



control



Series

ENGEL victory
ENGEL e-motion
ENGEL e-max
ENGEL duo
ENGEL speed
ENGEL combimelt
ENGEL insert
ENGEL elast / LIM
ENGEL PETsystems

Integrative technology

ENGEL robot
> ENGEL control

Services

ENGEL training
ENGEL e-factory

Application technology

ENGEL application technology

Business units

ENGEL automotive
ENGEL teletronics
ENGEL packaging
ENGEL medical
ENGEL technical moulding

Summary

ENGEL portfolio

Language

german
> english
russian



ENGEL

be the first.

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ENGEL EC 200 / CC 200 – the control unit for ENGEL injection moulding machines

ENGEL injection moulding machines are your guarantee for economy and productivity. The EC 200 / CC 200 control unit impresses with exemplary ergonomics including a touch screen, tilting control panel and a large, bright screen. The well-known ENGEL control unit logic and familiar elements from the PC world make for intuitive use. A variety of options give customers the ability to add functionality for complex processes. The RC 200 robot control unit can be fully integrated. Further interfaces permit trouble-free communication with peripherals, process data acquisition and quality data documentation, putting the EC 200 / CC 200 into a perfect position to master future challenges.

Tried-and-trusted control unit, optimised to meet new challenges, open for the future

- > Standardised, intuitive and logical control interface for all ENGEL machines and robots
- > Traditional and familiar ENGEL controls, adapted to reflect the world of Windows®
- > Input via touch screen, functional graphs or keyboard pop-ups
- > Tilting terminal for best-of-breed ergonomics
- > Bright, colour touch screen now with 15" diagonal format
- > Free programming of cycle sequence via graphical modules
- > Large selection of interfaces to industry standard peripheral units and the PC world
- > Comprehensive help functions

The EC 200 and CC 200 control units offer the same basic functions and the same control logic, however, with different features and options.

ENGEL machines are equipped either with the EC 200 or the CC 200 control unit depending on the series or their year of construction. The available options and custom programmes also depend on the series and year of construction.

The control panel: New design, optimised ergonomics

control



Basic functions

- Switch on
- User identification
- USB interfaces

Settings: Clear cut control logic

The control logic for the machine and robot support simple programming of an individual cycle sequence without special programming skills. To support this, the cycle sequence for the injection moulding process is subdivided into separate basic sequences. These basic sequences – mould closing, injection and opening – along with the additional sub-sequences are mapped to characteristic pictograms.

Function library for easier programming

A comprehensive function library provides a range of selectable code blocks. Customers can easily compile sequences by adding or removing blocks. „Drag and Drop“ gives users the ability to select functions from a menu and integrate them with the sequence for serial and parallel execution.

Dialog-based customisation supported

To change a parameter, users simply press the corresponding dialog box on the touch screen and change the setting (e.g. for clamping force, closing or opening speed etc.). A plausibility check occurs after saving the modified data set to prevent programming errors.

Controls

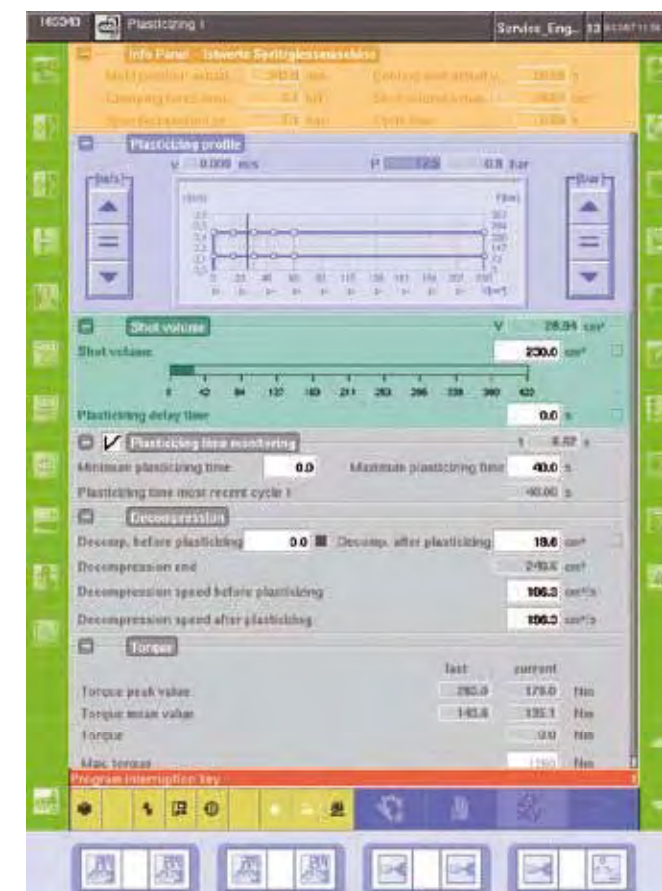
Flexible configurable keys for individual machine functions.

