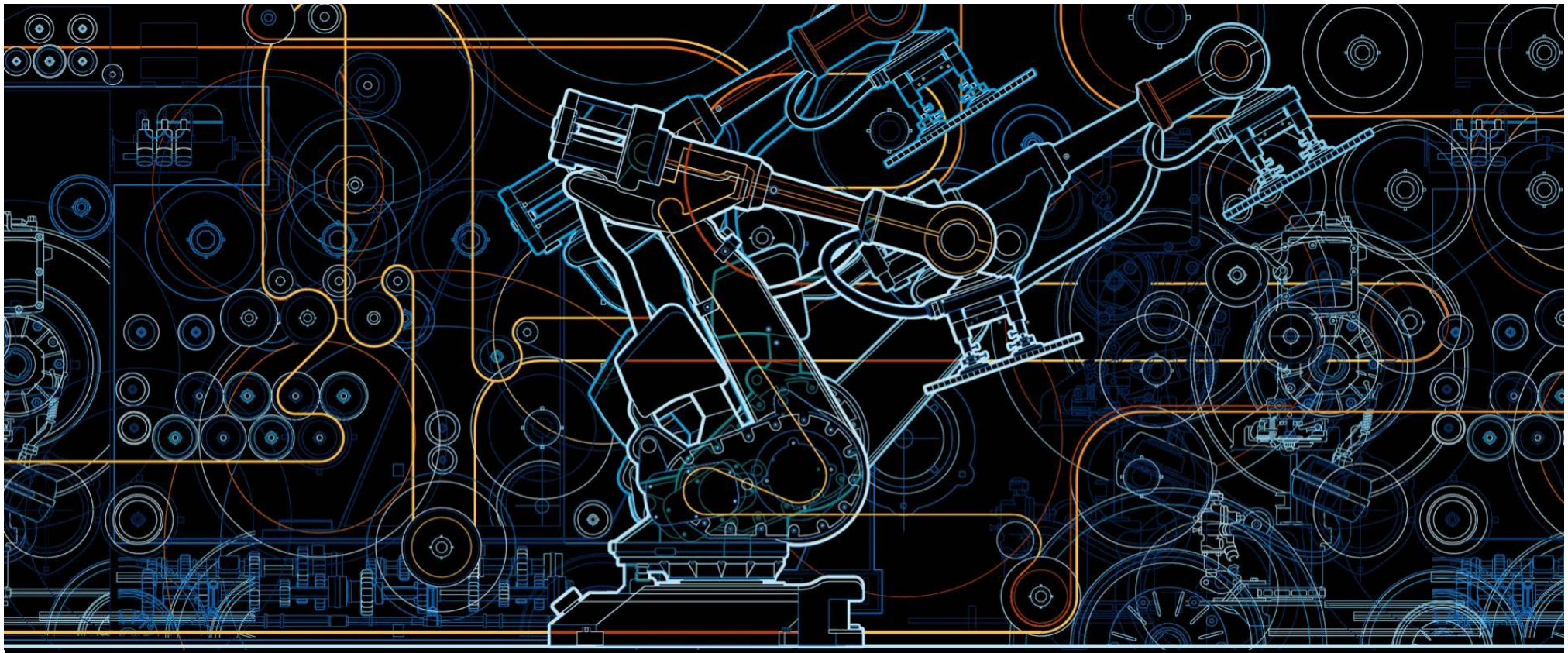


ABB Robotics

Machine Tending Software

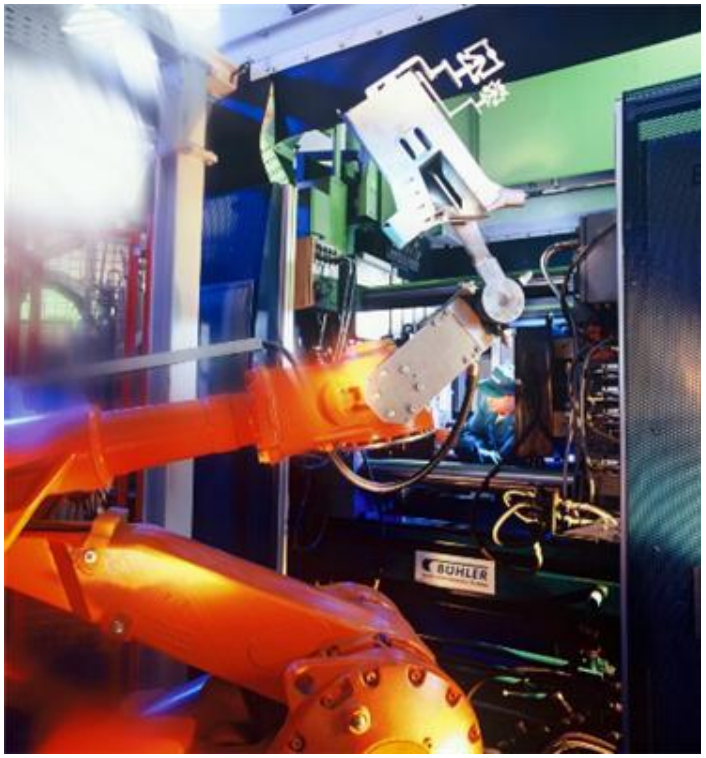
Easy to use tools for flexible & trouble-free robotic machine tending

Power and productivity for a better world™

Presentation Outline

- Machine Tending applications and the industries served
- Machine Tending Software Overview
- Software Package Details
  - RobotStudio Machine Tending PowerPac
  - RobotWare Machine Tending
- Summary

ABB Robotics
Machine tending



- Automation is the key
- Experience makes a difference
- 30,000 ABB robots installed in machine tending applications
- We believe in partnership
- We know your products and the demands of your industry

ABB Robotics
Machine tending



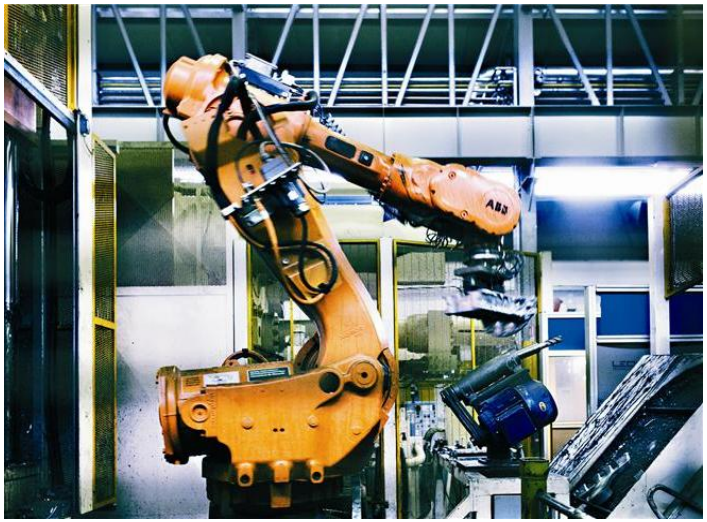



- Industries
  - Automotive OEM and Tier's
  - Foundry
  - Plastic & Rubber
  - Transportation
  - Electronics
- Machine Tending applications
  - Die casting machine
  - Injection molding machines
  - Machine tools
- Typical Machine Tending tasks
  - Part insertion and extraction
  - Loading and unloading
  - Post processing

Industrial robots for machine tending
Automation is a key to success

- **Maximize manufacturing productivity**
  - Improve machine utilization and availability
  - Fast throughput
- **Reduce operational cost**
  - Reduce manual labor cost
  - Improve manufacturing flexibility and add value through post-processing
- **Reduce capital investment**
  - Improve manufacturing flexibility
  - Save manufacturing space
- **Improve health & safety**
  - Reduce exposure to hazardous / dirty environment
  - Reduce accidents

Industrial robots for machine tending
Manufacturing processes



- Manufacturing applications
  - Die Casting
  - Plastic Injection Moulding
  - Machine tools
- Common process characteristics and needs
  - High productivity required - high throughput and uptime
  - Positioning accuracy to load and unload
  - Integration with robot and machine
  - Easy to program and operate
  - Loading and unloading tasks often in combination with post-processing

Case Study
DA Components, Burgos, Spain

“It’s all about quality. Greater automation means better products for less cost. So our competitiveness increases & our company can hold its own against low-cost countries”

