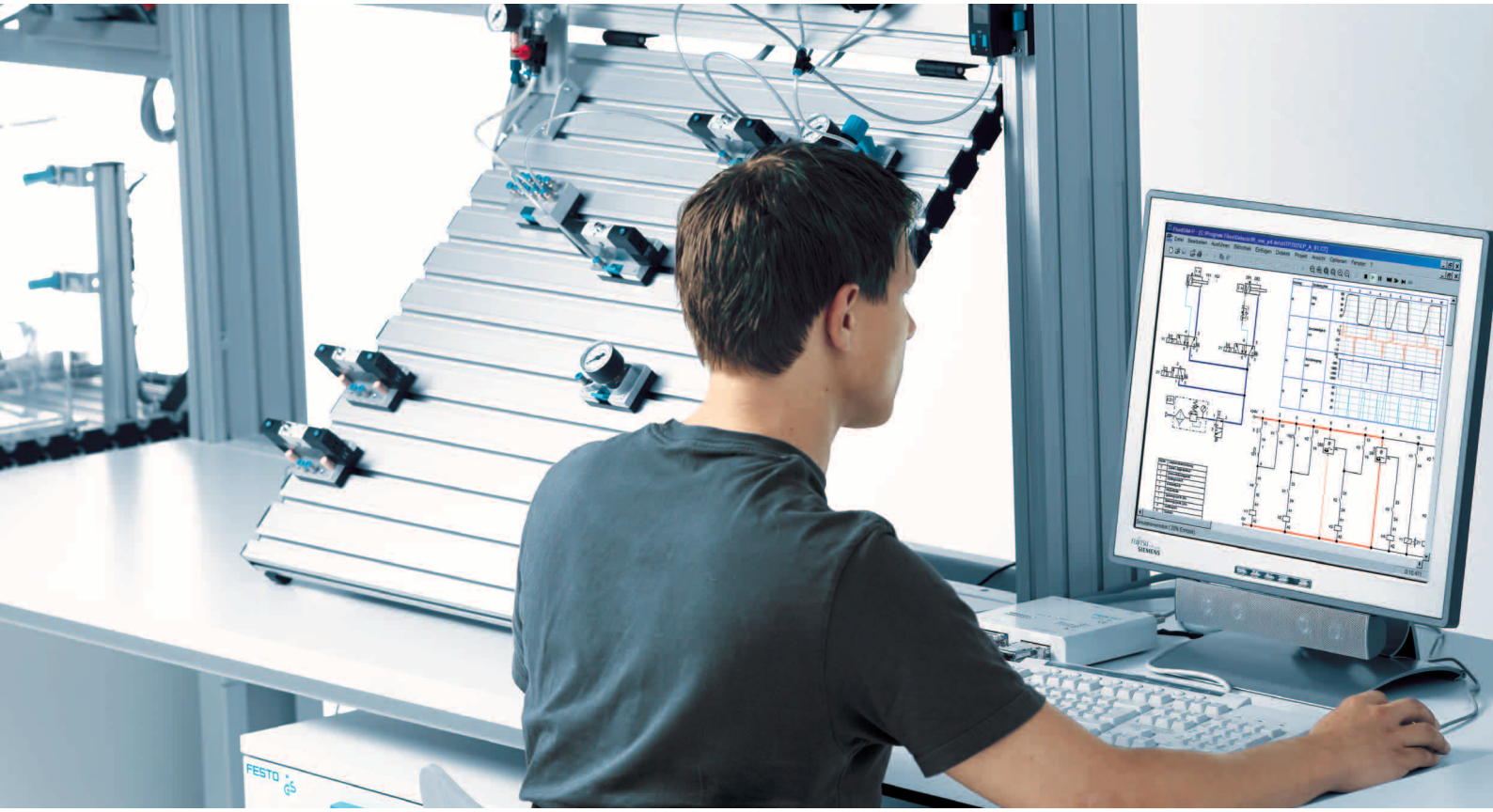
FluidSIM® 4

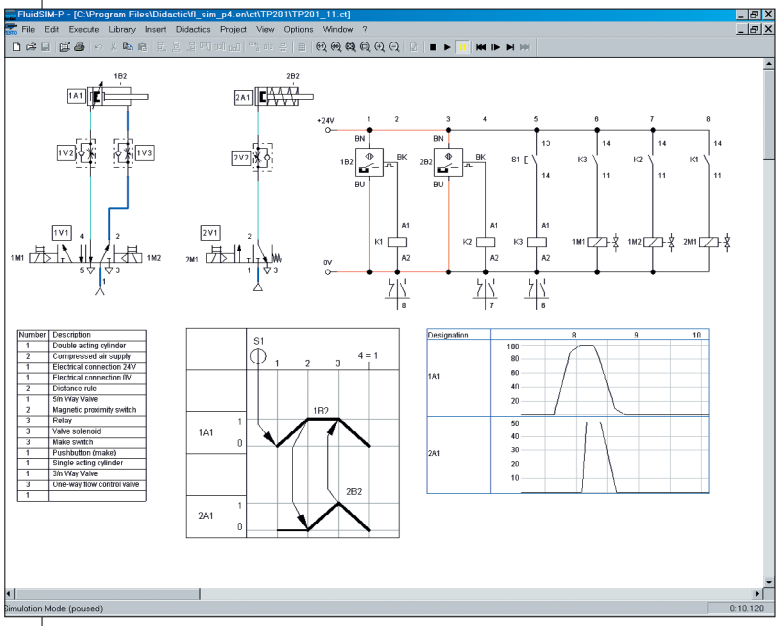
The training-all-rounder

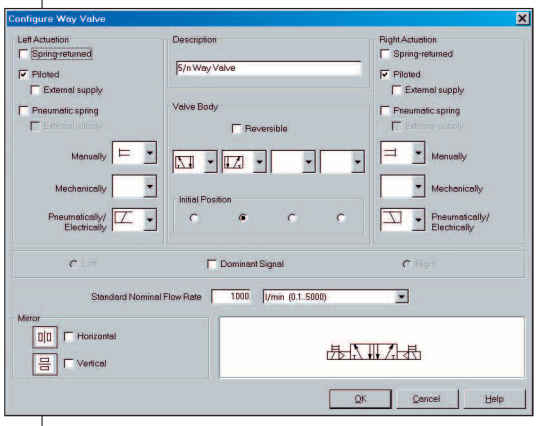


Two outstanding companions for successful training:
FluidSIM® 4.0 and the poster set for pneumatics and hydraulics

Draw like a CAD pro

The speed is no magic





