

I RAIL TECHNOLOGICAL
FORUM FOR
INTERNATIONALIZATION

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Madrid

**New generation of gauge changeover Facilities:
The UNICHANGER Project**

Dr. I.J. Iglesias
High Speed Operations and Engineering Direction.
Technical Coordination Director.
ADIF.

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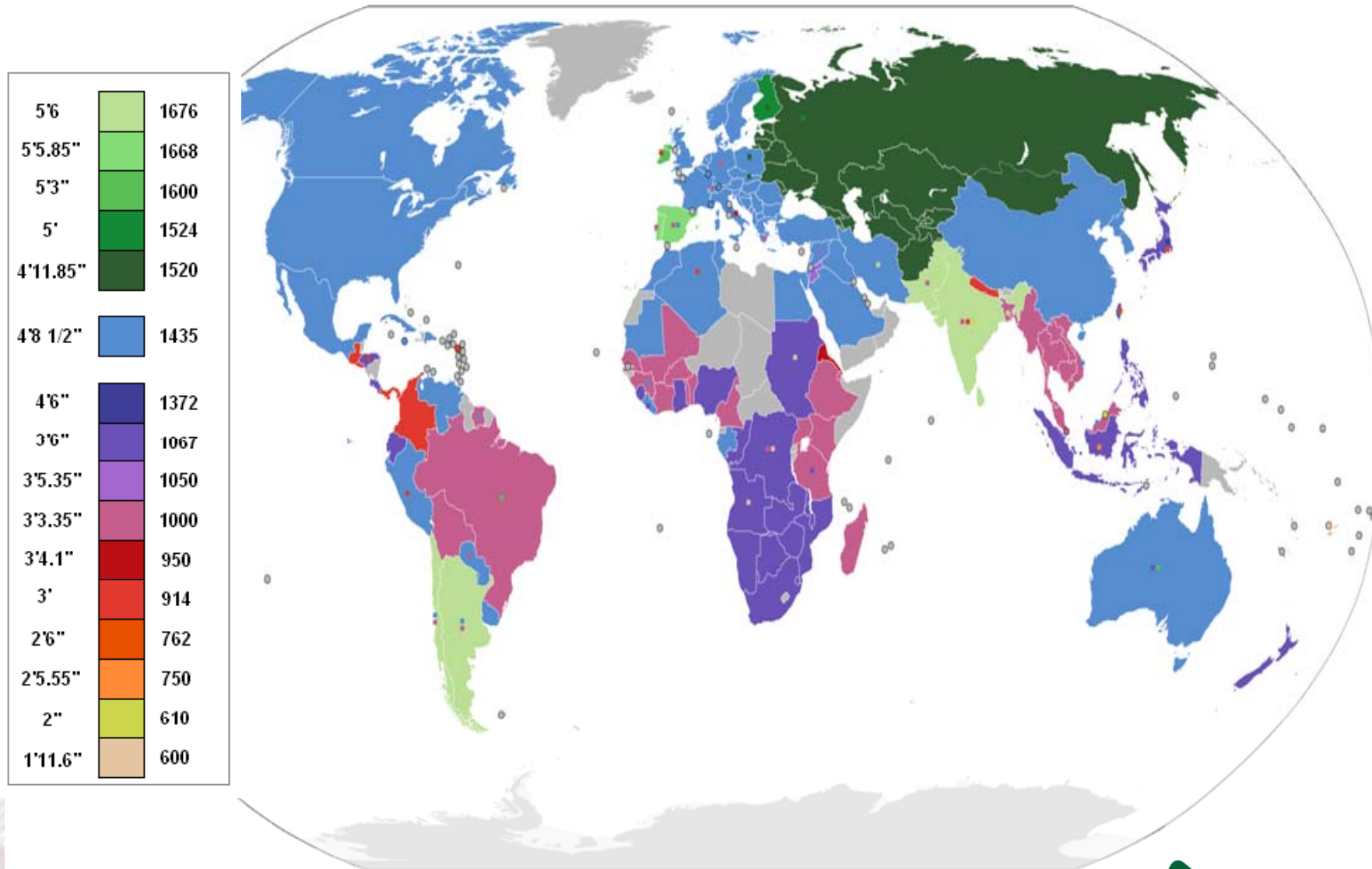
Summary

1. The problem of different gauge: A worldwide issue.
2. Variable gauge in Spain.
 - 2.1 Variable gauge trains solution: Spanish experience
3. Evolution of Track Gauge changeovers.
4. The Unichanger Project: an unique platform for all the existing technologies.
5. Conclusions.

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A LOOK AT THE DIFFERENT GAUGES WORLDWIDE



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THE PROBLEM OF DIFFERENT GAUGE BETWEEN COUNTRIES (or inside a country)

There are "frontiers" among the networks with different gauge, not only between countries but also inside countries with two different gauges like Spain. These barriers create a problem for the transnational rail traffic that can only be solved by means of one of the solutions:

- Make a transfer of freight or passengers.
- Change of wagons axles or the whole bogies.
- Use tracks with three or four rails.
- Use trains with variable gauge as well as systems allowing the trains to modify its axles gauge.

