APOSS®-IDE
Axis Positioning and Synchronization Language

High Level Language Programming Tool optimized for Motion Control

APOSS® is a programming language that offers an optimized syntax for effective programming of drive solutions. The APOSS language structure is based on established high level languages like Basic and C, but extends them with high performance motion control commands.

Even very complex positioning and synchronization functions can be initiated with APOSS using simple commands (e.g. POSA, POSR, SYNCP, SYNCV, SYNCC) and will run completely autonomously as background tasks.

Unlike typical PLC systems, interrupt functions allow fast, real-time reactions that are independent from the program main loop cycle time.

Motion Control Library

The specialized APOSS drive engineering commands within the Motion Control Library are freely available with every zub control. The Motion Control Library is completely license free.

Motion Control Functions

- **Absolute/relative Positioning:** Standard trapezoidal movement for fast and precise axis traversing; asynchronous axis traversing (POSA/POSR) or multiple synchronous axes (LINA/LINR).
- **Jerk limited positioning:** Profile runs with limited jerk; jerk limitation can be defined separately for all four acceleration phases. Jerk limited runs can also be changed during the actual run (velocity, acceleration, jerk, target).
- **CAM profiles:** Each axes can traverse its own CAM profile. CAM profiles can be freely combined and dynamically calculated. CAM segments can be splines, polynomials up to 5th order, or straight.
- **Path traversal** for any number axes. Path movements can be done with constant or maximum path velocity.
- **Synchronization tasks:** Run axes synchronously with a master axis, with synchronous position, synchronous velocity, or synchronous position with marker correction. Each axis can be synchronized with a different master.

APOSS-IDE

The APOSS **I**ntegrated **D**evelopment **E**nvironment is a comprehensive software development tool for programming, testing, and debugging motion control solutions. It supports networking with CAN, EtherCAT, and Ethernet.

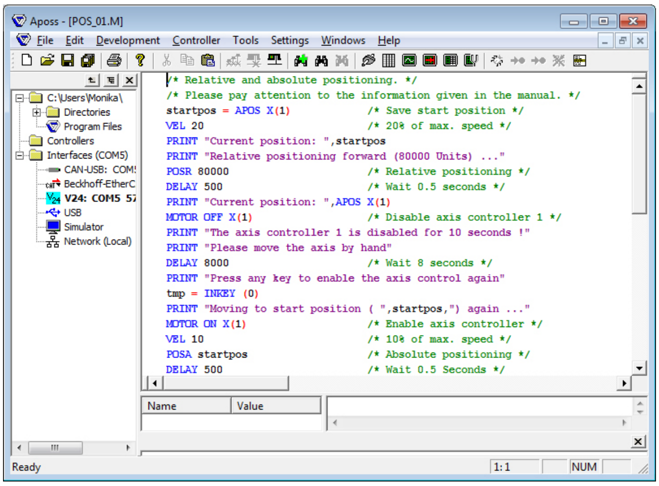
- **Editor** with syntax highlighting
- **Online help** with many typical programming samples
- **Program and parameter handling:** Multiple program support on the control unit; configuration for automated start at power-on, program selection by a PLC, or selection simply using switches connected to the digital inputs.
- **Interactive graphical editors** like CAM, Array, and Path Editor
- **Debugging & Optimizing:** Online debugging of process data and variables; Smart-Oscilloscope with real-time support

New

- **State Machine Support:** Supports the automatic execution of hierarchic State Machines.

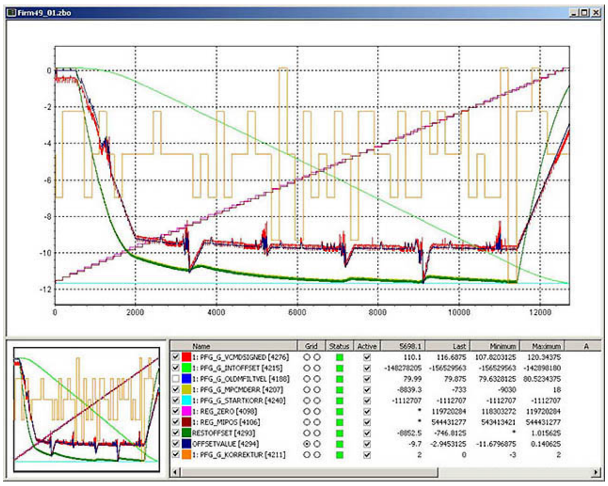
The APOSS-IDE is supported on PC systems running Microsoft Windows from Windows XP onwards.

