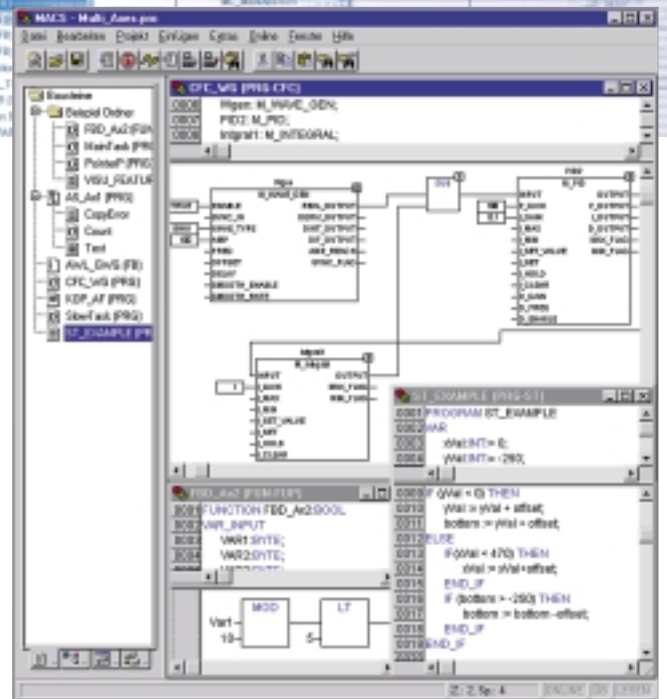


M3000 Control System



MACS Moog Axis Control Software

Development Environment
to IEC 61131



GENERAL

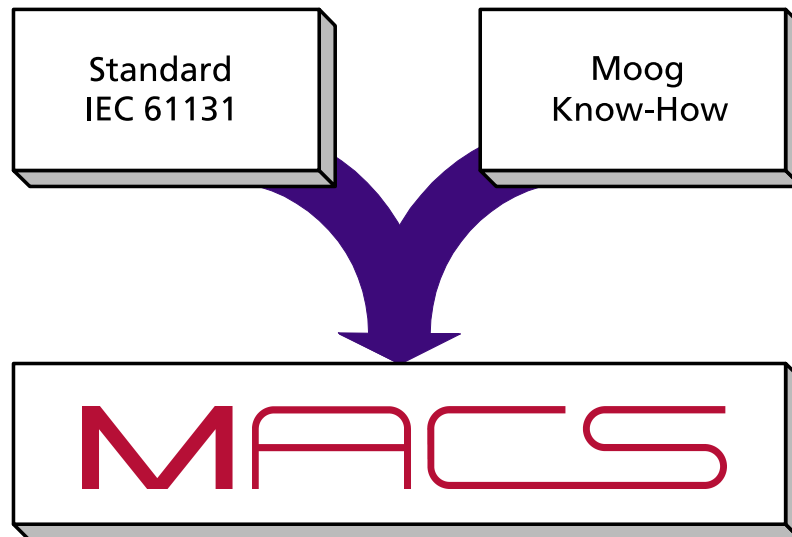
The Moog Axis Control Software (MACS) offers a state-of-the-art development environment for solving demanding control tasks on the basis of the IEC 61131 standard.

MACS includes tools for:

- Programming
- Testing and optimizing
- Debugging
- Documenting
- Visualizing
- Configuring

FEATURES

- Extensive libraries with Moog function blocks, based on 50 years of experience in electric and hydraulic drive engineering
- Freely programmable controller structures with cycle times from 500 μ s
- Maximum flexibility by a complete scope of functions in all IEC-61131 programming languages
- Simultaneous realization of control, regulation and PLC applications in one application program
- Open standard interfaces for communication on machine and process guidance levels
- Motion control functions corresponding to PLCopen standard
- Import possibility for S5/S7 programs



INTERFACES

Process guidance level:

- OPC server
- DDE interface

Machine level:

- CAN
- CANopen
- Ethernet TCP/IP
- Profibus DP (in preparation)
- RS-232

YOUR BENEFITS

- Quick project realization
- Low programming efforts
- One tool for programming, visualizing, documentation
- Compatibility to products of member companies of the CoDeSys Automation Alliance