Isidro Alfonso
Industrial Director, Grupo CROPU

Key drivers and benefits

- ✓ Increased productivity 4%
- ✓ Reduction in cycle times 3%
- ✓ Gained floor space
- ✓ Lower labor costs
- ✓ Return on investment in less than 3 years
- ✓ More highly qualified workforce

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ABB’s Machine Tending Software
Capturing ABB’s extensive experience in machine tending

RobotStudio
Machine Tending PowerPac

RobotWare Machine
Tending

- **Integrated set of software**
  - Reduce operational expenditure and increase productivity
- **Extensive experience and knowledge**
  - More than 30 years of experience and 30,000 machine tending robots installed
- **RobotStudio Machine Tending PowerPac**
  - PC based software for quick and easy creation, modification, simulation and validation
- **RobotWare Machine Tending**
  - Flexible controller software for deployment and trouble-free and safe operation

ABB's Machine Tending Software
Supports programming, configuration & operation

Easy and flexible to program

- **Easy to program**
  - PC-based program creation & modification
  - Simulation & validation
  - Templates with unique process logic
  - Flexible HomeRun strategies
- **Flexibility**
  - Customized HMI's
  - Modular program structure
  - Full access to RAPID

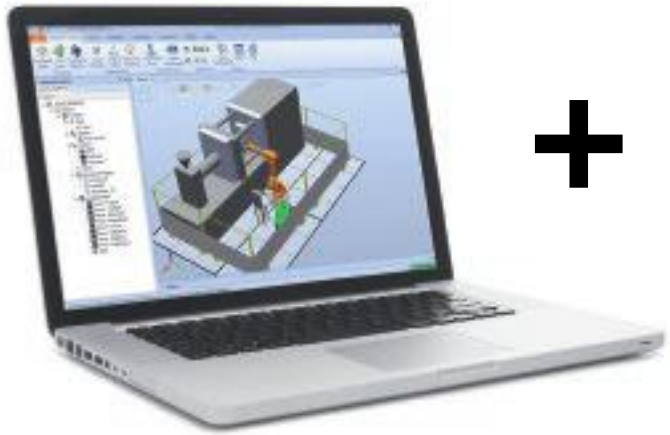
Straightforward to install & configure

- **Easy to configure**
  - Graphical user interface
  - Cycle handling & program control
  - Stations, grippers and tools
  - Signals
- **Quick installation**
  - Euromap/SPI
  - Delivered & tested with RobotWare

Trouble-free to operate

- **High reliability**
  - Online production overview
  - Safe Home Run
  - Advanced error handling
- **High availability**
  - Quick and safe re-programming
  - Quick error recovery & debugging
- **Easy to maintain**
  - Modular & documented programs

ABB’s Machine Tending Software
Feature overview



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RobotStudio
Machine Tending PowerPac

- Creation and modification of robot programs
- Simulation, validation & optimization
- Deployment and documentation
- Full access to RobotStudio

Robotware Machine Tending

- Graphical operator screen
- Cycle handling and program control
- Config of stations, grippers, parts, signals, service & setup routines
- Full access to RAPID
- Creation and modification of programs

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RobotStudio Machine Tending PowerPac
Concept overview

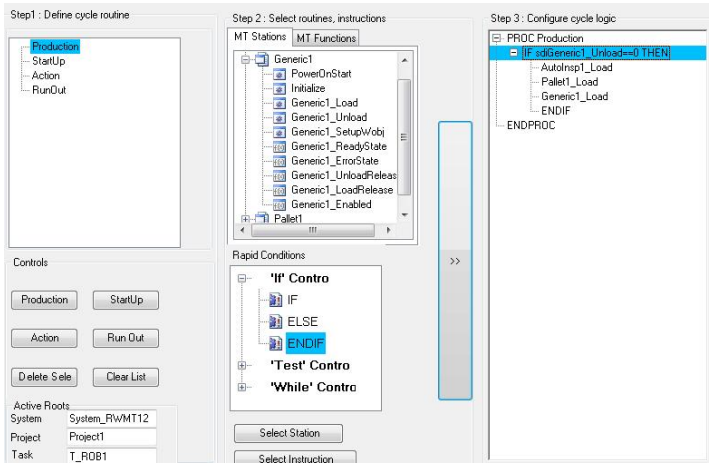
Easy & flexible to program

Straightforward to install & configure

Trouble-free to operate

- Features and functions specifically for programming of machine tending
- Used together with RW Machine Tending
- Unlimited access to all RobotStudio features
- Programming in sequence of steps
- Graphical programming and configuration
- Inbuilt logic in templates and reuse of experience
- Automatic and Safe HomeRun
- Simulation, validation & optimization
- Deployment and documentation

