

with Unidrive SD



C) PowerTools Pro software

PowerTools Pro is a Windows™-based programming software that provides an unparalleled set-up and commissioning environment equally suitable for all skill levels—professional motion control engineer, infrequent user, or someone new to servo systems.

- “Plug and Play” implementation configures the **Unidrive SD** parameter settings, making hardware setup almost automatic.
- Safely program the SM-EZMotion without removing the cover or powering down by using the Modbus RTU port on the front of the **Unidrive SD**
- Data entry simplified using Windows™-based interface
 - Fill-in-the-Dialogue Box values
 - Point-and-Click Radio Buttons
 - Scrolling Menu Selections
 - Drag-and-Drop parameter and I/O assignments
- The Hierarchy view provides instant access to all the tools in PowerTools Pro and is the key to “Motion Made Easy”
- PowerTools Pro software is free and comes with the SM-EZMotion—go to www.ControlTechniques.com to download the program



Savings

The flexible and scalable architecture of the **Unidrive SD** provides many tangible cost and space saving benefits. Savings derived with “Motion Made Easy” are:

- Internally fitted motion controller, less cabling, speeds installation and reduces the chance of termination errors.
- “Hot-pluggable” commissioning that’s virtually automatic, simply describe your system hardware in PowerTools Pro and the rest is done for you
- Low learning curve, thorough on-line diagnostics, and other powerful software features enable even novices to create high-performance motion profiles in minutes

Performance

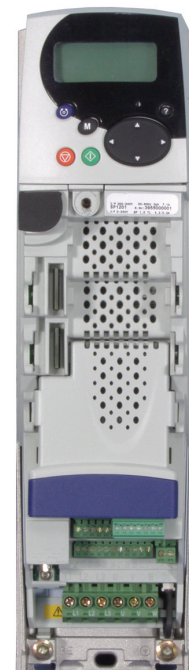
The **Unidrive SD** is easily matched to a wide range of motors and feedback devices to provide optimum performance for nearly any servo application. The “Motion Made Easy” solution provides users with all the power needed for precise motion control:

- | | | |
|------------|-------------------------------|------------------------------|
| • Indexing | • Programmable Limit Switches | • Multiple Profile Summation |
| • Homing | • User Defined Variables | • S-curve Accel and Decel |
| • Jog | • High-Speed Position Capture | • Program Multitasking |
| • Gearing | • Queuing | • Synchronized Motion |

