

Jornadas Internacionales
Sistemas de cambio automático de ancho de vía

40 años de cambiadores automáticos
de ancho de vía en España

INNOVATION AND PROJECTS OF FUTURE TCSR3 Y UNICHANGER

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Technological Innovation Direction

General Direction for Infrastructure Development

ADIF



INNOVATION IN ADIF

- Adif's Technological innovation Direction was created in June 2006 with the target of promoting and supporting the development of Innovation Projects in the field of Railways.
- At the time being we are managing 44 R&D projects financed by : Spanish R&D Program (Ministry of Fomento and Ministry of Science and Innovation), European VII R&D Framework Program and directly by ADIF.
- The Adif R & D Plan is devoted to promote the participation of both public and private companies in the development of Innovation projects for railways.
- UNICHANGER is one of the most important projects under development financed by the Ministry of Fomento (started in January 2009). Partners: ADIF, TRIA, FFE, TALGO, CAF and CEIT.



VARIABLE GAUGE CURRENT PROJECTS OBJECTIVES

- Development of engineering, prototypes as well as the homologation processes for the commercial exploitation of gauge changeover facilities based on a **SINGLE CHANGEOVER PLATFORM**

Currently there are two systems under development:

TCSR3: CAF + TALGO and

UNICHANGER: Rafil/DB+SUW 2000+TALGO+CAF

- **UNICHANGER PROJECT MAIN TARGET:** To define and built an standard changeover technology valid for all the existing variable gauge technologies in Europe.

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BACKGROUND AND STATE OF THE ART

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 following solutions:

- Make a transfer of freight or passengers.
- Use tracks with three or four rails.
- Use systems allowing the trains to modify its axles gauge.



BACKGROUND: GAUGE ADAPTATION SYSTEMS

- Change of wagons axles.
- Change of the whole bogies.
- Automatic gauge change by varying the distance between the wheels.



BACKGROUND: VARIABLE GAUGE SYSTEMS IN EUROPE

- TALGO Technology of moving rolling system.(RD).
- New TALGO Technology for Freight wagons.
- CAF “Brava” Technology.
- SUW2000 Polish Technology.
- DBAGRafil “Type V” German Technology.



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

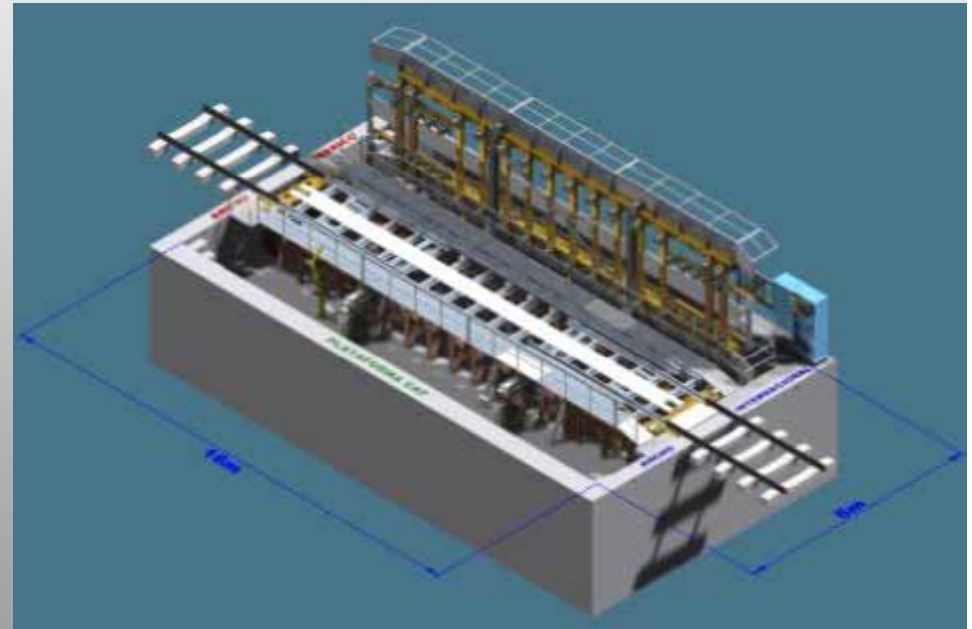
- Adif as Spanish Railways Administrator is obliged to allow the circulation over its network of all the existing rolling stock.
- In the frame of this open market scenario, Adif is strongly committed with the development of universal changeover facilities, in the sense of allowing the pass of all the existing variable gauge technologies.
- 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.

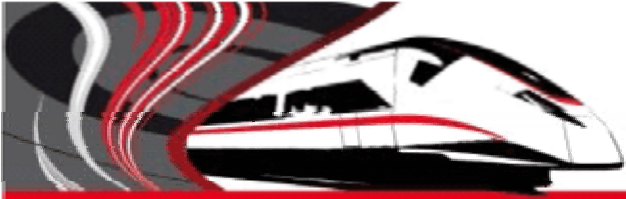


ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION TCRS1

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.