Set of fixed keys for standard functions.

15" colour touch screen

The most obvious innovation with the ENGEL EC 200 / CC 200 is the larger, centrally located, bright 15" colour touch screen.

The screen reflects a Windows®-orientated usability philosophy that makes it easier for newcomers to learn how to navigate the controls. Just tap on a menu item to control the machine. Various input texts and graphical input functions accelerate the process of customising the injection moulding machine and integrated robot settings for the task in hand. Freely programmable machine sequences make it easier to customise settings for complex demoulding processes, special processes and special technologies. A help system with graphics supports operations and maintenance of the injection moulding machine.



Clear-cut screen layout

Freely definable info panel displays actual machine and process data on any screen

Graphical display and setting of pressure and speed profiles

Variable groups: also freely definable

Screen selection and function keys

Warnings and current messages

Status display for basic functions (drive motor, heating, etc.)

Program keys for modifying and displaying the current operating mode (setup, manual mode, or teach mode, semi- or fully automatic)

Flexible configurable keys for individual machine functions



Ergonomics in detail: safe and convenient setup

Numerous functions, options and accessories facilitate and accelerate the setup process of the ENGEL machine and the ENGEL robot with the EC 200 / CC 200 control unit. Thanks to clear-cut screens, the ergonomic layout of the control elements, and logical structures and sequences, the machine and robot support intuitive controls and setup.



Text and numeric input

If you need to modify numeric or text-based parameters, screens with numeric or alphanumeric input pads, and dialogue window pops up, and disappears again after completing the entry.

The alphanumeric keyboard is just like the keyboard on any PC. The numeric input pad layout is also just like that of the numeric block on the PC keyboard.

Machine operators, who are unfamiliar with the machine, but have PC skills, will be able to set up the machine quickly and safely.

Freely programmable screens

ENGEL control units give users the ability to add display modules and functions to existing screens, or to create completely new screens. A special Mask Editor on the EC 200 and the CC 200 simplifies this process.

You can add variable groups to existing masks, and then add actual values, target values, markers or switches to the variables groups. New screens are compiled using a special function. New screens and inserted variables groups can be labelled with freely assignable titles.

These functions help the operator to customise the display to match his personal requirements or those of the company.

Ergonomics in detail: safe and convenient setup



Privilege system with RFID technology

Anybody who wants to enter or modify parameters or settings on the machine, must first log in on the control unit using a special user ID. Every user is assigned a language, user name and user level. The higher the user level, the more privileges the user has.

To identify the user, you can either use a user access card, or log in by entering a valid password on screen. The user access card stores the user's credentials. It relies on contactless RFID technology. The user simply holds up the card to a sensor on the control panel, and is automatically identified.

Changes made at the machine are automatically logged by the control unit, along with the date and time. If the user has sufficient privileges, he or she can create new user accounts, manage or delete users, and programme new access cards directly at the control unit.

The RFID access system speeds up the user login process, and protects the machine and robot against incorrect settings by untrained staff.

Notepad

The EC 200 / CC 200 control unit gives users the ability to add notes to mould data sets. The notebook function gives you the ability to store specific information for production use in a safe and clearly visible way. You can even establish your own mould and production process-related help system.