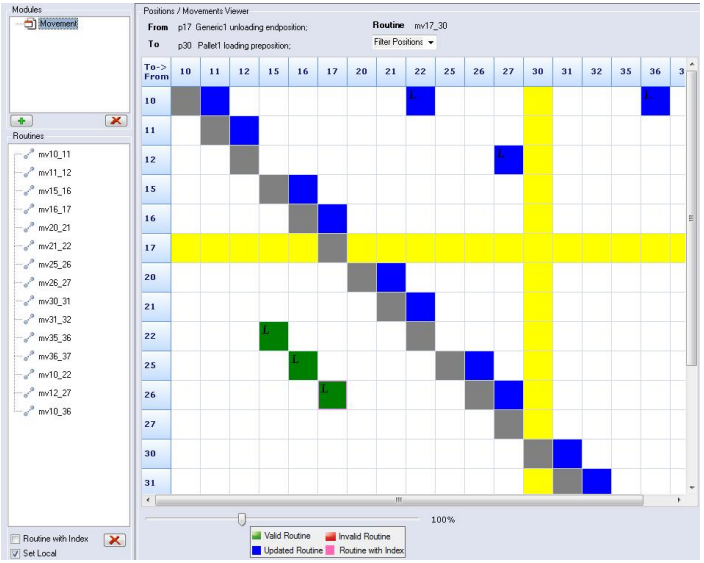
RobotStudio Machine Tending PowerPac
Programming in sequence of steps



Creation of cycles

- Parts that are produced in the cell
- Grippers used by the robot
- Stations in the cell
  - Station types: Processing, Sensor, Feeder, or self-defined
  - Template programs: Injection Molding, Die Casting, Sensor, Generic Load/Unload, etc
- Movements between stations
- HomeRun strategy
- Create production cycles
- Simulation, validation & optimization
- Deployment & documentation

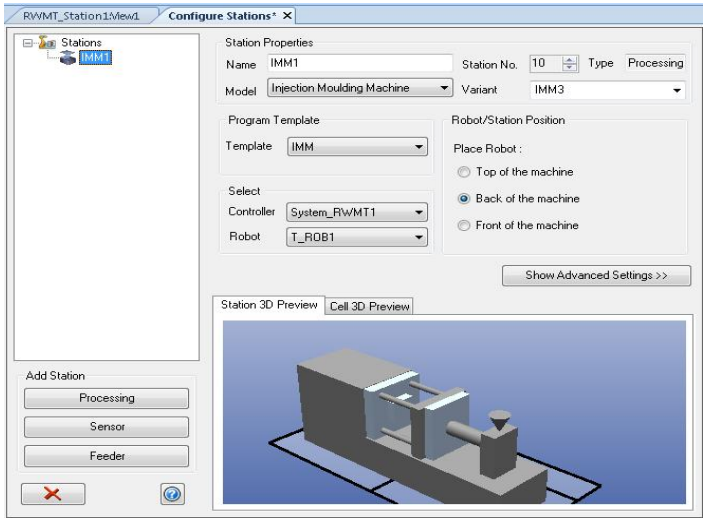
RobotStudio Machine Tending PowerPac
Graphical programming and configuration



Movements between stations

- Interactive user interfaces support program creation
- Graphical representation of most settings and features
- Limited need to use RAPID code
  - Only for advanced features and functions
- Configuration of FlexPendant visualization
  - Customize operator screens to fit unique customer requirements

