

Avtomatizacija tehnoloških procesov z uporabo naprednih simulacijskih orodij v procesni industriji

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Automation of technological processes by using advanced simulation tools in the processing industry

The development of advanced technology and simulation tools was a major step forward in the field of automation, improving the level of automation and making significant progress in optimising technological processes. Standard tools are available that have enabled engineers to take a systematic and standardised approach, save time when designing, testing and validating processes, as well as map real technological processes in the field of industry in a virtual environment.

The equipment and software solutions enable standardisation of automation processes in companies and the inspection and testing of processes in a virtual environment, ensuring continuity, high reliability and robustness, and providing support and upgrades throughout the entire process lifecycle.

In our case, Siemens PCS 7 v9.0 software and the Simatic Batch tool allowed us to automate the process part of the technological batch process in order to ensure production continuity and repeatability. The biggest challenge was to replace the control system and resume the batch process in just a few hours. The simulation tool allows the operator or programmer to eliminate process errors, while the client learns how to work with the new formulation system (for process engineers, this means introducing new formulations, for operators, managing the new formulations). In this practical example, all stakeholders were able to test the system on the digital twin of the process months before implementation. In complex processes such as changing formulation systems or introducing new ones, simulation tools have become an indispensable part of automation.

In the solution design and planning stage, the Siemens Simit tool for simulating and setting up a virtual environment for the development, testing and validation of the technological process demonstrated great value for both the customer and the software supplier. Using the Simit tool and special or dedicated libraries meant that less time was required for testing and commissioning the process in the field, errors in the design process were eliminated and it could be confirmed that the customer's requirements were understood correctly. Furthermore, it enabled the simulation of the technological process throughout the entire level of architecture from the control and supervision and the formulation system to the actual simulation of the technological process, including user training.

By using standard solutions and new technologies, the design process as a whole brought time savings in terms of time required for design, testing and commissioning both to the client and supplier. In the aspect of all benefits of applying advanced solutions, the trust placed in them by the client to continue to improve the engineering in their company was of key importance.

Kratek pregled prispevka

Razvoj napredne tehnologije in simulacijskih orodij je na področje avtomatizacije prinesel velik korak k izboljševanju stopnje avtomatizacije in velik napredek v optimizaciji tehnoloških procesov. Na voljo so standardna orodja, ki so inženirjem omogočila sistematični pristop, standardizacijo, prihranek časa pri načrtovanju, testiranju in validaciji procesov ter preslikavo realnega tehnološkega procesa v virtualno okolje na področju industrije.

Oprema in programske rešitve omogočajo standardizacijo postopkov na področju avtomatizacije v podjetjih in pregled ter testiranje procesov znotraj virtualnega okolja, zagotavljajo kontinuiranost, visoko zanesljivost in robustnost ter zagotavljajo podporo ter nadgradnje skozi celotni življenjski cikel procesa.

Z uporabo programske rešitve Siemens PCS 7 v9.0 in Simatic Batch orodja se je v našem primeru avtomatiziral procesni del šaržnega tehnološkega postopka z namenom zagotavljanja kontinuirnosti in ponovljivosti proizvodnje. Največji izziv je bil zamenjava krmilnega sistema in nadaljevanje saržnega procesa praktično v nekaj urah. Z simulacijskim orodjem izvajalec/programer izloči napake v procesu, naročnik pa se nauči rokovanja z novim recepturnim sistemom (uvajanje novih receptov za tehnologe in upravljanje le-teh za operaterje). V tem praktičnem primeru so vsi deležniki lahko testirali sistem na digitalnem dvojčku procesa že mesece pred realizacijo. V zahtevnih procesih kot je menjava ali uvajanje novih recepturnih sistemov, so simulacijska orodja postala nepogrešljiv del avtomatizacije.

V fazi priprave in načrtovanja rešitve je veliko uporabno vrednost tako za naročnika kot dobavitelja programske opreme prikazalo uporabljeno orodje Siemens Simit namenjeno simulaciji in postavitvi virtualnega okolja za razvoj, testiranje in validacijo tehnološkega procesa. Z uporabo orodja Simit ter specialnih oz. namenskih knjižnic se je skrajšal čas za testiranje oziroma zagon procesa na terenu, eliminiralo se je napake v procesu načrtovanja oz. potrdilo razumevanje zahtev naročnika in omogočilo simulacijo tehnološkega postopka skozi celoten arhitekturni nivo vse od krmilno-nadzornega dela, recepturnega sistema do samih simulacij tehnološkega procesa vključno z izobraževanjem uporabnikov.

Celoten proces načrtovanja je skozi uporabo standardnih rešitev in uporabo novih tehnologij prineslo prihranke v času načrtovanja, testiranja in tudi zagonu na strani naročnika in dobavitelja. Ključno se je izkazalo zaupanje naročnika z vidika vseh prednosti uporabe naprednih rešitev z namenom še izboljševati inženirske prakso v njihovem podjetju.