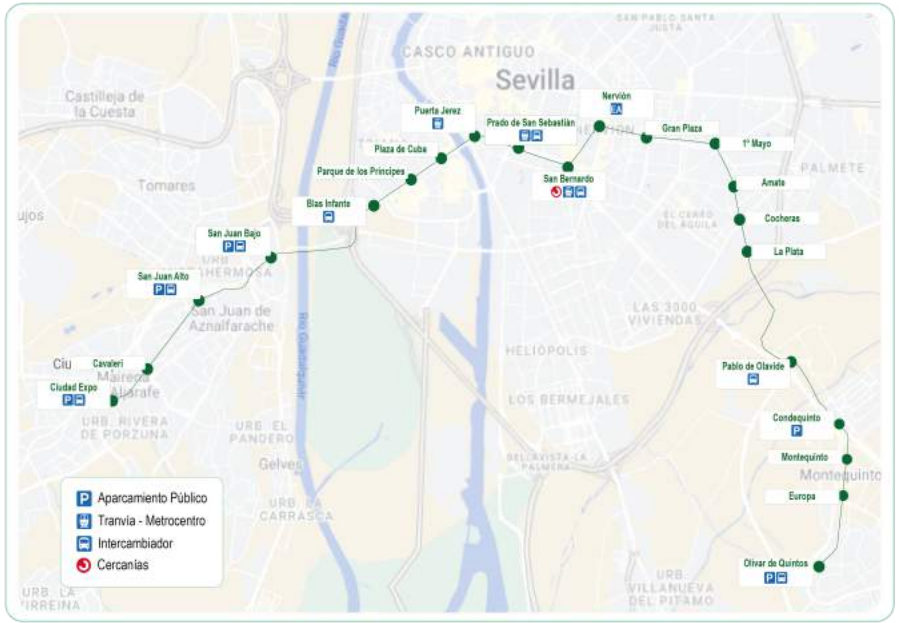
High-speed:

- Iryo

Metro de Sevilla overview

Metro de Sevilla. Who are we?

- Metro de Sevilla (MdS) concession was awarded in 2003 by Andalusian Regional Government (AOPJA) and follows a common PPP-type arrangement.
- MdS began its operation in 2009.
- MdS's shareholding is composed by Globalvia (88.2%) and AOPJA (11.8%).
- Globalvia is its proud operator.



Metro de Sevilla. Who are we?

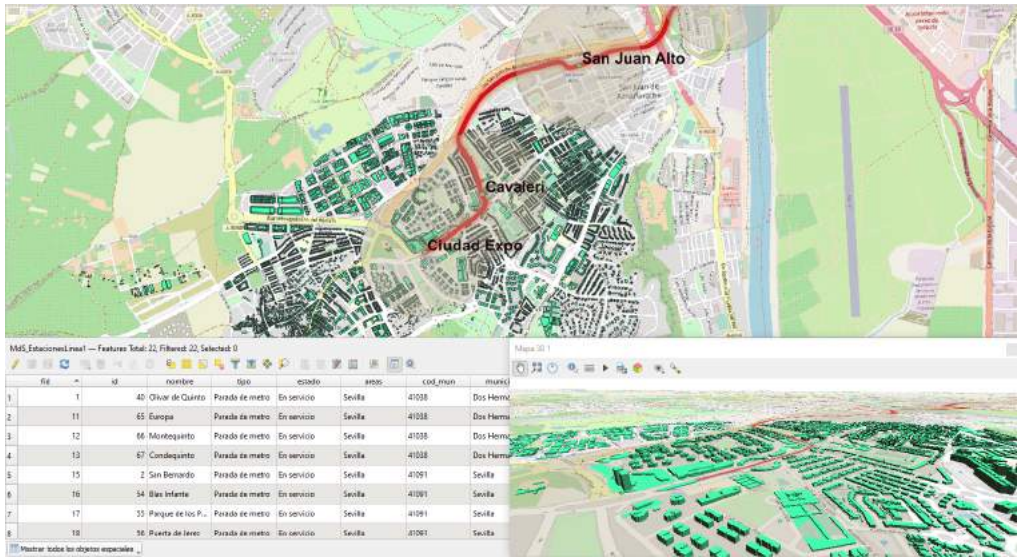
- It’s an 18.1-km light rail network: 10.5-km underground and 7.6-km aboveground.
- The system runs on dedicated street-level track and its 21 stations have PSD.
- Metro de Sevilla currently holds a total LRV fleet of 21 bidirectional CAF Urbos2 (5 modules, 3 bogies).

Technical features	
Rolling stock units	21 CAF URBOS 2
Maximum speed	73 km/h
Commercial speed	30 km/h
Journey time	37,9 minutes
Frequency at peak hour	3’58”
Capacity of each rolling stock unit	207 (4 p/m2) 284 (6p/m2)

Linear Railway Assets management

Linear Railway Assets management

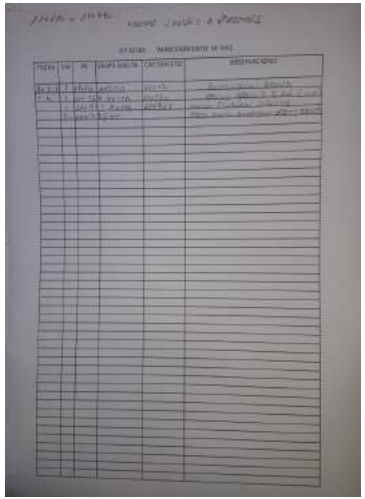
- Digitalisation, a challenge for light rail operators.
- Assets georeferencing in linear infrastructures with long tunnel sections.



