ARMBRUSTER ENGINEERING

Consulting | Systems | Products

HOW TO USE ELAM

A collection of field applications

Currently, the **ELAM system** is used in more than **1,200 installations** of well-known customers in many different applications.

In this brochure, we want to introduce some of the most interesting fields of application of the system and explain them in detail. At the beginning of each chapter, we will present the requirements of the specific application and subsequently justify the solution approach chosen by **Armbruster Engineering** in order to meet the customer's needs.

CONTENT

01

TRAINING OF EMPLOYEES

REQUIREMENTS: By now it is becoming increasingly difficult, to find suitable employees for the assembly. Especially medium-sized companies are affected by the lack of skilled workers and the high fluctuation rate. In order to minimize these problems, a system is needed, that supports and takes over the training of new employees and relieves the burden on the supervisor.

SOLUTION: In order to solve this problem, we set up a training workplace for employees equipped with an ELAM START system. Here, new employees can easily get familiar with the work instruction and practice individual assembly steps. New or prospective employees thus have the opportunity to get to know the system and the production process without time pressure until they have enough confidence and knowledge to follow the specified quality standard of the production.

CONCLUSION: After purchasing the ELAM START workstation, our customer noticed a significantly reduced training time for new employees. For the production workstations that are also equipped with the ELAM system, the error rate for newcomers is almost zero and job satisfaction is very high. Based on the positive experience, the customer plans to equip further workstations with ELAM START.

- Quick setup
- Fast configuration
- Self-explanatory

02

ELIMINATION OF ASSEMBLY ERRORS

REQUIREMENTS: An extremely high error rate has been noticed in a running assembly: Parts were forgotten, screws were not fully tightened and wrong parts were installed. Therefore, a system was needed which eliminates these deficiencies and helps to raise the quality of the production again.

SOLUTION: Armbruster Engineering implemented an ELAM system very quickly in order to reduce the high error rate rapidly. Now employees can only continue with the next work step if the previous one is done correctly. If the employee uses the wrong screws or forgets components, the ELAM system informs him and he has to rework the process step in order to continue the work instruction. In addition, an ERP connection has been integrated to ensure an automated order dispatch.

CONCLUSION: The quality and quantity of the products increased rapidly and as a result the customer had equipped his entire line with the ELAM system. The cost savings due to the elimination of repairs paid for the purchase in the first year!

- Pick to Light is connected directly
- ERP is connected professionally
- Automatic testing machines can be integrated

03

CONSISTENT PICKING FROM DIFFERENT SOURCES

REQUIREMENTS: During picking, it is often necessary to assign components from different data sources. For a manufacturer of agricultural machinery this proved to be a complex and cost-intensive problem that had to be solved.

SOLUTION: As a solution, Armbruster Engineering designed and installed a middleware level in the processing infrastructure. This enables a unique data structure to the user and is safe and easy to maintain and use.

CONCLUSION: New employees could be trained in a very short time due to the guided picking process, thus accelerating the overall picking process. This allows flexible response to peak times and staff fluctuation. The rapid implementation of the solution in two other plants speaks for the satisfaction of the customer.

- Best Software Engineering
- Self-explanatory application
- Reduction of operational complexity

04

CONTROL EXTREMELY LONG AND DIFFICULT ASSEMBLY PROCESSES

REQUIREMENTS: For the assembly of large devices and components it is often necessary to complete several hundreds of work steps – all of them have to be configured in the system. The processing of these steps can take several days. Additionally, the customer required that the tightening values were recorded, controlled and assigned under cleanroom conditions. Due to the fact that no competitor could fulfill these requirements this case was transferred to Armbruster Engineering.

SOLUTION: The extremely flexible configuration of the ELAM system makes it possible to perform over 37,000 work steps (the maximum limit has not been reached yet) and to save and process them simultaneously. In addition, Armbruster Engineering developed and installed a search system to manage the partial work sequences. In order to accelerate the company‘s order handling, an efficient connection to the SAP system was realized.

CONCLUSION: The solution installed by Armbruster Engineering allows the control of complicated assembly processes. The disassembling and rework of products is no longer necessary and the quality is fully assured. Further lines have already been ordered and delivered. Currently, the customer operates a total of 11 different production lines with the ELAM system and plans the commissioning of further lines.

- Very extensive systems with fastest response

05

ENABLE ONE PIECE FLOW DESPITE A HIGH VARIETY OF PARTS

REQUIREMENTS: A manufacturer of fittings with many different product types requested the assembly of a new product line using One Piece Flow. For the safety-relevant assemblies, mix-ups should be completely avoided and assembly times reduced. Existing plants could not meet these requirements.

SOLUTION: Armbruster Engineering presented a closed assembly circuit including individually monitored picking points and PTL support. These and the SAP connection were directly linked to the allocation of product conveyers. The positioning of the components on mobile changeable racks ensured a fast changeover.