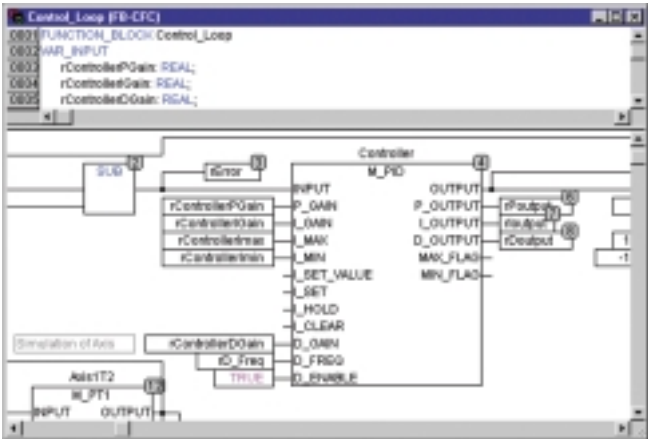
PROGRAM CREATION

- All IEC 61131 programming languages and CFC (Continuous Function Chart).
- Full scope of function in all programming languages, provides maximum flexibility in creation of user programs
- Each module can communicate with other modules regardless of the programming language they have been produced in

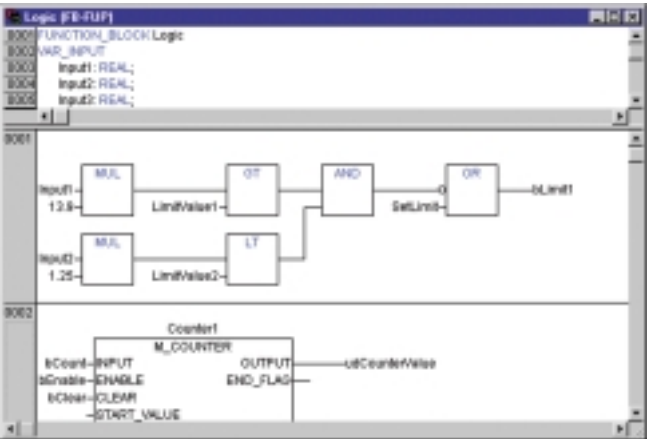
EDITORS

- Context-sensitive input help
- Automatic formatting
- Context menus in all editors
- Syntax coloring
- Multi-level undo/redo
- Display of the current values of all variables in online operation

CONTINUOUS FUNCTION CHART (CFC)



FUNCTION BLOCK DIAGRAM (FBD)



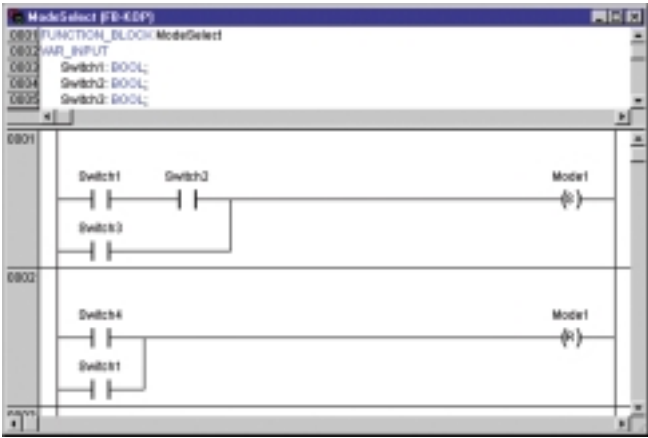
STRUCTURED TEXT (ST)

```
0801 FUNCTION_BLOCK Limiter
0802 VAR_INPUT
0803   Input: REAL;
0804   UpperLimit: REAL;
0805   LowerLimit: REAL;
0806 END_VAR
0807 Output := Input;
0808 IF Input > UpperLimit THEN
0809   Output := UpperLimit;
0810   UL_Flag := TRUE;
0811 ELSE
0812   Output := LowerLimit;
0813   LL_Flag := TRUE;
0814 ELSE
0815   Output := Input;
0816   UL_Flag := FALSE;
0817   LL_Flag := FALSE;
0818 END_IF;
0819 END_FUNCTION_BLOCK
```

SEQUENCE FUNCTION CHART (SFC)



LADDER DIAGRAM (LD)



INSTRUCTION LIST (IL)

```
0801 FUNCTION_BLOCK Calculator
0802 VAR_INPUT
0803   Input1: INT;
0804   Input2: INT;
0805   Input3: INT;
0806 END_VAR
0807 LD Input1
0808 ADD Input2
0809 ADD Input3
0810 ST output1
0811 LD Input1
0812 ADD Input2
0813 ADD Input3
0814 ST output2
0815 LD output1
0816 OT output2
0817 JMP L_Label1
0818 LD Input1
0819 ST output1
0820 L_Label1:
0821 END_FUNCTION_BLOCK
```

TECHNICAL DATA

MACS is based on CoDeSys which is the most modern IEC 61131 programming system. It has been extended in the areas of control technique and motion control by Moog. In this way, even complex automation projects can be simplified.