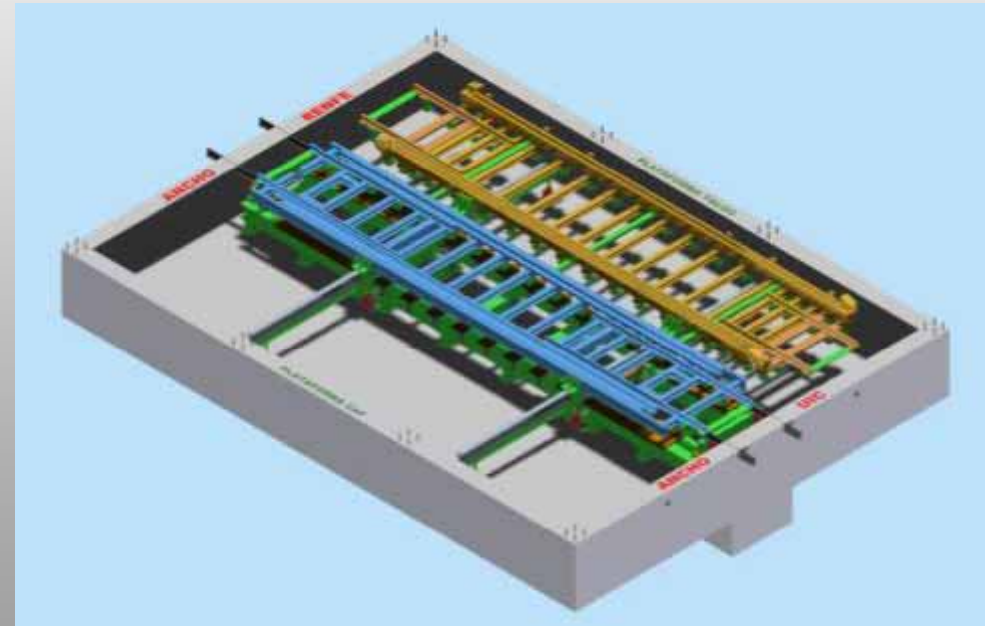




ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION TCRS2

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

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

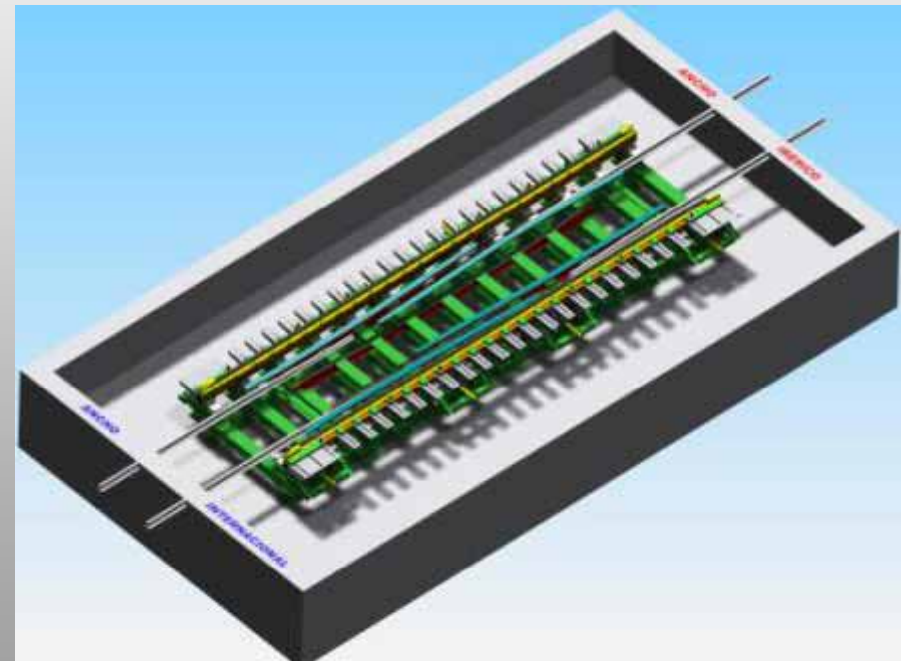




ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION INNOVATION : TCRS3

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

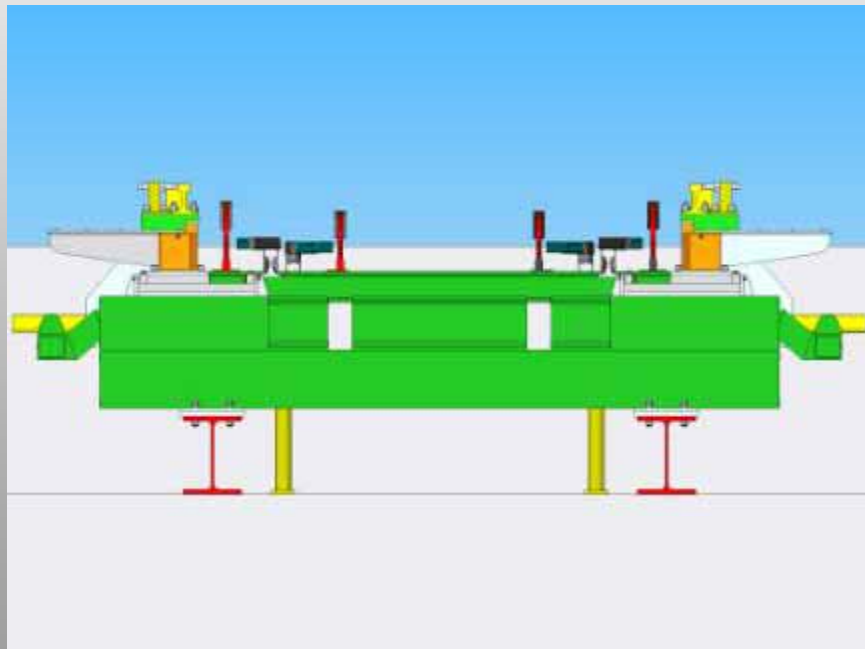
- Time reduction to commutate from one to the other technology.
- Space reduction for the whole system.