System of the past

Complex and time consuming system

Used in Spain in some specific places

This is the system more extended in Spain

TRAINS WITH AUTOMATIC VARIABLE GAUGE SYSTEMS IN EUROPE

- TALGO Technology of moving rolling system (RD).
- New TALGO Technology for Freight wagons: under construction the prototypes of the 2nd generation (lighter weight and less cost).
- CAF "Brava" Technology.
- SUW2000 Polish Technology.
- DBAGRafil "Type V" German Technology.

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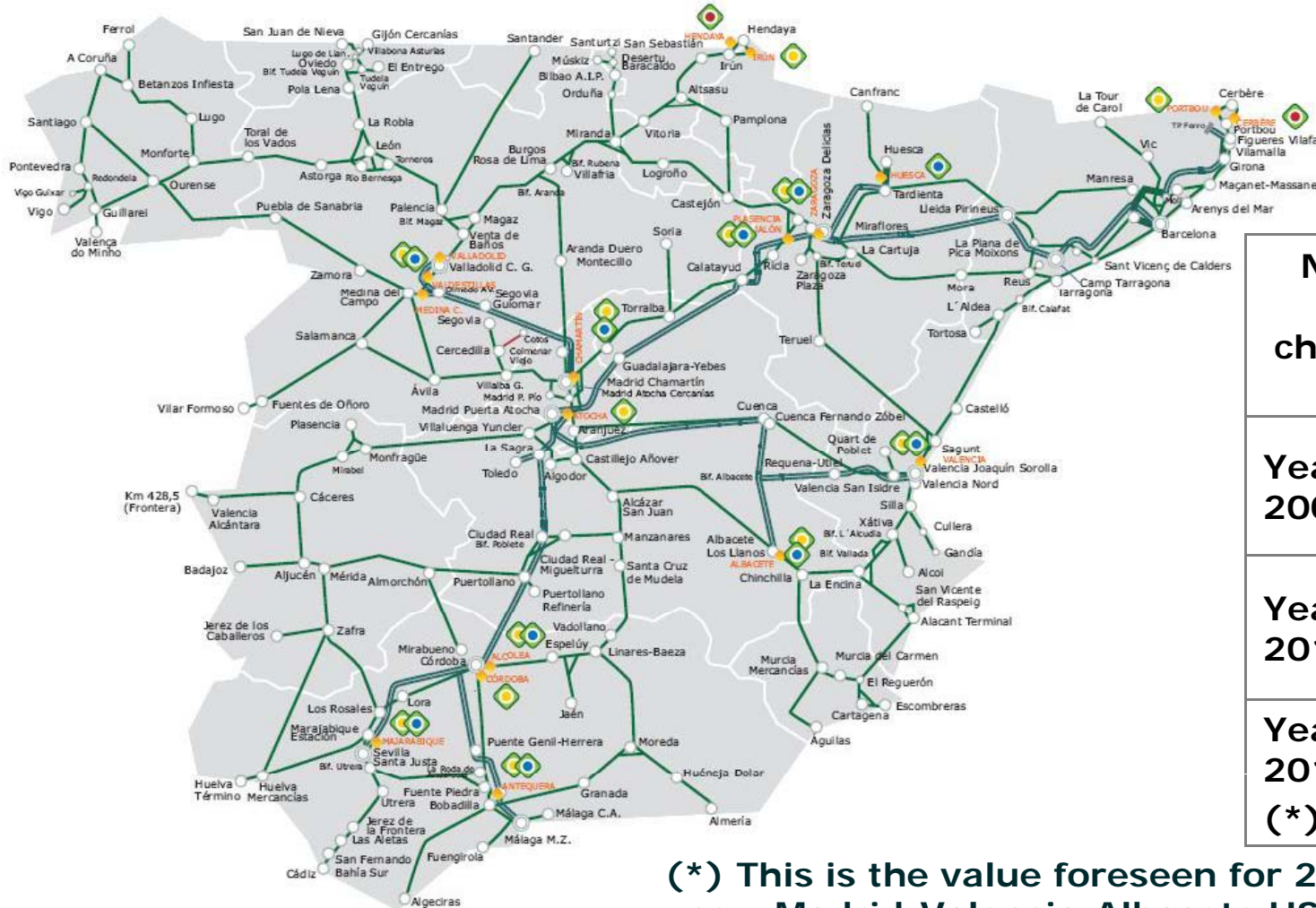
AUTOMATIC TRACK GAUGE CHANGEOVER EXPERIENCE IN SPAIN

- 300.000 trains, 70.000.000 passengers since 1969
- 1969- First Talgo changeover facility in Portbou
- 1981- Second Talgo changeover facility in Irun
- 1992 – Construction of the first automatic changeover facility in Spain
- 1992 – Construction of the first automatic changeover facility in Spain
- 2000 – Construction of the first automatic changeover facility in Spain
- 2000 – Construction of the first automatic changeover facility in Spain
- 2009 – 14 inner changeover facilities in daily operation in Spain + 2 international connections Irun: (Madrid-Paris) and PortBou (Barcelona to Paris, Milan and Zurich and Montpellier-Cartagena)

Around 100 High speed trains change track gauge daily.