An overview displays the messages along with their headings and the name of the author. Selecting a message displays its content. Of course, you can modify, store and delete notes.



Context-based help system

A help system with graphics supports operations and maintenance of the injection moulding machine. Pressing the help key pops up a dialogue with targeted support, explanations or instructions that always refer to the current function.

The help system can distinguish between screen, variables, alarm and programming help:

- > Screen help provides a general description of the functional unit and/or programme.
- > Functional descriptions and setup tips for the parameter in question are provided by variables help.
- > The alarm help function describes the cause and remedies for an alarm.
- > Programming help assists developers with any instruction available for machine and robot sequences.

If this information is insufficient, or if no entry is available for the selected screen or variable, an index of available keywords gives the user a context-based search function. Control functions can also be viewed.

Setting profiles by moving points and lines

Many machine function parameters can be set in different ways.

- > Fast adjustment using the adjust keys helps users to raise or lower standardised functional profiles proportionally.
- > The pop-up window with the numeric keypad gives users the ability to enter numeric values directly.
- > And the touch screen is a particularly convenient input setting tool: After expanding the graphical window, you can modify the parameter profile on screen with your finger tip or a stylus. This means that you can move profile key points or the whole characteristic between two points.

These options give every operator the ability to modify parameters in the way he/she prefers. Changes are immediately visualised in the graphic.



Flexible Machine and robot sequence: simple and safe configuration of complex process

The freely configurable machine sequence supports simple, individual configuration of sequences throughout the injection moulding cycle. Programme sequences can be created, visualised and modified using graphical tools.

- The machine sequence is divided into three subsequences
- > Mould closing
 - > Injection and
 - > Mould opening

Customised complete sequence

You can set up various movements and instructions for ENGEL machines and integrated ENGEL robots in these sequences, drawing on a set of functions to compile an individually customised complete sequence. Customised complete sequences are not only definable for the machine, but also for the robot.

Clear-cut overview

The machine and robot sequences visualise the individual movements of the machine and robot step by step. The three sequences contain the individual program steps. For each program step a short text, and the matching parameter, can be displayed or hidden. Subsequences for machines and robots can be freely programmed. This makes complex sequences easier to read.

Factory default standard sequences

The machine sequence is part of the parts data set and is stored along with the data set. ENGEL supplies its machines with pre-defined standard sequences which are stored as parts data sets. Depending on the machine's equipment and the associated programme steps, we may supply multiple data sets.



Machine sequence at a glance

Freely definable info panel displays actual machine and process data on any screen

Function library can be hidden after creating the sequence

Parallel sequence steps are displayed adjacently, and serial steps one after another

Status display:
Green checkmark: executed
Green arrow: step currently in progress

Quality control at a glance: critical parameters under control

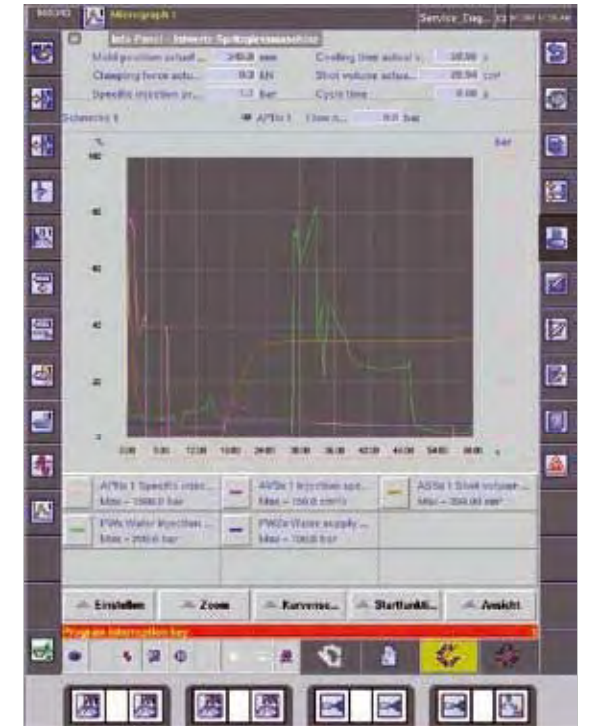
control

100% Quality thanks to Micrograph

The Micrograph module gives you the ability to log quality-related process parameters for analysis, optimisation and monitoring of the injection moulding process. These are mainly the injection parameters such as injection pressure, injection speed, nozzle stroke and internal mould pressure.

