

TECHNOLOGY IN ACTION



Greener and smarter rail solutions



Orgalim's Technology in Action series showcases how the technology industries we represent are shaping a future that's good for Europe's economy and society – and how the right policy framework can help them do even more.

Challenge

The European rail supply industry is a world leader, representing nearly half of the global market and, with rail recognised as key to decarbonising transport, demand is growing. But so too is competition, challenging European rail technology companies to deliver innovative and competitive solutions, products and services to support future increased usage in an efficient and sustainable way.

And challenging it is, because innovating in the rail sector calls for working with rapidly developing digital technologies in trains that are expected to operate thirty years or more, and with older legacy systems to interface with. At the same time, the potential to improve the efficiency of European rail systems is huge.

Solution

Alstom Belgium steps up to this challenge not only through what it innovates, but also how it does so. Its Charleroi site is unique within the Alstom Group for combining two centres of excellence, addressing the development of both greener and smarter rail solutions. Talk about the twin green and digital transition: in Charleroi they are inseparable.

The combination of green and smart is key to developing new energy optimisation solutions in rail transport, says Pierre Meunier, Innovation Excellence Director, whether we are talking about more efficient power conversion systems for both on-board and infrastructure applications, the ability to recover and store braking energy, smart signalling to optimise traffic management, or automatic train operation to optimise driving strategies.

Take braking energy recovery. Alstom's solution, currently in use on metros, tramways and railways from Milan to Dubai, allows train and tram operators to reduce their energy consumption by 20-30%, Mr Meunier says. That reduces the need to add substations as traffic grows.

Then there's the power converters that sit on top of trains and trams. The more efficient, lighter and smaller iTAC converters developed in Charleroi allow tramways to free up space and load, which can then be used to add batteries for energy storage and use. This in turn means trains and trams can cross areas where there are no overhead power cables available or possible, without having to resort to diesel fuel.

A third piece of the puzzle is smart signalling systems, which allow more trains to travel safely on existing lines, reduce maintenance costs, and enable automatic train operation, ensuring optimum total cost of ownership. Alstom is world leader in European standard ERTMS (European Rail Traffic Management System) solutions,

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Pierre Meunier, Innovation Excellence Director, Alstom Belgium



Smart signalling system

having equipped more than 12,000 trains.

As for how the team in Charleroi goes about developing these innovations, that is equally key in an ever more competitive market environment where efficiency and time to market pressures are keenly felt.

Here too automation plays a big role, though people always come first and foremost, as Samantha Esteban, Head of Production, explains. Collaborative open innovation is core to the culture, and a global Alstom innovation process and yearly recognition contest called I NOVE YOU fosters the participation of all employees.

Out of this have come, for example, an agile prototyping methodology, an automated watertightness test bench to ensure the required IP standards are met, and a smart interactive cabling tool to facilitate the production of cable looms. This latter innovation helps the team to produce looms faster and better: efficiency has improved 30%, industrialisation is 40% faster and paper consumption has been cut by €20,000 per year, Ms Esteban reports.

Policy implications

Alstom Charleroi's three main asks of European policymakers?

"First, more robust investment plans from Member States in sustainable transport systems and, at the EU

level, more robust deployment plans when mandating the introduction of new technologies. Rail is a proven and available technology with many advantages: already electrified, extremely safe, with a low land footprint and high capacity. Currently the speed of deployment varies a lot between countries: for example, in Belgium, 50% of the network is ERTMS equipped, while the Netherlands are barely starting. This delays the moment when the full benefits will materialise.

Second, would be a more stable and predictable regulatory framework for the rail sector, evolving in a timeframe in line with our sector – say every 6-8 years. Currently the frequent updates of the European regulatory framework every 3-4 years require significant effort to upgrade ERTMS systems and slow the deployment.

Third, to regulate only in as much as needed and make more room for norms and standards instead of regulations. For example, while the development of a coherent EU legal framework for digital technologies like AI or cybersecurity is positive, it may sometimes collide with existing sectoral regulations. If not done properly, this may create uncertainties and lead to more complex and costly authorisation processes which is in nobody's interest."

Related Orgalim position papers

- [Delivering the Net-Zero Transformation](#)
- [Data Act](#)
- [AI Act](#)
- [Cyber Resilience Act](#)



About Alstom Belgium

Alstom, a world leader in smart and sustainable mobility, employs more than 2,200 people in Belgium across two sites, including 600 engineers. Alstom's Bruges site is a major assembly and testing centre for trains such as the M7 regional trains for SNCB. Its Charleroi site hosts two centres of excellence focused on innovation and

technologies enabling automatic train operation, smart signalling, and recovering braking energy for efficiency. The solutions developed in Charleroi are deployed worldwide and Alstom Charleroi contributes to the diversity of Alstom's employees with 29 different nationalities represented. The company received the Factory of the Future label for the first time in 2020.

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