Trains change gauge and electrification system at 15 Km/h without stopping (in the inner changeover facilities).

GAUGE CHANGEOVER FACILITIES IN COMMERCIAL EXPLOTATION IN SPAIN



Number of passes through the 14 changeover facilities in Spain	
Year 2009	24.036 Operations
Year 2010	28.540 Operations
Year 2011 (*)	38.690 Operations

(*) This is the value foreseen for 2011 once opened he new Madrid-Valencia-Albacete HSL in December 2010

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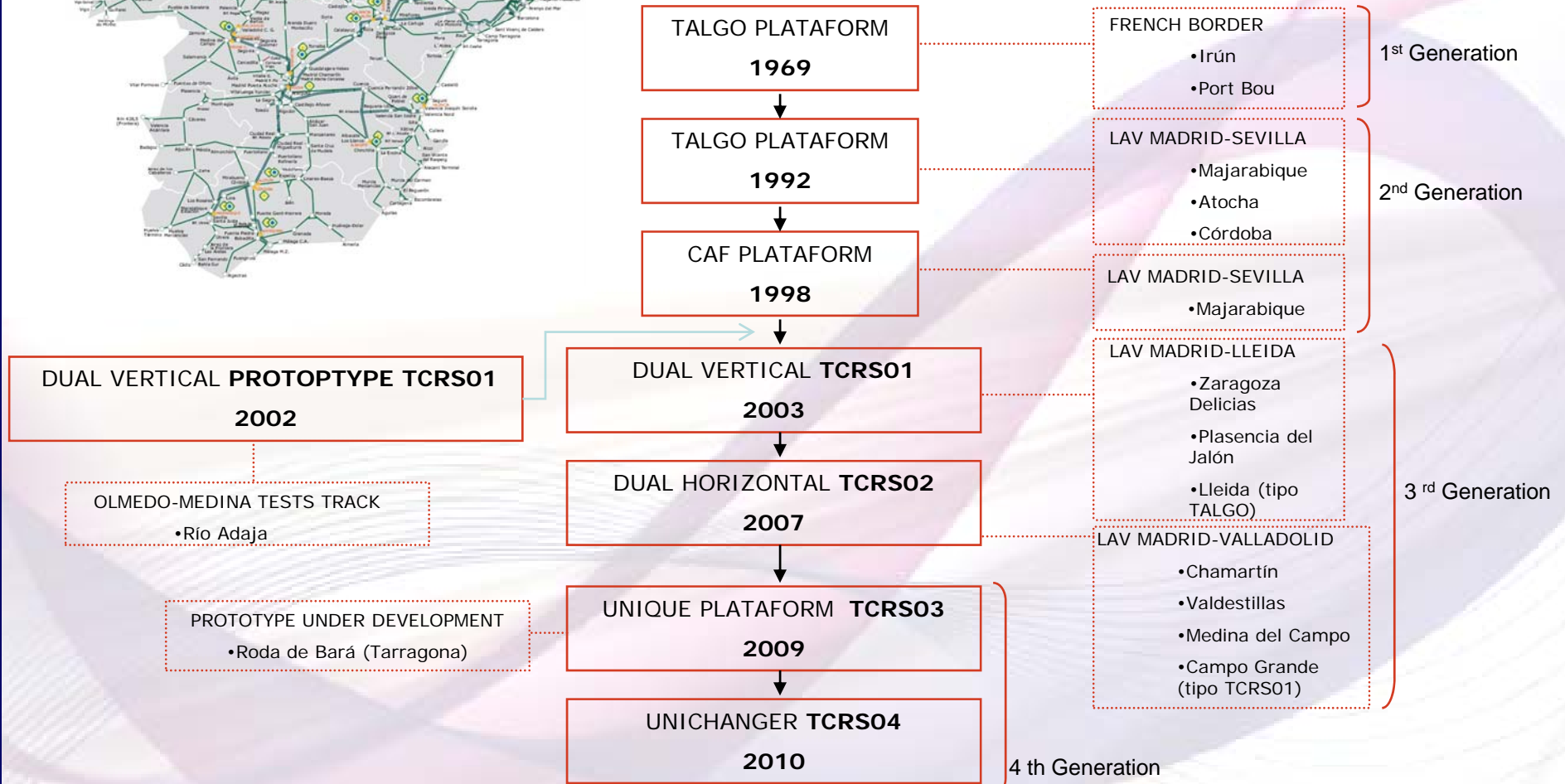
ADIF TARGET: ALLOW THE CIRCULATION OF ALL KIND OF ROLLING STOCK

- Adif as Spanish Railways Administrator has the vocation of allowing the circulation over its network of all the existing rolling stock.
- In the frame of this open market scenario, Adif is strongly committed with the development of universal changeover facilities, in the sense of allowing the pass of all the existing variable gauge technologies. Not only in the international frontiers, but also in the inner frontiers due to the two gauges existing in Spain.
- UIC, in the frame of the project "Automatic Gauge Changeover Systems" should also promote the opening of all national networks to all the existing variable gauge rolling stock.