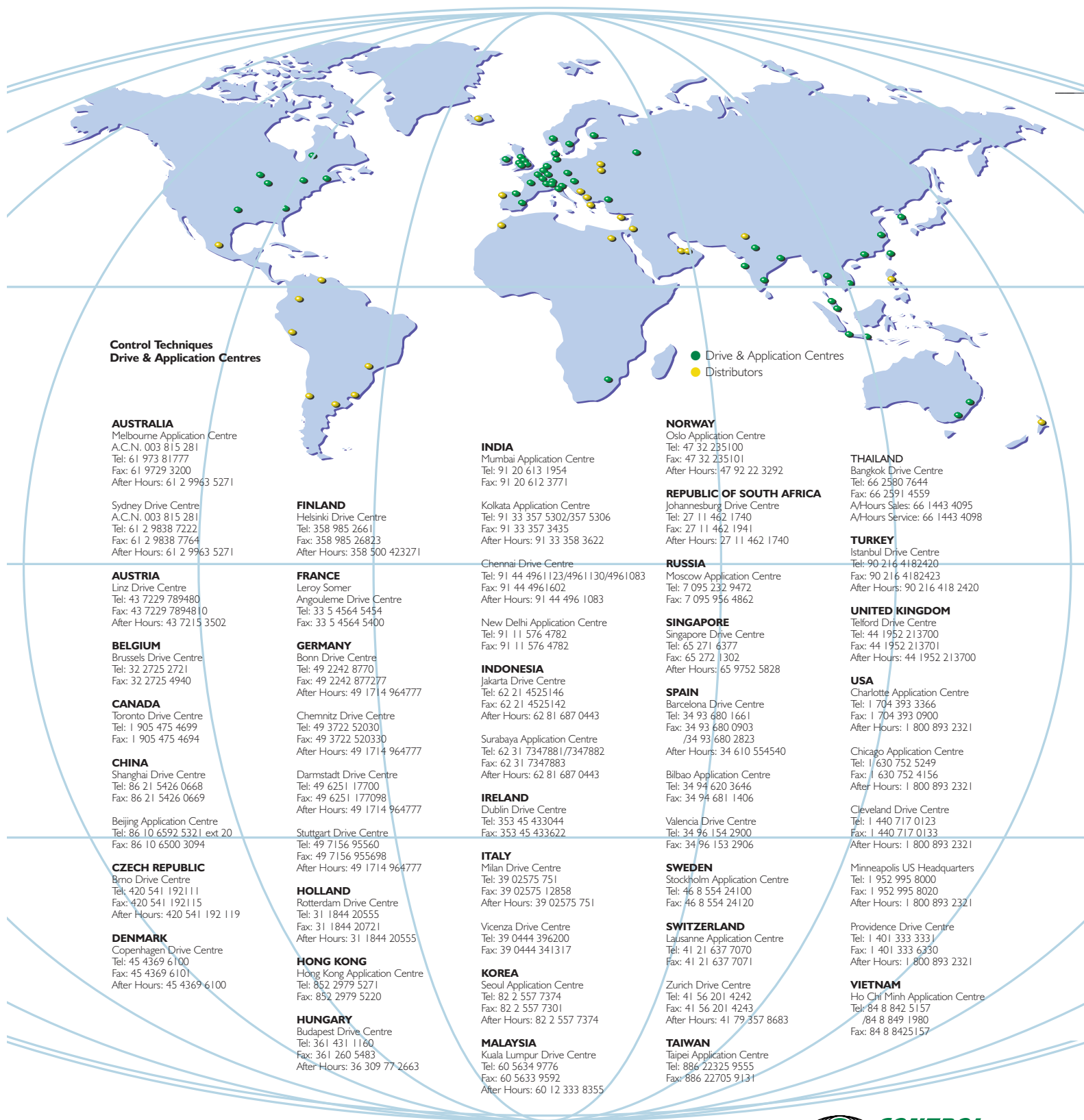
Experience

Control Techniques has a long and successful history of developing, manufacturing and supplying integrated servo systems. The **Unidrive SD** takes this strategy further with its unique and highly flexible modular approach.

Through its worldwide network of Drive Centres, Control Techniques offers programming assistance, on-site commissioning help with system implementation, as well as after-sales support agreements, and product warranties.



Driving the world...





**CONTROL
TECHNIQUES**

www.controltechniques.com



“Motion Made Easy”™

with Unidrive 

Servo Drive

The Solutions Platform



"Motion Made Easy"™

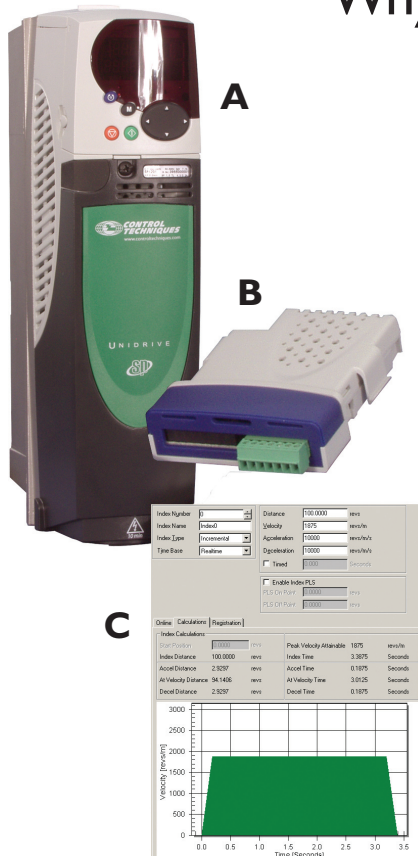
Unidrive^{SD}, the AC servo drive Solutions Platform, packaged with the EZMotion module and free PowerTools Pro™ software means "Motion Made Easy"™ for OEM's, integrators, machine builders and end users.

Why Unidrive^{SD} and Motion Made Easy?

For most motion control applications, users are looking for fast set up, short software learning curves, and fill-in-the-dialogue-box programming that achieves motion profiles quickly and reliably. The Unidrive^{SD} "Motion Made Easy" option has been designed specifically for these users.

