

Keyword retrofit

THE TERM “RETROFIT” STANDS FOR THE MODERNIZATION OR EXPANSION OF EXISTING OLDER PRODUCTION LINES. THIS IS ALSO POSSIBLE IN THE FIELD OF THE AUTOMATIC FEEDING OF KNEADING MACHINES



++ figure 1
Automatic kneading machine feeding

+ Many plants in the field of the automatic feeding of flours, baking agents, sugar, flavorings, liquid components and oils have been in operation for decades and are getting old. There are now numerous efficient, energy-saving innovations in process engineering, but even more significant are the developments in process IT and in control systems in general. Today these provide far greater production safety and transparency, continuous batch tracing and the extensive documentation of the entire production process. In addition, these systems deliver meaningful indicators for optimizing processes. This is why many operating companies today are facing the challenge of investing in

the modernization of their plant. Retrofit is the keyword. By retrofit we mean the modernization or expansion of existing older production lines. An important part of this is the plant controls, even if these are frequently neglected. But what is the reason for this? Ostensibly, modernization of controls first involves costs and makes production neither faster nor better. But is this really the case? On the contrary, isn't it true there are many good reasons for a retrofit?

Reasons for a retrofit

After more than ten years in the manufacturing plant, the potential risk in the plant controls is considerable since electrical parts are also subject to wear. Many parts are no longer available after a certain time. This results in a lack of spare parts, which can lead to the plant coming to a standstill. Service and support from suppliers also becomes limited and there are no longer staff available with the relevant know-how. It might also be impossible to expand older controls to the required extent. However the most important reasons for modernizing controls are:

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++ figure 2
Ageing control center



++ figure 3
Objectives for modernization are discussed together with the customers

- + Control assemblies age more quickly than mechanisms
- + The controls are at the heart of the production plant
- + The entire system will come to a standstill without the controls!

Benefits of retrofit

The immediate benefit for customers from modernizing their control systems is on the one hand safety and sustainability of production for the years to come and securing service and support, and on the other hand minimization of risk and the options for expansion. But that is not all by a long way. Rather it is that the modernization of control systems provides an opportunity to optimize processes, that is to say to improve existing workflows. The error quota can be reduced significantly with better operator prompting, plausibility checks, barcode validation and tracking & tracing. New control systems can also be integrated better into the company's structure, e.g. by connecting on the business level (ERP linkage). This increases transparency, leads to a simplification of the workflows and decreases handling costs.

This indirect additional benefit from modernizing control systems represents an opportunity to justify the required investments, to decrease the amortization time substantially and to simplify compliance with the laws, standards and regulations relevant for production. A modern production line and documented, reproducible processes help in gaining new customers.

4 steps to the successful completion of modernization

Step 1: setting targets

Together with the supplier of the control system, the plant operator defines the goals that are to be achieved, e.g. safeguarding production, protecting investments, future-proof platforms, as well as flexibility and the ability to expand/upgrade. Further goals may be improving productivity, efficiency and product quality in addition to implementing new guidelines. MES/ERP connection is a fundamental prerequisite in many factories today. It is also possible to correct structures that have evolved over time and simplify them while the controls are undergoing modernization. ▶

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++ figure 4
Operator-controlled weighing with ManDos ensures reliability and provides documentation

Step 2: analysis of the system

The second step involves taking stock of and analyzing the status quo. For example, the following areas are studied here:

- + PC system: consisting of the operating system, database, PC hardware, backup system, as well as the server and production PC
- + The control system itself: which platform and which bus systems are used? Which standard components are installed and where are special components used? Are there discontinued components that are no longer available for delivery? What links are there to third-party machines?
- + Environment: it is also necessary to analyze the environment in detail. For example an assessment is made of the concept for visualization and control, the operational procedures and data and product handling, to name but a few aspects.

Step 3: concept for migration

After analyzing the current situation, the supplier of the control system can now draw up a proposal for implementation with the following objectives:

a migration concept that has been planned with the operator of the system and tailored to meet their requirements in order to meet the specified targets with a short downtime and costs that are kept within reasonable limits.