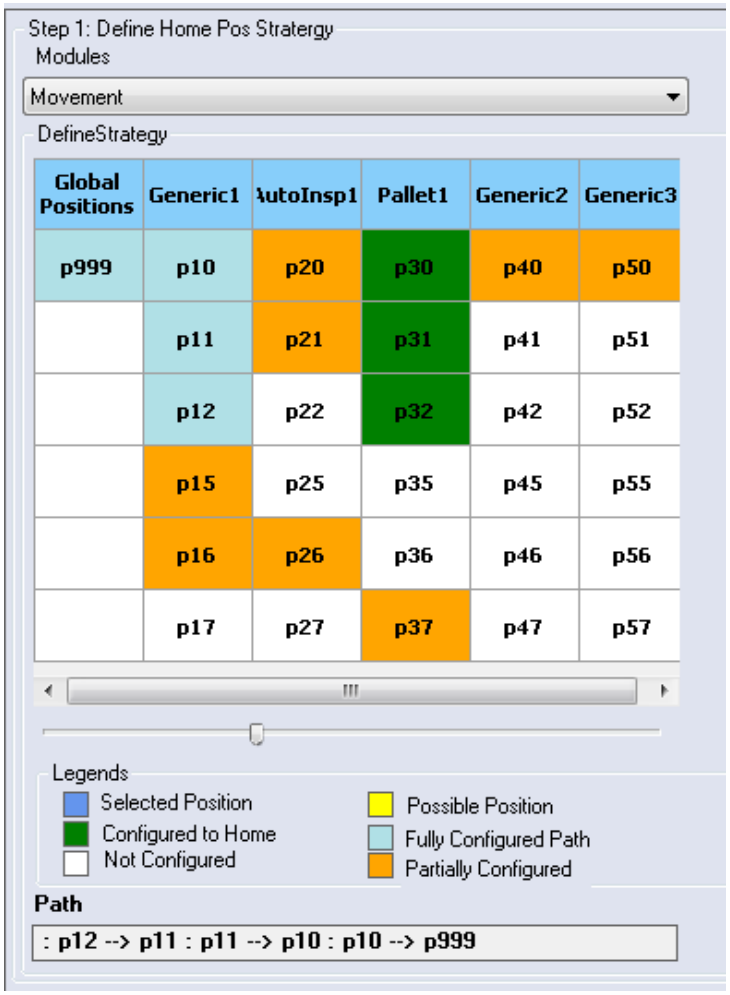
RobotStudio Machine Tending PowerPac
Inbuilt logic in templates and reuse of experience



Definition of stations

- Different station types and program templates with pre-defined logic and inbuilt knowledge
  - Station types: Processing, Sensor, Feeder
  - Template programs: Injection Molding, Die Casting, Sensor, Generic Load/Unload of machines
- Gripper and part libraries for re-use
- Modify and re-use available templates and libraries
- User defined stations, grippers and parts

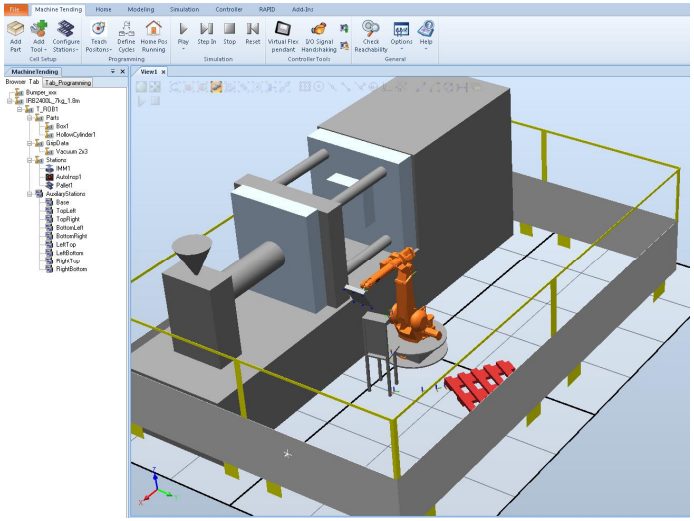
RobotStudio Machine Tending PowerPac
Automatic and Safe HomeRun



Define HomeRun strategy

- Enables user to move the robot to Home Position in a safe way
- Reduced risk for damage and collision with peripheral equipment
- Quick error recovery in case of stop
- Easy and secure with one button click on the operator interface
- Graphical representation of robot movement to Home position
- Customizable home run logic
- Set parameters, actions or conditions for each movement

