



Endress+Hauser realizes higher level of standardization and design reuse thanks to PTC® University

Endress+Hauser, Maulburg, Germany

In many companies, development, design, and drafting are divided up among a number of different individuals or departments. Users often find it difficult to understand how their colleagues have built the CAD models, which they are supposed to continue working with.

To improve process consistency, Endress+Hauser, supported by PTC University, have standardized their design methodology and developed a tailored training program. With more than 10,000 employees and annual sales of just under EUR 1.7 billion (USD

2.3 billion), Endress+Hauser is a global leader in the provision of solutions and services for process automation in all industries, including the chemical, pharmaceutical, and food industries. The family-owned group of companies consists of approximately 100 independent companies in 44 countries, subdivided into five Production Centers (PC). The largest single company within the group is Endress+Hauser GmbH+Co. KG, based in Maulburg, Germany, which is the competence center for industrial pressure and level measurement technology. Products are sold as part of complete solutions through regional Sales Centers or resellers, which act as customers to the PCs and also bring customer requirements to the attention of the Development or Technical Marketing departments.

Endress+Hauser develops a comprehensive range of pressure and level measurement instruments in multiple variations at its Maulburg site.

“These are largely standard products, which are configured from a kit as specified by the customer and manufactured on a made-to-order basis,” explains Carsten Koch, Head of Mechanical Design in the Research and Development department.



“As we need separate approvals for almost every country, there are many characteristics that are specific to individual countries. The FDA [US Food and Drug Administration], for example, requires the use of certain sealing compounds for equipment that is to be used for producing food.”

In addition to cost-effectiveness, quality is a major challenge in developing new products, which are usually based on legacy products. Pressure and level measurement instruments have relatively long life cycles but are constantly modified to improve certain parameters or to manufacture them more cost-effectively. However, product developers are no longer responsible for such design changes. Instead, their colleagues in the Design Modifications department make these changes. According to Koch, “Staff turnover constantly requires that designers continue to work with CAD

models provided by colleagues. Working with their colleagues' CAD models is the bread and butter of the draftsmen's job. These are the people who use the models to produce drawings for manufacturing, the procurement of bought-in parts, or technical documentation.

"We use draftsmen because they spend years learning their skill and therefore have more experience than the engineers," says Koch.

Incorrectly structured models

Both the users in the Mechanical Development and Design Modifications and Drafting departments have been working with PTC Pro/ENGINEER®, the company's parametric design system, for about 15 years. It is used throughout the Endress+Hauser group to make system administration easier and to facilitate data exchange between the PCs. Users have access to approximately 100 network licenses that can be used simultaneously. Developers, in particular, spend only some of their working hours on the CAD systems.

In Maulburg, more than 200 employees, including many electronics and software developers, work in series development. Users in the Mechanics department are in the minority, but their numbers have increased significantly in recent years. The organization of initial and further training and standardization have not quite kept pace with the rate of growth.

Koch says: "Some people worked in a very structured way with the CAD systems, others less so. As a result, the quality of CAD models varied considerably." Consequently, if changes had to be made to the 3D models, team members often needed extra time to familiarize themselves with the models and more time was needed to understand the process.

To counteract these negative effects, Endress+Hauser decided, with the help of PTC University, to stipulate clear guidelines for 3D modeling.

"The decision to get the PTC training experts on board was an obvious one as we have worked closely with the company for 15 years. So, we knew that PTC University specialized in CAD and design optimization," says Koch.

Maulburg played a pioneering role in standardizing design methods, but with the clear remit of rolling out the methodology to other PCs. Notwithstanding their independence, the individual companies work together on the standardization process and try, for example, to reuse existing components in order to be able to purchase or manufacture them at a lower cost.



An associate working in research and development at the Maulburg, Germany site.



Level instruments are often placed on the lids of storage tanks.