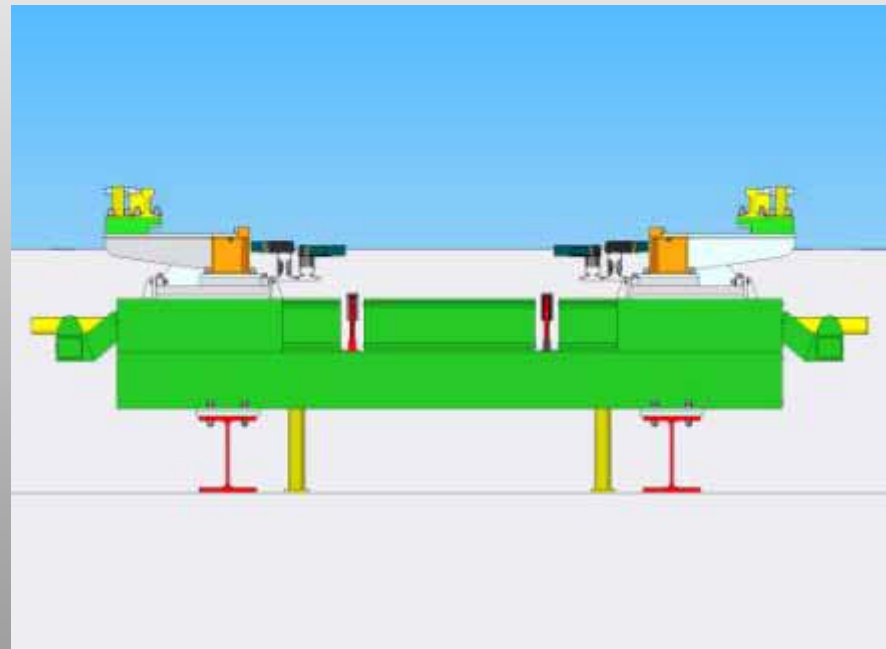


ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION INNOVATION : TCRS3

TCRS3 Prototype. TALGO position



TCRS3 Prototype. CAF position

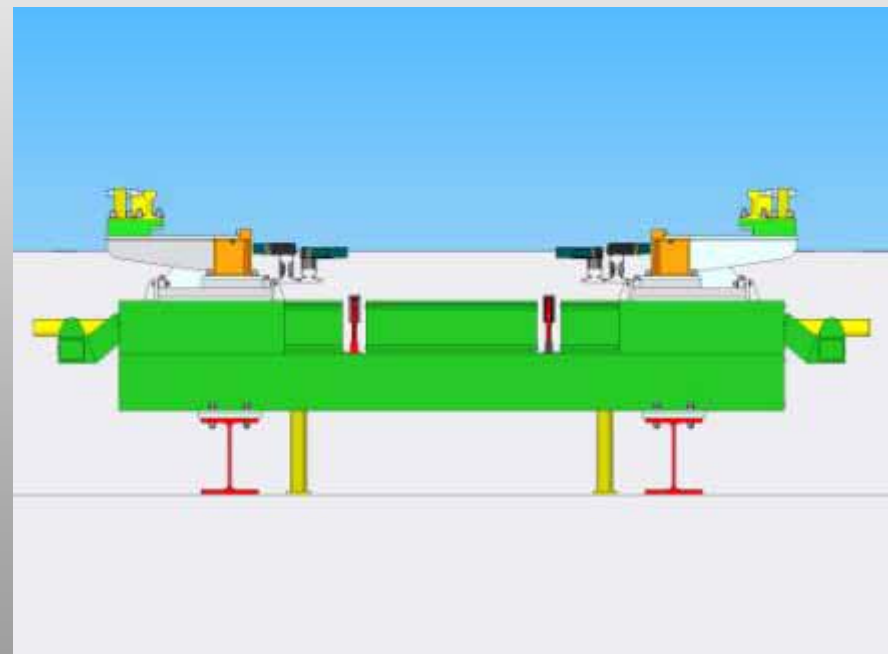




ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION INNOVATION : TCRS3

TCRS3 Prototype. CAF position

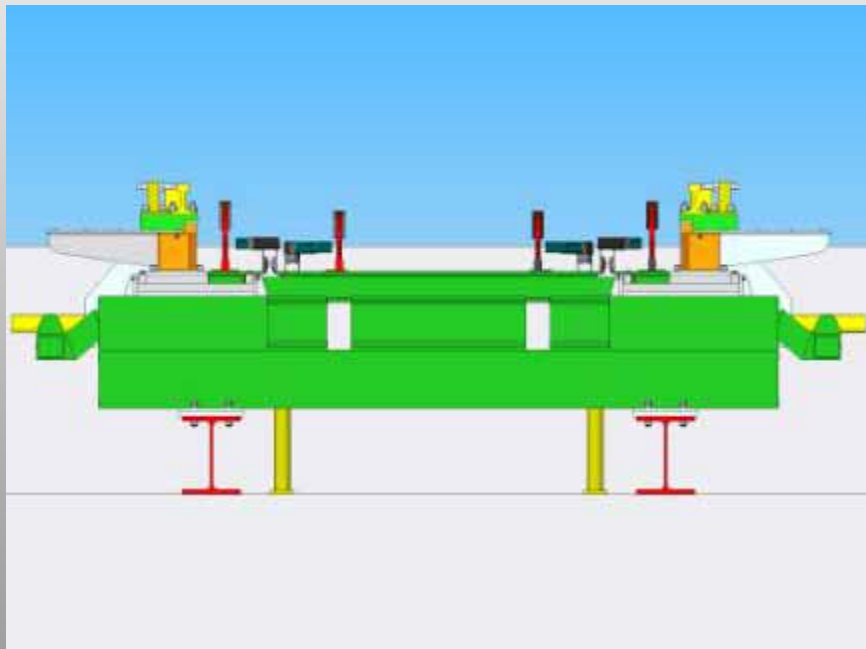
- Unification of wheels' displacement guide rails for both TALGO and CAF technologies. The elastic TALGO system is adopted as the common element.





ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION INNOVATION : TCRS3

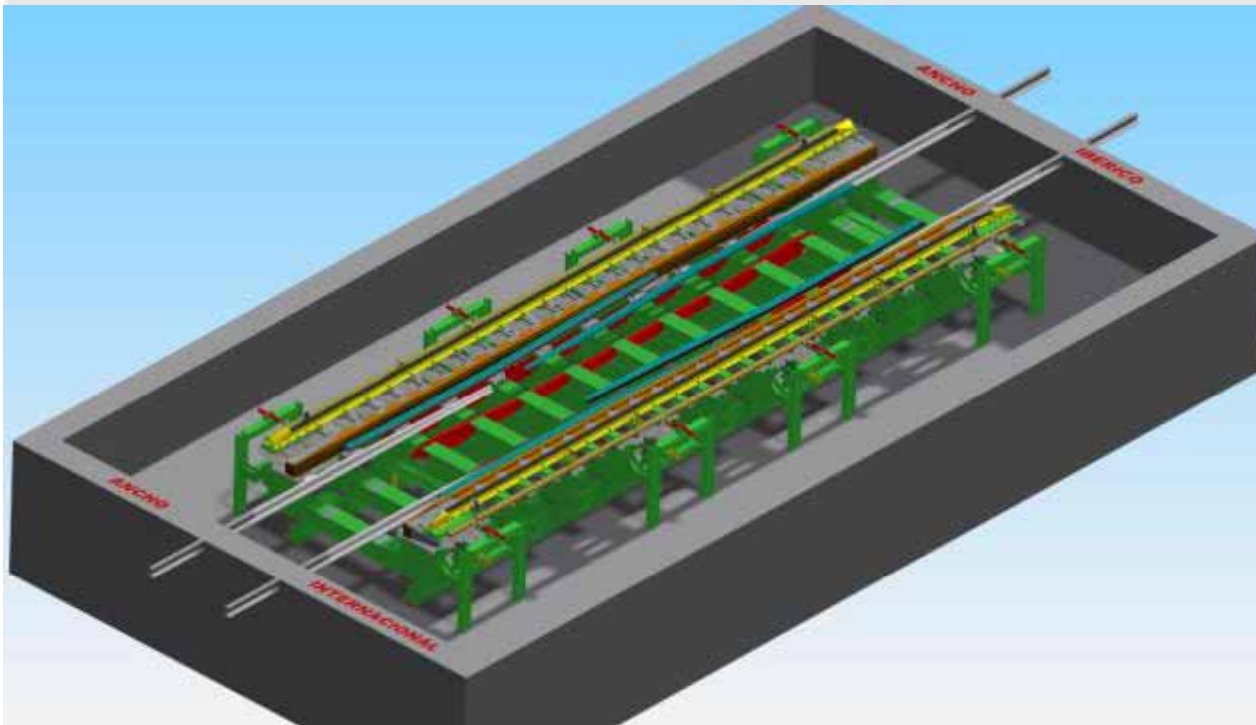
TCRS3 Prototype. TALGO position



- Improvement of the current system, as the TALGO guide rails lubrication, by means of using a biodegradable oil instead of water. With this system the whole installation is more clean and it prevents early platform components corrosion.