Micrograph analyses the acquired parameters to give you an objective, immediate and fast evaluation of mould quality and process stability.

A signal to, say, a quality gate or a robot means that you can separate out defective parts as rejects directly at the machine.



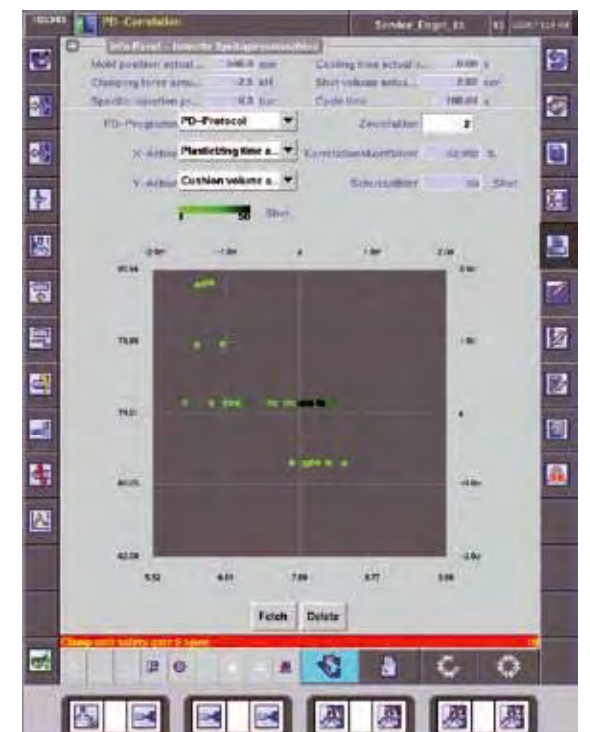
Safety thanks to process data acquisition

