

Digital Twin for sustainable manufacturing

A DT for manufacturing is a data-driven software and hardware emulation platform, which is a cyber replica of a physical asset (e.g., a manufacturing process in our case), and includes real-time computing, real-time control, and real-time communication. Different digital technologies are used for the design, development, and operation of the DT, such as advanced sensors, internet of things (IoT), data analytics, artificial intelligence (AI) or cloud computing, among other.

Within the hierarchy of Safe-by-Design (SbD) strategies for process safety design, DTs can be labelled as engineering active protections, because they require electrical power for its operation. However, a working DT goes further, as it can deploy inherently safe strategies in real time, since it continually attempts to optimize the manufacturing process to moderate operating parameters and thus, minimize the consumption of nanoforms (NFs), materials and energy, thereby preventing and avoiding emissions and exposures.

This presentation summarizes the architecture and expected results of the manufacturing DT developed by the ASINA project, for the optimization of a textile nanocoating process.