RobotStudio Machine Tending PowerPac
Simulation, validation and optimization



- Verify robot program prior to deployment
- Simulation of complete machine tending cycles prior to deployment
- Validation of robot reach and potential collisions
- Optimization of movements and robot positions to shorten cycle time
- Allow verification of cycle logic and signal interfaces
- Simulate automatic and safe HomeRun

RobotStudio Machine Tending PowerPac
Deployment and documentation

StationName	PositionNumber	
Generic1	17	Generic1 unloading endposition;
AutoInsp1	20	AutoInsp1 loading preposition;
AutoInsp1	21	AutoInsp1 loading position;
AutoInsp1	22	AutoInsp1 loading endposition;
AutoInsp1	25	AutoInsp1 unloading preposition;
AutoInsp1	26	AutoInsp1 unloading position;
AutoInsp1	27	AutoInsp1 unloading endposition;
IMM1	13	Outside IMM1 unloading endposition;
IMM1	14	Inside IMM1 unloading preposition;
IMM1	18	Inside IMM1 unloading position;
Pallet1	30	Pallet1 loading preposition;
Pallet1	31	Pallet1 loading position;
Pallet1	32	Pallet1 loading endposition;
Pallet1	35	Pallet1 unloading preposition;
Pallet1	36	Pallet1 unloading position;
Pallet1	37	Pallet1 unloading endposition;

- Seamless deployment of the robot program to the robot controller
- Modular and structured RAPID code
  - The generated RAPID modules follow the programming guidelines
- “Project” is the container of all information about the specific application
- Automatically generate project documentation
  - Microsoft Word document
  - Stations, Cycles, Signals etc

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RobotWare Machine Tending
Concept overview

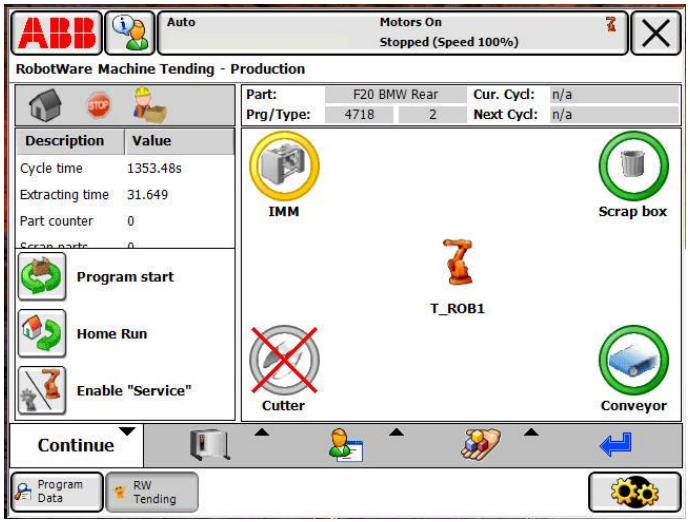
Easy & flexible to program

Straightforward to install & configure

Trouble-free to operate

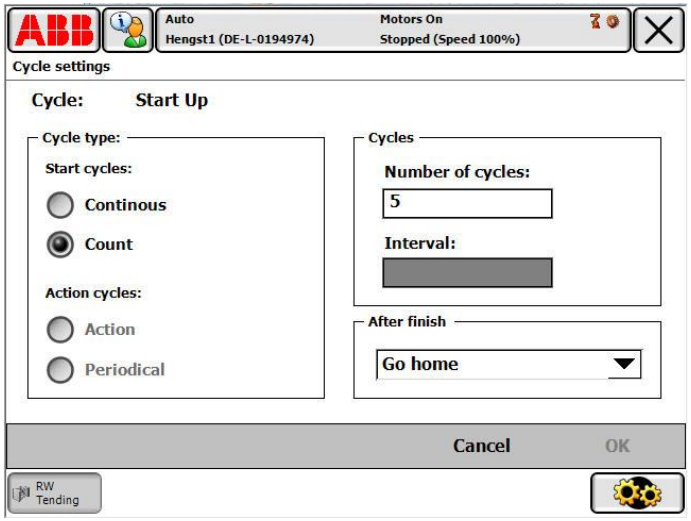
- Graphical user interface and RAPID framework for machine tending applications
- Easy to understand & adjustable graphical user interface for operators
- Production monitoring and control
- Full integration of ABB's programming language RAPID
- Modular and structured RAPID program structure
- Seamless integrated with RobotStudio Machine Tending PowerPac