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GAUGE CHANGEOVER FACILITIES EVOLUTION

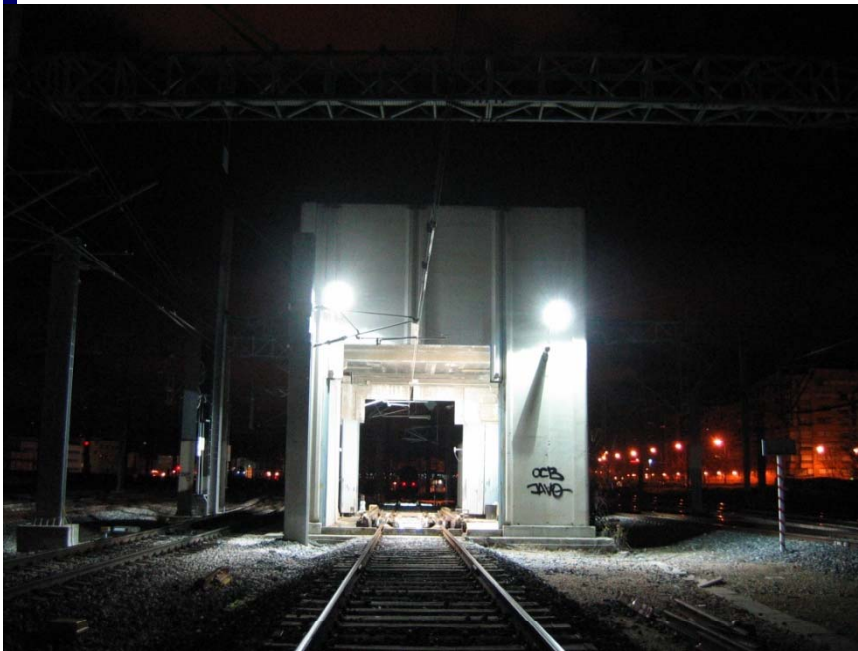


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FIRST CHANGEOVER FACILITIES

CHANGEOVER FACILITY WITH A SINGLE PLATFORM



TALGO changeover Madrid-Atocha



TALGO y CAF changeover in Majarabique, Sevilla

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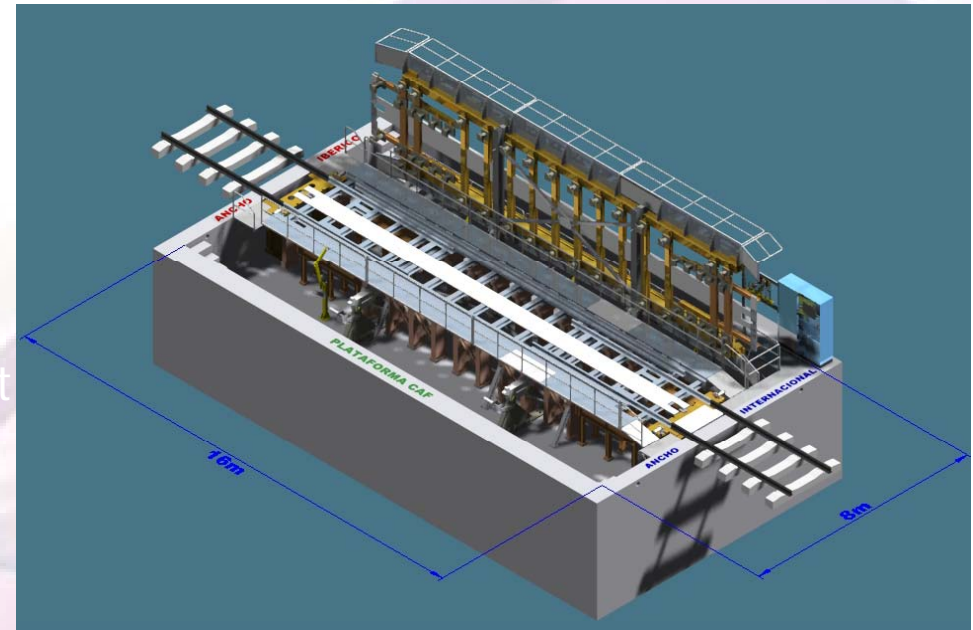
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ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

TCRS1

TCRS1 allows the pass of TALGO and CAF Technologies by means of two reclining platforms.

- To move the platforms a complex hydraulic system is needed. This system is appropriate for places with space restrictions.



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ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

TCRS1

CHANGEOVER FACILITY TCRS01



Gauge change shunting with ADIF's BT Diesel train

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ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

TCRS1

CHANGEOVER FACILITY TCRS01



Dual vertical changeover facility in Plasencia del Jalón.