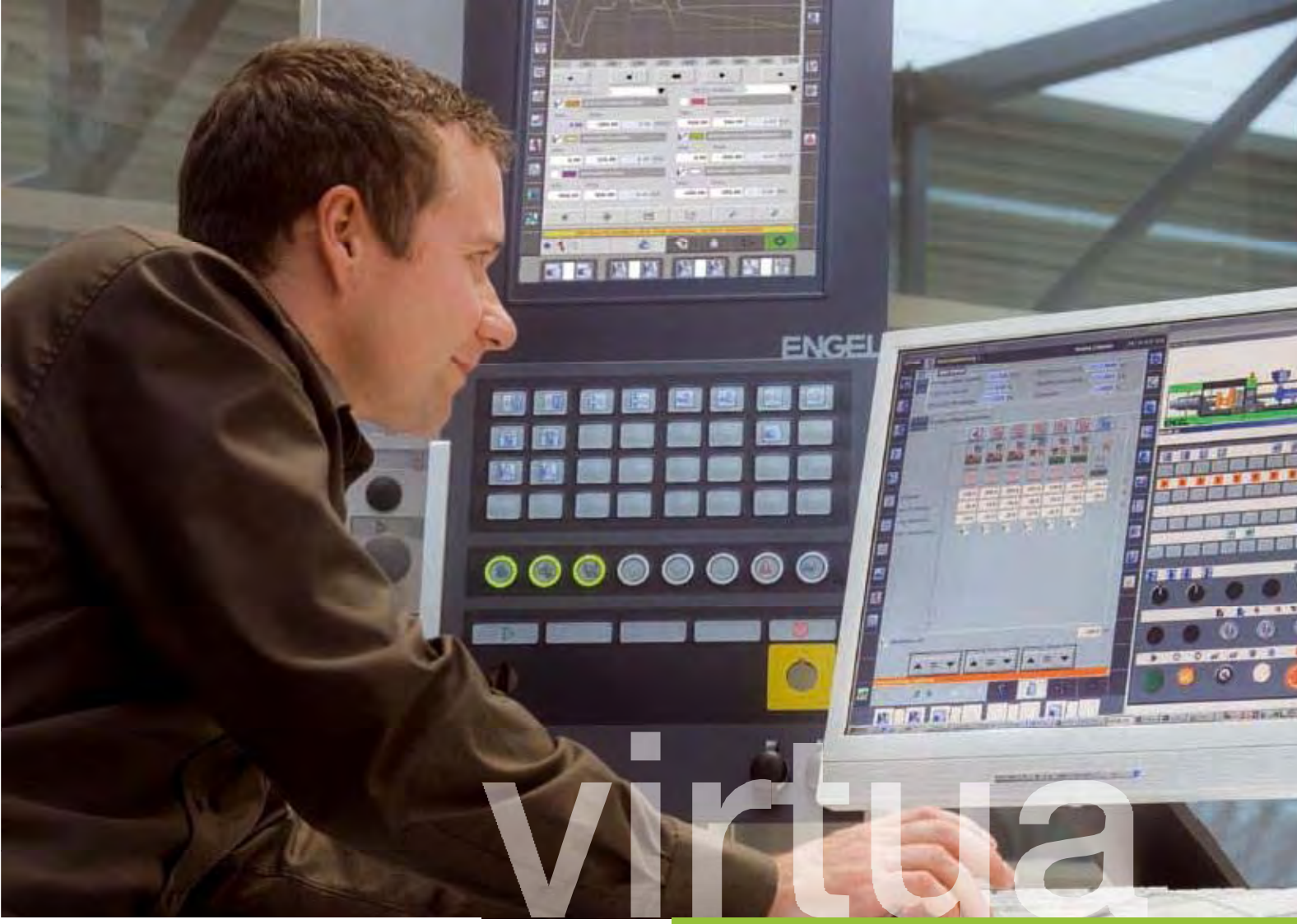
The ENGEL process data package supports numeric and graphical logging of process data measured by the control unit. Inline quality metrics help you analyse, monitor and document the injection moulding process.

Machine and process capabilities can be measured and analysed by various programmes:

- > **Process data log** for logging of process data at the machine; stores data for future processing on a PC
- > **Process data graph** for simultaneous logging of multiple process parameters as graphs for convenient analysis of interdependencies and deviations
- > **Process data monitoring** for online monitoring of quality thresholds; calculates statistical values such as mean values, standard deviations and machine capability key data (Cm, Cmk)
- > **Histograms** that display deviations of quality-related process parameters and reveal the cause of fluctuations
- > **Correlation graph** displays interdependencies between two selectable process parameters

Process data acquisition is an important tool for customer-facing quality documentation within the scope of your quality management.





RC 200:

Robot control unit for integrated or stand alone operation

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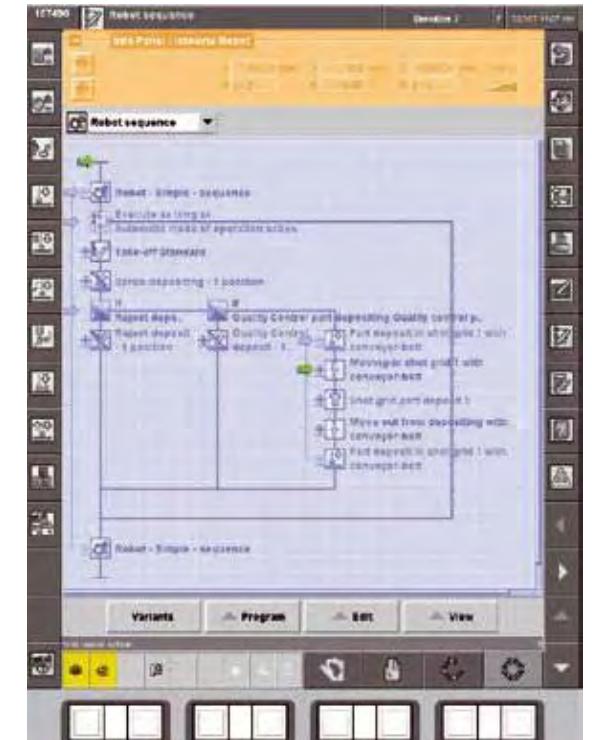
Robot sequence at a glance