The following gives some details of migration in the area of PLC and PC technology, which are frequently questioned when the topic of retrofits is up for discussion.

Migration in the area of PLC using the example of upgrading from S5 to S7

An inexpensive solution with the shortest retrofit time can be achieved if only the central control (PLC) is changed and the I/O cards are retained. Often there are still enough I/O cards available and the risk is therefore acceptable. Subsequent replacement of the cards is possible at any time without the pressure to meet deadlines, e.g. by the works electrician on

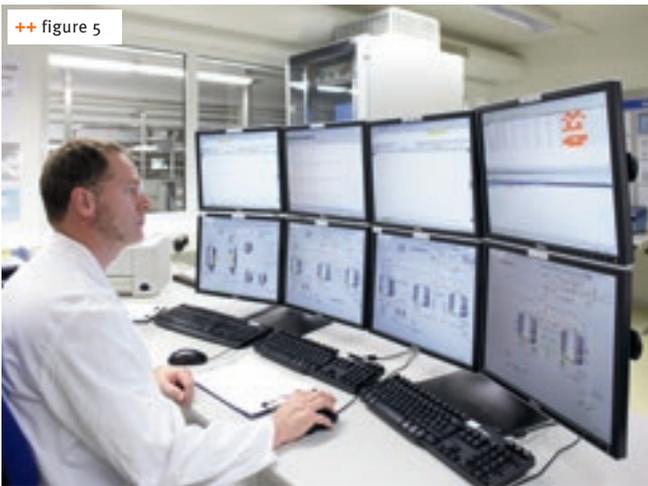
site. If both the central controls and also I/O cards are replaced, the use of adapters offers crucial advantages, which offset the costs: complicated wiring is avoided and downtimes are kept to a minimum. The most extensive modernization naturally provides a complete replacement involving the central PLC, the I/O cards and the entire load management, the local peripheral systems as well if necessary. This is when the latest hardware is used and the control cabinet is rebuilt completely to comply with the latest in technology. This alternative offers the advantage that new plant controls with all the benefits described above can be attained in a single retrofit, which can be carried out at a time when there is no production for operational reasons.

Migration with regard to PC technology

Process instrumentation and control is implemented on the basis of current computer hardware and operating systems. The “Kastor” system results in a centralized process control, instrumentation and visualization system that is able to perform a whole range of workflow controls and checks. This may involve both the recording of data for raw material and also calculation of yields. Furthermore, this system can be validated to meet GAMP 5 and FDA requirements and it provides documentation for continuous traceability of production workflows, e.g. by means of batch protocols, yield balancing and long-term archival of collected data. Access protection and system security can also be configured on an individual basis in addition.

Step 4: Implementation

Implementation is carried out in two stages. First AZO Controls must design, plan, carry out preliminary installation and test the new controls. In this case, the entire range of functions can be reproduced using simulation. The customer confirms their final acceptance here too and the operating personnel are given in-depth instruction and training.



++ figure 5

++ figure 5
Modern "KASTOR" process control system with process visualization



++ figure 6

++ figure 6
Operator terminals on site installed in stainless steel control cabinets

After a successful acceptance test, the new system can now be commissioned at the customer's premises. Installation of the new process control system is carried out in parallel with the legacy system, insofar as this is technically feasible, the PLC components are installed beforehand. After completion of this preparatory work, which for the most part can be performed during on-going production, changeover to the new system takes place in as short a time as possible, e.g. during a long weekend. A decisive advantage of this method is a minimum in production downtime and maximum safety at the same time.

All in all, there can be no question that the modernization of control systems is vital in maintaining secure production. Retrofitting can be carried out virtually in parallel with production without major downtimes. It provides an opportunity to optimize the existing production and to automate the flow of data. It also allows a system for tracking and tracing to be established. These additional benefits are the underlying factors in rapid amortization. Carefully planned and executed retrofitting of control systems offers the plant operator future-proof production. +++

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