

# Control Complex Processes Easily

## *Tutorials Directly on the Operator Panel of the Injection Molding Machine*

With advanced process integration and a higher degree of automation, the complexity of injection molding processes is cumulative. This trend also increases the demand imposed on control technology. The clearer, more convenient and more intuitive the control system is for the operator, the safer and more efficient it can be to operate even large production plants and manufacturing cells that combine different technologies. Engel now goes one step further with tutorials integrated directly into the control of the injection molding machines.



The CC300 control is the interface between the injection molding machine and the plant operator. If the operator feels comfortable in the control environment, he can get the most out of the machine (© Engel)

The CC300 control is the interface between man and machine, between machine operator and injection molding machine or production cell. Consequently, it is not just technology that is in-

involved here, emotion is also a factor. If the machine operator feels comfortable in the control environment, he can work even more efficiently and more safely, produce higher quality and is motivated

to get more out of the machine. The control's large touch screen automatically encourages the user to swipe with the fingers and navigate intuitively through the pages (**Title figure**).

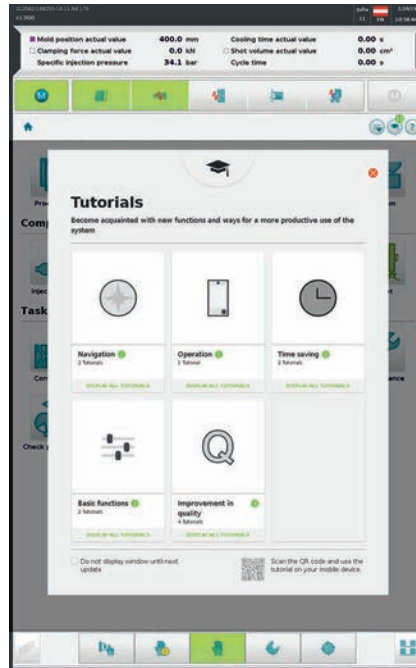


**Fig. 1.** Components and tasks are combined on a common page in the new interface. This improves clarity and saves time (© Engel)

### Intuitive Operation and Clear Menu Navigation

With the CC300 control from Engel Austria GmbH, Schwertberg, Austria, complex, highly integrated production units can be as easily controlled as a smart phone. In addition, the machine operator can control every movement through a single rotary knob operation, known as the e-move. Machine and robot movements can be controlled not only precisely but variably. The more the operator deflects the knob, the faster the system moves – similar to the function of an accelerator pedal. Engel presented this new operating concept for the first time at K2013 and has been continuously developing the CC300 ever since. In this regard, feedback from the customers plays an essential role.

On the occasion of the CC300's fifth anniversary, Engel presented the control system at Fakuma 2018 with a further optimized navigation system. For this purpose, the developers systematically analyzed the usability context as part of a user-centered design process (UCD) and implemented the new requirements in a prototype. The new features were evaluated with test users and investigated for their usability in tests. Particularly regarding software solutions, it is the many



**Fig. 2.** With tutorials directly available in the control, Engel takes the next big development step. Eleven tutorials are currently available; they are divided into five main topics (© Engel)

minor adjustments that provide a significant improvement.

With the revised navigation, response times have become shorter, and the more clearly organized system structure also helps to save time. Several factors contribute to this:

- The fact that all components and tasks are combined on a common page (Fig. 1),
- the so-called breadcrumb navigation, which shows the user at any time in what branch he or she is located in an application,
- the clearly recognizable Home button, as well as
- the possibility of quickly calling up the menu items "Production" and "System" with a swipe gesture from the edge of the display.

The use of favorites has also been improved. It is now intuitively possible to create, edit and delete favorites.

### Crash Course on the Control Display

The tutorials, which can best be compared with crash courses, are a totally new feature. They offer more than a manual, but are not equivalent to the help function, because here the operator must already know what he wants to look for.

Integrated into the CC300 control, the tutorials offer high usability; the machine operator is informed directly at his workstation, he does not have to first access the Internet via an operating computer or his private smart phone, for example.

As soon as the operator logs on to a machine, he is automatically informed if, for example, an update has been installed during his absence. The same thing happens if a new machine is placed in service, but the employee was last trained on a machine with an earlier control version. In these cases, he can inform himself of the changes and the new possibilities in the tutorial. He can decide for himself whether he wants to start the tutorial immediately or at a later point in time or whether he dismisses it completely, since he may already have been informed by his colleagues or through a training course. In this manner it is possible to efficiently ensure that even large teams are on the same knowledge level.

### Quickly Record and Retain Information

A prerequisite for a high usability value is that the information imparted via the tutorials must be learned very quickly and efficiently. Consequently, the scope is strictly limited and the operator can move through the pages at his own pace. The tutorials work with many photos, graphics and minimal text. In collaboration with a leading European institute in the field of human-machine interfaces, with which Engel developed the tutorial concept, this has proven to be the best solution. Shortly after the first presentation of the new tutorial concept at Fakuma 2018, Engel made eleven tutorials available (Fig. 2). They are divided into five main topics:

- Operation,
- basic function,
- navigation,
- increasing quality, and
- saving time.

The control offers tutorials on topics that are also available on the injection molding machine or in the production cell. If a company upgrades a feature for which there is a tutorial, the tutorial offering is automatically updated. In the future, the Engel customer portal, e-connect, will provide an overview of all available tutorials. Here, the machine operator can »

obtain information online at any time and from any location.

For example, the Time Saving section includes tutorials that help system operators increase the productivity and availability of the injection molding machine or production cell by shortening setup times. If the injection molding machine is equipped with a Setup Wizard, the operator will find the appropriate tutorial here.

### *Interactive through the Sequence of Events*

The Setup Wizard is software that interactively guides the machine operator through the specific steps required for tool change. Many program steps are processed automatically. Manual work steps must be acknowledged in the control. This means that even less-experienced employees can safely exclude the possibility of process errors. As the demand for the digital Set-Up Wizard (which is offered for injection molding machines of all Engel product series) is increasing, the tutorial was one of the first to be developed (Fig. 3).

The tutorial explains how to activate the menu-driven tool change and how to track the progress of the process. Then the tool change workflow is discussed. The system shows which control page the operator can use to track this process and see what set-up step the machine is currently executing. The tutorial explains how dialog messages prompt the operator to perform manual tasks and how to acknowledge these prompts after completion. To make the usability of the Setup Wizard transparent, the Setup Wizard shows how much time each individual setup step requires.

The tutorial has a separate page for employees, who are responsible for opti-



**Fig. 3.** The Setup Wizard is software that interactively guides the machine operator through the individual steps of a tool change. This tutorial is one of the first that Engel developed (© Engel)

mizing setup times in the plant. This makes it clear how the tool change sequence can be run-through in teach mode, which can only be reached in a specific user level.

### *Tutorial Offering Keeps Growing*

Engel provides all tutorials in 32 different languages, in accordance with its CC300 control. With continuous development of new products and machine features, the number of tutorials continues to increase. From the summer of 2019 onwards, the tutorials will be standard for all new machines. Machines in the field can be retrofitted. ■

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