We are constantly amazed at how quickly, easily and intuitively students create circuit diagrams using FluidSIM®.

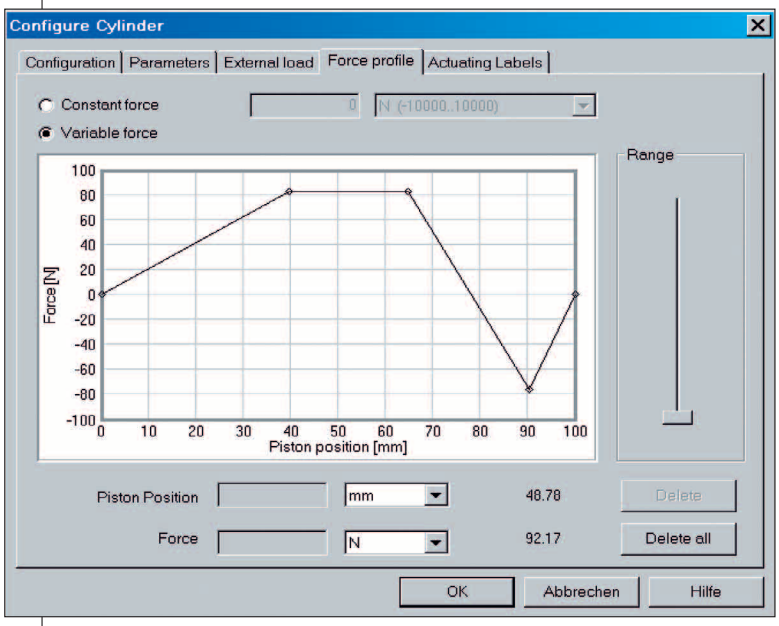
This is good, since the important thing is not so much the creation of the drawing but rather the design of planned functions and experimentation with the actual circuit diagram. So don't hold back from using all the excellent features:

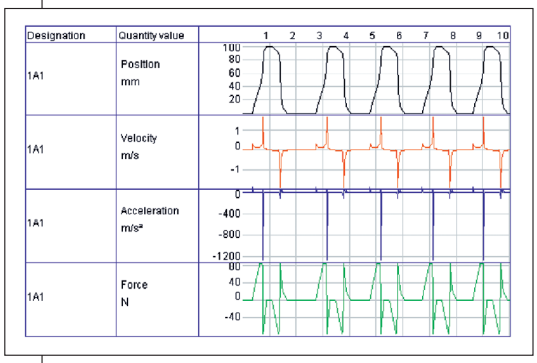
- Key commands and **standard Windows® editor functions**:
  copy and paste, aligne, groupe, rotate, mirror ...
- Like magic:
  Optimised wiring, placing of the designations and labels, error analyses
- Many new components and now the convenient option of creating your own **symbol library**
- Simple **key commands to view**
  pressure (P), current (I), voltage (U), force (F) and others
- Automatic **parts list, current path numbering and terminal allocation list**
- **Configurators for cylinders and valves**
- Editor for **status diagrams**
- Universal **printing functions** and **export via TIFF or DXF**
- **Import function** for DXF files

➔ You are sure to find more tips – even without the handbook!

Physical experiments

Advantages of dynamic simulation





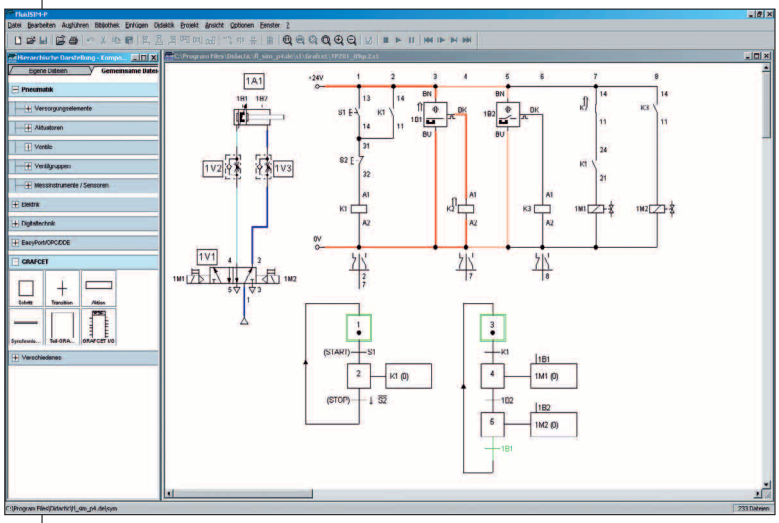
All status variables are dynamically (continually) calculated. In this way, pressure build-up, acceleration and inertia can be precisely simulated. This becomes very interesting if you experiment with cylinder configuration and change one or another variable, for example:

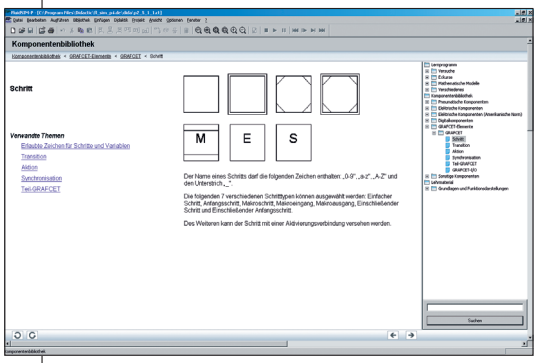
- The external **load** to be moved
- **Inertia** of the moving mass
- **Angle of installation** and therefore the effective applied load
- **Static friction**, Newtonian and Coulombian **sliding friction** of cylinder pistons and moving masses. This allows you to simulate the stick-slip effect.
- For cylinders with spring return:
  The proportional spring force for the **spring rate**
- A graphically created **force profile**
- **Leakage** due to leaky seals
- The **end position cushioning**
- The **volumes of the cylinder chambers** as they change during piston strokes for pressure build-up

→ Examples of circuits to simulate the stick-slip effect, for instance, can be downloaded from the service area of our home page: www.festo-didactic.com

GRAFCET – DIN EN 60848 made intelligible

As of version 4.1: GRAFCET editor and simulation





Be confident and well prepared thanks to a dynamic explanation of the new standard. GRAFCET is the new graphic specification language which describes the logical performance and sequence of a control system or a process – regardless of technical conversion in terms of software or hardware.