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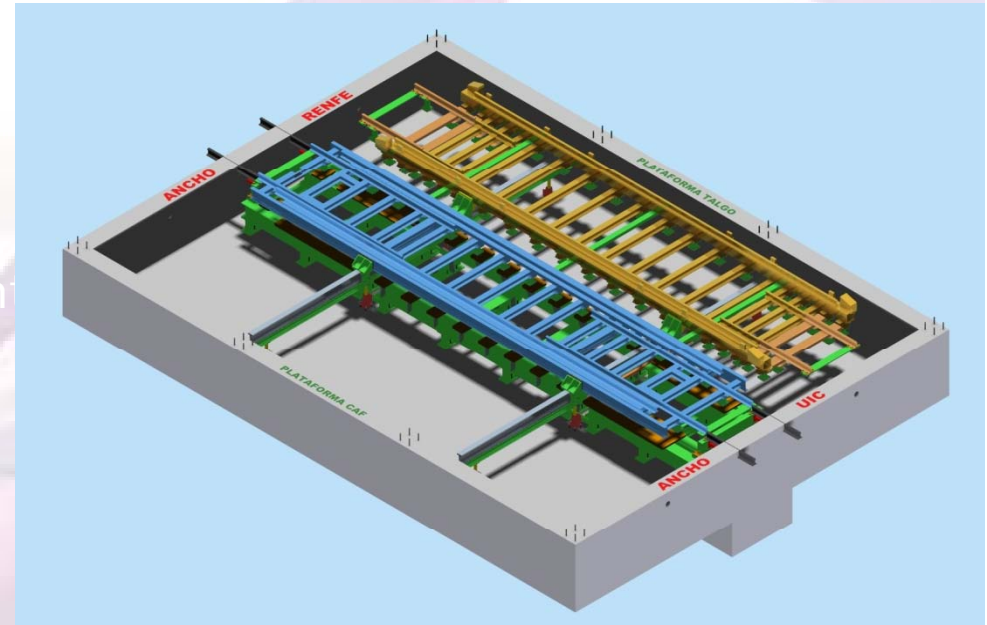


ADIF'S AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

TCRS2

TCRS2 allows the pass of TALGO and CAF Technologies by means of two horizontal moving platforms.

- Track Gauge Interoperability
- Easy and reliable movement.
- Hydraulic System Optimization.
- More economic installation.



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ADIF'S AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

TCRS2

CHANGEOVER FACILITY TCRS02



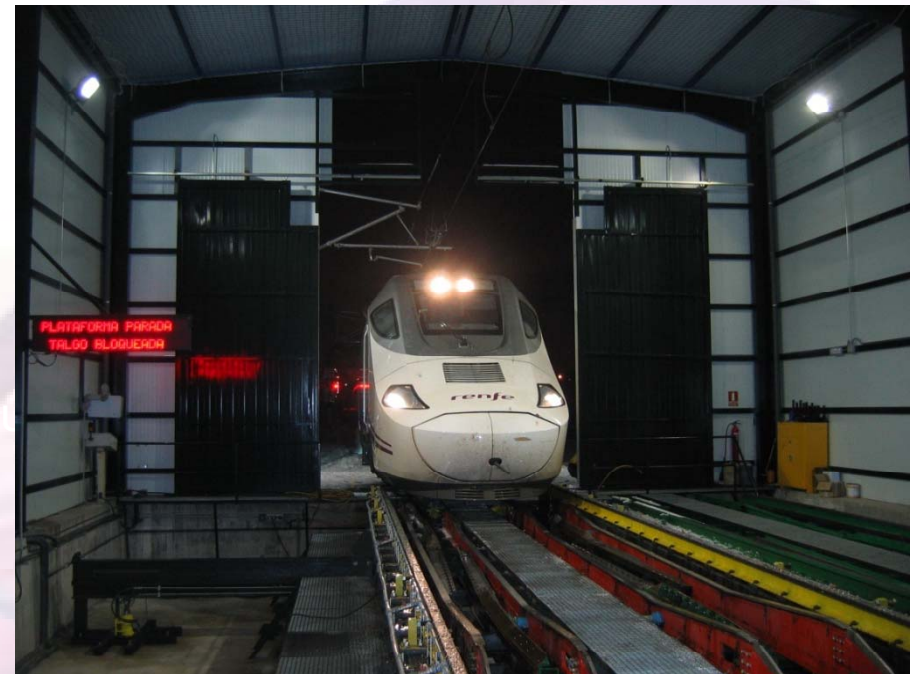
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ADIF'S AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