Overview: Scope of Function of the Moog Libraries

Regulation and Control Technique

- Controller
 - I, D, PID standard, PID extended
- Filter
- Transmission functions
 - continuous, time-discreet
- Non-linear functions
 - dead band, non-linear
 - dual-gain, look-up table
- Simulation of control routes
 - PT1, PT2
- Function generator
- Signal delay
- Counter, timer

PLCopen function blocks

According to the specification „function blocks for motion control“ for single and multi-axis applications:

- Absolute and relative positioning
- Speed functions
- Homing
- Cam functions
- Gearbox functions



Communication, CAN and RS 232

- Initialisation
- Transmission and receipt of data

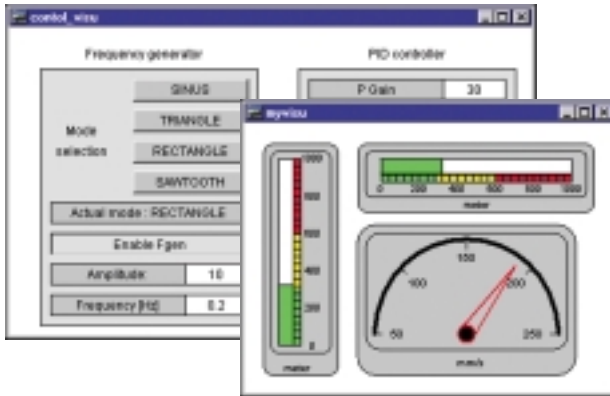
Hardware Related Functions

- Signal conditioning for analog inputs/outputs and position sensor
- Evaluation of status information
- Time evaluation
- Monitoring
 - temperature, watchdog, wire breakage

Designation	Description	Order number
MACS (Moog Axis Control Software)	Development environment pursuant to IEC 61131	1 licence: D138-001-001
	One licence per developer	5 licences: D138-001-005
MACS HMI (Human Machine Interface)	Visualization version	1 licence: D138-003-001
	For full-image portrayal of visualizations produced with MACS without development environment	10 licences: D138-003-010
Software maintenance contract	Includes support and updates for 1 year	B95914-001