Linear Railway Assets management

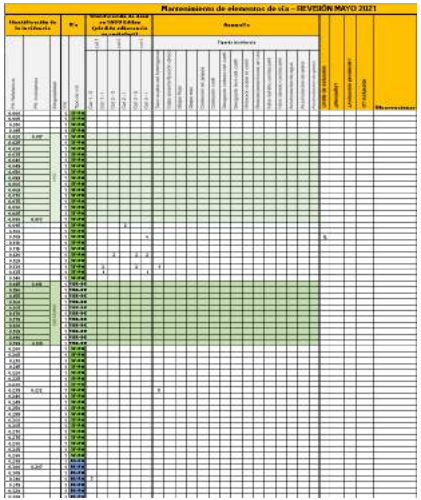
UNTIL 2018

Paper-based registration



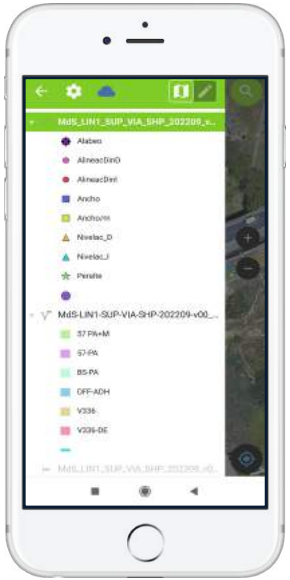
UNTIL 2023

Excel-sheet based registration



PRESENT

Open based GIS registration



globalvia

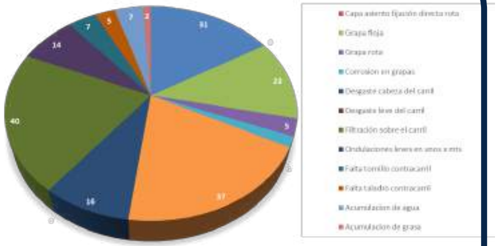
metro SEVILLA

Junta de Andalucía

Linear Railway Assets management

PAST

Mantenimiento de elementos de vía					REVISIÓN AGOSTO 2022																								
Identificación de la incidencia			Vía		Clasificación de daño en TACO Edilon (pérdida adherencia en corkelast)						Anomalía																		
					Cat 1		Cat 2		Cat 3		Tipo de incidencia																		
PK Referencia	PK incidencia	Singularidad	Vía	Tipo de vía	Cat 1 - E	Cat 1 - I	Cat 2 - E	Cat 2 - I	Cat 3 - E	Cat 3 - I	Taco suelto del hormigonado	Capa asiento fijación directa rota	Grapa floja	Grapa rota	Corrosión en grapas	Corrosión carril	Desgaste cabeza del carril	Desgaste leve del carril	Filtración sobre el carril	Ondulaciones leves en uno/a retc	Falta tornillo contracarril	Falta taladro contracarril	Acumulación de agua	Acumulación de arena	Acumulación de grasa	Límite de actuación	¿Resuelto?	¿Actuación pendiente?	OT Actuación	Observaciones
6.725			2	BS-PA																							No	Sí		Se mantiene en observación
6.730	6+731		2	BS-PA		1		1											K								No	Sí		Pendiente de valoración para su desvío y/o tratamiento
6.735			2	BS-PA																										
6.740			2	BS-PA				1											K								No	Sí		Deterioro en fase preliminar. No requiere de actuación.
6.745			2	BS-PA																										
6.750	6.747		2	BS-PA															2								No	Sí		Pendiente de valoración para su desvío y/o tratamiento
6.755			2	BS-PA																										
6.760			2	BS-PA															K								No	Sí		Pendiente de valoración para su desvío y/o tratamiento
6.765			2	BS-PA																										
6.770			2	BS-PA		1																					No	No		Deterioro en fase preliminar. No requiere de actuación.



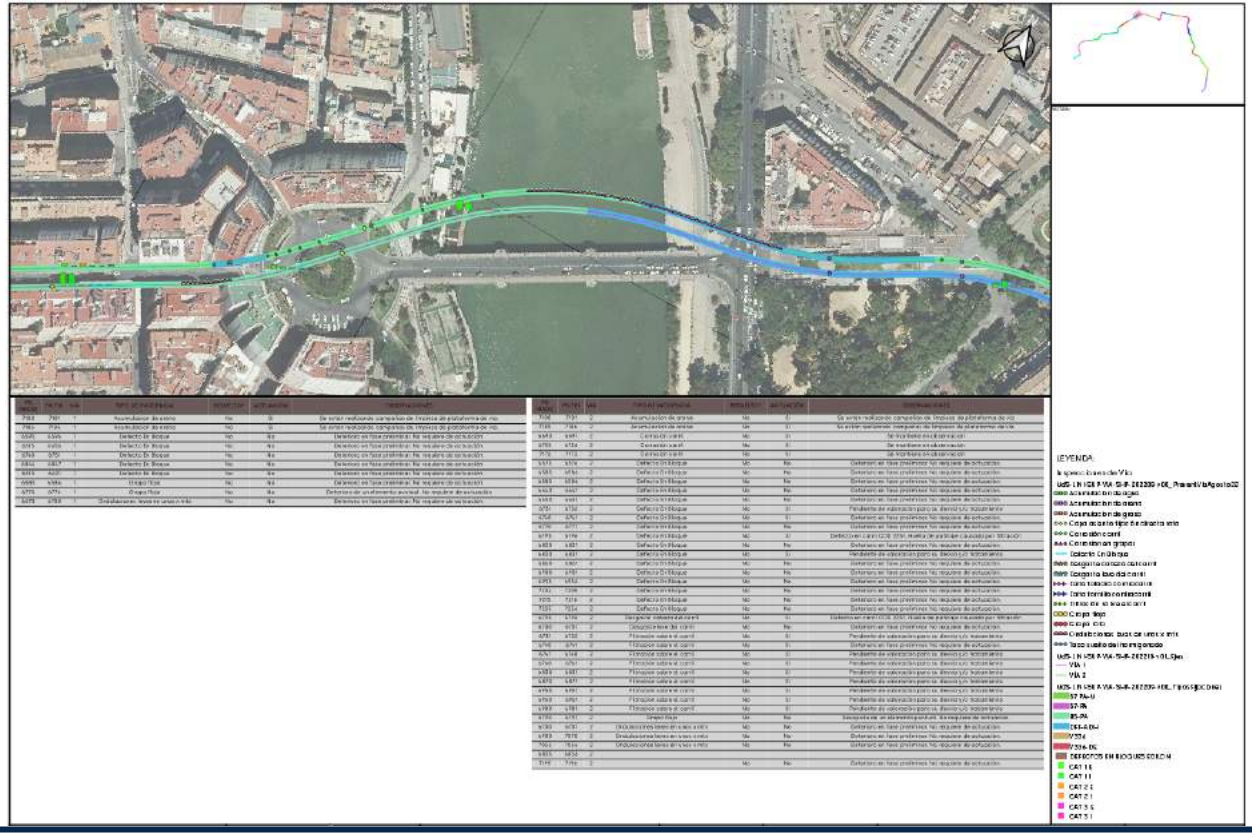
PRESENT

MdS-LIN1-SUP-VIA-SHP-202210-v00_PreventViaAgosto22 — Features Total: 1051, Filtered: 51, Selected: 0