TCRS2

CHANGEOVER FACILITY TCRS02



Dual horizontal changeover facility in Madrid-Chamartín

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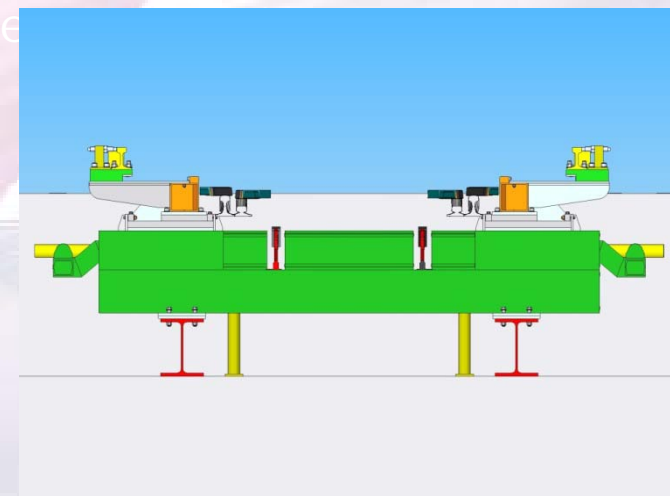
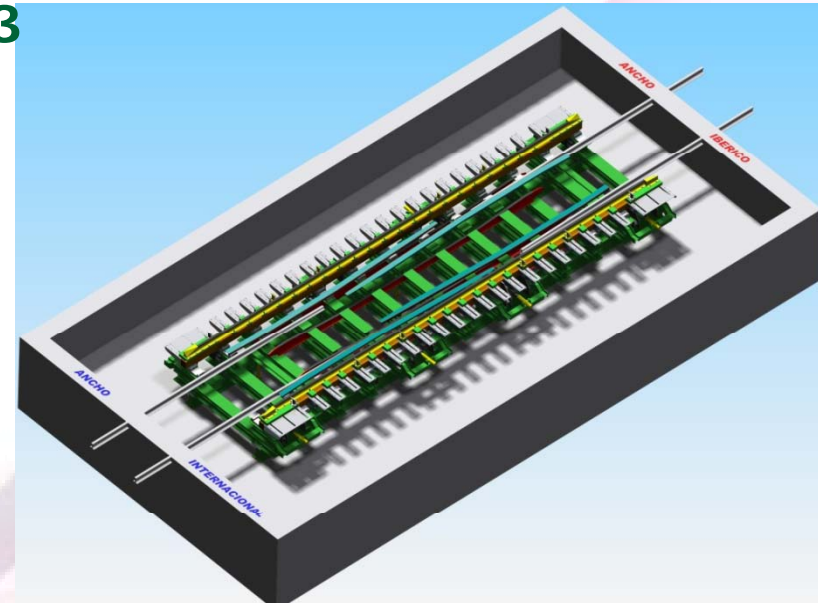
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ADIF'S AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION: UNICHANGER TCRS3

TCRS 3 allows the automatic gauge change of both TALGO and CAF technologies by means of a single platform with moving elements. Main features:

- Time reduction to commute from one to the other technology.
- Space reduction for the whole system.
- Better lubrication system for Talgo technology
- Unification of wheels' displacement guide rails for both TALGO and CAF technologies. The elastic TALGO system is adopted as the common element.
- Cost reduction



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ADIF'S AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

TCRS3

LUBRICATING OIL BY THE PLATFORM TALGO (TCRS3)

For Talgo compositions, oil is needed to lubricate the roller, for which there will be a oil pressure pipe, reservoir, and an oil collection tray. Oil will be recycled by simple filtration. The main advantages of this system, compared with the water lubrication, are:

- **Very few oil consumption: 0.144 liters / train**
- **Wider temperature range: Temperature range from -30 °C (critical fluidity point) to 100 °C, without any heating system.**
- **Avoid corrosion not only of metal parts but also all kind of electronics and pneumatic installation in the pit Changer**
- **This system is very similar to those used to lubricate rails in places with strong rail-track forces.**



ADIF'S AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

UNICHANGER TCRS4

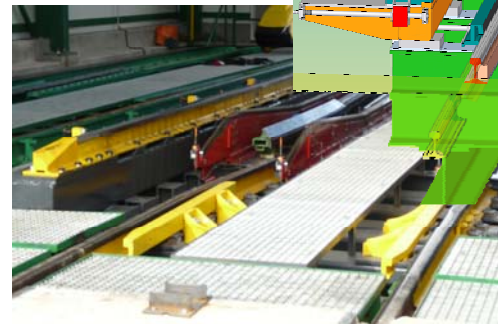
TCRS4 system allows the pass of CAF, Talgo, Rafil-DB y SUW2000 technologies with an unique platform.

- It includes the improvements of TCSR3 prototype.
- The commutation among different technologies is performed in seconds.
- The length of the changeover facility has to be increased to be adapted to RAFIL and PKP technologies.