A) Unidrive^{SD} — the drive hardware Solutions Platform

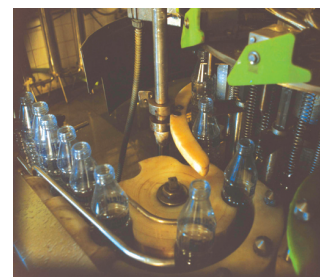
- Global voltage availability, 200V-575V, with full range of industrial output ratings (see catalog or main product brochure).
- High velocity loop bandwidth
- Universal Feedback with 14 selectable encoder types, including:
 - Quadrature, SSI, SinCos, Endat, Hiperface
 - Integration with your motor feedback virtually guaranteed
- Cost and space saving design features, including:
 - Secure Disable input as standard to meet EN954-I cat.3, a must for modern machine builders
 - Integral EMC filter as standard, meets EN61800-3 for global machine conformity
 - Optional zero-space dynamic braking resistors
 - Two additional option slots, which can be used for additional I/O, fieldbus communication support, or second-encoder support
 - 48Vdc operation for set up and low-speed operation on mains supply backup



B) SM-EZMotion module

The SM-EZMotion is a cost effective motion controller which clicks into any of the Unidrive^{SD} option slots to give a simple, fast and effective motion solution.

- Precise, reliable motion control using its own internal processor
- Six high-speed, digital I/O points (4 input & 2 output), adding to the seven digital I/O and five analog I/O standard on the Unidrive^{SD}
- One-and-a-half axis motion synchronized to a reference encoder (with encoder module)
- Designed to get users up and running quickly with applications such as:
 - Conveyor Synchronization
 - Electronic Gearing
 - Feed to Sensor/Torque
 - Flying Cutoff
 - Labelling and Printing
 - Multi-Lane Merge Control
 - Parts Alignment
 - Phase Synchronization
 - Point-to-Point Positioning
 - Product Spacing
 - Random Infeed Control
 - Registration Control
 - Rotary Knife
 - Slip Compensation
 - Thermoforming
 - Traverse Winding
 - Web Control
 - ...and many more!



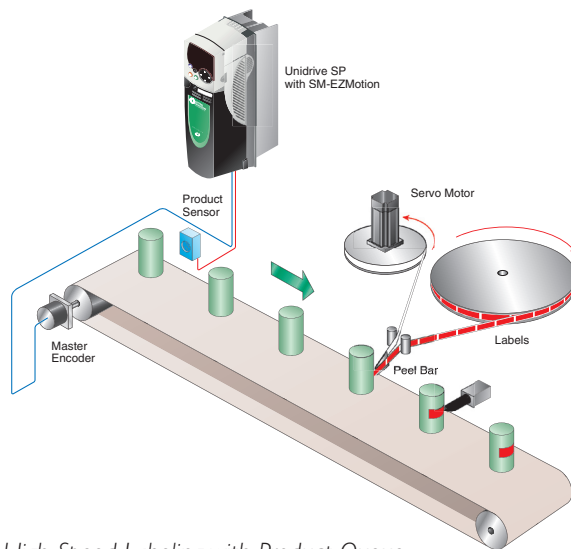
"Motion Made Easy" with Unidrive^{SP}

PowerTools Pro and the 5 Steps to Motion Control

A Unidrive^{SP} outfitted with the SM-EZMotion is one of the quickest and easiest servo drives on the market to program. With "Motion Made Easy" from Control Techniques, the ability to program motion in minutes quickly and easily is possible because of the software, PowerTools Pro.

PowerTools Pro, with its familiar Microsoft Windows™ interface, gives machine builders all the tools needed for complete motion control—programmable limit switches (PLS), indexing, homing, jog, queuing, user-defined variables, high-speed position capture, electronic gearing, multiple profile summation, S-curve acceleration and deceleration ramps, program multitasking, synchronized motion, and more.

Developing applications with PowerTools Pro is a simple, "five-step, top-down" process. The five steps, or task areas, to be completed in order are Hardware, Setup, I/O Setup, Motion, and Programs. The tasks are displayed in a Windows-Explorer™-like Hierarchy View, found on the left-hand side of the PowerTools Pro screen. In some cases, the number of tasks to be completed to develop an application can be fewer than five. For example, a flying-shear application can be implemented without a "program" per se, using only Assignments.



