

Human factors and the design of railway system

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Railway transport is one of the best solutions to answer to the increasing demand for transport of persons and goods while meeting the criteria of sustainable development. Thus, throughout the world, Railway Transport projects are being implemented or are planned due to the increasing cost of fuel, the need for mass transportation and the necessity to reduce CO₂ emission. In Europe, the capacity of the existing network to accommodate the forecast of traffic for the next few decades should be increased. It means that the management of tracks should be optimized to maximize the number of trains on tracks.

There are two key players in this process: on one hand the train driver and on the other hand the operator in charge of traffic management.

During the last decade, the quantity of information displayed on a driver desk has drastically increased due to interoperability and safety regulations. In case of an emergency situation, the driver has to decide quickly the right actions in order to protect passengers' life and to limit the impact of the immobilization of a train on the tracks that leads to traffic perturbations. In parallel, at an Operating Control Center (OCC), the level and type of information provided to the operators' controllers should be adapted in order to optimize the management of large fleet of trains.

The presentation will show how Alstom Transport takes into account the human factor in the design of train driver's desk and Operational Control Centre and the different methods used.

He is Chief Ergonomic Engineer and leader of the Alstom Transport Core Competence network in Human Machine Interface. Graduated in 1985 from the Ecole Centrale of Lille and Diplôme d'étude approfondi (DEA) in "Automatismes et informatique industrielle". After that, he spent 3 years at Thomson research labs in a strategical project in Artificial Intelligence and Software engineering. For the 5 following years, he was in charge of Methodology and Tools for software development in ALSTOM. He introduced software design methodologies and organized the training of more than 100 engineers. He contributed to the definition of the EN 50128 Norms ("Railway applications - Communications, signalling and processing systems - Software for railway control and protection systems"). For the 3 following years, he managed a team in charge of System Methods and Tools (including hardware and software development). He developed new methods for VHDL (VHSIC Hardware Description Language) design. Then he led consecutively two R&D projects: one for a Digital Simulator for traction system and another one for Testbench for Train control and monitoring system. He developed new Training Simulators dedicated to the training of drivers. He is now in charge of the ergonomics activities in Alstom Transport leading several projects (including European funded) of driver's desk assessment, Automatic train supervision and screens assessment. He is contributing to the EN standard for cabin under preparation.