

More efficient braking systems

Because braking is a safety-critical aspect of trains, railway operators are hesitant to introduce new braking systems.

But this is starting to change, thanks in part to the work being done by EU-Rail, which has introduced several new braking solutions:



	Electronic brake control	Electro-mechanical brake	Electro-mechanical brake system
Description	A new electronic EP brake control device with SIL4 functions for emergency brake control.	A closed-loop control of the brake calipers' clamping force.	Electro-mechanical brake actuators can directly replace existing electro-pneumatic brake calipers.
TRL	7 (system prototype demonstration in an operational environment).	4 (technology validated in a lab).	7 (system prototype demonstration in an operational environment).
Key finding	Braking capacity is 5% better than a conventional system.	Allows for more accurate braking force control than achieved with the electro-pneumatic brakes.	EM brakes alone will not necessarily eliminate the complete air system on trains.

ADHESION MANAGEMENT SYSTEM

Adhesion management systems make use of available adhesion to prevent damage and minimise stopping distances. This leads to improved performance, high safety, and low maintenance costs.

To learn more, EU-Rail investigated how the load impacts adhesion.



Key Finding

Test results showed a marginal increase of the adhesion limit with increasing load but not sufficient to justify a dedicated model for this effect.



Fast Fact

The model needs to be refined by interpolating the cleaning coefficient as a function of the brake entry speed.



Did You Know?

The effect of the axle load on adhesion was within the limits of the reproducibility of test results, with a slight tendency of reduced adhesion with increasing axle load.

CONTRIBUTE TO NETWORK CAPACITY

Automated rail traffic and signalling systems need to know a train's braking capacity to calculate stopping distances. Braking capacity depends on current adhesion conditions. If these conditions can be predicted more accurately, safety margins in the calculation of stopping distances can be reduced, ultimately resulting in increased line capacity.

EU-Rail delivered several solutions aimed at making such predictions possible:

- Adaptive wheel-slide protection and adhesion improving sander.
- Optimised adhesion through sanding system and software to adapt the wheel-slide protection.
- Optimised use of adhesion in traction and braking, detection and prevention of torsional vibrations and instability in traction.
- Optimised brake blending strategy.

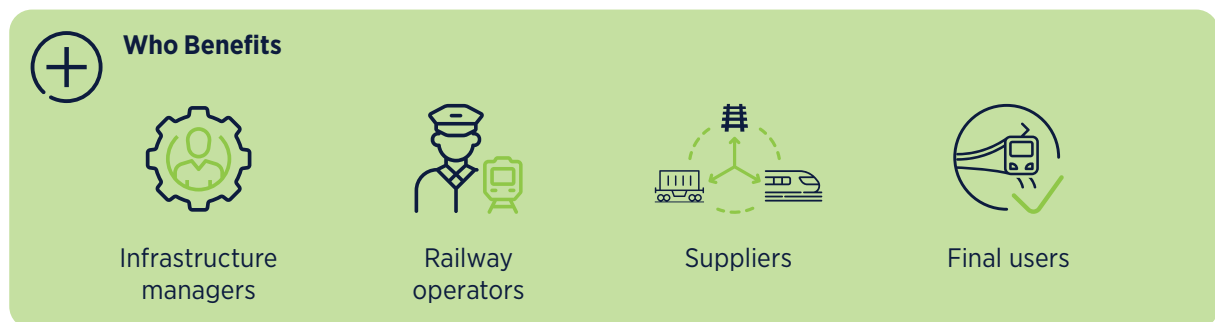


VIRTUAL CERTIFICATION OF BRAKES

Getting new train braking systems accepted is a time consuming and expensive process. EU-Rail showed how this process can be streamlined by replacing some track-based tests with simulated models.

CONCLUSION

New braking solutions have the potential to reduce both braking distances and wheel and track wear, independent of track conditions and train loads.



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Solutions developed by Shift2Rail,
Europe's Rail's predecessor programme

