

Steps Towards Intelligent Digitalization & Transformation in Plant Design & Engineering

In today's Process Industry, modification of plants to increase productivity and profitability is an ongoing phenomenon. Companies are always looking into new and cost-effective methods yielding to higher productivity with lesser efforts and resources.

Digitization Vs Digitalization in an Intelligent way

For most of the plants commissioned in the early 60s or 70s and even decades later, the design data was created on drafting boards using paper and pencil and then multiple blueprints were created using Ammonia prints. Very soon, it was realized that changing the design for any modification was not an easy task and it used to take time and effort, and multiple iterations were required to do the job. The introduction of CAD-based designs made it much easier to create and edit, than to edit paper-based designs and drawings.

The process of Digitization methods was adopted to bring in those paper drawings to CAD systems by scanning them, but this process required cleaning and processing of scanned images and use of tools for Raster-To-Vector (R2V) conversions or even redrawing them using CAD to convert them to geometrical objects like lines, circles, dimensions and similar objects. Each object was independent from the other objects and non-intelligent.

And this often resulted in not only the design data in different CAD and drawings formats, but there was also the enormous amount of data to be managed: the production data, the safety data sheets, various specifications for each process and product – either the raw material or the finished product and documentation about the regulatory compliances and certifications of products are also required to be created and maintained. The process of converting all such information into intelligent digital formats got the term as Digitalization of data, enhanced further with several new tools and technologies, even scanning the plant in 3D as Point cloud data to reconstruct the plants for new process and product lines, also known as the Brownfield projects. The management of information is also used for maintenance and the systems of records form the backbone of information and data management, systems of engagement and the last mile of the information process.

Digitalization is important: Consider monitoring a Plant's operating conditions by a technician who must walk along the line to all the equipment and devices to note down the operating conditions by checking dials and readouts, making it nearly impossible to cover large floor areas having hundreds of equipment. By the time he completes the work at one end of the plant, something at the other end may have already changed, requiring the immediate attention of the operator.

The digitalization and the system network in the Plant, interconnected sensors and controllers have made it possible to take information from every part of the floor to the control rooms. A number of Plants, in response to huge amounts of area to cover and control, are even using indoor positioning systems with wireless infrastructure to track the moving equipment on the factory floor. The digitalization process has made the plant operators and managers utilize the at-a-glance information environment in which every part of the plant is monitored, controlled, and even simulated digitally, with corrective and preventive actions being defined and actions taken on the fly.

Digitalization for Smart plants: The advancement and evolution of digital technologies has resulted in flexible, integrated & scalable plant solutions for Smart plants. Plant digitalization makes it possible to

create, maintain and retrieve all technical information essential for safe and efficient running of plants. Also, the secure and central management of the plant data enables informed decision making. It can help you to:

- **Manage Assets Effectively:** Central repository of equipment data, maintenance scheduling and instructions such as process documentation, history, cause & effects and increased capability of Operations and Maintenance teams to handle equipment efficiently
- **Improve team Effectiveness:** Availability of all data including experience at fingertips in an integrated environment improves the contribution of Operations and Maintenance teams
- **High data quality:** Improved accuracy comes with automation and customization of tasks
- **Lower cost with faster time-to-market:** Automation reduces cost and improves the speed of digitalization in a more competitive environment
- **Lower project risk:** Projects become more likely to be delivered on-time, on-budget, and within specifications with high quality digitalization
- **Increase safety preparedness:** The concepts of virtual Plants and digital twins greatly aid in training of Operation, Maintenance and Safety procedures



While digital transformation may look complicated and time-consuming in the beginning, the industry leaders still need to think and drive towards it. You may face different challenges and may come up with different answers; transformational business practices are necessary to compete globally. These practices will drive the innovation and speed required to help companies outpace their competitors.

One of the good points as you start on the transformation is about the availability of data which would already exist and resides in your plant. Harnessing it and using it to transform the business is the key to a successful transformation. Success can be realized by taking one step at a time, starting with the most pressing problems and solving them.

Most of the plants and facilities have implemented automation programs, and they may have produced a wealth of data available for driving digital transformation, creating opportunities to use data to first address immediate and pressing needs. Moving forward with the latest tools and technologies allows digital transformation efforts to start small and scale up, and greatly increasing the odds for success.