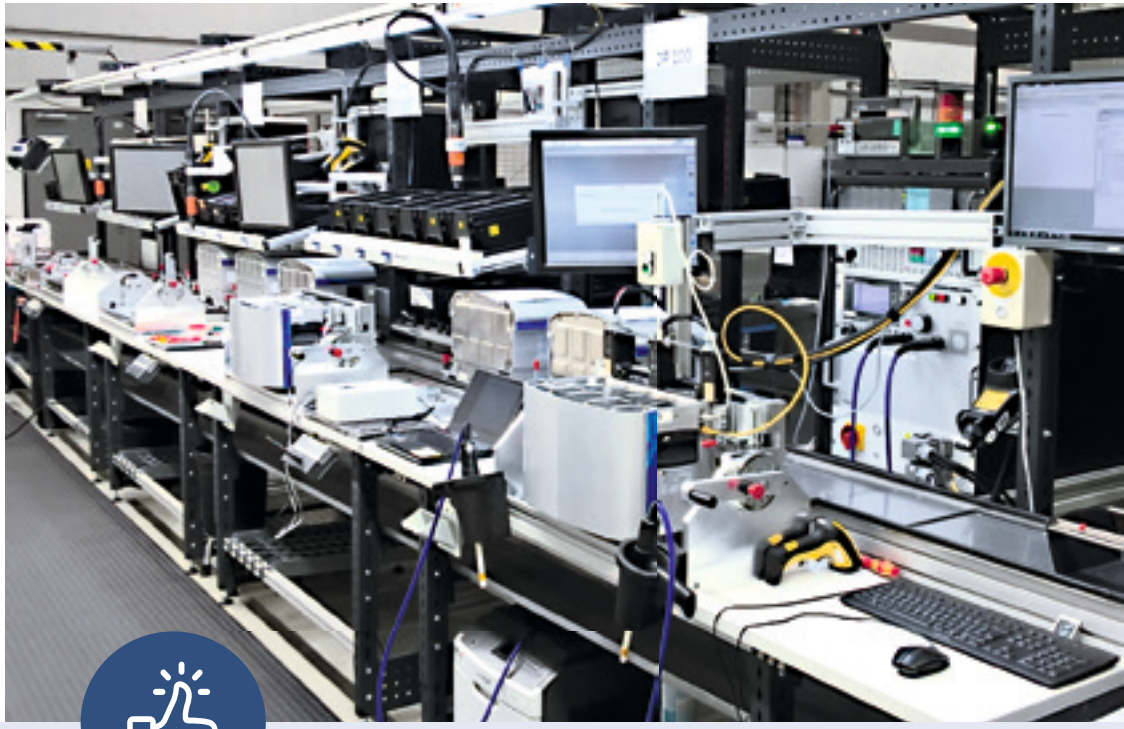
CONCLUSION: The customized plant design, realized by Armbruster Engineering, made it possible to reduce the assembly time by 20 % compared to similar plants and to ensure assembly quality at the same time. Thanks to the modular design, the assembly time was reduced even further in the event of subsequent optimisation. The customer plans to equip further plants.

- Design and realization from one supplier
- Fast display and evaluation
- Flexible material supply

06

SAFE START-UP OF NEW PRODUCTS IN NEW PRODUCTION WITH NEW EMPLOYEES

REQUIREMENTS: A maufacturer of electronic power supply products aimed to relocate new products in a new plant with new staff in an extremely rapid ramp up curve. It is required that the presented solution can flexibly follow this growth rate. Additionally, the high proportion of foreign-language employees must be taken into account. Furthermore, each line covers about 50 stations which makes them very complex.



SOLUTION: The customer had already made very positive experiences with an ELAM system in the factory and decided to commission Armbruster Engineering with the implementation of the project. Individual workstations were consistently standardized and each workstation was equipped with the ELAM system. In order to handle the extremely increasing quantities, punctual delivery of the large volumes in time was indespensable.

CONCLUSION: The newly installed ELAM system resulted in a remarkable market success. The quality standards could be kept although the customer was challenged by onboarding of new staff. Due to the non-failure production process, the customer is always ready for delivery. The language settings integrated in the ELAM system enable foreign-language employees to work immediately with the ELAM system and qualify for assembly. The flexibility and adaptability of the ELAM system impressed the customer.

- Software and assembly devices are perfectly matched
- Easy scalability
- Espansions are realized quick and easy

07

SAFE RELOCATION OF THE PRODUCTION TO EASTERN EUROPE

REQUIREMENTS: Usually, it is necessary to relocate productions to countries with lower wage levels. In order to minimise downtime, such relocations have to be done very quickly. Furthermore, it must be guaranteed that there will be no decline in quality at the new location.

