Robotics

S4
Advanced Programming stage 1

Course Outline
Duration 5 days
Beneficial to programmers, operators and maintenance staff
Students must have attended the S4 Programming and Operation Course or have extensive working knowledge of the topics covered.

Subject areas

Introduction and Safety

Complex Tool Centre Points
Default Orientation
Tool Centre Point with Z Elongator (5 approach method)
Tool Centre Point with X Elongator (6 approach method)
Stationary Tools

Review
Pendant
Instructions
Techniques
Procedures
Data types
Arguments

Modules
Program and System Modules
File Names & Module Attributes
Local & Global Data
Loading & Unloading Modules during execution

World Co-ordinate System
Reasons for use and comparison to other systems
Definition of World co-ordinates

Work Objects
Reasons and Uses
Definition of Work Objects
Mirroring

World Zones
Definition of temporary and stationary zones

Working with Numbers
Assigning a value to data
Instruction / Operator definition
Incrementing values
Decrementing values
Clearing Values
Read a clock used for timing
Checking numerical data values using "IF" and "TEST"
Common Numeric Functions

Cycle Timing Instructions
Reset a clock used for timing
Start a clock used for timing
Stop a clock used for timing
Clock Data

Configuration Instructions
Robot configuration control during Joint motion
Robot configuration control during Linear motion
Interpolation method through Singular Points

New Functions
Displacing a robot position
Reading the robot current position e.t.c.

Searching
Linear search for position
Circular search for position

Error Handling
Explanation and Uses
Instructions and data
Backwards Handling

Position Displacement
Activating program displacement
Deactivating program displacement
Activating program displacement by specifying a value

Working with Strings
Concatenation
Special Characters
String Functions & Manipulation

Interrupts
Connecting a variable to a trap routine
Interrupt from a Digital Input Signal
Interrupt from a Analog Input Signal
Timed interrupts
Activating individual interrupts
Deactivating individual interrupts
Enabling all interrupts

Trap Routines
Uses and Instructions / data

Event Handling
Power on
Start
Restart
Stop
Qstop
Reset

Continued:

For further information please contact the Training department
Email: robotics.training@gb.abb.com
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Subject areas continued

Logical Instructions
For
While
Goto
Label

Advanced I/O Instructions
Changing Analogue Output values
Changing the value of a group of Digital Output signals
Waiting and testing for Inputs
Group/Binary signals
Cross Connections

Trigg Instructions
Defining a fixed position I/O event
Defining a fixed position Interrupt event

Performance Instructions
Reducing acceleration
Changing programmed velocity
Defining the payload of the robot
Soft Servo
External Axes activaton & deactivation

Communication Instructions
TPWrite, TPErase, TPReadFK & TPReadNum
New User Interaction Instructions & Functions
Reading from files
Writing to files
Serial Communication
Binary Communication

Creating Your Own Instructions
Functions & Instructions

Objectives
On completion, participants will be able to perform:

☑ Practise all areas of robot safety
☑ Perform basic programming techniques
☑ Create and properly use complex tool centre points
☑ Define and use World and work object co-ordinate systems
☑ Use numerical data instructions
☑ Use instructions for avoiding singularity areas
☑ Use search and error handling instructions
☑ Use program displacement instructions
☑ Use interrupt instructions and trap routines
☑ Use event and backward handling
☑ Use communication instructions
☑ Use advanced I/O instructions
☑ Use instructions to enhance robot performance
☑ Create basic 'user' instructions and functions

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