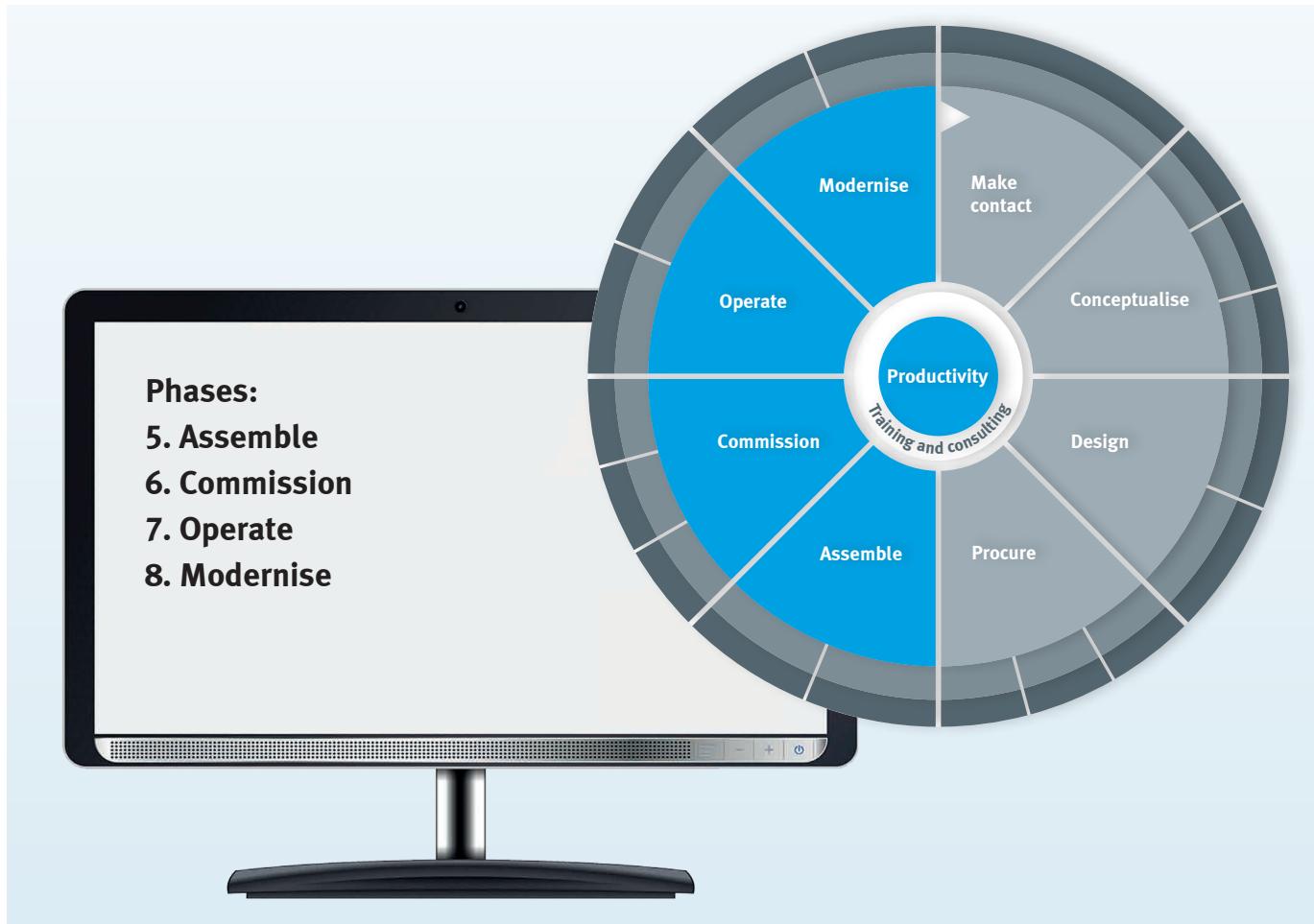


White Paper:

Saving process costs with software support

Part 3: Practical tips for phases 5 – 8



Product life cycles are becoming ever shorter¹. Less and less time is available, whether for development of an installation or its possible modernisation. Companies and their employees therefore try to continuously optimise their processes as that is the only way they can remain competitive and deal with increasingly demanding challenges.

The software tools provided by system and component suppliers can support them in this; they have been available for quite some time and their number is constantly growing. The short tips in this white paper are intended as a guide to selecting tools which will help you to save valuable time in the eight-phase model of the value creation process shown above.

This white paper provides information on:

- The challenges in the individual value creation phases
- Support tools
- How you can become even more productive with networked tools, and
- Tips about which functions can be used and when.

Would you also like to save process costs in other phases?