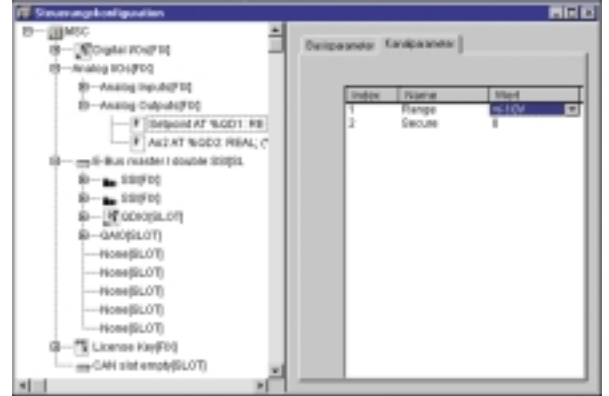
VISUALIZATION

- Commissioning tool
- Creation of visualizations for final users



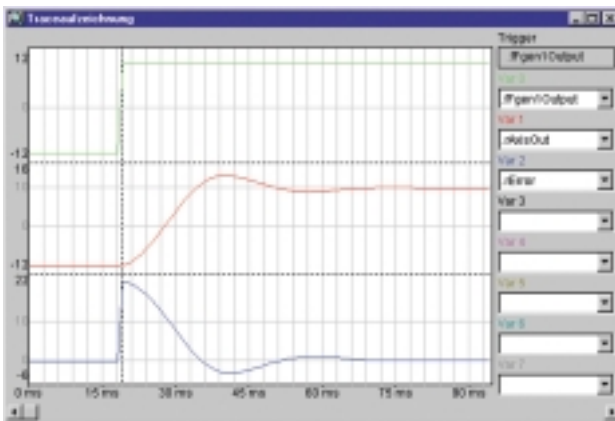
HARDWARE CONFIGURATION

- Configuration of all M3000 modules on one screen



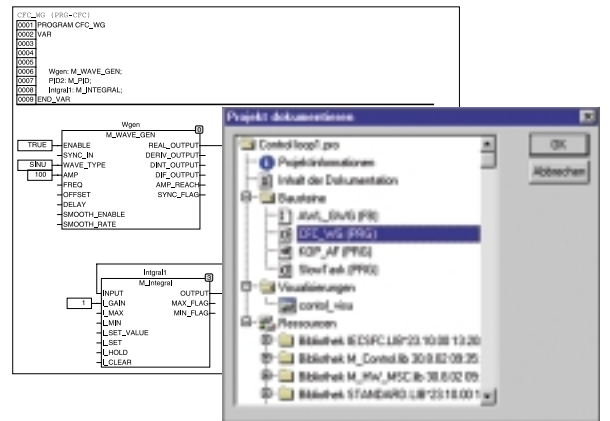
OSCILLOSCOPE

- Recording of up to 20 channels
- Various triggering possibilities



DOCUMENTATION

- Automatic creation of the project documentation with all components



DEBUGGING

- Break points
- Individual step/individual cycle
- Writing and forcing of variables
- Simulation possible without hardware
- Display of all the current values



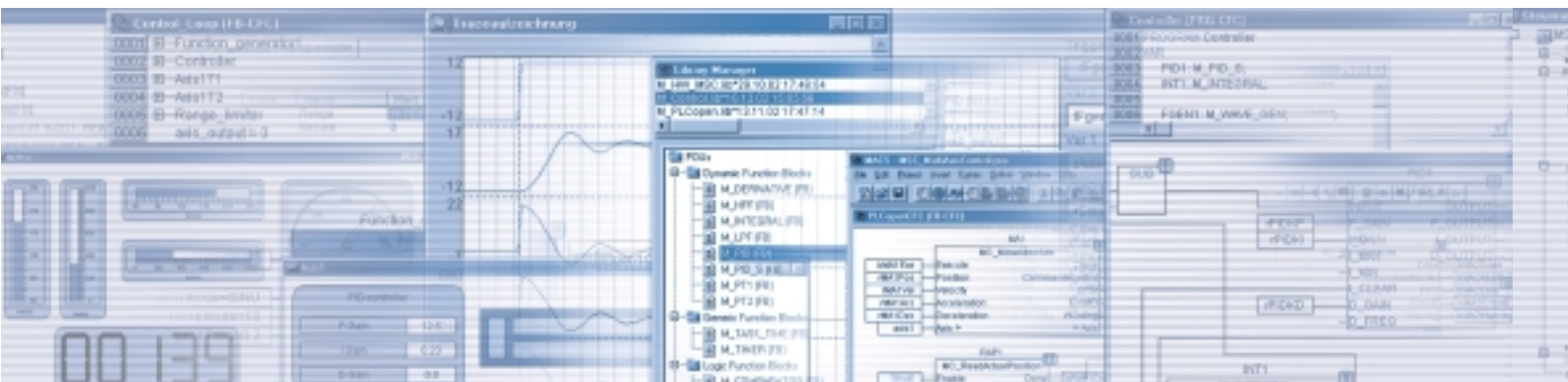
TASK CONFIGURATION

- Enables division of the application program into a number of tasks
- Call of the tasks optionally time-based (cyclic) or incident-triggered
- Priority of each task adjustable





Argentina
Australia
Austria
Brazil
China
Finland
France
Germany
Great Britain
India



Ireland
Italy
Japan
Korea
Luxembourg
Norway
Philippines
Russia
Singapore
South Africa
Spain
Sweden
USA

Our quality standard is according to DIN EN ISO 9001.



The modules described in this catalog have passed the EMV examination according to the EU directive.

NOTES

This catalog is intended for users with technical knowledge. In order to ensure that the peripheral conditions necessary for the function and the safety of the system have been fulfilled, the user must examine the suitability of the modules described herein. Please contact Moog for further clarification.

Technical changes are reserved.

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