Product report: Industry 4.0/The Industrial Internet of Things-enabled monitoring system with responsive design

Web-based simulation with Qualicision®

In the age of Industry 4.0/The Industrial Internet of Things production processes must maintain high performance in traditional desktop PCs as well as in modern web-frontend technologies at all times and even with high access figures and many data points to be processed, such as sensor data. The PSI subsidiary F/L/S Fuzzy Logik Systeme GmbH supports the web-based simulation of production sequences with Qualicision® its multicriteria software solution.

In an ongoing industrial automotive production process short-term process deviations, such as material-provisioning errors, have to be intercepted in a targeted manner. To this end, F/L/S implements modern web-frontend technologies and uses the Qualicision® simulation offline as a separate tool in addition to the online production systems in order to identify the impact of disruptions on a planned sequence at an early stage and to interactively mitigate this through short-term modification of the sequence specifications. Using the web frontend the sequence recalculated by the simulation and any disruptions or impacts that occur can be assessed at practically any workstation.

In-situ coordination using mobile devices

Coordination with the divisions concerned to resolve possible disruptions and thus to re-evaluate the pending sequences can be effected in-situ by using, e.g. tablets or modern mobile phones. Thus the use of web technology saves time and reduces friction losses.

The orders to be sequenced and the warehouse stocks including expected addition to stocks are imported into the Qualicision® SK simulation. Afterwards the optimisation specifications are loaded or modified by the user. A distinction is made between technical requirements such as the interval between two demanding jobs (vehicles), and requirements regarding the number of units such as "Include 100 orders (vehicles) with four-wheel drive". The importance of the individual requirements to each other can be controlled by assigning priorities. In the next step the simulation stores an internal virtual warehouse based on the input data and removes orders from the virtual warehouse to virtual assembly lines according to the requirement settings. The interaction between virtual movements of orders to and from an assembly line results in changes to the currently available inventory which means that the simulation encounters a changed situation after each individual step and optimises the selection of the next order for the sequence to be created.

Fig. 1: Mobile devices with Qualicision® simulation.

KPIs and stock levels via mobile devices

Graphical displays show the stock levels and the utilisation of the assem-

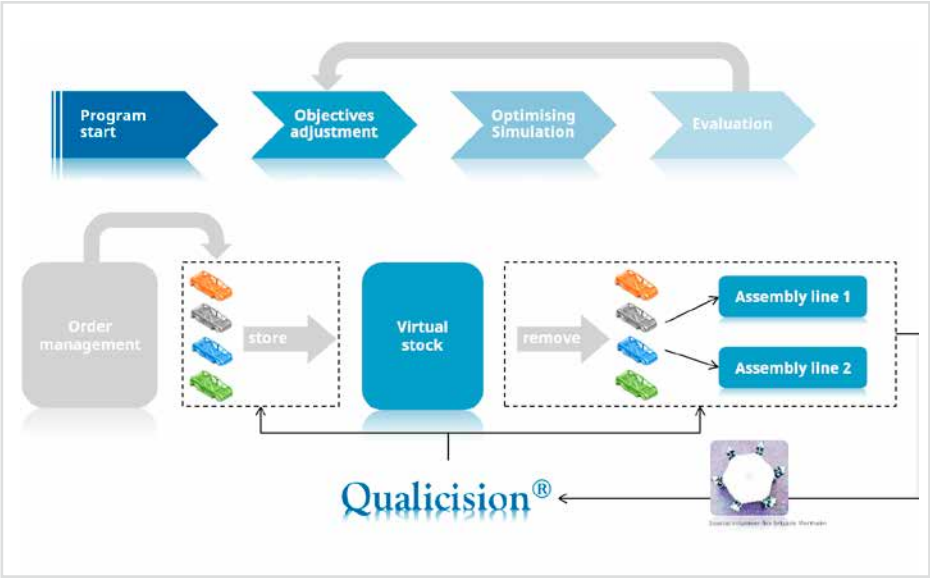

Fig. 2: The Qualicision® simulation sequence.

bly lines (see Fig. 1). The conflict and compatibility analysis is a key tool for analysing the sequences created for the individual assembly lines. This indicates which requirements are in conflict to each other and are very difficult or impossible to meet. In the next step the user can adjust the requirements to create a better, more homogeneous sequence. This is followed by restarting the simulation. This step is repeated until the required KPIs are achieved (see Fig. 2). The result of the simulation is that optimisation requirements are determined that take into account the current inventory situation, compensate for any disruptions as far as possible and achieve the desired KPIs.

KPI-controlled I4.0 production

After the simulation these optimisation requirements determined by the web-based simulation possibly in situ are transferred in the production system so that a stable, harmonised production can be achieved.

By using web-based technology with a responsive design production sequences can be viewed and analysed on almost any device with a web browser given the appropriate authorisations. The transparency of the production process towards Industry 4.0 production is improved and a consensus of all partners involved in the process can be achieved more quickly and efficiently.

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