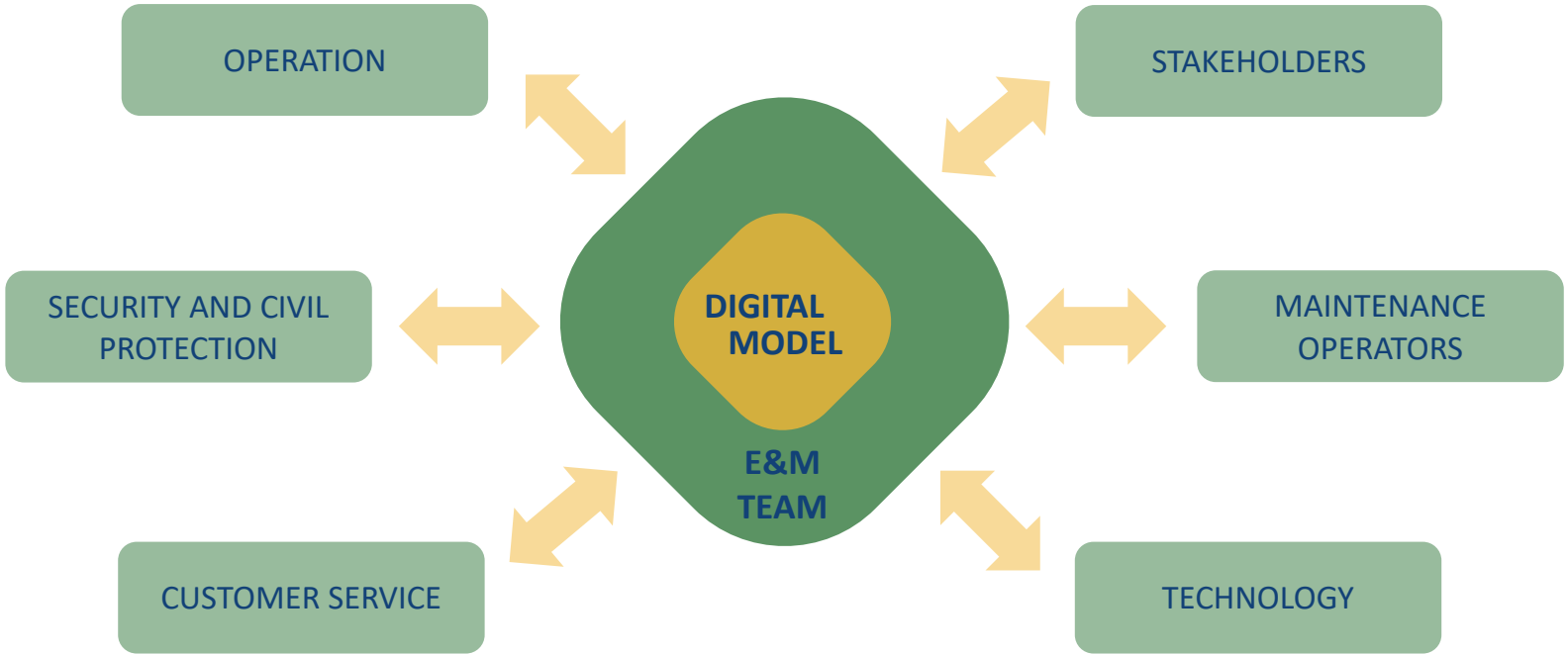
	PK INICIO	PK FIN	VIA	RUTA	CAT 1 E	CAT 1 I	CAT 2 E	CAT 2 I	CAT 3 E	CAT 3 I	RESUELTO?	TIPO DE IN	ACTUACIÓN	OBSERVACIO	OBSERVAC_1
31	6795.000000000...	6796.000000000...	2	IZQUIERDA	NULL	NULL	NULL	NULL	NULL	NULL	No	Desgaste cabeza del carril	Sí	Defecto en carril COD 2251. Huella de patinaj...	Cod. 2251 2m...
32	6700.000000000...	6701.000000000...	2	IZQUIERDA	NULL	NULL	NULL	NULL	NULL	NULL	No	Desgaste leve del carril	No	Deterioro en fase preliminar. No requiere de a...	Cod. 2252 a 70c...
33	6731.000000000...	6732.000000000...	2	IZQUIERDA	NULL	NULL	NULL	NULL	NULL	NULL	No	Filtración sobre el carril	Sí	Pendiente de valoración para su desvío y/o tr...	HI
34	6740.000000000...	6741.000000000...	2	IZQUIERDA	NULL	NULL	NULL	NULL	NULL	NULL	No	Filtración sobre el carril	Sí	Deterioro en fase preliminar. No requiere de a...	HI

Linear Railway Assets management

PRESENT



Linear Railway Assets management

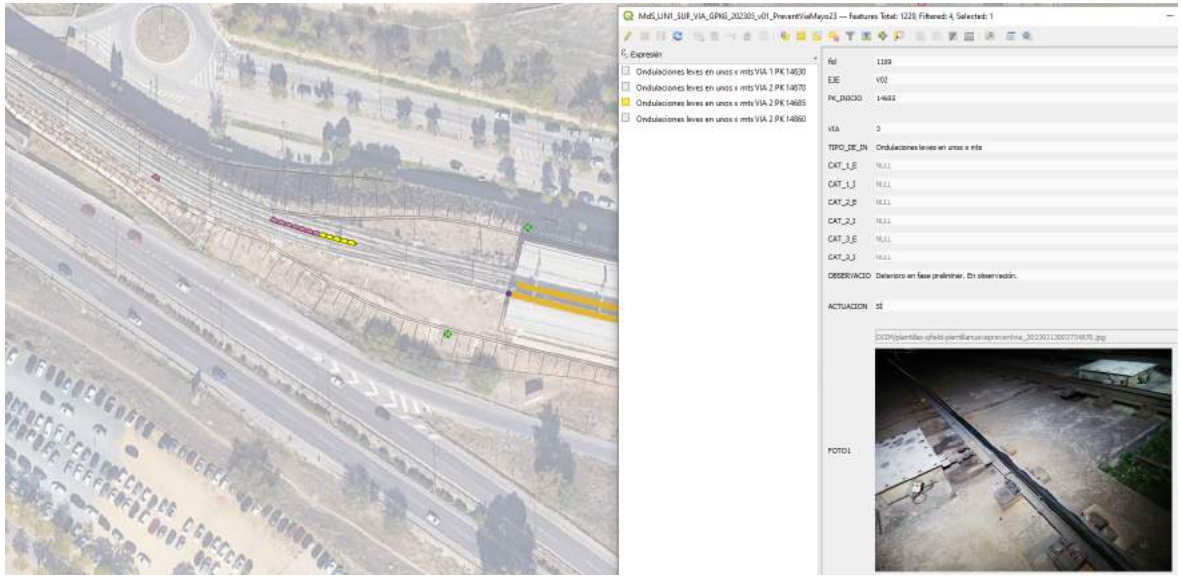


Linear Railway Assets management

- Use of QGIS software for a better management of linear assets at Metro de Sevilla.