SUW2000



Rafil/DB



TALGO RD



CAF

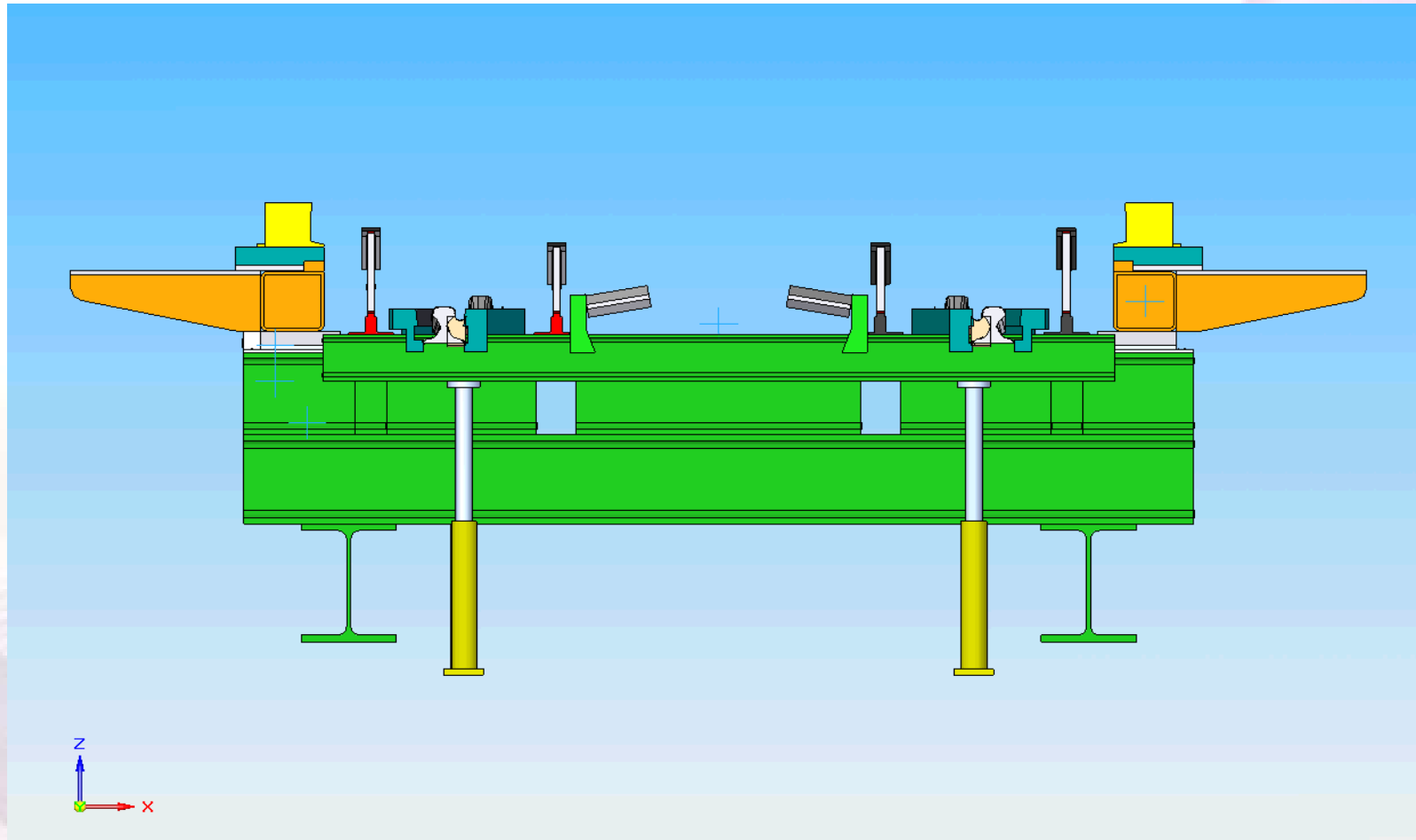
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ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

UNICHANGER TCRS4 TALGO TO CAF



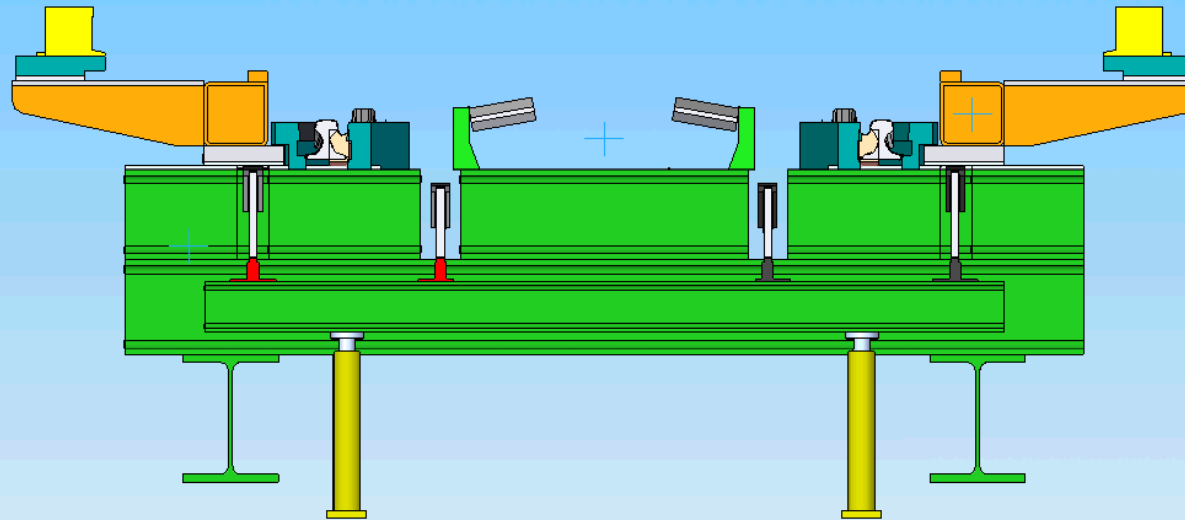
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ADIF'S AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

