Wagon4.0 – the smart wagon for improved integration into Industry 4.0 plants

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Classification: Vehicle Track Systems; Automation in HH systems

ABSTRACT In many instances, freight vehicles exchange load or information with plants that are or will soon be Industry4.0 plants. The Wagon4.0 concept, as developed in close cooperation with e.g. port or mine operations, offers a maximum in railway operational efficiency while providing strong business cases already in the respective plant interaction.
The Wagon4.0 consists of main components, a power supply, data network, sensors, actuators and an operating system, the so called WagonOS. The Wagon OS is implemented in a granular, self-sufficient manner, to allow basic features such as WiFi-Mesh and train christening in remote areas without network connection. Furthermore, the granularity of the operating system allows to extend the familiar app concept to freight rail rolling stock, making it possible to use specialised actuators for certain applications, e.g. an electrical parking brake or an auxiliary drive. In order to facilitate migration to the Wagon4.0 for existing fleets, a migration concept featuring five levels of technical adaptation was developed.
The present paper investigates the benefits of Wagon4.0-implementations for the particular challenges of heavy haul operations by focusing on train christening, ep-assisted braking, autonomous last mile and traction boost operation as well as improved maintenance schedules.