SOLUTION: Armbruster Engineering has already carried out such relocations successfully several times. For a sucessful relocation each plant was equipped with the ELAM system and special attention was paid to the training of the operating staff. Customers receive long-term support from our high-performance service team and are accompanied during training and commissioning.

CONCLUSION: The successful relocation of the production did not only reduce the costs significantly. It also resulted in a zero failure assembly. This can be attributed to choosing Armbruster Engineering and the ELAM system. Similar solutions are increasingly requested by medium-sized and large companies.

- Simple language switching
- High-performance service team
- Remote maintenance

08

ENABLE DIFFICULT PACKAGING

REQUIREMENTS: Packaging often implies a complicated process because attachments and documents have to be supplied correctly. Video sequences, which can be called up step by step and confirmed manually, turned out to be really helpful in very complex processes. In the present case, a complicated packaging process had to be implemented directly after an end of line test. Here, a worker had to place boxes in a certain way, insert the instruction leaflets and check the serial number.

SOLUTION: Armbruster Engineering solved this problemy by using a collaborating robot that inserts the products into the boxes from behind and subsequently lifts them to the appropriate level. Afterwards, the employee can check the serial number by using data glasses. In case of a match, the robot automatically closes the box and stacks it on a pallet for shipping.

CONCLUSION: With the support of the robot, employees can carry out all work steps in a relaxed and controlled manner directly at their workplace. In order to protect the robot from damage it was placed in the background. The solution turned out to be extremely flexible and very economic.

- Multifunctional interface
- Integrated plant design
- ELAM Assistant is freely configurable

09

BATCH RECORDING OF PURCHASED PARTS

REQUIREMENTS: A customer manufactures electronic devices in high variance with many individual parts. Due to the high proprtion of purchased parts, it is necessary to monitor both, the assembly and the information of parts from the main suppliers.

SOLUTION: As a solution, Armbruster Engineering offered a continuous batch tracing system in the incoming goods department, which runs through the entire production. For all component withdrawals with Pick to Light, the batch number is read and checked separately. ELAM controls which quantities have been removed and informs the worker when a new batch needs to be scanned. The product lifecycle file stores the batch information including serial number, worker no., material no., batch no., removed quantity and remaining quantity. This prevents faulty constructions with blocked batches.

CONCLUSION: As a result, the material supply is completely secured and the material flow runs smoothly. A data connection to the main suppliers guarantees a trouble-free supply as well as a high level of quality. This increases the overall efficiency of the assembly.

- MES functions are fully integrated
- Connection of picking and stocking
- Transparent material stock

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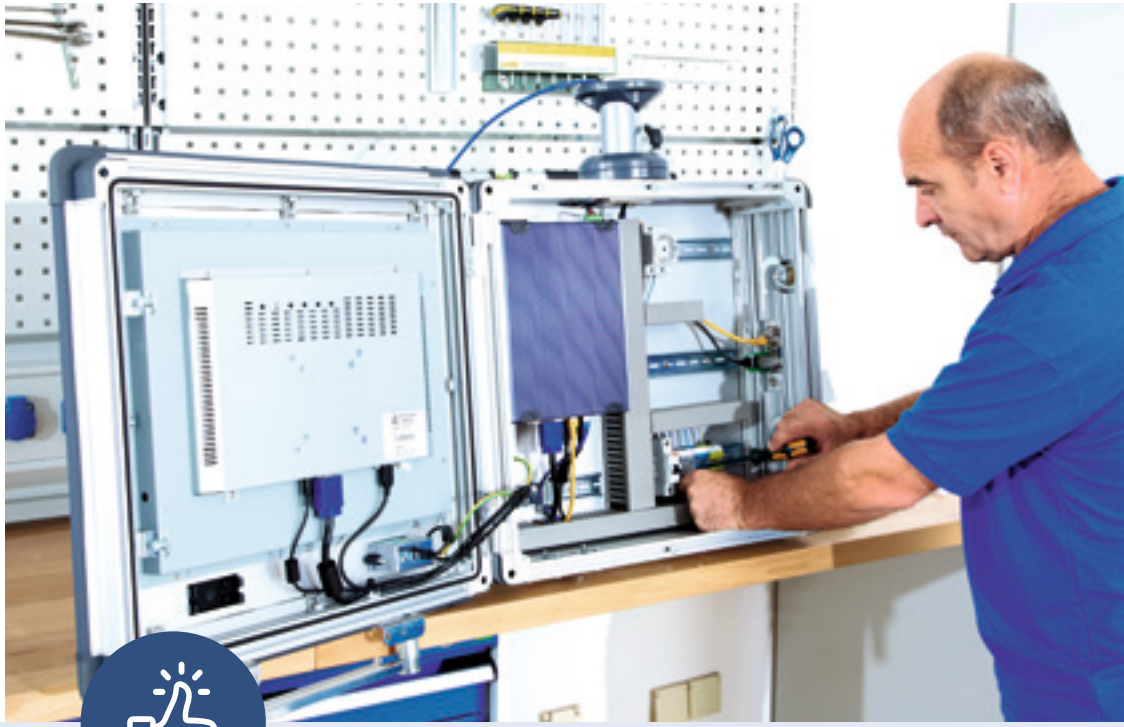
ELECTRICAL CABINET ASSEMBLY

REQUIREMENTS: The economical production of electrical cabinets poses a big challenge due to an enormous amount of different components and terminals and an extremly high variance. Additionally, the customer required that the configuration of the work instructions is done automatically and directly from the Internet to the workplace.