Freely definable info panel displays actual machine and process data on any screen

Parallel sequence steps are displayed adjacently, and serial steps one after another

Green checkmark: executed
Green arrow: step currently in progress

Function key for toggling between the robot and machine sequences

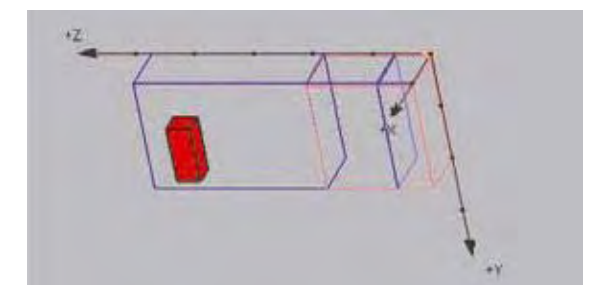


ENGEL ERC linear robots include the RC 200 control unit. This can be fully integrated with the EC 200 / CC 200 control unit on your ENGEL injection moulding machine, however, it still supports stand-alone operations on ENGEL machines with older control units or machines by other vendors.

Integrated operations with ENGEL robots

ENGEL machines equipped with an ENGEL robot are supplied with the robot control unit integrated with the machine control unit. This offers a number of advantages:

- > The machine and the robot are set up using a shared terminal with integrated screens. The robot can be controlled using a separate mobile control device.
- > Machine and robot control unit have the same control logic and the same look-and-feel.
- > Mould and robot data sets are stored together.
- > Extremely fast data transmissions between the robot and the machine support real-time communications. This means that you can, e.g., synchronise movements of end-of-arm tooling and the mould.



Simple and fast definition of work areas

A work area is the space in which the robot is permitted to move, in contrast to the prohibited area, and undefined areas, in which the robot is not permitted to move.

Work areas can be defined in an intuitive 3D view using the EC 200 / CC 200 control unit. When you deploy a new mould, you must create a set of spatial data for the machine, removal and work areas, and for the depositing area. These data are stored with the mould data sets.

Work space monitoring with work areas and optional user areas add safety and prevent operator errors.

Stand-alone operations with ENGEL robots

A manual control device with an integrated touch screen is available for stand-alone operations with ENGEL robots. The manual control device is also available as an option for robot control units integrated in the machine control unit. It shows users the same screens as the EC 200 / CC 200.

Fast tooling:

Taking on the next job on a virtual machine

The unique Virtmould simulation programme visualises the complete operating unit including the EC 200 / CC 200 control unit and the RC 200 robot control unit on a PC. It is completely identical to the machine and robot software.

This means that you can edit, create, check and test mould data sets, along with machine and robot sequences in a simulated environment, safely, and independently of the machine control unit. Even fatal operator errors can't possibly damage the virtual machine.

The mould data sets you create on the virtual machine can easily be transferred to the machine's control unit. A normal PC with Windows® 2000 or Windows® XP is all you need.

Mould data can easily be transferred between the machine and the PC using a USB memory stick or a CompactFlash card. If you connect multiple machines to a Virtmould version, you simply read the data for the new machine and the new mould data set.

The virtual injection moulding is a very successful training tool, under its ENGEL e-trainer label. ENGEL's e-trainer was accoladed in 2005 as one of the seven most innovative training concepts by the Otto-Wolff Foundation and DIHK, Association of German Chambers of Industry and Commerce.

The virtual machine is available as an optional extra, if your machine does not include it as standard equipment.

