Realizing flexible continuous manufacturing - The enabling effect of Industry 4.0 and IoT on efficient use of plug&play modules

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Within the pharmaceutical and (fine) chemical industry there is an increasing requirement on flexible continuous processing facilities. To increase efficient use of hardware and to fit multiple products and processes, there is a pull from the market to develop plug and play modular production facilities.

To comply with high processing standards and validation requirements these modules should be smart and flexible. In this presentation several project cases are shown, which give insight how this process technology is brought from the lab to production and how a revolutionary alternative approach to automation is taken.

In practice these new production facilities are build up from individual modules into a backbone. For new processes and/or products these modules are exchanged or rearranged. To minimize reprogramming and revalidation a concept is developed with localized control of these modules.

Based on this new system it is also possible to execute hot-swap exchange of modules while the process plant is running. Bringing the module outside of the processing area and using the local control functionality it is possible to do maintenance or testing of single modules in a safe environment.

The new control philosophy also addresses a digitized documentation and validation approach. A 100% modular process (both automation and hardware) is developed. Using the modular approach new processes and products are brought faster to the market. Validation and documentation work for pharma projects is reduced to a minimum.

With this new technology continuous processing is enabled for small quantity processes and also contract manufacturing organization which depend on flexibility and multipurpose application of their production hardware.