Part 1: Practical tips for the phases "Make contact", "Conceptualise" and "Design"

Part 2: Practical tips for the phase "Procure"

¹Sources:

<https://www.hs-pforzheim.de/De-de/Hochschule/Einrichtungen/IAF/Forschungsschwerpunkte/ppw/Seiten/Inhaltseite.aspx> (2015-10-15)

<http://www.tagesspiegel.de/wirtschaft/produktlebenszyklen-immer-schneller-neuer/4041756.html> (2015-10-15)

Phase 5: Assemble – missing hole patterns and recesses and hard-to-read labelling

If, because of time pressure, hole patterns and recesses are omitted or the tubing is not defined, the usual instruction with regard to mounting holes, e.g. for valve terminals, is to drill these during assembly. After the wiring has been completed, the individual valves need to be labelled. Instead of using label carriers, however, technicians under time pressure frequently use handwritten labels with handwriting of varying quality and inconsistent positioning. End customers often complain about this during acceptance testing. If these labels fall off or are not legible, this can have very expensive consequences in the case of a breakdown, as the function of the industrial components has to be determined first.

Tips for optimised assembly

Templates for drilled holes and recesses

These allow flying assembly to be carried out quickly and easily. Manufacturers often provide these templates as downloads in DXF and/or PDF formats or include them as a document with the product. The PDF format is advantageous when people have access to a PC – the technician only needs to enter the product code in the configurator and activate the CAD data output and can then simply download and print out the template, no matter where he/she is. DXF data come with a free DXF viewer which allows templates to be printed out.



Fig. 1: → DXF document for a cut-out with mounting holes in a control cabinet for a valve terminal VTUG

Documents for labelling

These, including for example label carriers, provide useful support for fast assembly and reliable operation. If the person generating circuit diagrams generates these assembly documents at the same time, the process becomes even faster.

Phase 6: Commission – achieving perfect system operation can be time-intensive

In order for a system to operate optimally, all its components must be matched during commissioning. Electric axis systems require a particularly large amount of information. The mass moments of inertia of the motor and the axis, the precise axis length as well as the values for acceleration, speed limit or maximum current all have to be defined.

First the necessary data have to be gathered so that the optimum parameters can be determined. If a system is to operate with high accuracy and fast control response, such as for pressure control using a proportional valve, there may sometimes be a need for further equipment, e.g. an oscilloscope, in order to achieve optimum parameterisation. If any specific questions still need to be resolved, commissioning staff will generally first look for assistance on the Internet before they pick up the telephone.

Tips for quick and easy commissioning

Intelligent configuration software

This can significantly simplify the commissioning of mechatronic modular systems. High-end systems are the best solution, since they determine all the data during the dimensioning process and then make this data available via a server and the Internet. The data come from the parameter cloud so there is no need to download software to a PC. Functions such as auto-tuning can also help to boost the performance of a system. If a manufacturer does not offer these high-end systems, optimised tools for parameterisation and fast commissioning can still make work considerably easier. With these systems, components are specified via a modular system and type code, and the software then undertakes the basic configuration. This eliminates laborious searches for lots of data, such as the manufacturer's data for the mass moment of inertia of an axis, and the need to import this separately. If data on the various components are not available, they can be entered into the software using plug-ins. These plug-ins can also incorporate additional integrated functions such as an oscilloscope.



Fig. 2: Commissioning an axis system using configuration software
→ Festo Configuration Tool (FCT)

Product manufacturers' information and community platforms

These platforms combine information other than just product documentation. They contain clearly presented lists of firmware, driver data, ready-made software modules or special expert knowledge (application notes). If users cannot find what they are looking for, the product manufacturers' support communities may be able to help. Here, questions from users are answered quickly by technical support staff. These communities often also offer other useful tips and information which help users to reach their goal faster.

The screenshot shows the Festo Support Portal interface. At the top, there is a search bar with the placeholder "Please select a category on the left or use the search." Below the search bar, a product card for "DNC-125-100-PPV-A" is displayed, showing its part number (183501), ReCo9, pmax. 12 bar, and a link to "Support Community". A sidebar on the right provides links to Contact, Product conformity, Terms and conditions of use for electronic documentation, and Support Community. Below the search bar, a navigation menu includes "Top 3", "Product information [6]", "Technical documentation [0]", "Engineering software [32]", "Firmware and drivers [10]", and "Expert knowledge [5]". The main content area displays a table of results for "Firmware". The first row shows "Firmware CPX-CEC-C1-V3, CPX-CEC-M1-V3, CPX-CEC-S1-V3 (Version 1.0.2)" with a version of R02 and a download link. The second row shows "Funktionsbausteine CODESYS" with a version of 3.5 and a download link. A "Filter result" dropdown is shown above the table. To the right of the table, there are links to "Firmware", "File and language versions", and a rating of ★★★★☆ (3). Below the table, a section titled "Supported Systems" lists "Codesys Festo_Motion_Lib FHPP library for Codesys PLC in version 3.5 (also Beckhoff TwinCAT 3) to communicate with the following motor controllers:".