The GRAFCET editor in FluidSIM® provides the necessary symbols, the simulation clearly demonstrates the sequence and the comprehensive help texts quickly indicate exactly what needs to be taken into consideration when creating a GRAFCET.

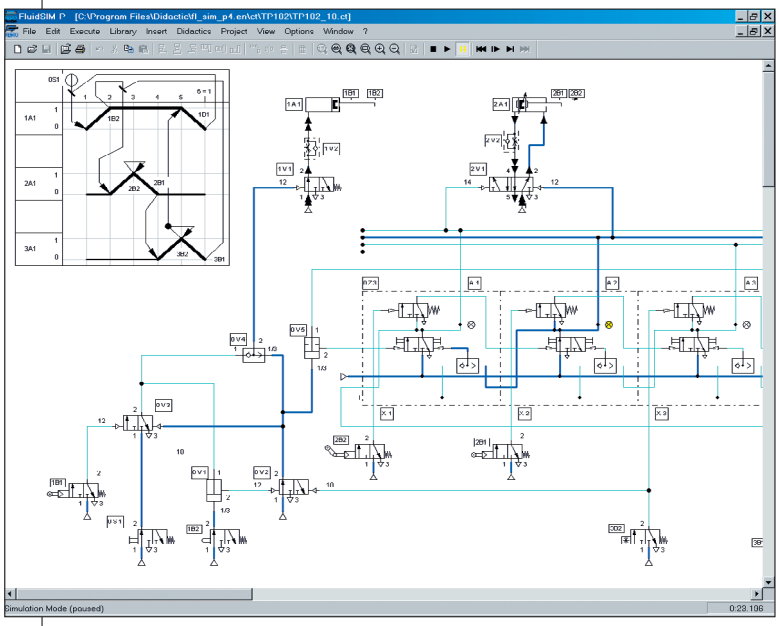
Unique features

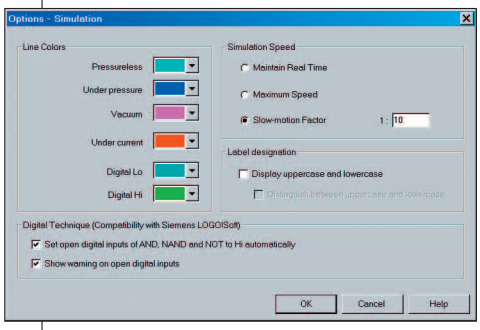
- All elements exactly in accordance with DIN EN 60848
- Simulations of GRAFCET, pneumatic and electrical circuit sections on a single sheet
- Editor and simulation in the pneumatic and the hydraulic versions
- Extensive description of all GRAFCET elements in the help function
- I/O interface between GRAFCET simulation and the external world of 24 V
- Free update from 4.0 to the current version with GRAFCET editor on the Internet

➔ Just using GRAFCET is one thing.
Understanding GRAFCET and making good use of it is something else. The WBT for GRAFCET! Demo and information on the Internet.

Simulating in real time

Handles high speed easily





➔ The running simulation clock shows when the simulated events would take place in reality. If the hardware is fast enough, FluidSIM® will even simulate in real time.

The circuit model on the left contains more than 5,200 variables, of which 1,500 are continually changing. In a simulation, an integration procedure has to calculate 110 status variables (pressure, position, speed, etc.) at an accuracy between 1 in 10^6 to 10^9, which must be maintained in relative and absolute terms.

To do this, about 1.8 million equations have to be carried out for each second of simulation time. In this example, there are also about 80 switching operations per second (opening/closing valves, cylinder stops, etc.) which lead to the integrators having to be stopped and reset.