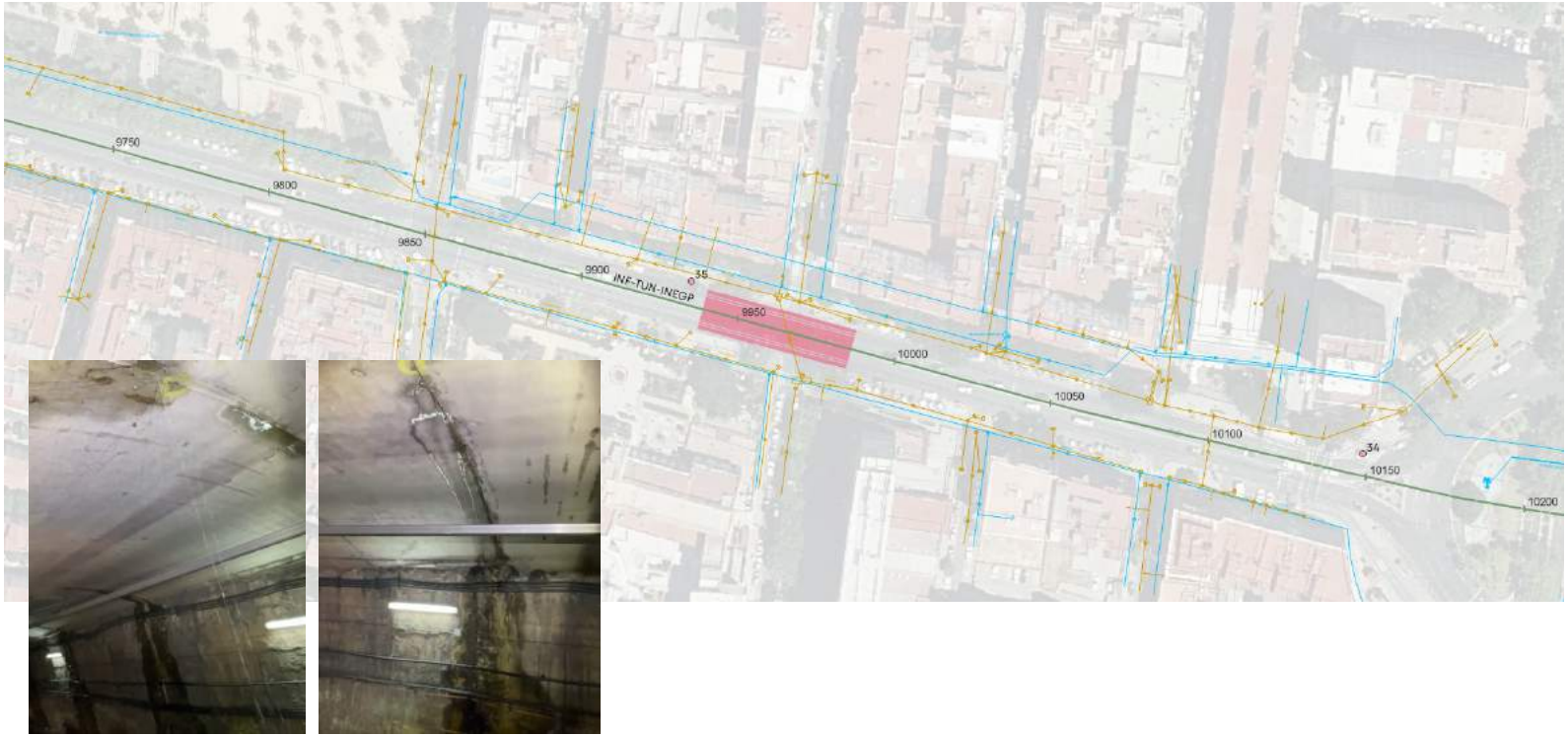
Linear Railway Assets management

- Use of QField for data collection in field inspections.



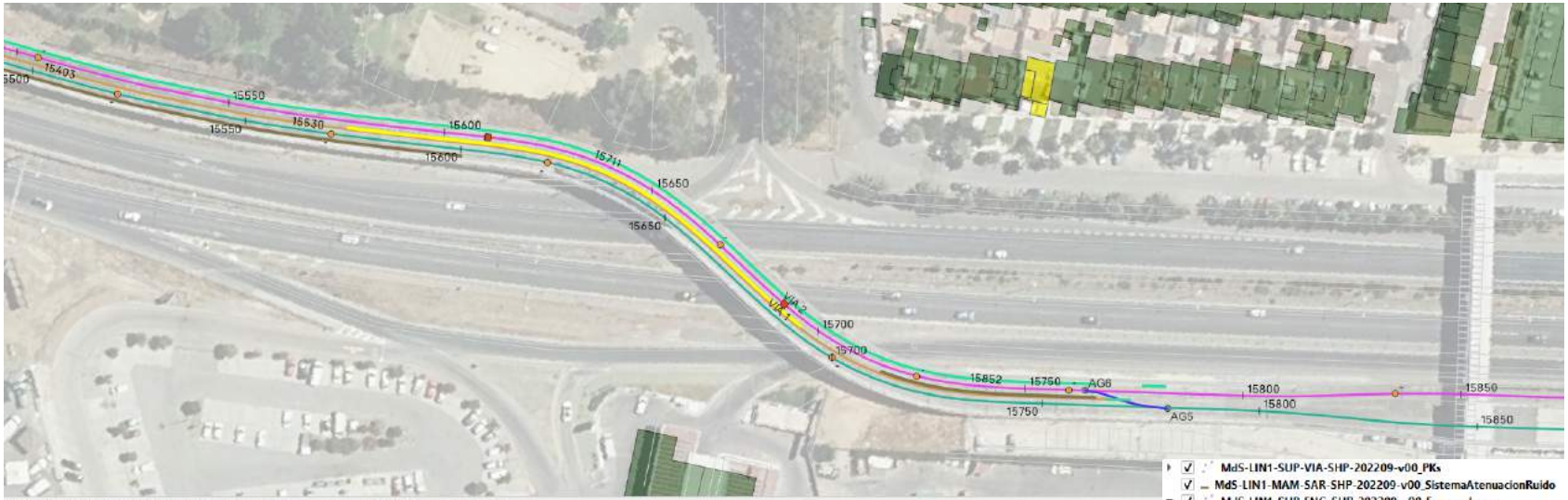
Linear Railway Assets management

- Quick management of incidents with stakeholders.



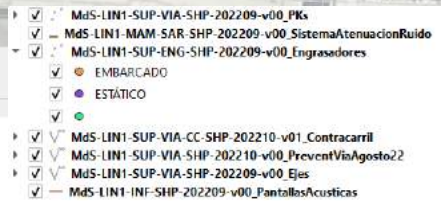
Linear Railway Assets management

- Improving the complaints handling process.