Fig. 3: Examples of information and community platforms

→ Festo Support Portal and → Support Community

Phase 7: Operate – downtime costs money and causes stress

High overall equipment effectiveness (OEE) is the goal when operating any system. For servicing and maintenance staff, this means being able to identify and localise the causes of faults as quickly as possible and replace defective components. If faults cannot be identified quickly or if it takes a lot of time to identify and order the right spare part, the cost of the resulting downtime may be exorbitant. Depending on the system, e.g. in the petrochemical or cement production industry², it could run into millions.

² Source: <http://www.aud24.net/pi/index.php?StoryID=189&articleID=123775> (15.10.2015)

Tips for operation

Special diagnostic software

This makes fault-finding for components even faster and allows preventive maintenance too, a factor which is becoming ever more important. The current technology for accessing an individual device is represented by network tools such as the Festo Maintenance Tool and web-based software such as the CPX Web Monitor. Handheld devices with suitable software can also provide valuable support for local fault-tracing and thus help to rectify faults more quickly. Components that feature integrated preventive software intelligence for fault detection are the way forward. The Energy Efficiency Module MSE6-2M, for example, sends a message to the higher-order controller if a leak occurs in the system.



Fig. 4: Intelligent diagnostic software integrated in the Energy Efficiency Module MSE6-E2M

Product key with information platform in the background:

More and more products have a data matrix code on their rating plate which provides a direct link to a mobile portal and incorporates a product key as a unique identification. With a scan app on a mobile phone all the information on a given product can be viewed on the spot. This speeds up identification and ensures accurate data – up to and including re-ordering. Flexible access via various media such as smart phones, tablets or PCs makes it easier to access data from any location. These codes, which can be read both by people and machines, reduce reaction times when support is required and provide important additional information online, such as system and product documentation.

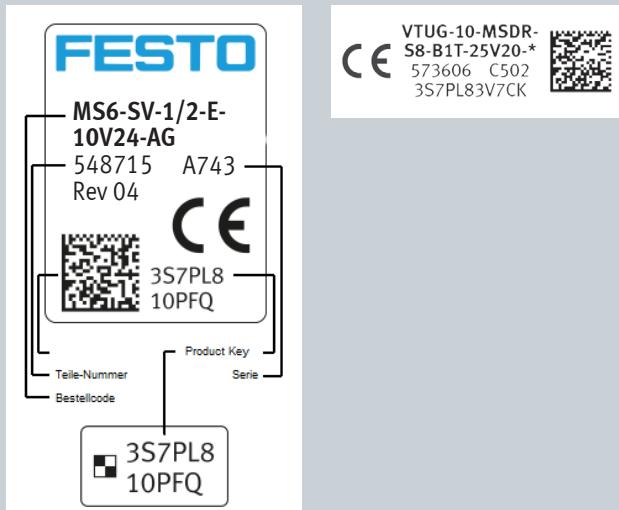


Fig. 5: Examples of data matrix codes on products by Festo AG & Co. KG

Spare parts finders and catalogues

These have an integrated link to an online shop, and speed up the process of deciding whether it would be preferable to repair a product or buy a new one. In addition, spare parts finders often provide important supplementary information, such as other materials that are required (lubricating greases, special tools etc.) as well as assembly drawings.

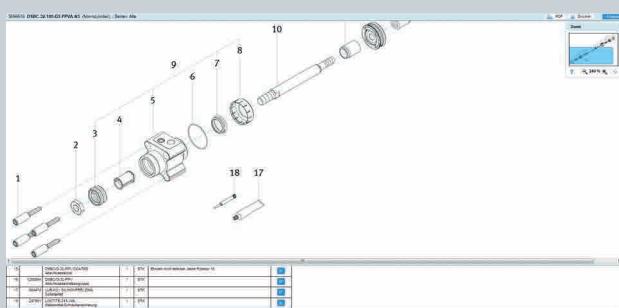


Fig. 6: Festo → spare parts catalogue

Phase 8: Modernise – when is it worthwhile?

Modernisation may serve several purposes, for example to increase system output, to expand the range of products which are produced or to reduce operating costs. If the aim is to reduce operating costs, a cost/benefit calculation will be needed. The complex interrelationships within a system and the large number of factors that need to be taken into account make such a calculation difficult.

Tips for cost-effective modernisation

Cost calculators can help to carry out initial estimates quickly. Although they are generally no substitute for a detailed analysis and the precise calculation of the break-even point, they can provide an initial concrete indication of whether modernisation will be worthwhile. If a system operates with compressed air, a cost calculator for pneumatics can quickly determine the savings which can be achieved by, for example, reducing cylinder sizes. Appropriate engineering tools for simulation and dimensioning can then be used to check whether this reduction in size is compatible with the technical system requirements. This completes the circle – and the phases "Make contact" and "Design" start again.



Fig. 7: → Compressed air cost calculator from Festo AG & Co. KG

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