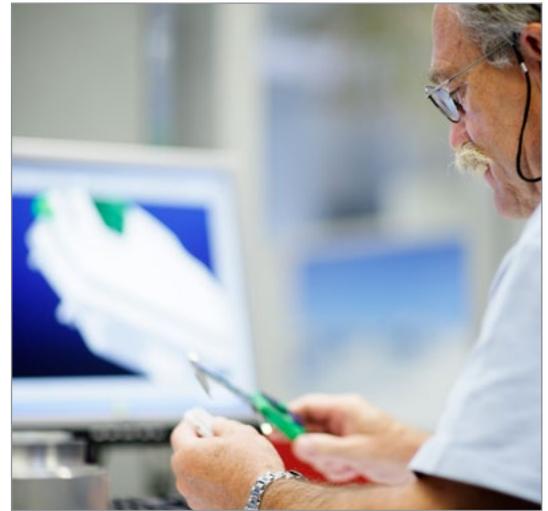
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Carsten Koch
Head of Design, R&D department

Analysis of methodological weaknesses

The PTC University consultant initially identified the methodological weaknesses in development and design by studying typical 3D models using the PTC University Expert Model Analysis (XMA) tool. XMA scans the models and analyzes their structure using several parameters from a number of perspectives. The objective is to reduce the complexity of the models and make the optimization requirements visible. Previously, the tool was used only during consultations, but it is now also available to customers as a desktop application. In a second step, the consultant conducted interviews with a range of key users in the company in order to confirm the results of the analysis and to identify the departments with the greatest need for action. It emerged that the differences in quality bothered the draftsmen in particular, as they frequently had to modify or redesign their models in order to be able to derive their drawings, as Koch explains. While this happens within a constructive dialogue, it still means unnecessary and costly extra work.

Based on the weakness analysis, the consultant worked with the CAD system administrator and a group of key users to develop proposals for standardizing the working methods. They were guided by the Best Practices for parametric design with PTC software but also took on board customer-specific requirements – not just those in Maulburg.



Housing designs of new instruments are first represented at the computer.



A tank facility at the test center in Maulburg.

“We aligned our methods with the other PCs so that they are technically applicable for everyone,” confirms Koch. “Initially it was a case of standardizing the structure of models and drawings, the alignment of components, and similar and fundamental matters throughout the company. We also defined a starting model, a familiar concept in automotive design.”

The general methods have now been released and introduced in Maulburg. In a following step, special design rules are to be defined in order to design certain components and assemblies faster and to be able to use the design models more efficiently in subsequent processes. These include rules for dealing with parametrically-structured part families and the corresponding family tables. The special methods also include the use of dummy models for generating a label for cylindrical components, for example, or for laying a cable in a room from point A to point B and deriving its extended length in drawings.

Training concept revised

Developing a standardized design methodology is one thing, and embedding it in the minds of users is another. In cooperation with PTC University, Endress+Hauser has fundamentally revised their training concept. Instead of the traditional standard and updated training courses, which in Koch’s experience, “always only reach half the participants, because the others either know the material already or are overwhelmed by it,” the focus is now on half-day workshops in small groups. “Users cannot absorb any more information over a longer period; plus, they are more interested because they are not taken away from their project work for an entire day.” Management also welcomed the idea of half-day workshops because they can be integrated more effectively into the working day.

In total, Endress+Hauser has conducted 20 workshops on different topics as part of the Precision Learning Program (PLP) run by PTC University. Starting with Basics, which really should be familiar to all users, the workshops also include special topics, which previously had not been systematically taught. To determine the training requirements of individual users, their level of knowledge was ascertained through interviews. The level of knowledge that users were expected to achieve was also determined. This delta could then be systematically addressed in the workshops. Each user attended an average of six workshops, divided over two installments. Of course, good designers did not have to attend workshops covering basic topics.



An open dialogue provides new incentives.



For a long time Liquiphant has been successful on the global market.



New instruments are the result of team work.

“After some initial skepticism, the changes were viewed positively by most users,” Koch confirms.

Koch is sure that the standardized design methodology in conjunction with the new training concept, will quickly lead to a better quality of data in design. To determine whether the new methodology has also been adopted, Endress+Hauser will have the model quality analyzed again next year by PTC University. The company also plans to introduce PTC® Creo® ModelCHECK™, which can be configured in a way that compliance with the methods is automatically checked before the files are released. The reason for this is not to check up on employees but to give them the opportunity to check themselves, something that Koch emphasizes as a final point. “We do not want to put people under unnecessary pressure.”

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