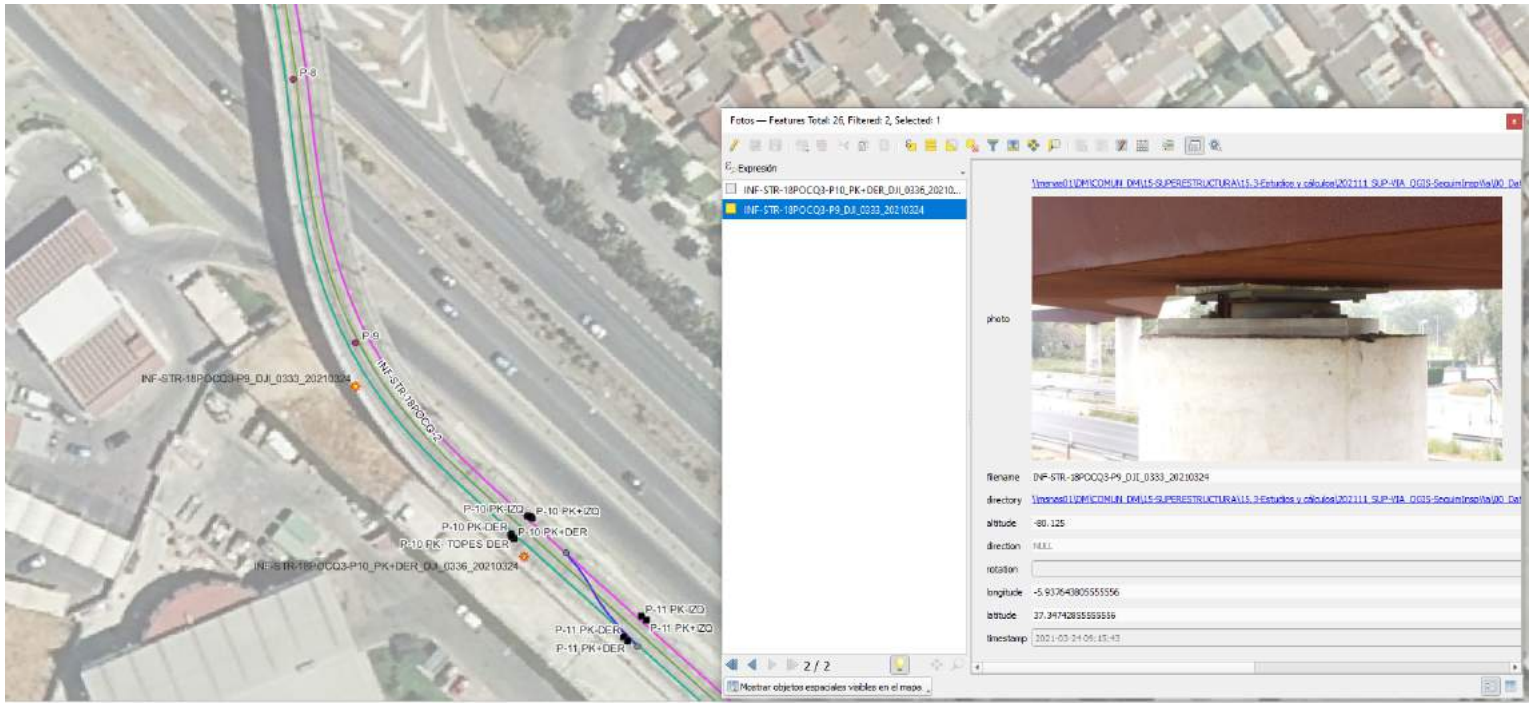
MdS-LIN1-MAM-SAR-SHP-202209-v00_SistemaAtenuacionRuido — Features Total: 38, Filtered: 4, Selected: 1

	VIA	HITO_RUTOM	PK_INICIO	PK_FINAL	PK_REFEREN	LONGITUD	LADO_LUBRI	VALVULA	ADELANTO_P	LOCALIZACI	MOTIVO
1	1	15403	15412	15530	15471	118.00	L	J6	9	Curva Carretera Utrera	RUIDO
2	1	15530	15530	15600	15565	70.00	R	J5	0	Curva Carretera Utrera	RUIDO
3	2	15711	15578	15696	15637	118.00	R	J6	15	Curva Carretera Utrera	RUIDO



Linear Railway Assets management

- Improvement in the management and analysis of field information.



Train digitalisation

Train digitalisation

- Train digitalisation to deal with fleet obsolescence.
- Improvements in reliability and availability of rolling stock fleet based on recent developments:

- CCTV system renewal.
- Implementation of an Ethernet network.
- New door electronics and cabin monitoring terminal.
- Next step: train to ground communication.

Our initial analog onboard CCTV

- 12 cameras.
- It was a 100% analog system (low data transmission rates).
- Images had to be downloaded locally.
- Technological obsolescence.
- Implementation of digital technology that would embrace the renovation of CCTV in MdS trains.

Our challenge: manage complex OCMS/ICT changes in a live operating train network.

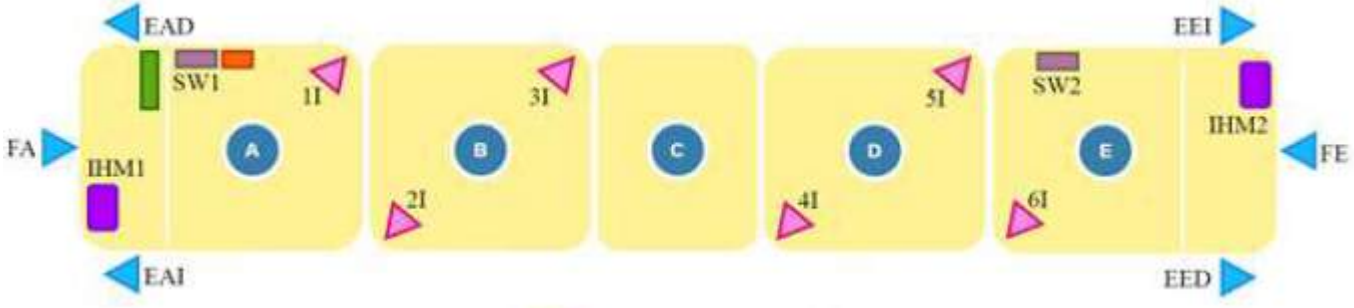
New digital CCTV system

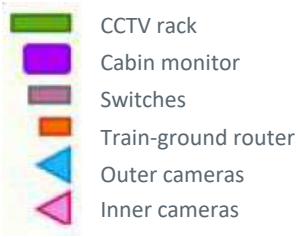
We carried out a project that involved the following scope:

- Supply and Installation of:
  - Digital Recorder, fully integrated into the train.
  - Hw and Sw required for viewing real-time images from OCC.
  - Equipment for image recovery from a WIFI connection located at depot.
  - Monitors for viewing images in cabins.
- Ethernet LAN deployment inside the train.

No changes to train cameras.

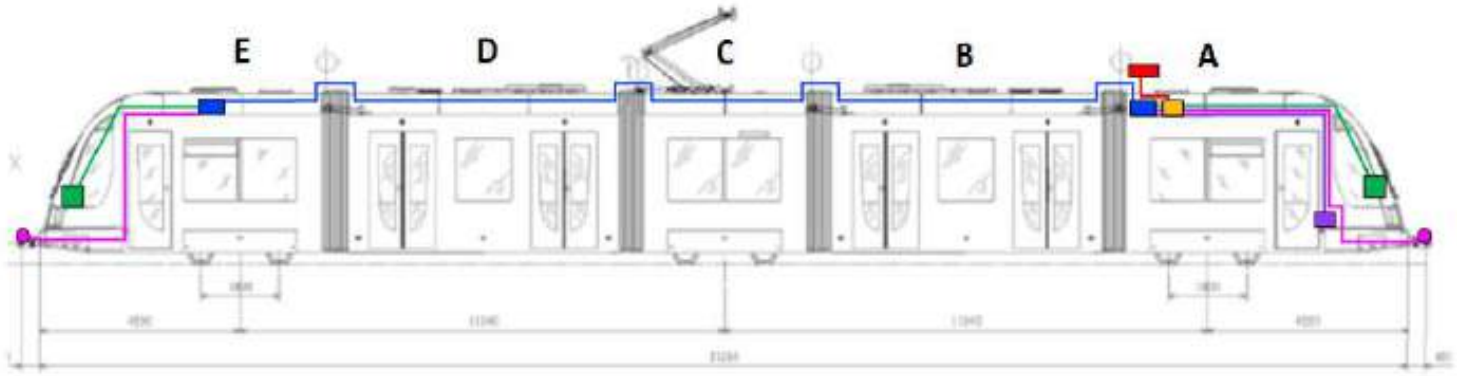
CCTV. Component locations





- Most advanced railway certifications
- ONVIF compatibility
- Recording images in high-quality Full HD resolution