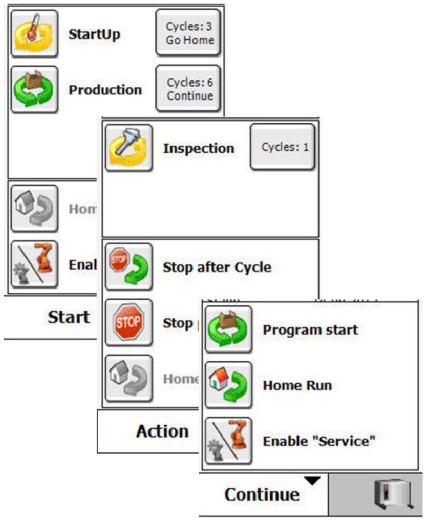
RobotWare Machine Tending
Graphical operator screen for production monitoring



- Production and station overview
- Status and error indications
- Program and error messages
- Cycle information, including cycle time and cycle count
- Cycle handling and robot control
- Safe and Automatic HomeRun
- MultiMove Robots – one tab page for each robot
- Configurable graphical user interface to fit unique customer requirements

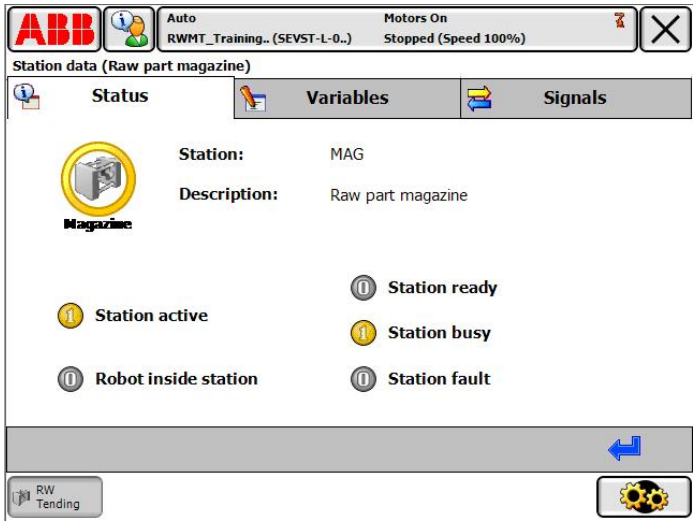
RobotWare Machine Tending
Cycle handling and program control





- Easy to configure and run different production cycles
- Create different cycles to production needs, e.g.
  - Production start
  - Regular production
  - Production stop
- Initiate and run different cycles from the graphical operator screen
- Straightforward to define and configure cycles
  - RobotStudio Machine Tending PP
  - RAPID