To enable you to follow what is happening, FluidSIM® offers several options:

Simulation

- Slow-motion setting
- Simulation in discrete steps
- Simulation in steps between status changes
- Variable colour settings for different circuits

View

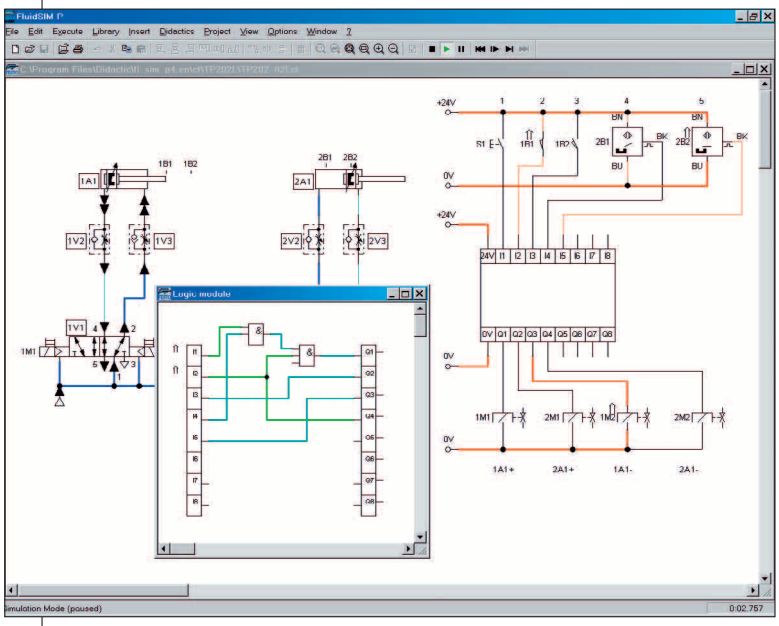
- Zoom view
- Show direction of flow
- Show/hide status variables

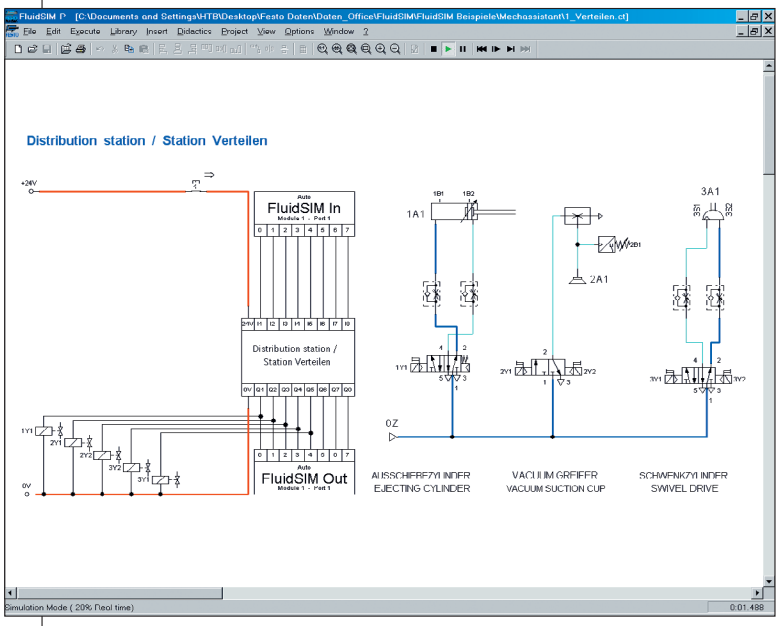
Analysis

- Dynamic status diagrams
- Variable steps for the exported status diagram protocol

The virtual digital mini control system

Up to 16 inputs/16 outputs for connections to the outside world





→ The simulation is, in any case, an economical and very flexible addition to the real world use of control systems or processes.

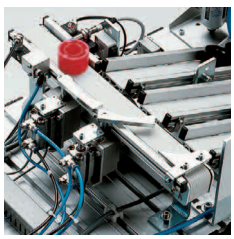
The **route to expertise in mechatronics** could look like this:

- Basic principles of control technology
- Pneumatics
- Electrical
- Relay technology
- Electro-pneumatics
- Digital technology
- PLC technology
- Field bus layers and higher positioned network layers

FluidSIM® will accompany you all the way up to digital technology and provides you with a proper mini control system in the form of the logic module which can use up to 16 inputs and outputs. And there's more: With the EasyPort, you can use the logic module in **FluidSIM® as a real control system** – for example, for the sorting station from the MPS® modular production system.

