

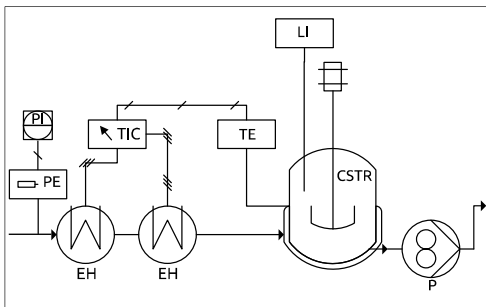
Bachelor thesis

Build-up and integration concept of a processing island in the model factory μ Plant

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Optimization of processes is a pursued goal in large plants due to increasing targets regarding quality improvement and cost reduction. The increasing demand for product variety requires a flexible and efficient operation as well as new ideas on production techniques and automation. The Measurement and Control Department (Mess- und Regelungstechnik, MRT) is building up a large-scale model factory, which is called μ Plant, in order to provide an environment which is required to develop new concepts for plant operation and to test these in a simulated industrial framework. The model factory μ Plant consists of two processing islands, a sorting and emptying station, a stock area with buckling arm robot, several mobile robots, which transport the product in the location, and a control room for the supervision and operation of the plant. A soft drink production is simulated as use case and the operating fluid is water.

The scope of the present Bachelor Thesis concerns the build-up and proposal of an operation integration concept of the second processing island into the μ Plant. The second processing island (PI2) consists of three main units. Two units represent equipment where two different intermediate products are manufactured. The third unit is a mixer where the two intermediate products are blended. The feed stream is first preheated and then it is temporarily kept in the reactor tanks until the product properties meet the requirements. The finished products are stored in different tanks according to their type. They can then be pumped to other units of the model factory. The local operation mode has been already defined but an integration of the process performed in the PI2 into the μ Plant is required. Therefore, the process integration concept of the island into a use-case, where all units work together to execute a specific order, must be established



within this Bachelor thesis.

The process components of the PI2 mainly consist of small gear pumps, Festo reactors, heat exchangers and storage tanks. The components are connected with pipes and several types of valves which are used to control the flow. On the other hand, a variety of sensors are to be placed to acquire process variables such as temperatures, pressures and levels. In addition, two areas have been conceived for the electrical cabinets and for a PC with monitor and keyboard.

The tasks to be performed within the Bachelor Thesis are:

- Familiarize with the operation concepts related to the model factory
- Record operational requirements for the PI2 and organize them as a prioritized list
- Develop detailed qualified use-cases for both continuous and batch operation mode of the entire model factory and derive functional requirements for the process control system
- Review, optimize and validate the planned procurement of the required material
- Mechanical, electrical and instrumentation build-up of the PI2 according to the construction drawings
- Assembly of the electrical cabinets with control system hardware
- Plan and accomplish tests in order to verify the correct installation of the components
- Write the thesis and present the results

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