ADIF's AUTOMATIC CHANGEOVER TECHNOLOGIES EVOLUTION INNOVATION : TCRS3



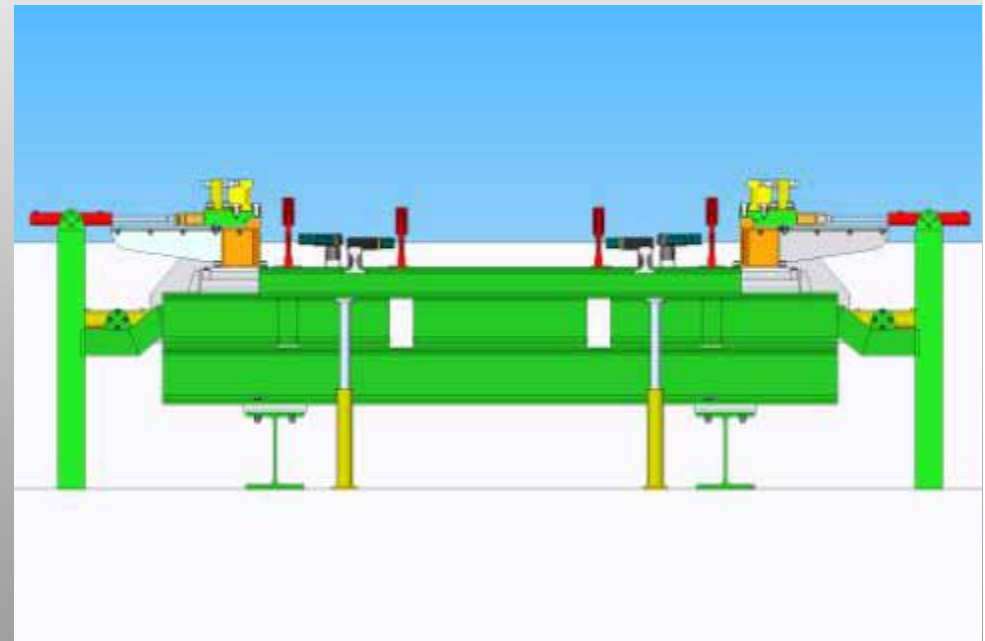
- Improvement of the displacement guide rails geometry by means of replacing the current straight guide rails by curve guide rails with smooth transitions. This modification reduces the lateral accelerations and generate an smaller impact in the rolling stock.



INNOVATION TCRS3

TCRS3 Prototype. TALGO position

- Improvement of the locking checking system and early incidences detection.





INNOVATION

UNICHANGER PROJECT: 1) TCRS4 development:

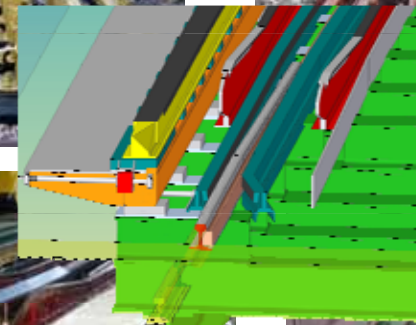
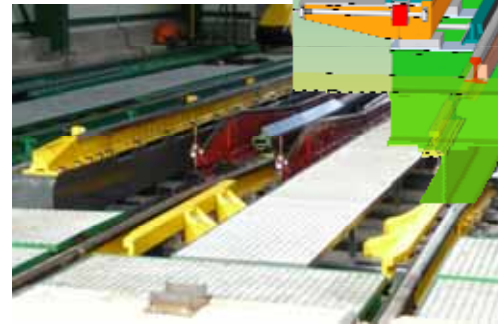
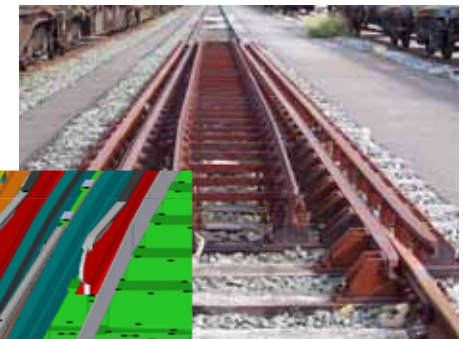
TCRS4 system allows the pass of CAF, Talgo, RafiL y SUW2000 technologies with an unique platform.

