



# SOLUTIONS and INNOVATIONS for the RAIL FREIGHT TRANSPORT of the FUTURE

.Dario Barberis R&D Group Director



# SOLUTIONS and INNOVATIONS .....

- CONTENT :
- AUTOMATIC COUPLERS
  - PANTOGRAPH
  - AIR BRAKE
  - MULTIPLE TRACTION & BRAKING
  - ECP BRAKE

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## AUTOMATIC COUPLERS

A jump in the future of European rail freight transport



## AUTOMATIC COUPLER





## AUTOMATIC COUPLER

The Automatic Coupler is the element that joins together different wagons and the wagons to the locomotive .

The proposed FERRMED coupler has the following main features and performances :

- compliant Fiche UIC n° 522 , 523 , 524 , 530-1 , 567-3 829 and certified EBA and German MoT + TSI
- Working in any rough service conditions (shocks , dust winter )
- Automatic coupling and centering
- Air + Electric coupling fully integrated

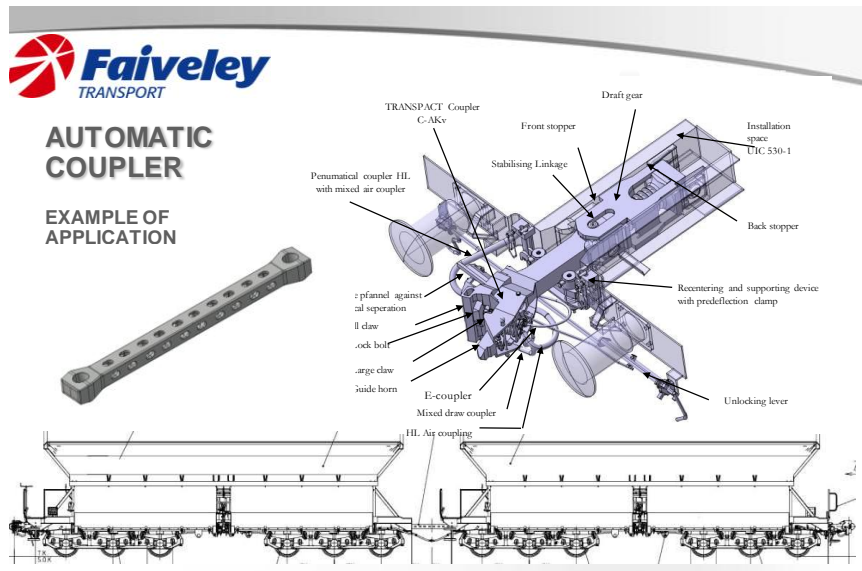


## AUTOMATIC COUPLER

Additional features :

- Max effort : 1000kN traction ; 2000 kN compression
- Compatible with russian coupler SA-3
- Compatible with traditional hook and side buffers of all european UIC wagons fleet
- Uncoupling with an external lateral lever , with a very low effort ( 25 dN )
- Service proven in Germany , France , Norway





## AUTOMATIC COUPLER

EXAMPLE OF APPLICATION

## AUTOMATIC COUPLER

### Major Advantages and Disadvantages 1/2

**PROS :**

- Permits the safe and reliable handling of long trains
- Reduces the wear of wheels and rails
- Minimizes the risk of derailment ( + stability )
- Allows the transmission of electrical signals ( ECP )
- Allows the removal of side buffers
- Allows fully automatic marshalling operations
- Easy transition from traditional to automatic solution





## AUTOMATIC COUPLER

Major Advantages and Disadvantages 2/2

CONS :

- Complexity
- Cost
- Transition period needs coupler and side buffers



## EXAMPLES OF APPLICATIONS





## CURRENT COLLECTION

The pantograph as a vital element for the availability and the service reliability of any freight Locomotive



## THE PANTOGRAPH

The Pantograph is the device dedicated to the collection of current from the Catenary for electric Locomotives .  
The fundamental characteristics of a freight loco panto are :

- Collection of high intensity electric current
- Full insulation from HV environment
- Adaptation to different heights , ondulations and movements of the catenary .
- Compliance to different profiles of railways and catenaries





## THE PANTOGRAPH

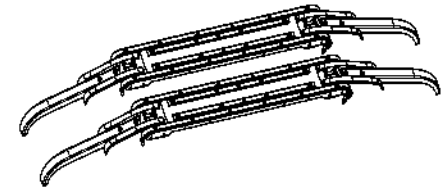
Additional features :

- Constant / adaptable contact force .
- Compact retracted profile and fast retracting speed (arch )
- Low agressivity and low wear on the catenary wire
- High current flow when standing ( auxiliaries and starting )

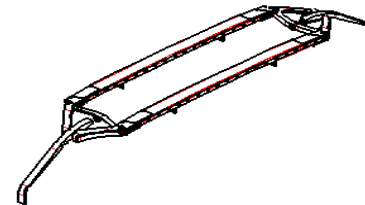


## TYPES OF PANTOGRAPHS

Fiche UIC 608



Type C for DC catenary  
1500 and 3000 V



Type D for AC catenary  
15.000 and 25.000 V





## THE PANTOGRAPH

### Installation solutions for FERRMED locomotives

- N° 2 pantos for DC and n° 2 pantos for AC catenary  
This configuration , with the correct profiles of the collector strips ,allows the accessibility to the majority of railway lines in Europe .
- Each couple of pantos electronically controlled for the choice ( driver's or automatic ) of the main working parametres : speed , direction , n° of locos per train , front / rear panto , type of network , ...



