

Robotics

# Flex Finishing Force Control for Machining Applications

# Force Control (FC)

The traditional way a user programs a robot is to define the path and the speed. These will be constant – independent of the process forces. If the path does not coincide with the surface and dimensions of the part, you will instantly have quality problems and potential damage to the tooling.

This is a known fact in the robotized finishing process. Users have spent a lot of time trying to correct these deficiencies and additional flexible toolings and servo axes were often needed. Three new functions add a new dimension to the use of robots in machining operations:

## FC Graphical Programming Interface

The robot will be made “soft” and the operator will be able to move the robot by hand to some reference positions defining the path. The manually taught paths will be used as the basis for Automatic Path Learning. The robot will run FC Pressure functionality and follows the surface/edge and at the same time the robot records the accurate path.

## FC Pressure

Will make sure that the robot will always follow the surface as the tool travels along the programmed path. The path can be linear or circular. The robot position perpendicular to the path direction will be changed continuously in order to maintain the force (contact pressure the toe surface).

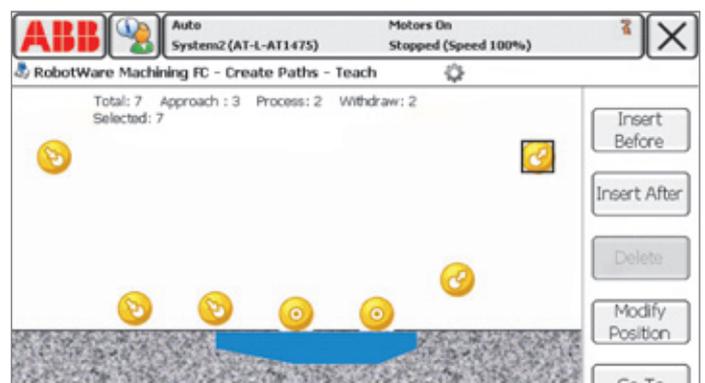
## FC SpeedChange

Will keep the process forces constant by changing the robot speed when the burr along a part line changes. This will keep the material removal rate below a maximum value when the depth of cut is increasing.

Softwareoption Robotware Machining FC



FC Automatic Path Learning



### Function Package (FC) for Machining Applications

Function Packages as a starting kit for those customers who would like to integrate the application /process themselves. The offer includes mounting of the sensor, testing and verification, as well as having the cable package integrated on the robot.

The basic Function Package includes

- RW Machining FC
- Graphical User Interface (GUI)
- Axis Board plus
- DAQ Board
- Force/Torque sensor
- Cable package
- Assembled, tested and verified



#### The benefits of Force Control are ...

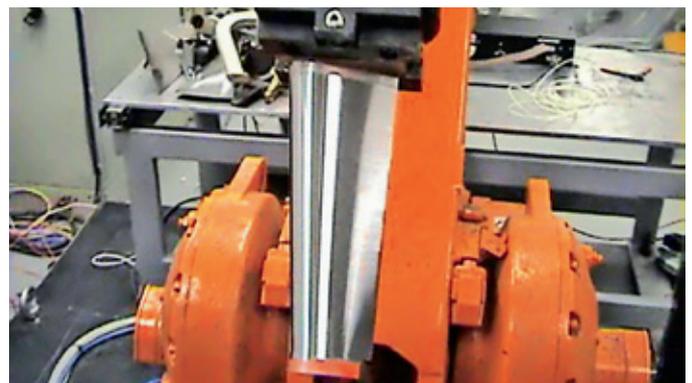
Ease of use –	shorter programming-,
fast integration:	tuning- and cycle times
Quality improvement	minimized risk of damage
in production:	to work piece, tools and robot
Improved	minimized injury and health risks
working conditions:	for personnel
Lower costs:	predictable tool wear and
	extended tool lifetime
Higher productivity:	ability to handle variations
	in location of burrs and flashes
Better	the ability to control the
process results:	process force, not the positions

The investment will lead to advantages, enabling the customer to focus on the application / process during integration. Setting up the system is a generic technique, independent of the process. Buying this option will eliminate the basic set-up of the system that has a large risk of being costly in terms of time and resources, affecting the final result if not done properly. The Function Package Force Control is available for: IRB 140, IRB 2400, IRB 2600, IRB 4400, IRB 4600, IRB 66xx (IRB 6640, IRB 6650, IRB 6660) and IRB 7600.

Conventional result, Position controlled



New result, Force controlled



### Flex Finishing Cell

ABB Robotics has developed an innovation called Flex Finishing Cell, a complete package which includes:

- IRB 140F industrial robot
- Function Package FC Machining
- manual 2 station turntable
- 2 meters high, 2 meters wide base plate including cell housing
- a spindle
- tool buffer for up to 5 tools
- Graphical User Interface (GUI)
- Human Machine Interface (HMI)



The Flex Finishing Cell represents a standardized, verified robot solution in the form of a robotized cell, which can be programmed for different tools and adapted to different components and work objects.

#### Main Cell Data

Weight:	2000 kg
Supply connections:	400V/50 Hz, 6 bar (oilfree, dry)
Spindle Power:	3.3 kW
Revolutions (max.):	50.000 rpm
Toolchanger:	SKI 11.5

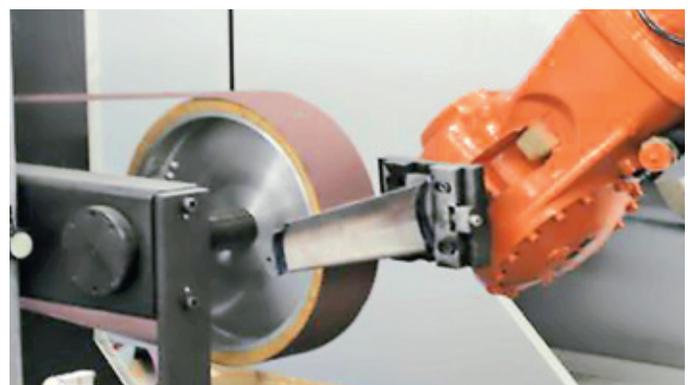
#### Force Control, a globally available solution developed by ABB for ...

Typical materials	Typical production processes
Steel	e.g. to cut secondary flashes
Stainless steel	Grinding or polishing of edges
Aluminium, Magnesium	Deflashing after die casting
Wood	Grinding & milling of wooden parts
Plastic	Deflashing, grinding and polishing
Glass	for rounding of sharp edges

FC Speed Change



FC Pressure



Take the robot by the hand and with just a few clicks, arrive at a new dimension of robot intelligence for the finishing process.



# Contact us

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ROB0215EN\_A\_Mai 2011