High-Speed Labeling with Product Queue

STEP 1 — Hardware

The task of entering the drive, motor and encoder combination, along with the SM-EZMotion and any other Solution Modules to be used in the application, is completed using simple "fill-in-the-blank" dialog boxes.

Configuration

Drive Type: SP1201

Motor Type: C 75UMB300

Drive Encoder Port: Motor

Encoder Setup

Encoder Supply Voltage: 5 Volts

Encoder

Encoder Type: Quadrature Incremental w/ Commutation Outputs

Lines Per Rev (pre Quadrature): 4096

Drive / Encoder – PowerTools Pro makes selecting a drive and motor as simple as point-and-click. Enter the encoder supply voltage, encoder type, and the encoder resolution, and you are ready for motion.

Slot Configuration

Slot Number: Slot 1

Slot1 Module: Universal Encoder Plus

Encoder

Encoder Configuration

Encoder Type: Quadrature Incremental

Encoder Setup

Encoder Supply Voltage: 5 Volts

Lines Per Rev (pre Quadrature): 3000

Simulated Encoder Output

Encoder Simulation Source: 0.00 SP Menu.Param

Encoder Simulation Numerator: 1.0000

Encoder Simulation Denominator: 1.0000

Solutions Module Configuration –

After selecting one of the three available

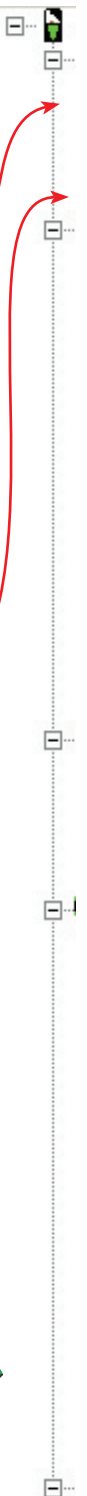
Unidrive^{SP} slots from the Hierarchy View, users then select the Solutions Module being used. Upon selection, a menu of configuration parameters for that Solution Module appears to the right of the Hierarchy View.

The entering of parameter data adheres to the "point-and-click" / "fill-in-the-blank" philosophy embedded in PowerTools Pro.



Hierarchy

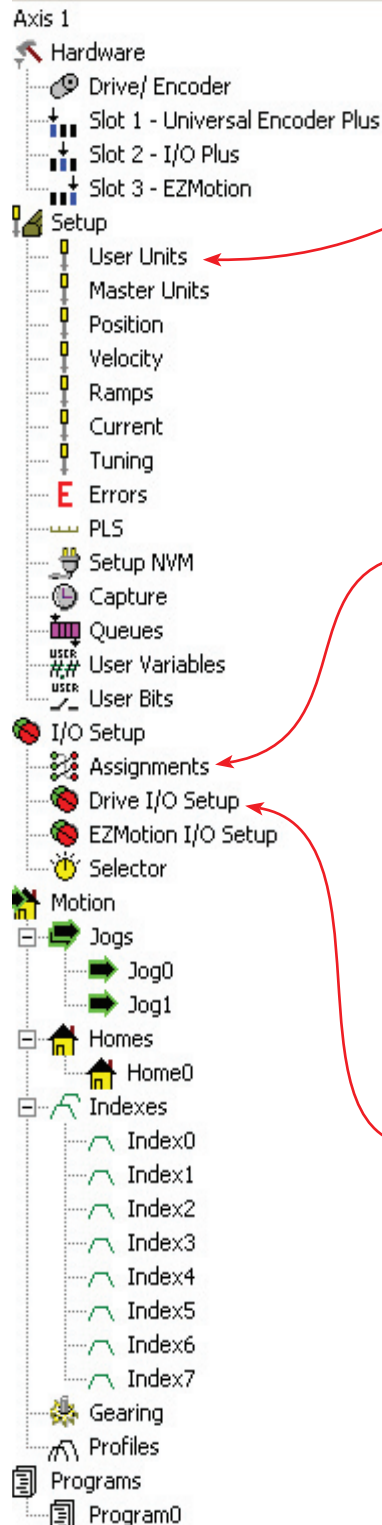
The PowerTools Pro displays sequence



— The “Solutions Platform”

hierarchy View

erTools Pro Hierarchy clearly shows the software's menus and the ease for creating “Motion in Minutes.”