RobotWare Machine Tending
Easy to install and configure

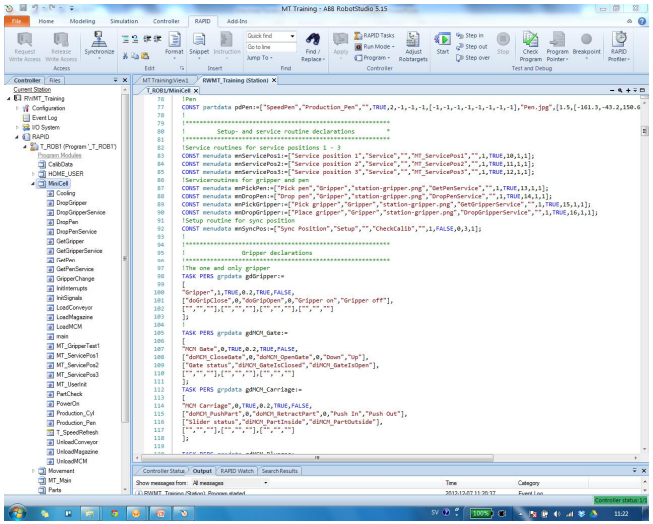


Configure and change basic settings for key components

- Stations
- Grippers
- Parts
- Signals
- Service and setup routines

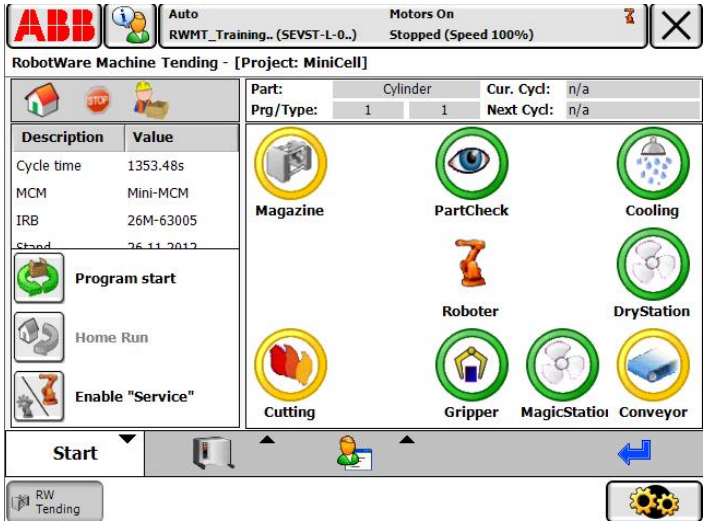
- Straightforward to create and configure program modules for key components
  - RobotStudio Machine Tending PP
  - RAPID
- Configurable graphical user interface to fit unique customer requirements

RobotWare Machine Tending
Full integration of RAPID programming language



- Software framework based on standard RAPID
  - Modular, flexible and structured RAPID programs
- Programming guidelines
  - Facilitate reuse and experience sharing
  - Lower cost for trouble-shooting, re-programming and upgrades
- Flexibility to step outside of RAPID framework and guidelines
  - … but at the expense of potential reduction in operator interface functionality and less possibilities for reuse

RobotWare Machine Tending
Automatic and Safe HomeRun



- Move the robot to Home Position in a safe way without collision
- Easy and secure with single click
- Quick error recovery in case of stop
- Customizable HomeRun logic
- Easily define and create HomeRun strategies.
  - RobotStudio Machine Tending PP
  - RAPID

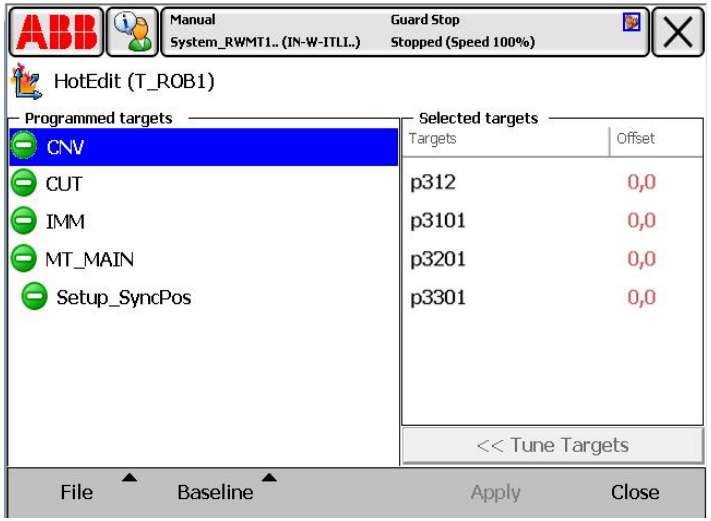
RobotWare Machine Tending
Pre-defined interface for Injection Molding Machines

- Hardware and signal interface robot-machine
- Based on international standards and safety regulations.
  - Euromap 12
  - Euromap 67
  - SPI
- Safe transfer of the signal exchange between robot and machine
- Reduced time for installation and configuration
- Fully integrated in the Machine Tending Software

RobotWare Machine Tending
Machine integration

- Interface that allow full integration of operation functions, e.g.
  - Operation mode (Start / Stop)
  - Program selection
  - Cycle selection
  - HomeRun
  - Service Routine Selection
  - Partless mode (Ghost mode)
- Tighter integration with machine and cell control

RobotWare Machine Tending
Optimize productivity and availability



- Hot Edit
  - Fine tune position and optimize the process
  - Simple selection of robot positions to improve movements
- Error handling
  - Advanced error handling simplify trouble-shooting and improve uptime
  - Error messages presented to operator
- Always in control
  - Production statistics
  - Status of machines, grippers, stations

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