## AIR BRAKE

NOT AN OPTIONAL FUNCTION !





## Air Brake

The Air Brake is the ultimate safety system allowing to slow down and to stop single vehicles and complete trains .

According to the UIC regulations , the maximum length of trains allowed in service is 750 metres . Longer trains could become dangerous during braking operations , due to long reaction times in brake application and release , mainly on steep slopes and curved lines ( mountains )



## Air Brake

The UIC Air Brake is a full service proven system with well over than one century of experience . It is based on a pipe running through the all train (Brake Pipe) and a safety device ( Distributor Valve ) installed on each vehicle . The air for braking is stored on each vehicle and every decrease of pressure in the B.P. causes a brake application .

ADVANTAGE : safety , inexhaustability

DISADVANTAGE : long reaction times





## Air Brake

Proposals for performance improvements to the UIC Standard Pneumatic Brake .

To overcome the functional limitations of the Brake systems currently used in Europe , FERRMED has chosen the following two solutions :

- A) Synchronization of multiple Traction / Braking operations via radio equipments on board locomotives
- B) Train wired Control and Command System ( ECP )



## MULTIPLE TRACTION & BRAKING

Distributed efforts along the trains





## MULTIPLE TRACTION AND BRAKING

The possibility to synchronize via radio the traction and braking efforts between two or more locomotives or distributed traction/braking units , allows the option to compose longer and heavier trains , still conserving or even improving the running performances .

A multiple consist of locomotives , duly synchronized via radio , could overcome the length limitations due to the brake pipe physical behaviour .



## MULTIPLE TRACTION AND BRAKING

Advantages and Disadvantages of the solution 1 / 2

PROS :

- Allows lower longitudinal pulling effort during traction
- Allows lower longitudinal compression efforts during braking ( risk of derailment )
- Allows longer and heavier trains to be handled , also on " difficult " lines ( mountains )





## MULTIPLE TRACTION AND BRAKING

Advantages and Disadvantages of the solution 2 / 2

### CONS :

- Risk of loosing the radio contact and , consequently , the reactiveness requested by a longer train .  
( particularly when trains are partially inside a tunnel)
- The train is still braked starting from two or more locomotives , with each wagon depending from the propagation of the pneumatic signal .



## MULTIPLE TRACTION AND BRAKING

Additional applications .

A locomotive fitted with radio remote control equipment based on encrypted communication protocol could also be managed from a control tower in marshalling yards , during all the composition and brake testing time , so reducing the permanence of driving personnel on board.

The radio system could also be used to discharge all the data related to monitoring and diagnostic of the locos .





## ECP\* BRAKE

Safe , giant trains for  
freight transport modal shift in Europe

\* Electronically Controlled Pneumatic Brake



## ECP Brake and Communication System

The system is based on a wired communication system ,  
running all along the train length .

The wires , two pairs for redundancy reasons , are  
used to transmit either the power and the signals at the  
same time . In case of loss of one line , the second one  
is able to give the same performances . The system is  
also able to overcome multiple interruptions , if not in the  
same location .

The system is conceived for a simple and fast recovery  
from train line and local failures and re-configuration .





## ECP Brake and Communication System

Main features :

- Brake Control and Train Communication for compositions longer than 1.500 metres
- Redundant trainlines resistant to multiple failures ( reconfigurability )
- Train “ baptizing “
- Multiple traction ; std codes for any type of loco ( D. & E. )



## ECP Brake and Communication System

Major Advantages 1 / 2 :

- Brake application and release in ( almost ) real time ( no longitudinal efforts ). Auxiliary reservoirs full all time ( increased safety )
- Train integrity is safely under control ( up to ERTMS level 3 )
- High resistance to electric failures , trainlined and local on wagon .





## ECP Brake and Communication System

Major Advantages 2 / 2 :

- Possibility of train “ baptizing “ ( what wagon in what position )
- High level of recovery from failure and re-configuration ( very high availability )
- Possibility of train monitoring and diagnostic , either for vital parameters ( risk of derailment ) and for cargo conditions ( dangerous goods ) .



## ECP Brake and Communication System

Major Disadvantages :

- Need for wiring all the wagons
- Trainset must be 100 % wired ; no traditional wagon can be inserted in between the train





END

Thank you for your attention