STEP 2 — Setup

Application development begins here in Setup with establishing what “units” you wish to use, along with setting up other key application parameters.

User Units – Setup units with up to 32-bit resolution using whatever measurement system you prefer for position, velocity and acceleration.

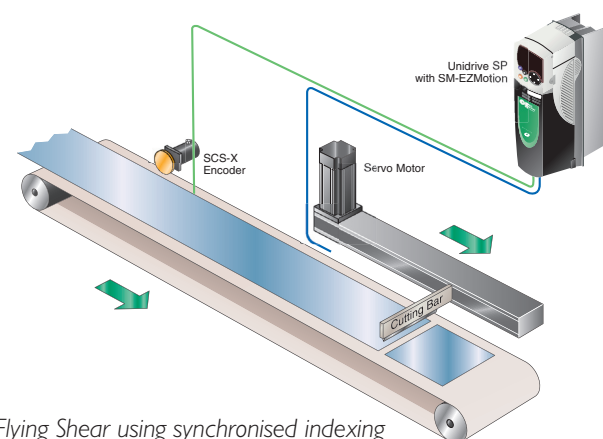
STEP 3 — I/O Setup

The first task listed in I/O Setup is Assignments. Assignments work like “virtual wires,” and define how the system operates. Sources, located on the left side of the screen (below), are functions or events

that activate based on drive/motor activity. Destinations, located on the right side of the screen, are functions that need to be triggered or activated (i.e. Index Initiate, Program Initiate, etc.).

Source	Assigned to	Polarity	Destination	Set From	Polarity
Inputs			Outputs		
SPIInput.4	Program.0.Initiate	Active On	SPIO.1.Out	DriveHealthy	Active On
SPIInput.5	Stop	Active On	SPIO.2.Out	SPIInput.5	Custom
EzInput.1	SPIO.2.Out	Custom	SPIO.3.Out	Error.Errorred	Active Off
EzInput.2	SPIO.3.Out	Custom		SPIInput.5	Custom
EzInput.3	Home.0.SensorTrigger	Active On		PLS.0.Status	Active On
EzInput.4	Index.0.Initiate	Active On			
Program0	Jog.PlusActivate	Active On			
Program0	Jog.MinusActivate	Active On			
Program0	Program.0.ProgramRunning	Active On			
Program0	EzOutput.1	Active On			
Status					
DriveHealthy	SPIO.1.Out	Active On			
PLS					
PLS0	SPIO.3.Out	Active On			
PLS0	SPIO.2.Out	Active Off			
Errors					
Error.Errorred					

Assignments – Assignments are created by dragging and dropping different functions to control all of your I/O and other system functionality.



Flying Shear using synchronised indexing

Drive I/O Setup – PowerTools Pro allows the user to quickly and easily define digital I/O. When online, virtual LED's show the status of each of the SP digital I/O points.

Unidrive SP — The “Solutions Platform”

STEP 4 — Motion

Now that the I/O has been configured, the next task is to enter the necessary motion profiles, home, jog, index, and gear definitions for the application.

Home Number: 0	Velocity: 10.00 mm/s
Name: Home0	Acceleration: 150 mm/s/s
Home Reference: Sensor	Deceleration: 150 mm/s/s
Time Base: Realtime	
If on sensor... ☒ Back off before homing ☐ Go forward to next sensor	
☐ Limit Distance: 0.00 mm	Home Offset: ☒ Calculated offset: 1.03 mm ☐ Specified offset: 0.00 mm
	End Of Home Position: 0.00 mm

Home – Fill in the blanks to configure your machine homing routine. PowerTools Pro allows the user to select the desired home reference (Encoder Marker Pulse, Sensor, or Sensor then Marker). Configure the velocity and ramps, followed by the Home Offset, and you are ready to run. No programming is required to complete the Home sequence

