

HOW AI WILL CHANGE MANUFACTURING^(AI)

[expleo]



1. Process & industrial design

- Generative Computer Aided Design (CAD) & process modelling: design production lines or cells by prompt, propose alternative layouts and workflows.
- Product-process integration: automatic adaptation of manufacturing processes when product designs change, synchronised with PLM systems.

Reduce the time of design phases and the risks of reworks.



2. Process prototyping

- Predictive analytics to identify the most impactful manufacturing process parameters for the product quality and predict how product quality changes with parameter adjustments.

Require fewer costly physical prototypes and accelerate the design-manufacturing convergence.



3. Work preparation & knowledge transfer

- Automatic generation (video-to-text) of assembly sequences and work instructions from operator videos.
- AI-driven creation of training curricula and maintenance documentation.
- Augmented Reality (AR) to support operator guidance and learning.

Accelerate efficiency and reduce the time to market.



6. Operations & continuous improvement

- Predictive maintenance to reduce downtime and optimise asset life cycle.
- AI-enabled MES/BMS for stock optimisation, energy management, and OTD prediction.
- Advanced robotics (collaborative & humanoid) to automate more complex workflows.
- NLP-driven root cause analysis of recurring non-conformities and automated corrective action planning.
- Digital twin-driven SCADA for real-time decision making and autonomous interventions (e.g. purchasing parts in shortage).

Improve production efficiency and cost, prevent production shutdown, reduce carbon impact and scraps, track non-quality.



5. Commissioning, qualification & ramp-up

- Natural Language Processing (NLP) to auto-generate PLC, HMI, and robot code.
- AI-powered visual inspection (with AR) to automate defect validation and support PPAP requirements.
- Digital twins for accelerated line balancing and ramp-up optimisation.

Faster transition from pilot to commercial operations.



4. Procurement, construction & installation

- Analysis of historical Factory Acceptance Test (FAT) data to predict recurrent non-conformities.
- AI-generated corrective action recommendations and assistance of FMEA process.

Shorter commissioning cycles with fewer costly late-stage defects.