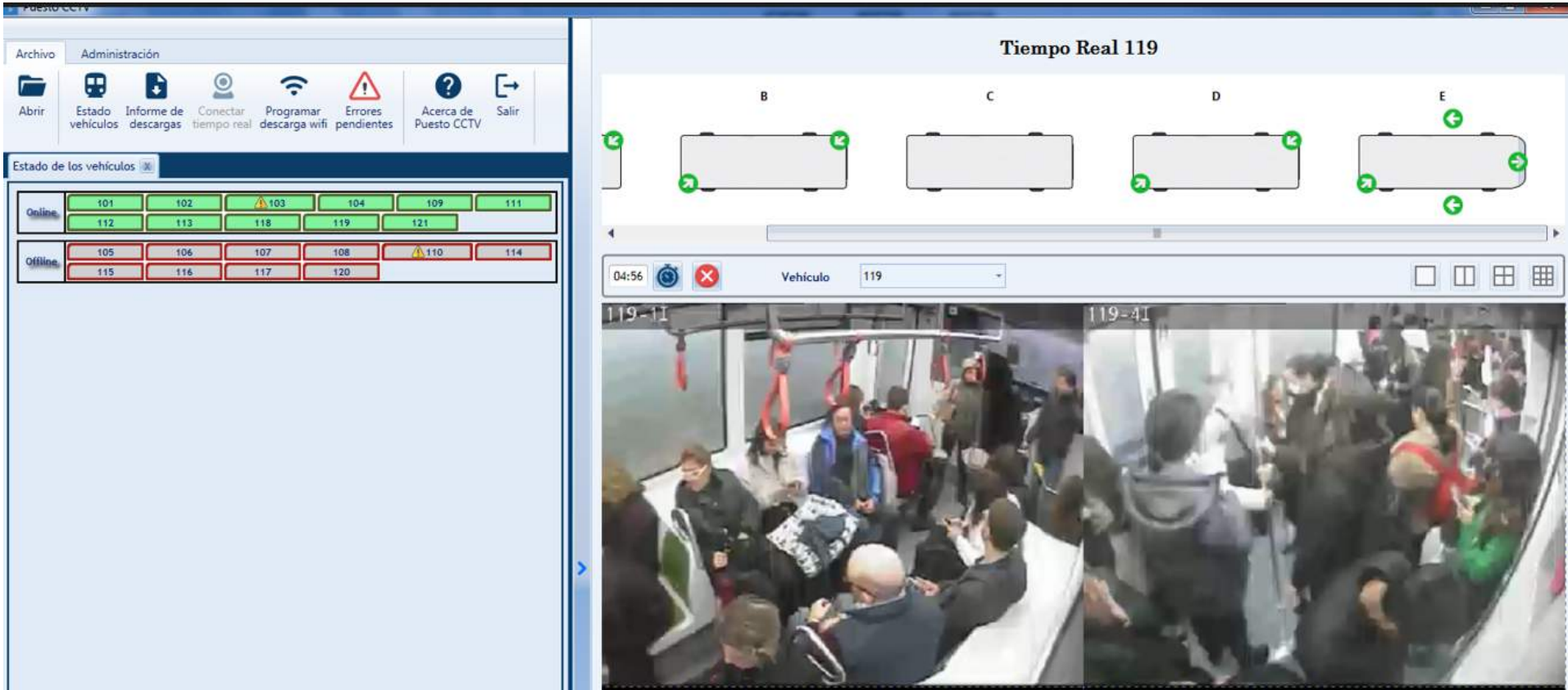
CCTV. Wiring diagram



Antenna	Antenna wire
Switches	Control wire
Router	Router wire
Cabin monitors	Monitors wire
Recorder	Recorder wire
Coupling	Coupling wire

New cabin CCTV monitor

CCTV. Real-time visualization from OCC



Mid-life works in a Rolling Stock fleet

Mid-life works aim to extend asset life, **sustain train performance and ensure system reliability**.

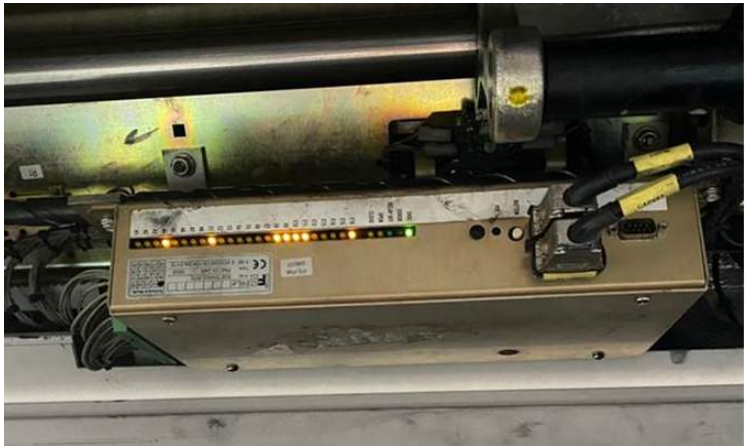
At Metro de Sevilla, ongoing mid-life works involve renovating key components.

DCU

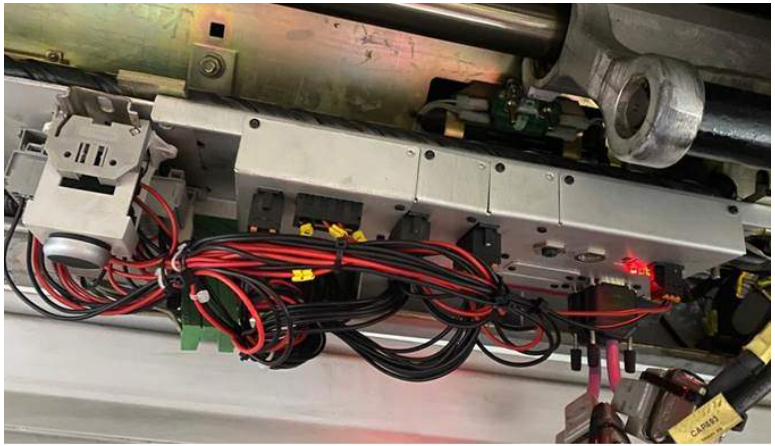
- All train doors have a DCU
- In 2018, it was received an Obsolescence Warning
- We have replaced the previous DCU (analog) with another digital one with higher performance
- The new digital DCU records activity for several days, improving failure analysis capability.