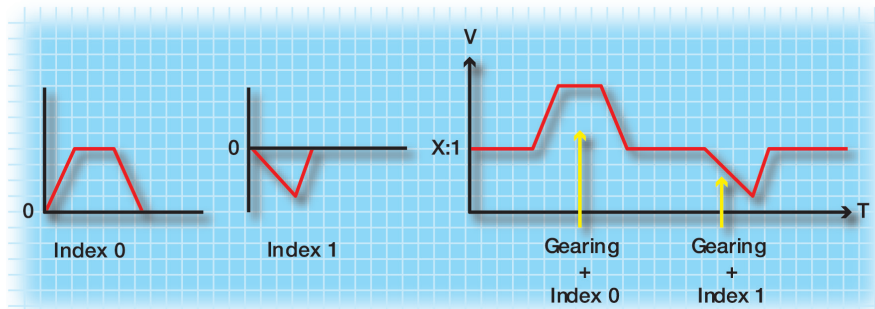
Index – With SM-EZMotion, you can select from six different Index profile types: Absolute, Incremental, Registration, Rotary Plus, Rotary Minus, and Timed.

Each Index profile can be realtime or synchronised (referenced to external encoder), and each has a built-in PLS (programmable limit switch) for controlling external devices. PowerTools Pro also provides some simple calculations and a graph, which allows programmers to see whether or not the values entered are realistic.

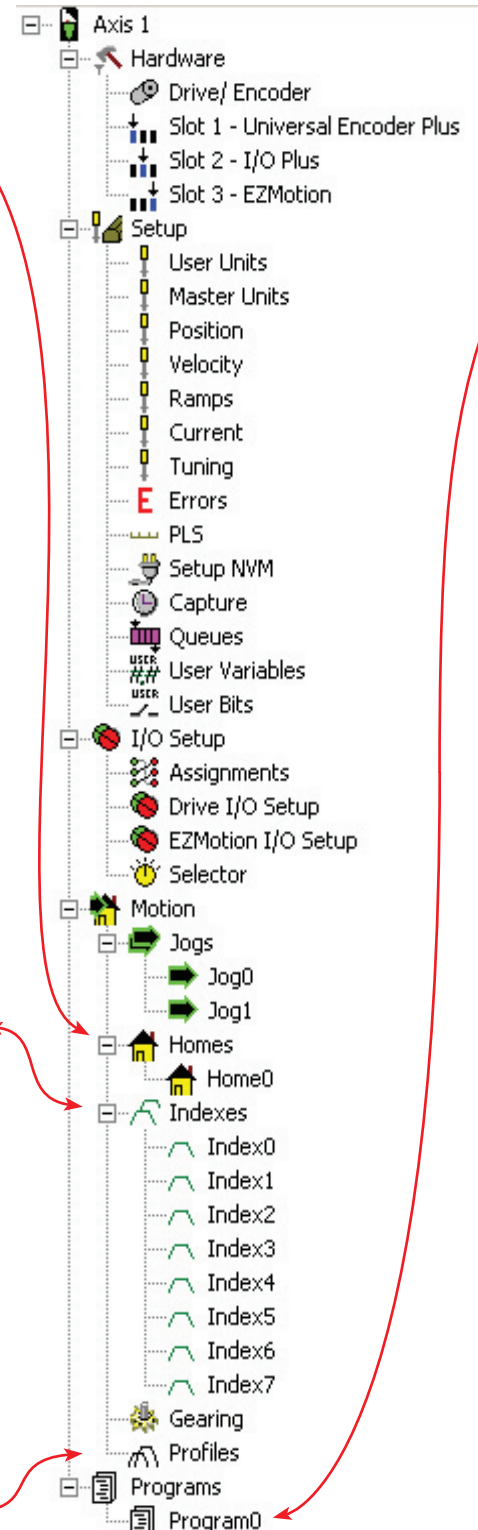
Index Number: 0	Distance: 200.00 mm
Index Name: Index0	Velocity: 200 mm/s
Index Type: Incremental	Acceleration: 1200 mm/s/s
Time Base: Realtime	Deceleration: 600 mm/s/s
	☐ Timed: 0.000 Seconds
☐ Enable Index PLS PLS On Point: 0.00 mm PLS Off Point: 0.00 mm	

Calculations Registration			
Index Calculations			
Start Position: 0.00 mm	Peak Velocity Attainable: 200.00 mm/s		
Index Distance: 200.00 mm	Index Time: 1.2500 Seconds		
Accel Distance: 16.67 mm	Accel Time: 0.1667 Seconds		
At Velocity Distance: 150.00 mm	At Velocity Time: 0.7500 Seconds		
Decel Distance: 33.33 mm	Decel Time: 0.3333 Seconds		

Profiles – The multiple profile feature allows the user to simultaneously execute any two motion types together resulting in a summed profile (i.e. Gear + Index, Jog + Index, Index + Index, etc.). Summing profiles is ideal for phasing applications such as Flighted Conveyor Synchronization, Random Infeed, Rotary Knife, and Multilane Merge Conveyor.



