Scheduling of Quality Control Laboratories

While planning the supply chain in Life Science, Food or Chemical industries, the QC in the corresponding laboratories can be an important or even crucial capacity constraint leading to delays in production or, even worse, delivery dates. Hence, detailed QC scheduling should be considered as an integral part of production planning and scheduling. The following paper presents a tool for this purpose that works as a complementary solution for SAP ERP.

Situation

QC laboratories have limited capacities. Due to this, they can be a bottleneck in a company’s overall production process. The essential task of planning and scheduling these activities is often done with MS-Excel Sheets. This approach is based on the fact that SAP ECC, often working as the core of companies’ IT-landscapes, does not provide any functionality for the named purpose. Furthermore, the business processes inside SAP create inspection lots on short notice. Typical scenarios involve delivering goods or process orders (or production orders) that are released only a few days in advance. In contrast, inspection lots based e.g. on purchase orders, purchase requisitions or planned orders are the basis for medium-term and long-term capacity requirements.

Hence a reliable capacity forecast for QC Labs is not available inside SAP, causing a missing functionality of scheduling inspection orders or related objects like samples. Additionally, many companies are not able to do any kind of capacity leveling for laboratory work centers or staff. This leads to the fact that most laboratories work on first-come first-serve principles for testing the samples. In conclusion, the timing of usage decisions or test results remains unclear or undetermined. So in case the production requires all samples to be processed in a certain time and an unforeseen capacity overload is in place, the production process or even delivering goods may be delayed.
ORSOFT LabScheduling

To streamline these business processes it is necessary to integrate the laboratory scheduling into the related business process inside SAP ERP. ORSOFT LabScheduling is such a solution that uses SAP ERP as the only database. All necessary master and transactional data is extracted directly from SAP ERP. Additionally the planning results, such as scheduled inspection lots, are sent back to this system.

All necessary data for the laboratory resources' capacity planning are available in SAP ERP. Execution information, such as inspection characteristics and the related specification task lists for the laboratory, is extracted from inspection plans and recipes (routings). A work center can be linked with machine and staff capacities. The operations on a task list occupy capacity of these work centers. Thereby, an operation may also include the required capacity of test equipment.

Capacity load caused by other origins e.g. stability studies, equipment or clean room monitoring is also present in the solution via the related inspection orders.

This means SAP ERP offers all the basic master data for simultaneous planning: laboratory resources, staff and test equipment. SAP is also capable of handling multiple inspection plans per inspection origin. This feature may be used within ORSOFT LabScheduling in terms of cross laboratory planning or by using other equivalent alternatives such as work centers, equipment etc. In case of insufficient laboratory capacity, one or multiple inspection lots may be shifted to another laboratory within the ORSOFT solution. For each inspection lot the dependent inspection plans/task lists are provided within a drop down list.

Within the modules MM and PP/PI (or PP), the results of the production planning and purchasing are available. These results include planned orders, purchase requisitions, process orders and the sourcing of raw materials. Based on those data objects and the information of the material master and SAP customizing, ORSOFT LabScheduling creates simulated inspection lots.

When the simulation process within ORSOFT LabScheduling is concluded and data is send back to SAP ERP, the simulated inspection lots will be replaced by the actual SAP inspection lots. Additionally, ORSOFT LabScheduling offers the creation of inspection orders based on maintenance plans / strategies (e.g. for stability checks or microbiological monitoring of production facilities). The result of the simulation is a midterm capacity consumption overview for the various kinds of laboratory resources.
Laboratory Capacity Levelling

A capacity leveling can be done by using interactive stack diagrams. A stack diagram can be created for each resource (e.g. machine, staff, and test equipment). The red dashed line marks the available capacity for each day or shift. A single block within the stack represents the capacity requirement of a (simulated) inspection order and can be moved to another bucket by drag & drop.

During this drag & drop action the feasible interval is marked with a background color. Restrictions for scheduling the inspection lot may consist of the earliest starting time (EST) and the largest completion time (LCT), which can be based on the end of the generating element and the start of the next requirement or the actual customer demand.

External Prioritization of Inspection Lots (Pegging Functionality)

The basic start and end dates for inspections are calculated dynamically via a pegging function. So for instance the system calculates the basic end date for an inspection origin 04 (goods receipt inspection by production) by using the stocks and requirements list of the finished good. Instead of using a static GR-processing, time the basic end date is determined by the time of the first consuming element that requires the finished good. For this calculation the first-come first-serve principle is applied.

Additionally, ORSOFT also offers the determination of the latest completion time (LCT). Assuming the goods receipt inspection is for a semi-finished good in a pharmaceutical production and this semi-finished good is used in a primary packaging and later on in a secondary packaging step to get the salable product, the pegging functionality can be applied for all intermediate materials. It thus determines the earliest sales order for which a quantity of the bulk material is required. This date is called the extended LCT.

Assign Staff to Inspection Lots

Additionally, the corresponding planning results can be delivered to the responsible persons in the laboratory via an easily accessible web interface. Capacity is usually planned on the level of staff pools. The persons subordinated to these pools usually correspond to other data objects in SAP ERP. An allocation to single person can be made within the planning work. Then, a Ready-to-work list can be delivered to a single individual within ORSOFT LabScheduling software, by export to CSV or MS Excel, or by a typical Web browser.

Seamless Integration into SAP

SAP ECC is the single data source for the ORSOFT LabScheduling. The integration as described above is done by a standardized interface certified by SAP SE. Certification is available for SAP ECC as well as SAP S/4HANA.
Conclusion

ORSOFT LabScheduling offers simulated inspection lots at an early stage and before SAP lots will be created. This results in a reliable medium term capacity forecast for QC Laboratories based on SAP ERP data objects. Capacity leveling for the laboratory resources can be done in a simple way. The external prioritization and dynamic calculation of basic start and end dates allow scheduling of inspection lots based on external due dates. This helps to match a service level to the customers. Additionally, ORSOFT LabScheduling offers different user interfaces to support the specific roles within the quality control process, e.g. a Ready-to-work application for laboratory technicians.