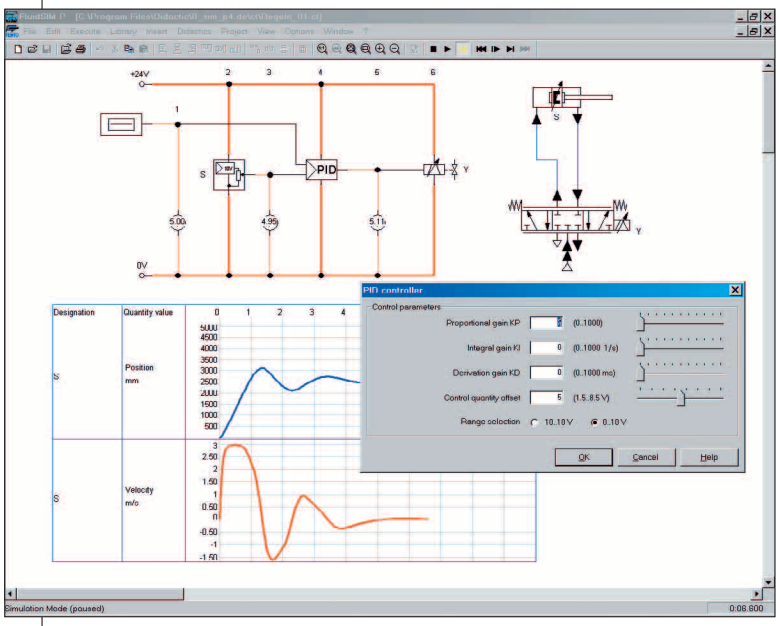
Further options

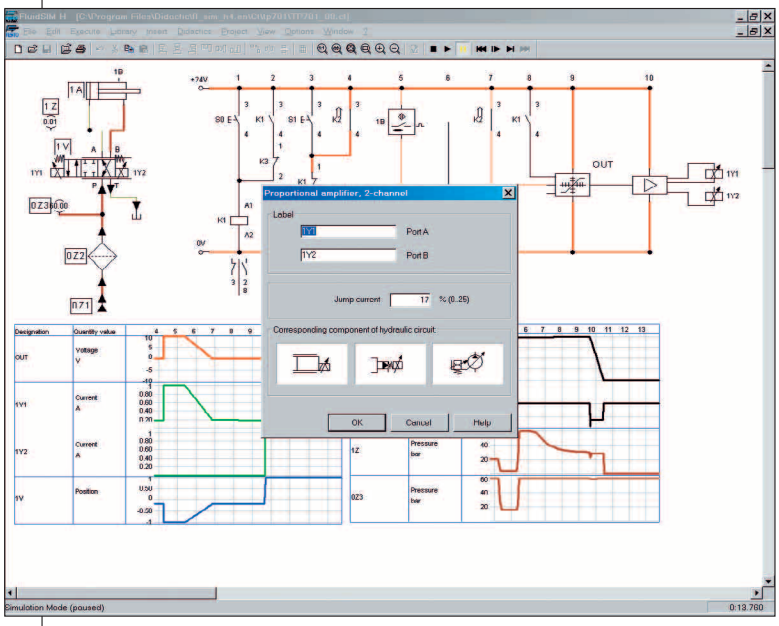
- Control of a simulated power section in FluidSIM® with any PLC (via EasyPort)
- Control of the same power section with the PLC simulation PLCSIM from STEP 7 (via OPC)



Closed-loop control and proportional control systems

The simulation makes relationships clear





Two developments are closely associated in pneumatics and in hydraulics: **miniaturisation** and the **increased use of closed-loop control technology.** The installation of displacement encoders directly in/on drive units and the development of compact electronic control technology ensure **low-cost and adaptable solutions**, for example, in handling technology.

