Course Outline
Duration 5 days
Beneficial to Supervisors, Team Leaders, Setters, Programmers, Advanced Operators
Students must have attended the IRC5 Programming and Operation Course or have an extensive working knowledge of the topics covered.

Subject areas

Introduction and Safety

Complex Tool Centre Points
Default Orientation
Tool Centre Point & Z
Tool Centre Point with X & Z
Stationary Tools

Work Objects
Reasons and Uses
Definition of Work Objects
Mirroring

Review
FlexPendant
Instructions
Techniques
Procedures
Data types
Optional Arguments

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

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

World Zones
Definition of temporary and stationary World Zones

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

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

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

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

Searching
Linear search for position
Circular search for position

Routine Handling
Explanation and Uses
Instructions and data
Backwards Handling
Error and Undo Handling

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

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

Trap Routines
Uses
Commonly Used Instructions

Continued:
Subject areas continued

**Event Handling**
- Power on
- Start
- Restart
- Stop
- Qstop
- Reset

**Logical Instructions**
- For
- While
- Goto and 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 program velocity
- Defining the payload of the robot
- Soft Servo
- External Axes activation & deactivation

**Creating Your Own Instructions**
- Functions & Instructions

**Communication Instructions**
- TPWrite, TPErase, TPReadFK & TPReadNum
- User Interaction Instructions & Functions

**Objectives**
On completion, participants will be able to:

- 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
- Perform String Manipulation
- Use instructions for avoiding singularity areas
- Use search and error handling instructions
- Use program displacement instructions
- Use interrupt instructions and trap routines
- Use event routines and backward handling
- Use Error Handlers and Undo Handlers
- Use communication instructions
- Use advanced I/O instructions
- Use instructions to enhance robot performance
- Create basic ‘user’ instructions and functions