Hierarchy View



STEP 5 — Programs

Combine program flow and motion instructions to create fully customized user programs of up to 1,000 lines of code. User-conditional branching, wait for, program calls, formulae, user variables, and numerous motion instructions are available to solve a variety of applications from the simple to the complex.

Easily create programs, such as the drill head positioning program shown below, by dragging and dropping, or typing program instructions, variables, I/O, and formula operands into your program screen. You can also “cut-and-paste” text for your code from any other Windows™ applications.

```

Program Number: 0 Task Number: 0
Run Anytime

'Drill Head Application

'Initialize Variables
Var.HolesDrilled = 0
Var.HolesNeeded = 10

'Home the System
Home.0.Initiate

EZOutput.1 = ON 'Start the Drill Head motor

'Main Program
Do While (Var.HolesDrilled < Var.HolesNeeded)
  Index.0.Initiate
  Wait For InPosn
  EZOutput.2 = ON 'Move Drill Head to next hole position
  Wait For EZInput.3 = ON 'Wait until Drill Head is in position
  EZOutput.2 = OFF 'Actuator moves Drill Head down
  Wait For EZInput.4 = ON 'Drill until lower limit switch activates
  Var.HolesDrilled = Var.HolesDrilled + 1 'Actuator moves Drill Head up
  'Drill until upper limit switch activates
  'Increment the "Holes Drilled" counter
  'Repeat the process
Loop
EZOutput.1 = OFF 'Stop the Drill Head motor

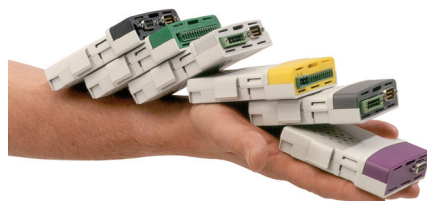
End
  
```

The multi-tasking capability of SM-EZMotion allows the user to run up to four user programs simultaneously.

Ordering

“Motion Made Easy” Hardware and Software

Product	Description	Additional Information	Order Code
Unidrive	AC Servo Drive	Details in the Catalog, Product Brochure and on-line at www.ControlTechniques.com	See literature or web site
SM-EZMotion	Motion Control Module	Solution Module supplied with free PowerTools Pro programming software	SM-EZMotion
PowerTools Pro™	Windows™-based software	Programming software supplied with SM-EZMotion, download from www.ControlTechniques.com	PowerTools Pro™
PC to Drive Cable	Comms Cable	For PC to drive configuration and programming of Unidrive and SM-EZMotion module	CT Comms cable
Unimotor	AC Servomotor	Details in the Catalog, Product Brochure and on-line at www.ControlTechniques.com	See literature or web site



**“One-click”
Option
Upgrades**

Additional Feedback Modules

Option Order Code	Description
SM-Encoder Plus	Additional Incremental Encoder Feedback
SM-Universal Encoder Plus	2nd Universal Encoder Feedback with Simulated Universal Encoder Output
SM-Resolver	Resolver Feedback
SM-15 Way	15-way D-Type to screw connector convertor board

I/O Option Modules

Option Order Code	Description
SM-I/O Plus	Additional Analog and Digital I/O

Fieldbus Option Modules

Option Order Code	Description
SM-Profibus-DP	Profibus-DP V1 12MB
SM-DeviceNet	DeviceNet
SM-Interbus	Interbus
SM-CANopen	CANopen
SM-CAN	CANbus

Operator Interface Options

Option Order Code	Description
SM-Keypad	Drive-mount LED Keypad
SM-Keypad Plus	Drive or Panel-mount LCD Keypad
CTIU 50	Operator Interface Panel
CTIU 100	Operator Interface Panel
CTIU 110	Operator Interface Panel
CTIU 200	Operator Interface Panel