FluidSIM® 4.0 offers you everything you need for an especially clear instruction in control technology:

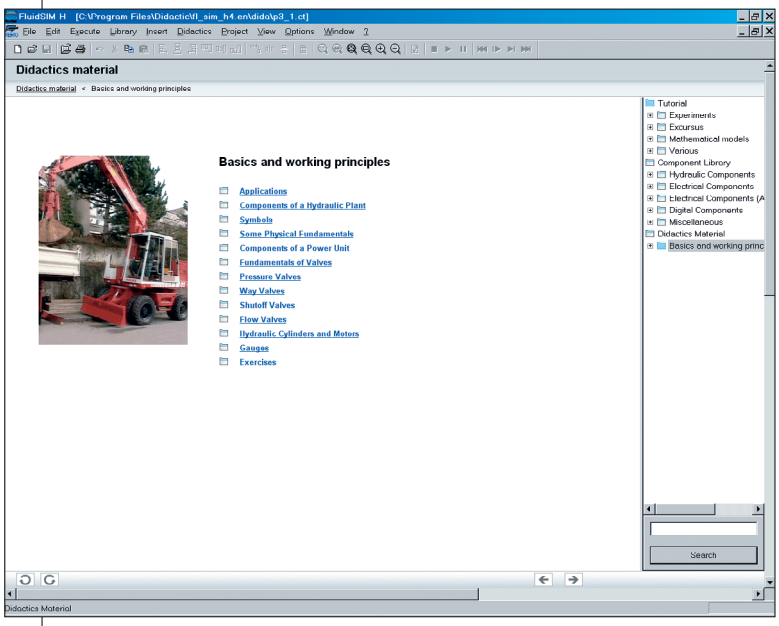
- Proportional directional control valve
- Proportional pressure regulator
- Proportional amplifier
- Setpoint card
- PID controller
- Configurable displacement encoders
- Function generator
- Last but not least: a mathematical simulation model that provides reliable and verifiable results.

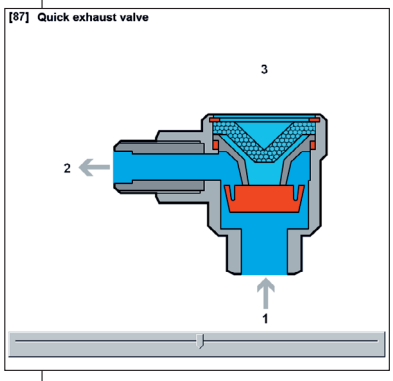
The characteristics of a regulated drive unit under differing, constantly changing loads are complicated. But, together with the dynamic status diagrams, these control circuits and the variables that control them can be very clearly shown with FluidSIM®. A good example is the principle of position control hydraulics.

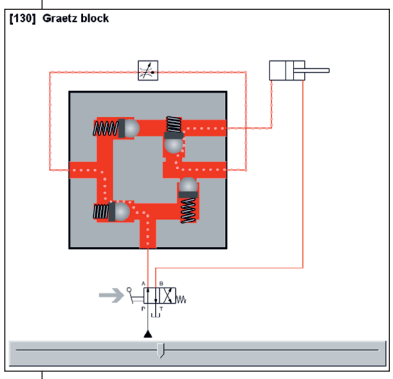
➔ The circuits for all the pneumatic or hydraulic training packages are included in the scope of delivery. On top of this, 37 circuits of digital technology circuits are included with each version.

The universal training tool

More value for student and teacher







→ Animated cutaway views can make some “black boxes” crystal clear. They help during the exercises from the training packages.

You can rest assured that FluidSIM® will help you to design and reliably test fluid engineering equipment – above and beyond its original concept as a teaching and learning tool. The texts, slides and movies are just what you need for your teaching or training work. And you will find more didactic material in Version 4.0 than ever before:

- Extensive textual and graphic **descriptions of all library components**
- **Movies, basic principles and functional representations** concerning all relevant topics of pneumatics and hydraulics
- Many **animated cutaway views** of drive units and valves
- Can be used with all MS Office® programs

The following are especially helpful for getting started with FluidSIM®:

- **Training program** with tests, mathematical and physical basic principles and an extensive description of the mathematical models used
- **Prepared presentations** for your classes. Of course you can create new material and use all the formats that Windows® knows: mpg, jpg, ppt, doc, ...
- More than 200 **sample circuit diagrams and solutions** from the Festo training packages