New Door Control Unit

Old DCU



New DCU



New Cabin monitoring and control terminal

The new terminal significantly **improves the interface with the driver**:

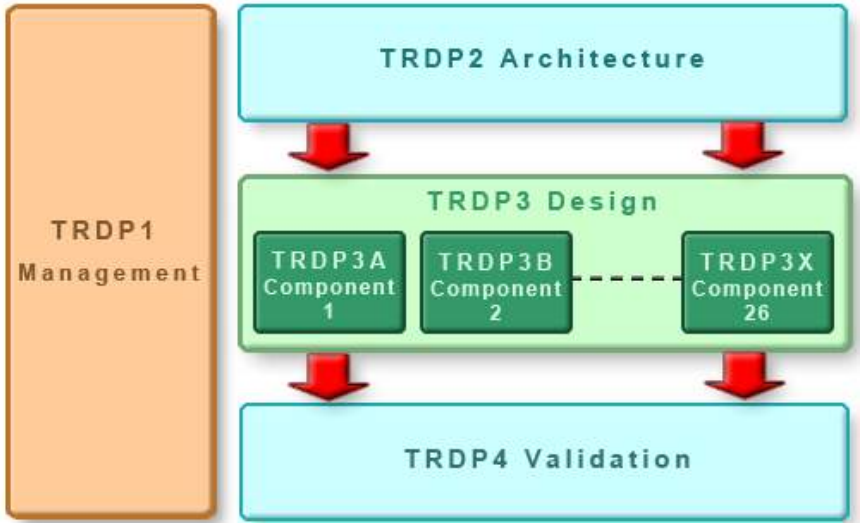
- More intuitive and easy to manage
- Tactile
- Color and brightness can be adapted to suit lighting conditions
- More driving parameters are displayed

New step: train to ground communication

We are currently focused on the development of a Real Time Data Protocol (TRDP) architecture.

TRDP is an Open Source development that allows the reading of main train maintenance parameters and that **will enable a CBM (Condition-Based Maintenance).**

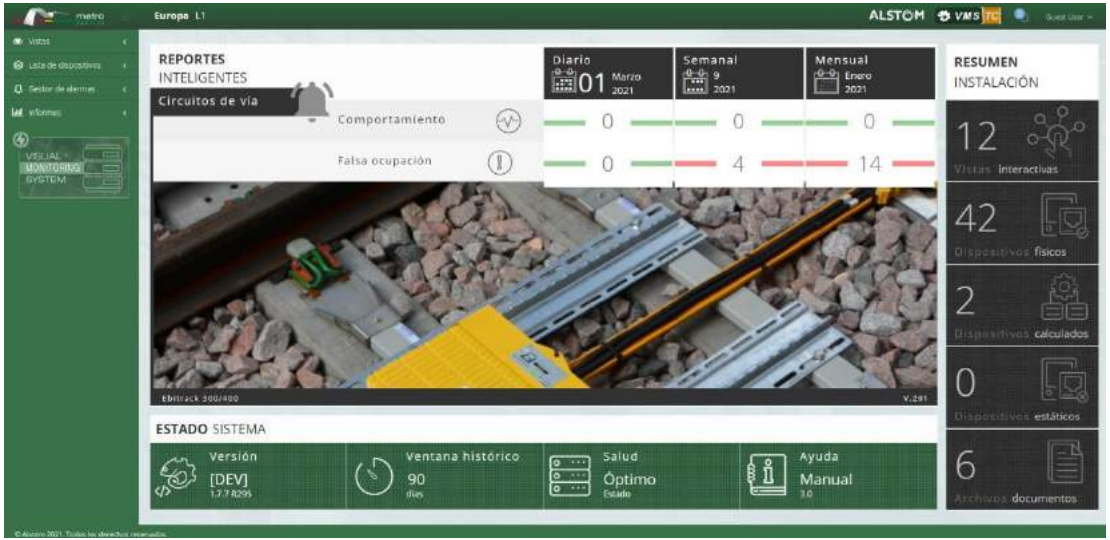
> We are evolving from a kilometer-based maintenance to a condition-based plan.

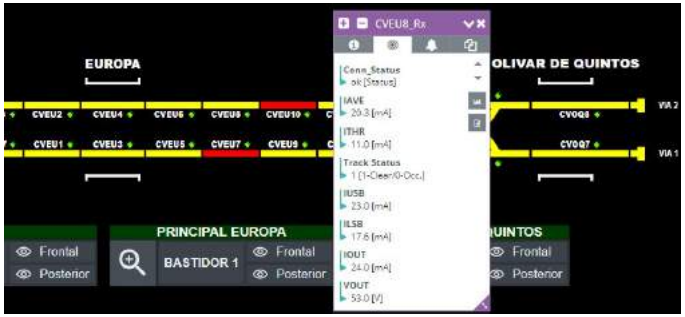


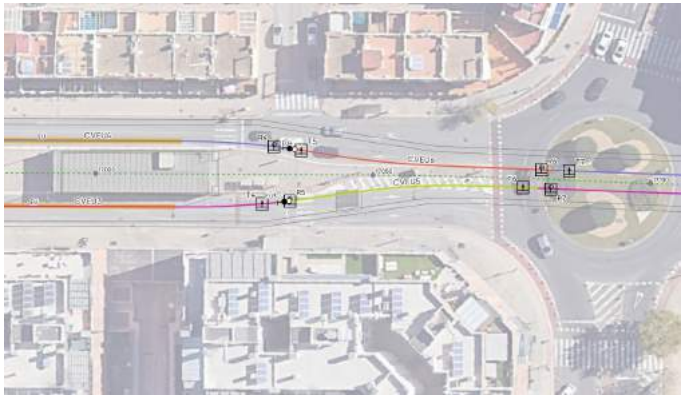
Asset conditioning monitoring

Asset conditioning monitoring

- Monitoring of digital track circuits for the control of performance data in real time and in historical mode, including an alarm manager to prevent system failures (preventive maintenance).