SOLUTION: This task was solved in cooperation with other efficient partners by developing individual solutions gradually and bringing them up to market. In a fast-delivery-line, for example, the necessary components from the customer order are transferred directly to the line, the processing positions are displayed with powerful projectors and the elements are assembled precisely.

CONCLUSION: Thanks to this arrangement, most orders can be delivered effortlessly within 24 hours. In addition, work preparations are skipped completely. Further solution modules can be found in joint planning.

- Sustainable modules
- Various display media available

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SEMI-AUTOMATED ROBOTIC STATION

REQUIREMENTS: A supplier of furniture fittings demanded that simple assemblies should increasingly be done in combination with collaborative robots. The assembly and testing of the products should be supported by a robot and secured by the ELAM system.

SOLUTION: Armbruster Engineering used a lightweight robot, which relieves the assembly personnel by carrying out the loading and unloading of the parts to the test station. The station operates in the assembly time cycle and is guided by the ELAM system.

CONCLUSION: Due to the stable and efficient arrangements Armbruster Engineering has chosen, almost no readjustments are necessary and the system works very economically.

- Fast creation of work instructions
- Software and hardware perfectly matching
- Best engineering services

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SECURING COMPLEX PRODUCTIONS AT INTERNATIONAL LOCATIONS

REQUIREMENTS: An automotive supplier that produces convertible car roofs required a secured production of pre-assemblies and final assemblies. The focus was the avoidance of any kind of failure and the strict adherence of the order traceability. In addition, the pre-assemblies are carried out stationary and the final assembly is done on mobile racks.

Data generated in both, pre-assembly and final assembly, must be recorded, evaluated for compliance with the limit values, stored and prepared for traceability. Data sources are tightening systems, tactile and optical measuring devices, parameters from control systems and cameras.

In addition, individual checklists have to be answered by the employees at the end of line test. Special end-of-line stations are installed, in order to display the results of all preliminary stations clearly and to do rework if necessary.

SOLUTION: Armbruster Engineering completely set up the lines after creating detailed plans and extensive configuration lists. The ELAM system was installed consistently as a platform and is highly accepted by the employees because it provides complete process control. Furthermore, special measurements ensure that the right product is always assigned to the right order. The short cycle time is realized because the visualisation is mostly based on automatic steps.

CONCLUSION: The use of the ELAM system ensures that the large number of variants with all added parts is handled safely and failures are prevented. For purposes of quality assurance, measured values are not only transmitted to ELAM's own reporting but also to an external reporting system. By now, 16 lines with 26 different models and a high number of variants have been put into operation in Germany, Poland, Japan and the USA. The ELAM system was commissioned completely online. The customer plans the implementation of further lines.

- Complex systems
- Transparent documentation
- Long-term and reliable system support

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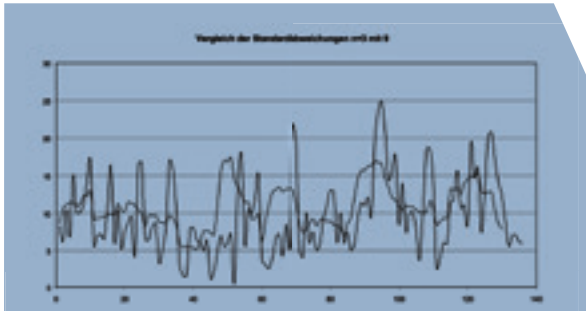
WHERE IS ELAM LESS USED

Of course there are also cases in which the ELAM system cannot be used or only to a limited extent:

- Unique productions that **run only and exclusively once** are not worth the effort of an ELAM system – unless a later repetition is expected and the process sequence shall be saved for that time.
- Productions that **run completely automatically** do not require guided assistance – unless the correct set up to run a new product has to be recorded and visualized as a work instruction.

WITHOUT ELAM

Poorly informed employees



Unstable processes, poor quality

Product risks and claims

WITH ELAM

Type-specific work instructions with the ELAM operator guidance

- Efficient production
- Satisfied employees

Transparent processes with the ELAM web server

- Best quality
- Increased profitability

Process assurance with the ELAM platform

- Low costs
- Safe products

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