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Fully automatic operations management increases line efficiency and reduces headways

Today, mass transit is facing the challenge of handling growing passenger volumes and, at the same time, creating incentives for opting in favor of public transport with attractive timetables and services. Up-to-date passenger information, higher passenger security, improved train tracking and automatic control are just some factors which contribute to transport undertakings' success. With its Controlguide OCS (Operation Control System), Siemens provides transport undertakings with an operations control system which, in combination with train control system of the type Trainguard MT, enables fully automatic operations management, increases line efficiency and reduces headways.

Automated metros are more energy-efficient and more punctual and optimize train operations both automatically and in real time

In Siemens' Trainguard MT automatic train control system, movement authorities and control commands are not indicated by signals but are sent by means of electronic data communications between the train and the trackside equipment (communications-based train control, CBTC). A trackside computer tracks all trains almost down to the last centimeter in the allocated line section and calculates the relevant movement authority for each train. In doing so, the train's control computers continuously exchange data with the control center by radio.

Automatically controlled trains consume less energy thanks to optimized acceleration, driving and braking. Depending on the level of automation, energy consumption can be reduced by up to 30 percent. At the same time, moving-block

operation enables short headways of 80 to 90 seconds, thus causing the capacity of a metro line to be increased by up to 50 percent and also boosting train punctuality. Based on line data, the automated system calculates just how and where the train has to be accelerated and braked in order to arrive at the next station punctually. With high passenger volumes, additional trains can be operated irrespective of the regular timetable. Such trains can automatically start operation from the depot by simply pressing a button.

Today, Siemens' Trainguard MT CBTC solution is the most widespread train control system and is used by 25 metro operators worldwide, for example in Istanbul, New York, Paris and the Chinese metropolises of Guangzhou and Beijing.

Controlguide OCS – tomorrow's operations control system

Remote-controlled interlockings have been on the market for about 50 years now. Computers started to enter the market around 30 years ago. For approximately 20 years, programs and systems have been available which simplify timetable creation, optimize traffic flows and automatically control traffic operations. With Controlguide OCS, Siemens offers a networked operations control and information system. This system facilitates operational processes, improves the usage of existing capacities by making full use of all reserves and, particularly in exceptional operating situations, ensures a high level of efficiency and quality in rail transport.

Unexpected disruptions in operations, for example due to track possessions or train delays, require the immediate adjustment of timetables and appropriate information to passengers. Controlguide OCS is capable of planning operations in advance, implementing them and minimizing the resulting disruptions by means of intelligent dispatching functions in the event of any out-of-course running.

Timetable management: predictive operations planning

Controlguide OCS provides the full range of information required for monitoring train services. Thus, production timetables are derived from the seasonal timetables created during timetable creation for the purpose of operations and are adjusted to actual operating conditions for a specific day. These production timetables can be managed and modified by Controlguide OCS just like special or emergency timetables for exceptional operating situations.

Work-site management with mobile devices: increase in safety and reduction in necessary track possessions

In the event of scheduled operational restrictions (e.g. track maintenance), staff on site can use mobile data terminals to request the activation and deactivation of track possessions and speed restriction sections. Controlguide OCS ensures that track possessions are only activated when staff is directly on site and then deactivated when the maintenance crew has definitely left the location. Any possible confusion in activating and deactivating track possessions is ruled out by correspondence checking of the planned and actual locations. All measures contribute to minimizing track possessions and maximizing safety during engineering work.

Dispatching: rapid troubleshooting

The current traffic situation as well as the train and line parameters form the basis for automatic conflict detection. It is particularly in the event of disruptions that Controlguide OCS demonstrates its strengths, enabling rapid, efficient troubleshooting in the case of any disruptions. Controlguide OCS detects any developing conflicts on the basis of both the train and delay situation and the competing occupancy of route elements and indicates them to the dispatcher. Controlguide OCS calculates suitable solutions for these detected conflicts in order to exclude or minimize resulting operational disruptions as far as possible, particularly due to predicted sequential conflicts. The objective is to restore planned operations within the shortest possible time.

Global reference projects

Chongqing Metro (China)

- The first metro line for the world's largest city with approx. 30 million inhabitants
- 36 km line with 23 stations

Beijing Line 10 (China)

- The world's longest metro line with a length of 57 km and 49 stations, equipped with communications-based train control (CBTC)

New York City Transit (USA)

- One of the most complex metro systems in the world
- 172 stations, approx. 175 km network length, 6500 trains per day, about 3.1 million passengers daily

São Paulo Metro Line 4 (Brazil)

- South America's first fully automatic driverless metro
- Approx. 12 km line with 11 stations and headways of 81 to 127 seconds

Singapore Downtown Line (Singapore)

- Fully automatic train operation without train attendants
- Singapore's metro network has a length of about 180 km and is used by around 2.5 million commuters daily.

Contact for journalists:

Silke Reh, Tel.: +49 89 636 630368

E-mail: silke.reh@siemens.com

All information about the Siemens presentation at the UITP 2015 can be found at

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