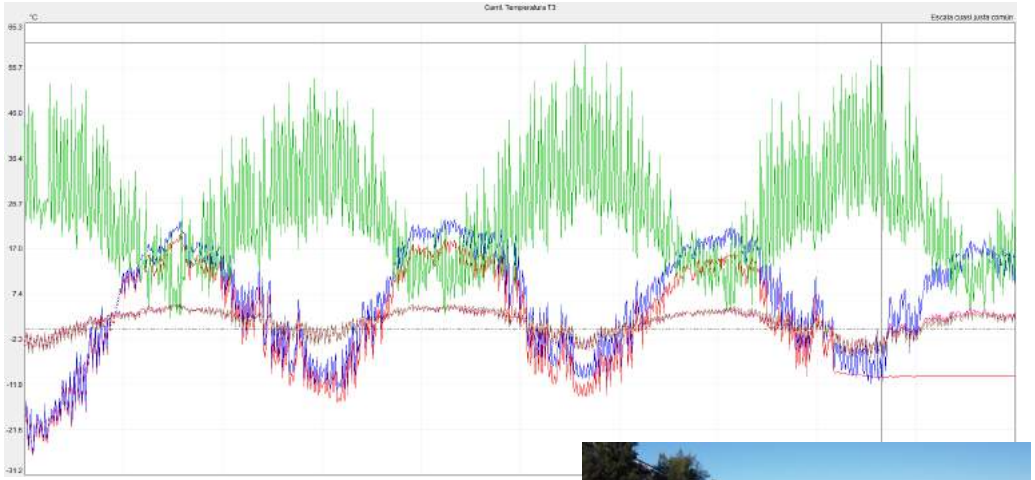




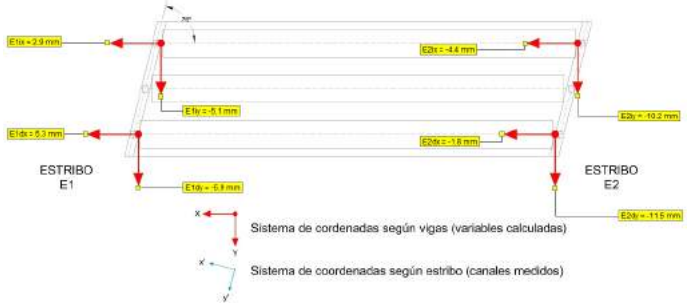


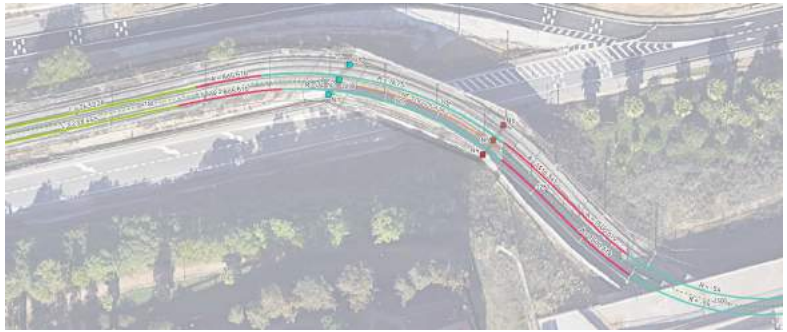
Asset conditioning monitoring

- Structure displacements and rail temperature and stress monitoring.



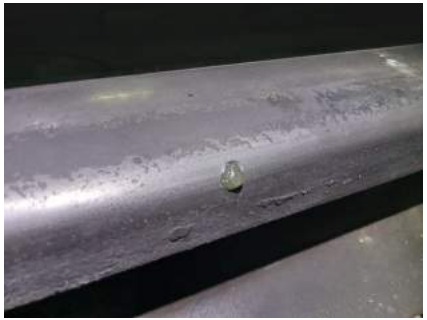
PASO SUPERIOR SAN JUAN ALTO. METRO SEVILLA
MOVIMIENTO RELATIVO ESTRIBO - TABLERO





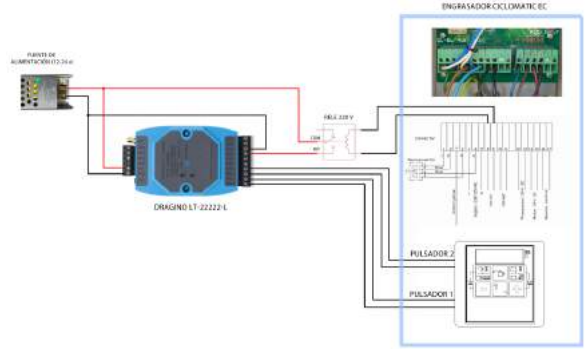
Asset conditioning monitoring

- Conditioning monitoring of Railroad Lubrication and Railroad Acoustic Attenuation System.
- Tank level control, number of cycles, possibility of remote reset, pump operating pressure, etc.



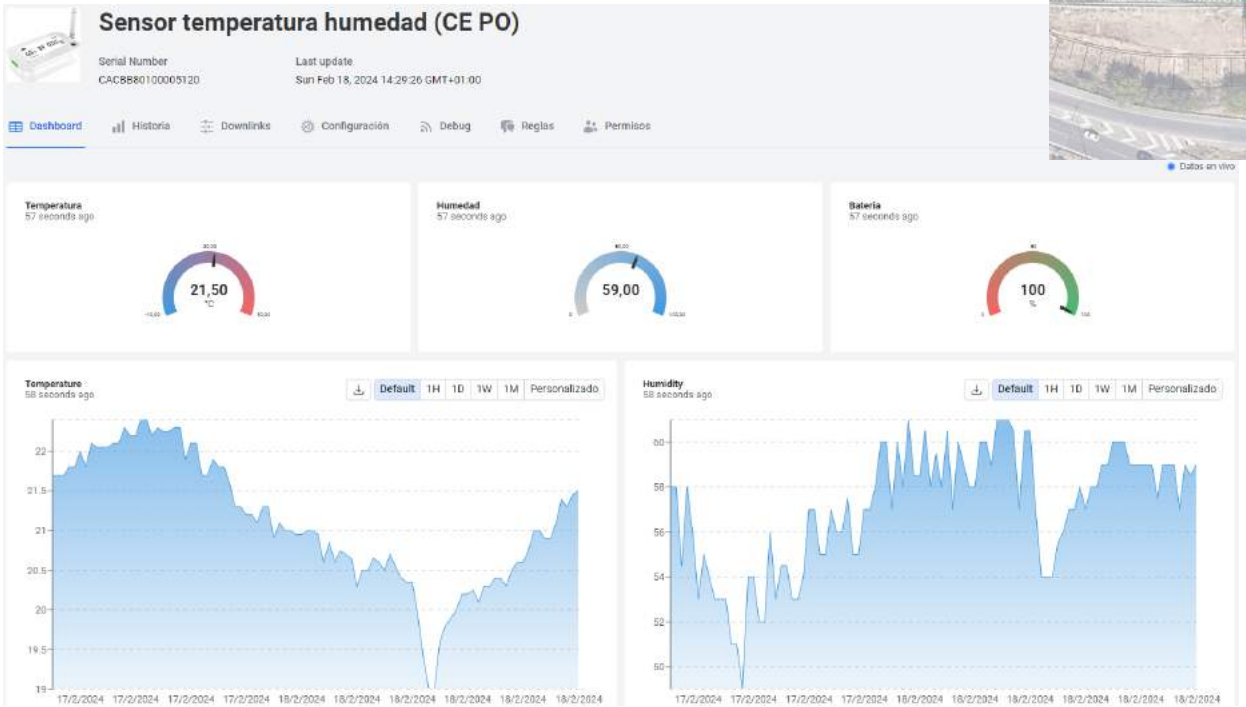
Asset conditioning monitoring

- Existing rail lubrication systems with no monitoring technology.
- Prototype of LoRa systems to know basic information.



Asset conditioning monitoring

- Temperature and humidity control in technical rooms with LoRa technological devices.



Asset conditioning monitoring

- Digital twin and predictable maintenance.

Thank you

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