EC 200 / CC 200 options: equipped for any challenge

The EC 200 and CC 200 control units offer the same basic functions and the same control logic, however, with different features and options. The available options and custom programmes also depend on the series and year of construction. The selection of interesting options for the EC 200 / CC 200 shown here may be part of your machine's standard equipment. The current brochures for the machine series provide details on standard equipment and the available options for each machine.



Ethernet interface for network communications

The standard Ethernet interface gives the ENGEL injection moulding machine access to your enterprise network. This supports

- > the exchange of data with PCs
- > information technology networking of injection moulding machines
- > the use of printers and drives on the network

At the same time, this interface is required for

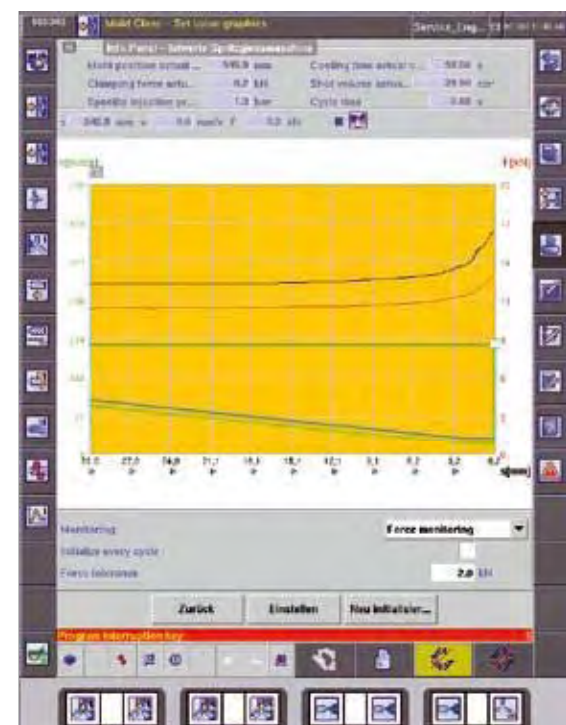
- > the use of centralised operation and process data acquisition, ENGEL e-factory,
- > linking to PDA and MES systems, databases and expert systems
- > remote control and service functions

Simple integration of peripherals

The EC 200 / CC 200 is equipped with interfaces to support communications with external peripherals.

For example, the temperature control device closed loop control is autonomous, but it receives the target values for temperature, maximum deviation and reduction from the machine control unit. Conversely, it feeds actual values, heating and cooling performance, operating mode and error messages back to the machine control unit.

Other peripheral units, such as modules for gas injection technology – ENGEL gasmelt –, or water injection technology – ENGEL watermelt, material feeding units and conveyor belts can all use interfaces to the machine to guarantee performance that is perfectly geared to your production needs.



Autoprotect

The Autoprotect programme is an effective, fast-response mould protection system.

On mould closing, the control unit compares the current force or speed characteristic in the mould protection area with a stored reference characteristic. If the actual force value exceeds or drops below the configurable tolerances in the reference characteristic, the mould protection alarm is triggered. The reference characteristic is recorded at the start of production, or it can be redefined from cycle to cycle, to use the last cycle as the reference for the next one.

Autoprotect is also available for the injection unit. It protects the mould against overmoulding in the best possible way. To do so, it compares the actual value of a relevant process parameter with the stored ideal characteristic, immediately detects deviations above a configurable threshold, and triggers the configured response. You can log and monitor two parameters at the same time with individual monitoring of each characteristic.

Programmable inputs and outputs

Programmable outputs give the EC 200 / CC 200 the ability to control and communicate with peripherals, and allow them to influence machine sequences by means of external signals. Almost any number of digital inputs and outputs can be implemented as optional extras and programmed to support your individual needs.

Machine sequence stages such as cycle start, mould closing, mould opening, ejector advance, ejector retract, move-in core, or move-out core are all signals that are useful for controlling peripheral units. Process data acquisition systems also need machine signals. And these signals are provided by means of programmable outputs.

Thanks to programmable inputs, machine or peripheral unit movements can be blocked or released, based on configurable conditions.

