



Delivering Digital Automatic Coupling: a make-or-break programme for European rail freight

In its Sustainable and Smart Mobility Strategy, the European Commission includes a target of increasing rail freight in Europe by 50% by 2030. To reach this goal, several different factors can play a part including digitalisation and new technologies like Digital Automatic Coupling (DAC).

The coupling of freight trains is an aspect of the rail industry that has hardly changed in decades. Employees still need to manually couple trains, walking the length of the train so that each individual wagon can be connected and checked. DB Cargo, Europe's largest rail freight operator, estimates that its staff carry out the coupling process 54,000 times every day and walk around 700,000 km a year during train formation.

To replace this inefficient process, several projects are working to develop a standard for Digital Automatic Coupling, allowing it to be implemented across the European Union (EU). DAC technology supports the automatic operation of physical components, connects digital elements like power and data, and is the key way forward to automated train preparation and digital rail freight operations.

The development of this technology has been initiated under [Shift2Rail's](#) Freight Innovation Programme. This was further accelerated when the German Ministry of Transport and Digital Infrastructure decided to fund the complementary DAC4EU project, which runs from July 2020 to December 2022, led by a consortium that includes DB, DB Cargo, SBB Cargo, Rail Cargo Austria and freight wagon leasers Ermewa, GATX Rail Europe and VTG.

These initiatives will feed into the [European DAC Delivery Programme \(EDDP\)](#) enabled by the Shift2Rail Joint Undertaking, which in total involves 44 entities Europe-wide, through which the sector will decide on the DAC solution to be implemented across Europe in the coming years.

The Shift2Rail Joint Undertaking was instrumental in bringing the partners together and continues to act as an enabler for the programme. According to Shift2Rail Executive Director Carlo Borghini, *"For broad sector agreement and the alignment of all ongoing and planned European DAC initiatives, a distinct programme with its own governance was needed. Together with the sector, we are setting the basis for a new approach to the deployment of innovative technological and operational solutions."*

Benefits of DAC

The advantages of DAC stretch across the rail freight sector, from operators and infrastructure managers to wagon keepers, ultimately delivering end-user benefits for rail freight customers.

With the use of DAC, automation increases coupling efficiency and safety, the need for manual processes decreases and train formation processes are substantially accelerated. Staff allocated to such heavy and risky tasks will be redeployed to more value added and safe functions, while ensuring a complex and delicate transition process.

Trains equipped with DAC can be longer and heavier. As there is enough energy supplied to all wagons, there can be secure data communication throughout the train. This new digital connection between the train's wagons unlocks the possibility to build-in further digital solutions, for instance further telematics applications and, later, predictive maintenance.

But this digital connection especially allows a "train integrity function" on freight trains. It is therefore the key prerequisite for ETCS Level 3 (moving block) operation in the infrastructure. Accelerated process times, higher train productivity and ETCS Level 3 increase the capacity of the network which makes shifting of substantially more transport to rail possible. Therein lies the greatest benefit of all as Europe looks increasingly towards rail to provide the zero-carbon transport it needs to reach its climate objectives.

The success of the programme however requires a single, harmonised, European system. While some countries are already well informed of the progress and understand what is at stake for rail freight, the interest and game-changing potential of DAC still needs to be highlighted to others. Reaching out to all EU Member States is indeed another key success factor for the programme.

This is where the EDDP comes in, which covers the various aspects that are necessary for the deployment of DAC in Europe, including a clear target picture for the sector, technological assessments of the available solutions, testing and demonstrations, definition of migration plans, assessing the interfaces with other programmes, business cases, the funding and financing issue and communication and dissemination.

To drive this vast project, structured into seven different Work Packages¹ and two decision-making bodies (Supervisory Board² and Programme Board³), a Programme Manager was appointed: Mark Topal, Chief Technical Officer of ÖBB. He is supported by Co-Manager Jens Engelman, Founder of railiable.

The EDDP's main current activity focuses on the four proposed DAC prototypes going through a testing programme under the DAC4EU project. Testing will help to determine the best design and concept and a final decision will be taken by the EDDP based on the results and an evaluation of the life cycle costs.

1 https://projects.shift2rail.org/s2r_ip5_n.aspx?p=EU-DAC

2 <https://shift2rail.org/european-dac-delivery-programme/governance/supervisory-board/>

3 <https://shift2rail.org/european-dac-delivery-programme/governance/programme-board/>

Making the transition happen

Work has already begun on DAC migration scenarios, which will factor in overall costs and benefits evaluation.

The challenges the EDDP must confront to make the transition to DAC happen are enormous. It is estimated that a fleet of around 450,000 to 500,000 wagons will need to be retrofitted over a still to be determined period. The EDDP is looking into the options to shorten the migration period which would reduce any negative impact on the rail freight sector's performance by a long period of using both old coupling procedures and DAC.

Besides the technology and operational aspects, a key success factor will be to bring all concerned actors on board. Establishing consensus with all partners and stakeholders is something that EDDP Programme Manager Mark Topal has put at the top of his agenda: *"The best plan in the world still needs the support and buy-in of those who need to implement it on the ground. The EDDP aims to reach out to these actors, explain what is at stake and what partners and stakeholders can gain from the migration to DAC, while respecting and understanding the respective doubts and concerns they may have."* Co-Manager Jens Engelmann added: *"We need to create an environment where everybody can join "what makes sense" for them. The work will need resources and budget, and stakeholders will only invest if they see it's worth the effort."*

This includes EU and national decision makers, whose political, regulatory and of course financial support is indispensable: *"The programme will build up an offer for European policy makers and EU member states to achieve sustainable freight transport in the most affordable way,"* Topal says. *"The offer will require funding that will, however, amount to less than the cost of building new infrastructure and paying for external costs which will persist, and even increase, if transport of freight does not shift to rail."*

Implementing DAC provides huge potential to increase the capacity of the rail freight network in Europe but also performance, bringing the sector into the 21st century. While there are still many aspects to be defined, the benefits for the sector and beyond are clear.

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