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A “digital twin” makes trains more reliable

Deutsche Bahn and Stadler are developing the first virtual image of a complete train. Real-time data should help to maintain the air conditioning and doors in time so that they no longer malfunction

A milestone for the digitalisation of rail operations: Deutsche Bahn and train manufacturer Stadler are developing the first virtual image of a complete train. It processes data from the real vehicle in real time, therefore preventing disruptions or breakdowns.

Representatives of both companies have signed a relevant cooperation agreement. In doing so, they are establishing a partnership between a rail company and a vehicle manufacturer that is unique in this form. Both parties see the cooperation as a model for other rail companies and manufacturers.

For Deutsche Bahn, the virtual image of the train – a so-called “digital twin” – is the key to more reliable vehicles and more capacity on the rails. With the help of digital twins, it will be possible to send trains for repair when it becomes necessary. This reduces the number of disruptions because they can be prevented beforehand. This will make rail transport more punctual and more attractive, supporting the climate-friendly mobility transition.

The first train to get a digital twin is Stadler’s 429.1 series. DB operates 28 of these multiple unit trains in regional transport in Rhineland-Palatinate, Hesse, parts of Baden-Württemberg and Saarland. A prototype is currently being equipped with the technology for recording and transmitting data. The other trains in the series will follow. The digital twin should be fully functional for the first time by the end of 2021.

The virtual image will initially focus on the train’s air conditioning, doors and wheel sets. The data sent by these components is processed with the help of artificial intelligence to create an increasingly perfect simulation of the real train. Its physical behaviour will be taken into account in addition to the vehicle’s mechanics, electrics and software.

Sabina Jeschke, Member of the Management Board for Digitalisation and Technology: “The cooperation with Stadler is a big step for the digitalisation of rail operations. We are showing that exchanging data with train manufacturers benefits both sides. It is primarily passengers that are helped by trains becoming more punctual and reliable. Only by digitalising rail operations can the climate-friendly mobility transition succeed.”

Jure Mikolčić, CEO Stadler Deutschland: “By creating a digital twin of an entire vehicle fleet, both Deutsche Bahn and we as the vehicle manufacturer obtain relevant data material. Thus we can ensure proactive maintenance and the constant optimisation of obsolescence management. This helps both sides to sustainably improve vehicle availability and to reduce breakdowns caused by faults to a minimum.”

About Stadler

Stadler has been building trains for more than 75 years. The headquarters of the system supplier of railway vehicle solutions are located in the town of Bussnang in eastern Switzerland. Around 12,300 employees work at several production and engineering sites, as well as over 40 service sites. The company is aware of its social responsibility for sustainable mobility and therefore stands for innovative, sustainable and durable quality products. The product range in the field of mainline railroads and urban transport includes high-speed trains, intercity trains, regional and suburban railroads, metros, tramways and streetcars. Stadler produces main-line locomotives, shunting locomotives and passenger coaches. Stadler is the world’s leading manufacturer of rack railways.

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