- 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

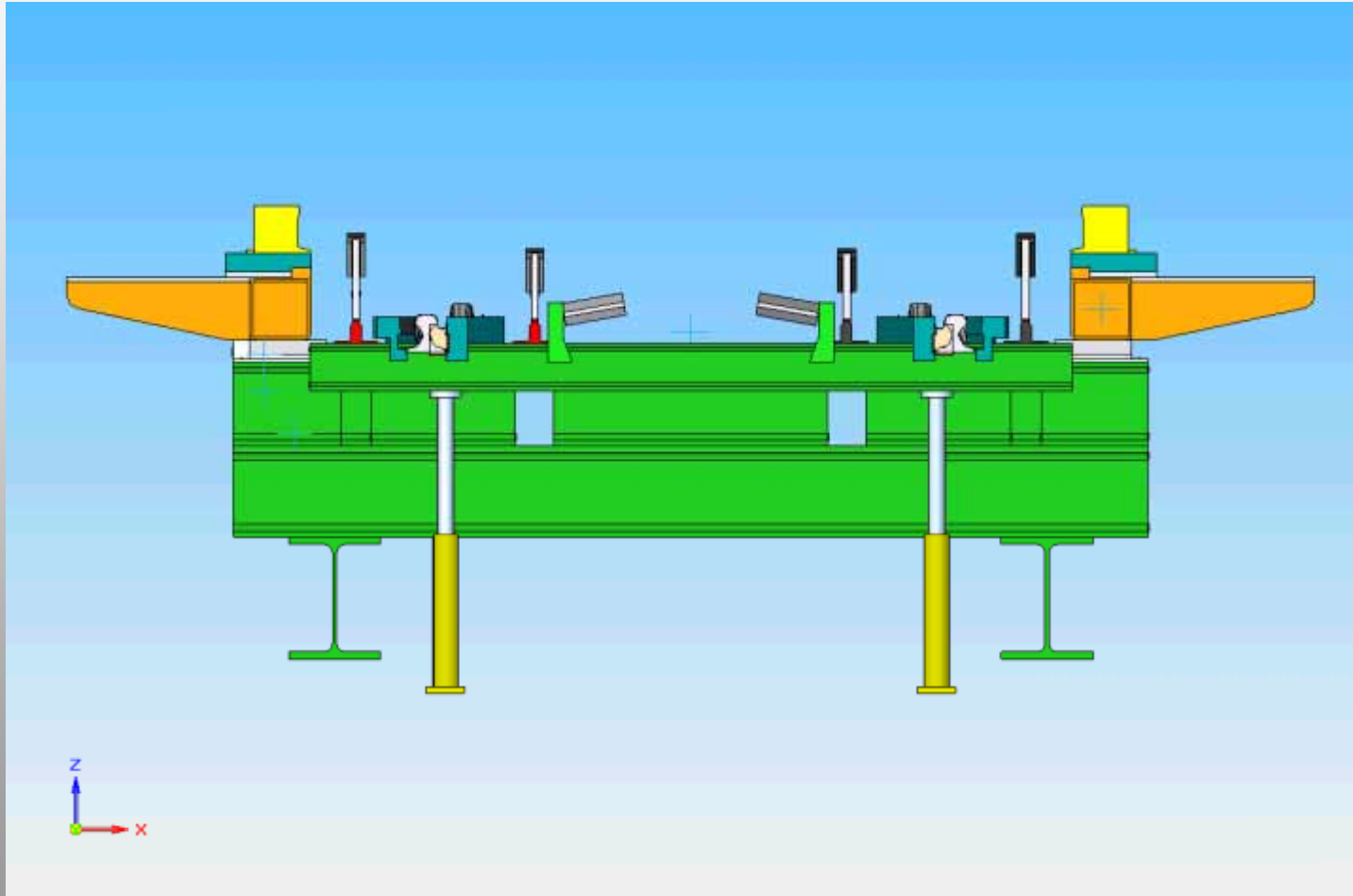


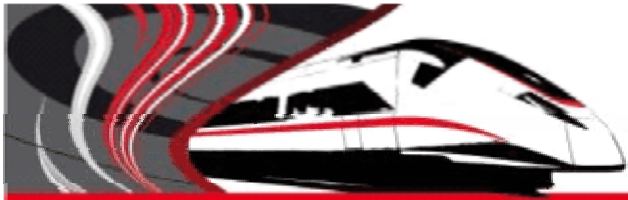
TALGO RD