UNICHANGER TCRS4 CAF TO RAFIL DB

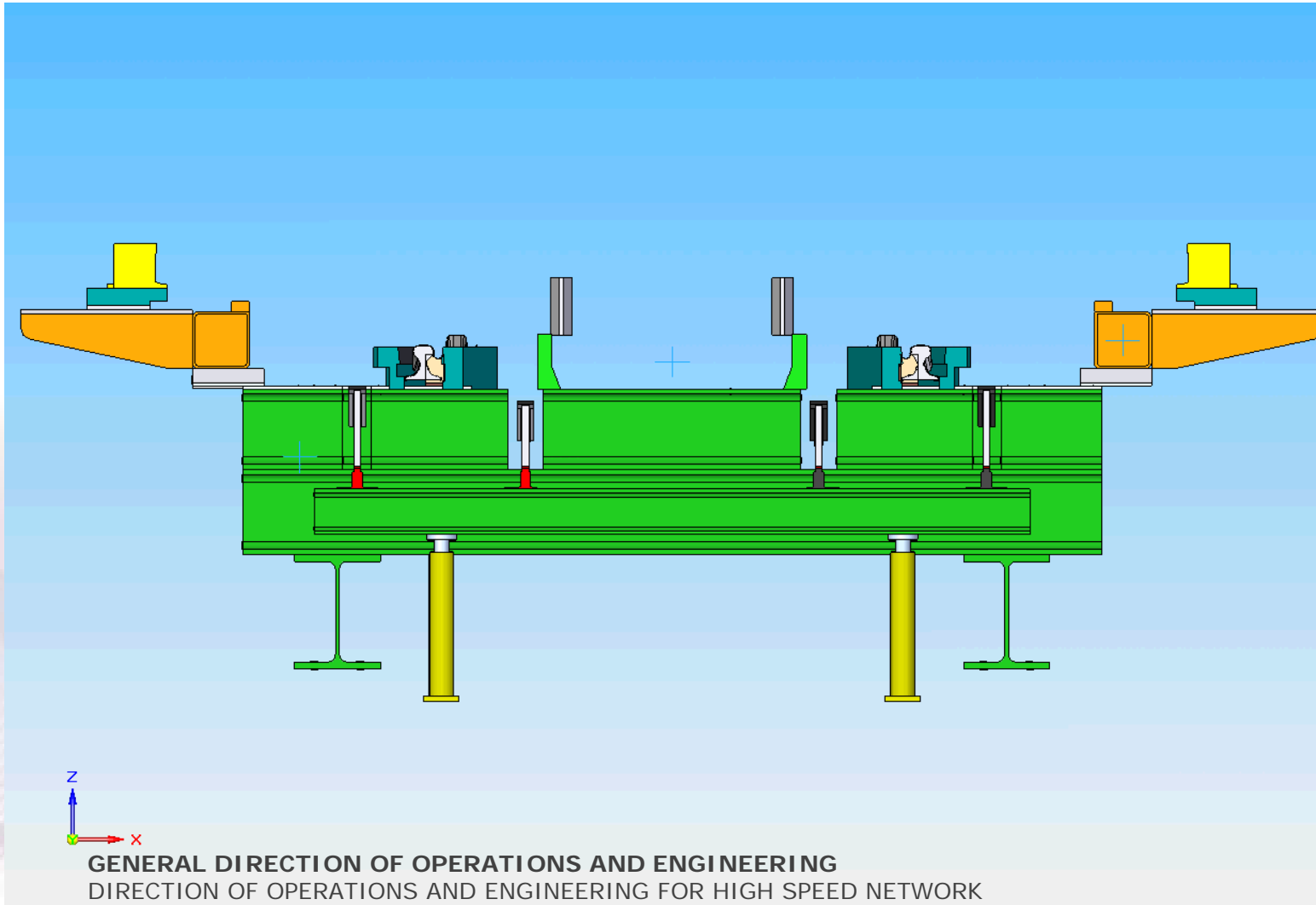


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ADIF'S AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION

UNICHANGER TCRS4 RAFIL DB TO TALGO



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CONCLUSIONS

- At the time being, Spain is leader in interoperability between different gauge tracks.
- Spain is one of the most important supplier of variable gauge trains (Talgo and CAF), with trains up to 250 Km/h circulating daily in Spain.
- From 1969 until today more than 300.000 trains, 70.000.000 passengers have run over these facilities, with almost 40.000 trains per year changing their gauge in 2011.
- UNICHANGER Project is one more step through the elimination of rail barriers due to the different gauge. It is the first attempt in the world of having an universal changeover platform.
- ADIF is strongly in favor of rail frontiers elimination as well as promoting an open market for all the variable gauge rolling stock suppliers, by means of eliminating any condition imposed by the infrastructure managers.

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TCRS3: Already installed in Roda de Bara changeover (Video)

