

## SMART FACTORY ASSEMBLY USE CASE

# High Mix / Low Volume Assembly

High mix / low volume (HMLV) production refers to manufacturing environments where many different product variants are built in small quantities - often customized to specific customer requirements. This makes planning, training, and quality assurance more challenging than in high-volume, repetitive production lines.

**ELAM Solutions** is designed to bring structure and efficiency to HMLV assembly. With dynamic digital work instructions, automatic order-specific configurations, and integrated process control, ELAM ensures that each operator receives the right guidance at the right time - no matter how often the product or process changes. It helps eliminate errors, reduces training time, and improves flexibility across your production.

### CUSTOMER

- **Founded:** In the mid-20th century
- **Employees:** Approx. a few thousand worldwide
- **Annual Revenue:** around CHF 500 million
- **Global Presence:** Subsidiaries and partners in numerous countries across all continents.
- **Products & Services:** Development and production of precision instruments and solutions for advanced analytical applications.

### INITIAL SITUATION / CHALLENGE

The customer operates in a high-mix, low-volume production environment, assembling a wide variety of specialized equipment in small quantities. Prior to the Smart Factory Assembly project, the company relied on traditional manual workbenches without process intelligence or digital guidance. This setup led to several challenges:

- A large number of existing workbenches were not consistently utilized, resulting in inefficient use of floor space and resources.
- Manual tools offered no process control or error-proofing, increasing the risk of variability in quality.
- The lack of standardization across workstations complicated training, support, and process optimization.

The customer identified the need for a flexible yet standardized solution to support their high product variability while improving traceability, quality control, and workstation utilization.



### PROJECT GOALS

The customer set out to modernize and standardize their production environment with a focus on flexibility, efficiency, and quality. The key goals of the project were:

- Optimize the use of factory floor space by introducing standardized, modular workbenches that can be flexibly reassigned.
- Support high-mix, low-volume production with a scalable digital solution that enables fast changeovers and clear work instructions.
- Increase process reliability and traceability by introducing intelligent tools and digital guidance.
- Reduce the number of idle or underutilized workstations and improve overall operational efficiency.

These objectives formed the foundation for selecting a Smart Factory Assembly solution that could adapt to their dynamic production demands.

## SOLUTION

In the first project phase, we implemented 10 standardized Smart Factory Assembly workstations equipped with a full suite of digital and intelligent technologies. The system was designed to support high product variability while ensuring quality and efficient use of space.

Key components of the solution included:

- ELAM (with ERP integration): Initially deployed standalone, ELAM was later fully integrated with the ERP system to allow direct order import, ensuring seamless digital workflows from planning to execution.
- Smart Tools: Used to monitor and control fastening operations, ensuring correct torque and angle on each screw.
- Pick-to-Light: Guides operators to the correct component, avoiding picking errors and improving assembly speed.
- Bitcube: Digitally tracks tool selection and provides automatic tool activation based on work instructions.
- Smart Towers: Provide automated material supply and visual signaling to support lean logistics and reduce operator search time.

Together, these components created a highly flexible and efficient workstation environment, aligned with the goal of space optimization and production standardization.

## IMPLEMENTATION

The rollout followed a structured and phased approach over a period of four years:

- Started with 1 pilot workstation to validate concept, usability, and impact.
- Expanded with an additional 4 stations based on positive feedback and successful results.
- Further extended with 5 more workstations, standardizing key areas of the assembly line.

- Most recently, 10 additional ELAM workstations were implemented, bringing the total to 20 stations in operation.

This gradual implementation allowed our customer to continuously test, adapt, and optimize the system while ensuring smooth adoption by both operators and management. Thanks to the plug-and-play setup and modular workstation concept, each expansion step was carried out efficiently without major disruptions. The final rollout phase also included full integration with the ERP system, enabling direct order flow into ELAM for real-time production control and traceability.

## RESULTS / BENEFITS

The implementation of Smart Factory Assembly has delivered significant improvements across flexibility, quality, and process control:

- Achieved full flexibility in production: standardized workstations can be dynamically assigned to any product, supporting the company's high-mix, low-volume needs.
- Complete process control over all Smart Tools: fastening operations are now fully monitored and traceable, with torque and angle values automatically verified.
- Significant error reduction in assembly: the combination of digital guidance, Pick-to-Light, and intelligent tools has minimized human error and improved first-time-right rates.
- Improved utilization of workspace: standardized, modular stations have replaced underused benches, resulting in better space efficiency and leaner workflows.

These improvements laid the foundation for further scalability and helped to increase overall productivity while maintaining its high quality standards.



*With the new ELAM workstations, we've not only significantly improved quality and process control, but also gained the flexibility we need for our high-mix production. Our teams appreciate the intuitive workflows, and the integration with our ERP system has streamlined order management across the board.*

Teamleader Industrial Engineering