CAF

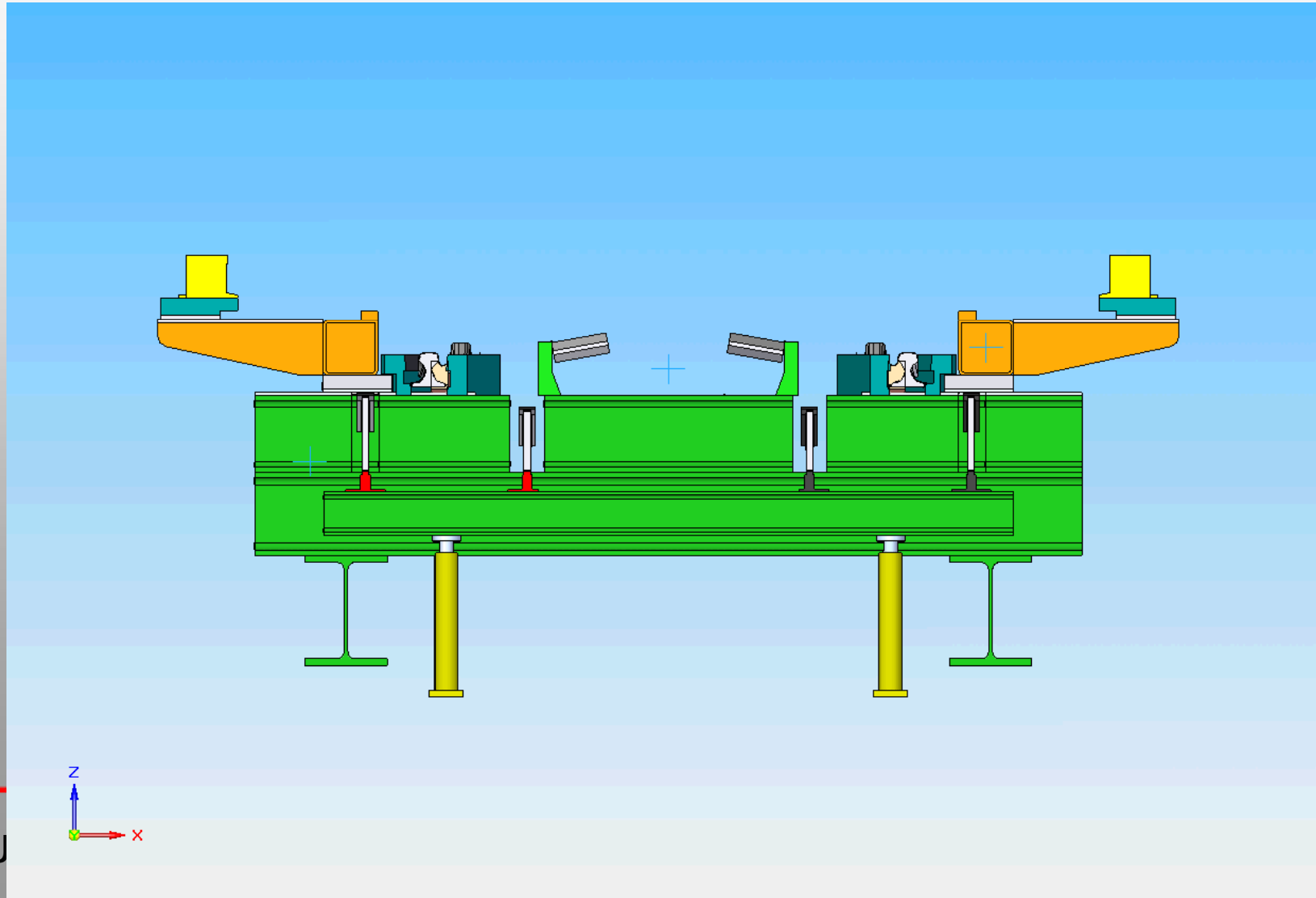


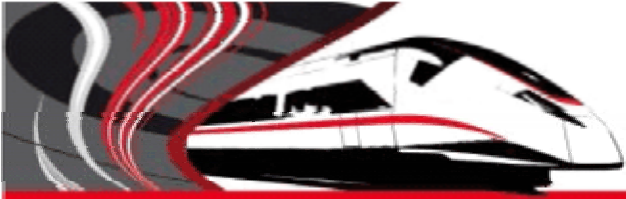
UNICHANGER PROJECT: 1) TCRS4 development: TALGO-CAF



