TECHNISCHE UNIVERSITÄT DRESDEN

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Press release

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# Site Execution System

Control centre for the digitalized, connected and automated construction sites

**Connected and automated construction machinery is key to more efficient construction processes. The Site Execution System (SES) is the central building block for aggregating all machine and process data on the construction site as well as for orchestrating automated construction machinery fleets. The SES platform integrates planning data and links it to the task description for automated construction machines. Work results are documented and then mapped to task descriptions and the underlying planning data. Site managers, supervisors and the MTA can monitor the construction site in real time and coordinate construction processes.**

As part of the joint research project "Bauen 4.0" (Construction 4.0), which is funded by the BMBF, the TU Dresden is addressing the technological challenges for the construction site 4.0. Together with TU Munich and 22 industrial partners, solutions for automated, connected construction machines, connectivity and cloud computing as well as for construction processes have been developed since 2019. The idea of a central data node was quickly born. This central data node can easily integrate machine information from different manufacturers, is constantly available on the construction site, allows extensive machine services to be implemented, orchestrates automated construction machines and - if required - allows information about the construction site to be sent out via secure web interfaces.

## Local infrastructure with the latest radio technology

A local construction site network, based on the latest mobile communications standard (5G Campus), is used for data security and availability. This is the first time that digital real-time access to the machines on site has been realized.

## Industry 4.0 approaches for the construction site

By using interoperable, uniform and universal interfaces based on powerful Industry 4.0 technologies (OPC-UA), the SES provides access to machine data, automation functions and process documentation for mixed fleets.

## Intelligent functions for the orchestration of automated construction machinery

In addition to the established telematics data optimizing the scheduling, logistics and service, the SES supplies formalized task descriptions for automated machines. Digital terrain models as a target geometry for automated excavators are transmitted, as well as target paths for automated crane movements or driving orders for transport rides with the wheel loader. A common map contains the relevant object information, such as restricted areas, storage locations and information on passability information. This is equally available to the automated machines. In addition to transmitting the job description, the machine interface grants reports on the construction processes, like “as-built”-surface models and survey points, as well as task-related loading masses, operating times and fuel consumption.
A link to the project management is established via a web interface in order to realize the target/actual comparison with regard to costs, time, material and geometry.

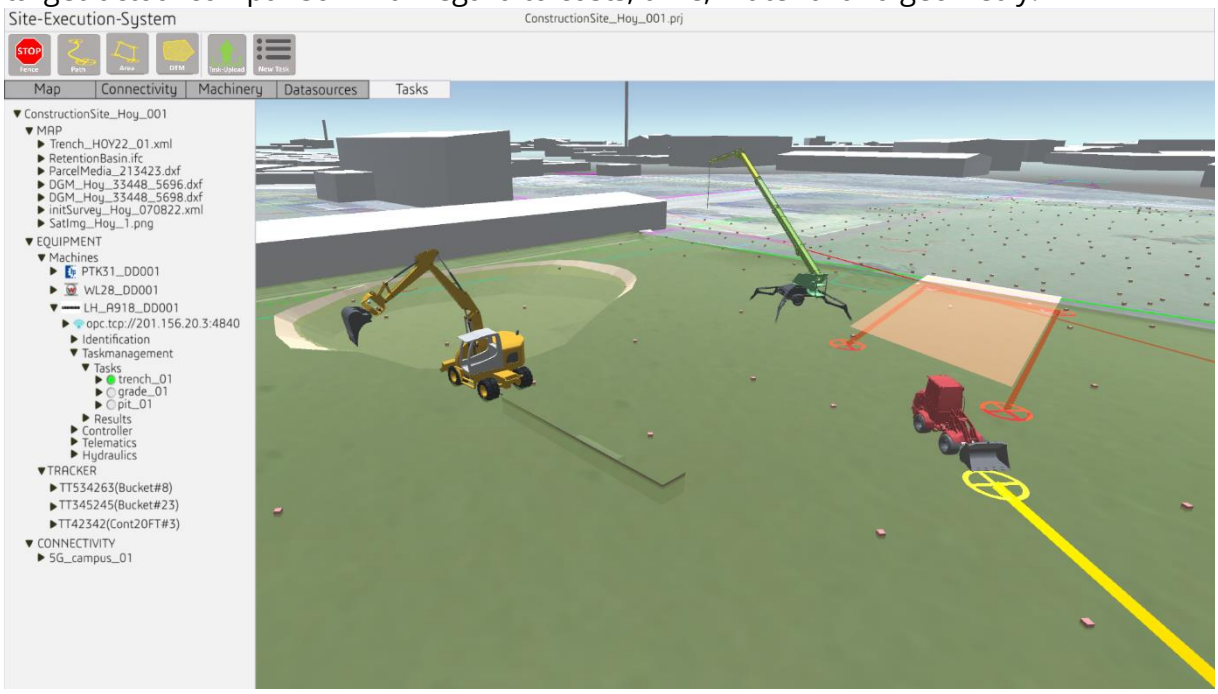


*Figure 1 Graphical view of the site-execution-system for task planning of the automated construction machines with real-time 3D display, planning data as well as editable blocking areas and path specifications*

**Thus, the Site Execution System is the central real-time information node on the construction site and an enabler for future digital, highly automated construction sites.**