Editor with Syntax-Highlighting



```
/* Relative and absolute positioning. */
/* Please pay attention to the information given in the manual. */
startpos = APOS X(1)                /* Save start position */
VEL 20                              /* 20% of max. speed */
PRINT "Current position: ",startpos
PRINT "Relative positioning forward (80000 Units) ..."
POSR 80000                          /* Relative positioning */
DELAY 500                           /* Wait 0.5 seconds */
PRINT "Current position: ",APOS X(1)
MOTOR OFF X(1)                      /* Disable axis controller 1 */
PRINT "The axis controller 1 is disabled for 10 seconds !"
PRINT "Please move the axis by hand"
DELAY 8000                          /* Wait 8 seconds */
PRINT "Press any key to enable the axis control again"
tmp = INKEY (0)
PRINT "Moving to start position ( ",startpos,") again ..."
MOTOR ON X(1)                       /* Enable axis controller */
VEL 10                              /* 10% of max. speed */
POSA startpos                       /* Absolute positioning */
DELAY 500                           /* Wait 0.5 Seconds */
```

Smart-Oscilloscope



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☑	🟩 1: PFG_G_INTOFFSET [4215]	○ ○	🟩	☑	-148278205	-156529563	-156529563	-142898180	
□	🟦 1: PFG_G_OLDMFILTVEL [4188]	○ ○	🟩	☑	79.99	79.875	79.6328125	80.5234375	
☑	🟨 1: PFG_G_MPCMDERR [4207]	○ ○	🟩	☑	-8839.3	-733	-9030	18	
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☑	🟪 1: REG_ZERO [4098]	○ ○	🟩	☑	*	119720284	118303272	119720284	
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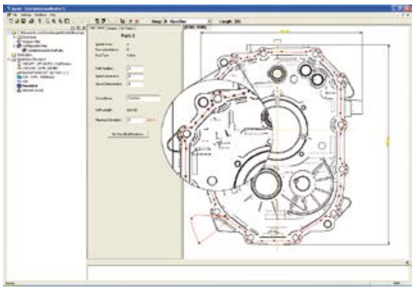
APOSS Tools

- **CAM Editor:** Interactive editor to create CAM profiles for CAM controls and CAM boxes.
- **Array Editor:** List-oriented interface to view and edit all arrays and parameters of the control.
- **APOSS Oscilloscope:** Recording and visualization of process data to optimize the drive and amplifier. Support during debugging of prototype applications, in identifying of problems during operation, and for tuning of the internal controller parameters for optimal system performance.
- **Path Editor:** User friendly path editor for path controls for
  - casting and foaming
  - engraving and milling
  - applying glue and sealant



Interface Support

Multiple interface types are supported for connecting controllers and encoders: V24 (serial), CAN-LPT, CAN-USB, USB, EtherCAT, and Ethernet (TCP/IP). As well, corresponding test programs are available.

Predefined standard solutions for different machine types alleviate the commissioning effort.

CANopen Master Functions

- **Control external CANopen I/O modules:** Control I/O's as well as analog modules and CANopen encoders, just with the standard commands IN and OUT.
- **Control CANopen Drives**: All drives using DS402 can also be controlled very easily simply by setting up corresponding drive types. Reference is velocity or position; feedback via CAN or directly via encoder.
- **HeartBeat or Guarding:** All activated CANopen monitoring functions are running automatically in background. If the slave does not answer, an APOSS error is triggered.
- **Parameterize CANopen devices:** With SDOREAD and SDOWRITE you can easily configure connected CAN modules and access every SDO.
- **Synchronize CAN modules:** Automatic sending of SYNC telegrams ensures the smooth functioning of all time-sensitive slaves, e.g. for slave drives with positioners.

CANopen Slave Functions

- **DS301 and DS402 support**: SPS communicates with zub controls the same as it does with other CANopen devices. A special APOSS program provides complete DS402 compatibility.
- **SYNC telegrams** are processed automatically and PDO processing is supported.
- **HeartBeat / Guarding:** All necessary slave functions are supported.
- **SDO Dictionary:** All parameters, program data, arrays, and process data can be read and written external.
- **Freely configurable PDO**: 4 PDOs are complete configurable, including COB-ID, Transmit Types, Event Time and Inhibit Time. The content is linked in existing user variables or with process data.

EtherCAT Slave Functionality (CoE)

- **Complete SDO dictionary** (same as with CAN)
- **Support of long PDOs and SDOs:** Up to 240 byte PDO and SDO lengths are supported. With these lengths, greater volumes of data can be transmitted easily.
- **Multiple PDOs with different cycle time:** The PDO content can be easily linked with user variables or process data. Each SDO is available.
- **Synchronized clock** is supported
- **Firmware and application download** via EtherCAT

EtherCAT Master Functionality

- **Automatic scanning:** Fewer APOSS commands are sufficient to scan the bus and determine the participants.
- **Configuration of bus participants:** By linking of bus modules with virtual Inputs/Outputs, drives, and virtual encoders, any I/O and axis configuration can be realized.
- **Control of EtherCAT Drives** in cyclic position mode or cyclic velocity mode or entirely by user-defined commands.

EtherNet TCP/IP Support

- **SDO via TCP/IP**: Every SPS and PC with Ethernet support can easily read and write every SDO on the control.
- **APOSS-IDE via TCP/IP:** Programming and download of firmware and applications is possible via Ethernet.

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