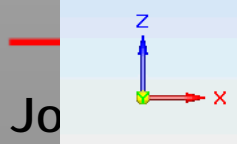
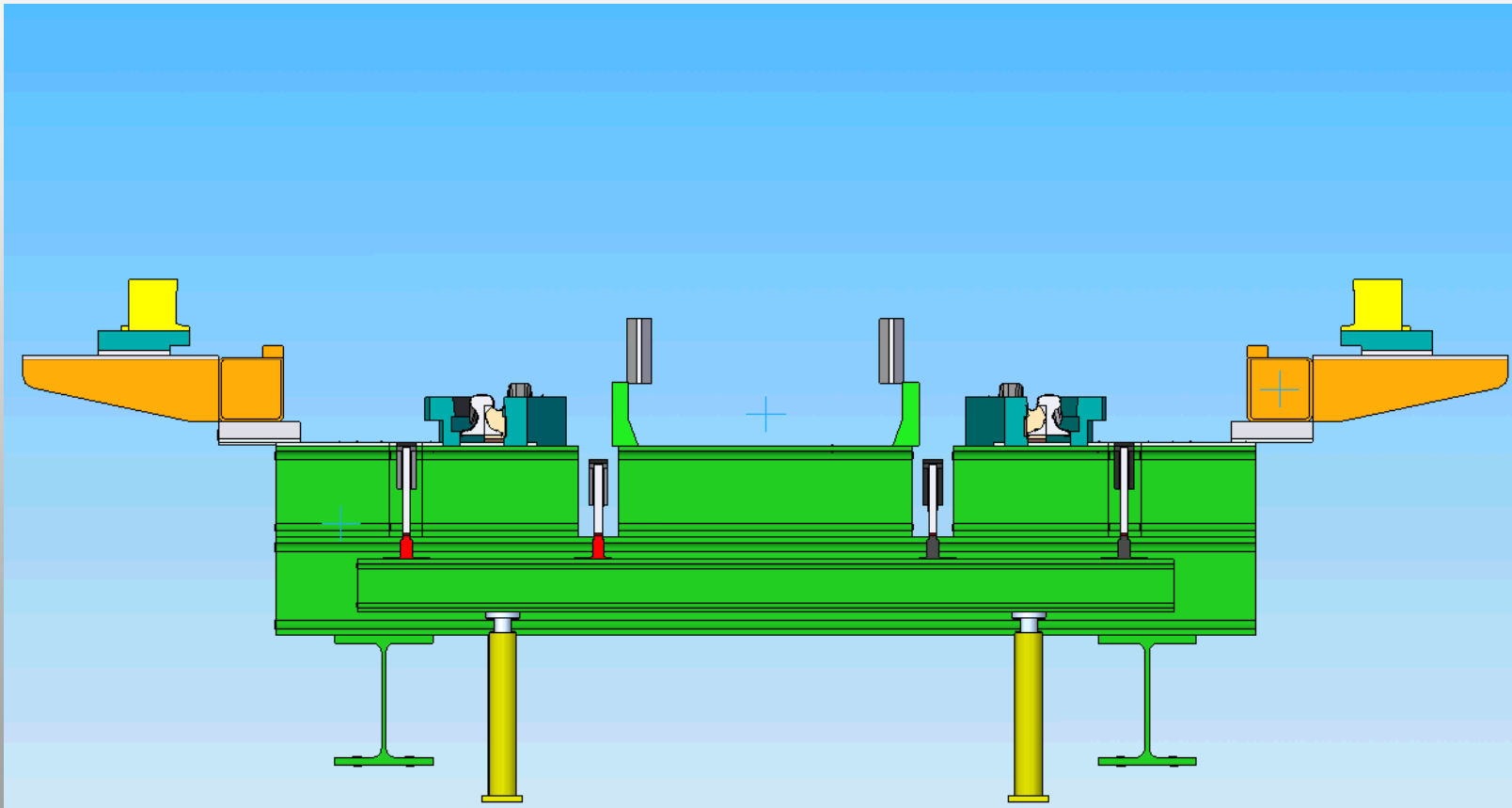


UNICHANGER PROJECT: 1) TCRS4 development: CAF-RAFIL





UNICHANGER PROJECT: 1) TCRS4 development: RAFIL-TALGO





INNOVATION UNICHANGER PROJECT: 2) State of the art in variable gauge technologies

There are two studies foreseen in the Unichanger Project:

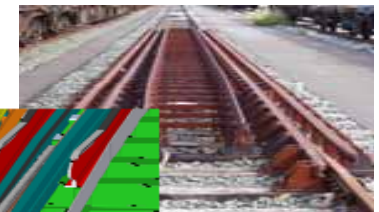
1.- "ESTRATEGIES TO IMPROVE RAIL TRANSPORT COMPETITIVENESS BY MEANS OF USING VARIABLE GAUGE SYSTEMS". This research analysis is focused on making a prospective of existing variable gauge rolling stock in Europe as well as the traffic to be performed by this material.

2.- "FUNCTIONAL DEFINITION AND EXPLOITATION CONDITIONS FOR AUTOMATIC GAUGE CHANGEOVER FACILITIES". This research study is focused on analyzing the exploitation of a network with the coexistence of two track gauges, two level of speed and two catenary voltages.

SUW2000

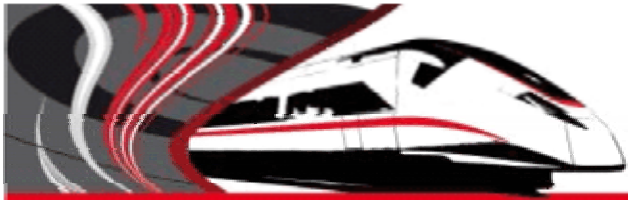


Rafil/DB



TALGO RD

CAF



INNOVATION TCSR4

EXPECTED RESULTS

- TCSR4: Infrastructure won't be a barrier blocking the entrance of any of the existing variable gauge technologies in Europe.
- TCSR4 incorporates artificial vision for detecting the type of the rolling stock and rapidly (in some seconds) adapting the changeover system to this technology.
- Improvement by means of considering the commercial exploitation of the currently existing rolling stock. The following improvements are foreseen:
 - Voltage change zones improvement.
 - Safety improvement: Implementation of early derailment detection systems.
 - Implementation of elements allowing the rapid intervention in case of blocked wheel derailment.
 - Improvement of "rodales" defrozen system.

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GLOBAL RESULTS

INNOVATION TCSR4

- UNICHANGER Project is one more step through the elimination of rail barriers among countries or inside countries with two different gauges.
- ADIF is clearly in favor of rail frontiers elimination as well as promoting an open market for all the variable gauge rolling stock suppliers, allowing the different rail operators to choose the most appropriate technology without any condition imposed by the inframanager.
- The role of the European infrastructure Managers should be the one described above facilitating the traffic of rolling stock from all the existing technologies. In this aspect the UNICHANGER Project is one of the most important contributions to eliminate the barriers due to the different gauges.



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Gracias por su atención

Thanks a lot for your attention

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