Take the robot by the hand …
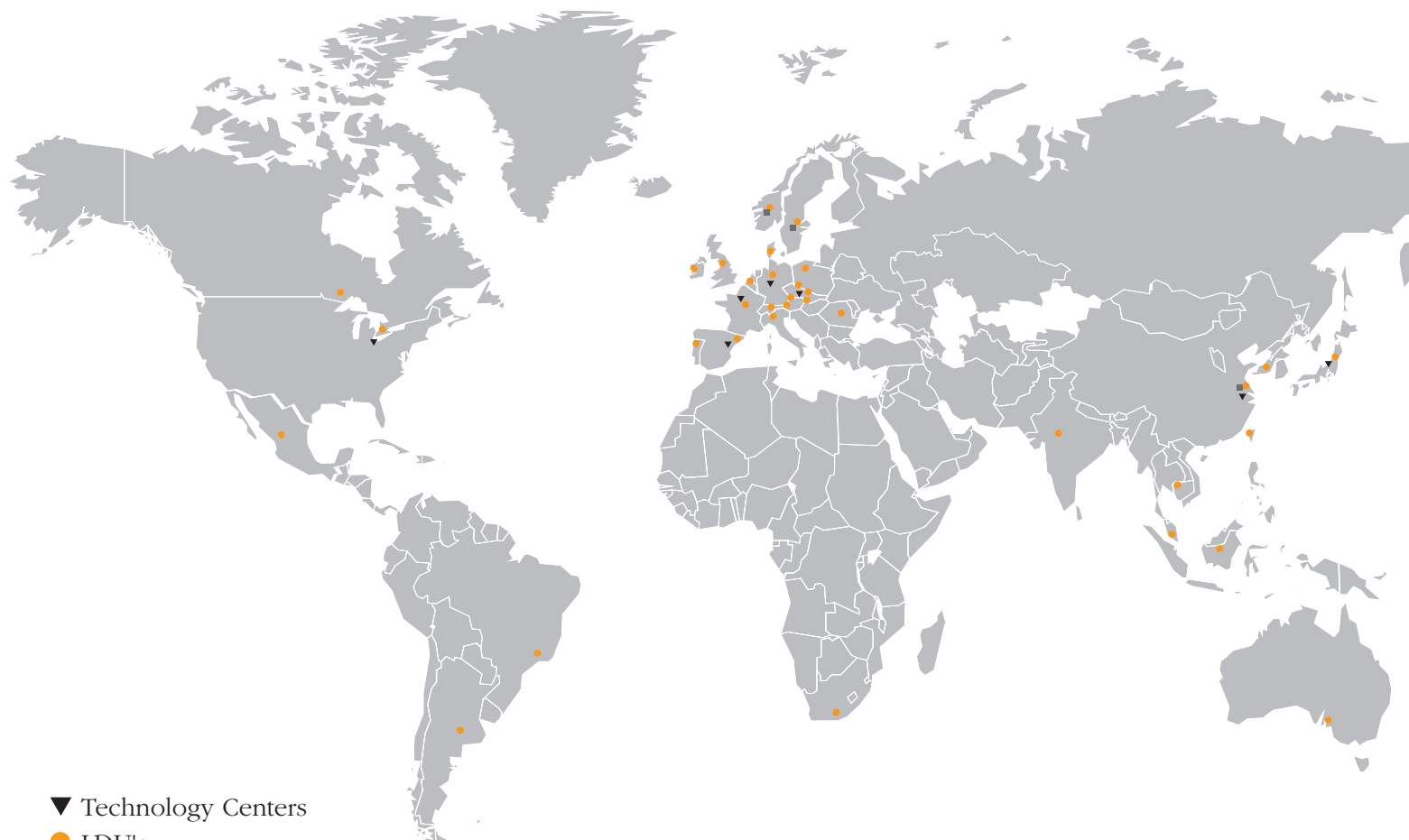
… and with just a few clicks …

… arrive at a new dimension of robot intelligence for the finishing process.

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Global Flex Finishing
Force Control for Machining Applications

An easy-to-use technology for flexible and efficient production

Slow down to 10%

The **heart** of Robotics

ABB

Force Control for Machining Applications

The traditional way in which 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 the correct positions defining the path and save these. The correct positions on the work piece (part) will only need to be accurate within a few millimeters. The manually taught paths will now be used as the basis for Automatic Path Learning. The robot will run FC Pressure functionality and follow the surface/edge and at the same time record 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 to the 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.

Function Package Force Control 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)
- DAQ Board
- Force/Torque sensor
- Cable package
- Assembled, tested and verified

The investment made will lead to bottom line advantages, enabling the customer to focus on the application/process to be integrated. Setting up the system is a generic technique, independent of the process to be run. 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 4400, IRB 6600, IRB 7600
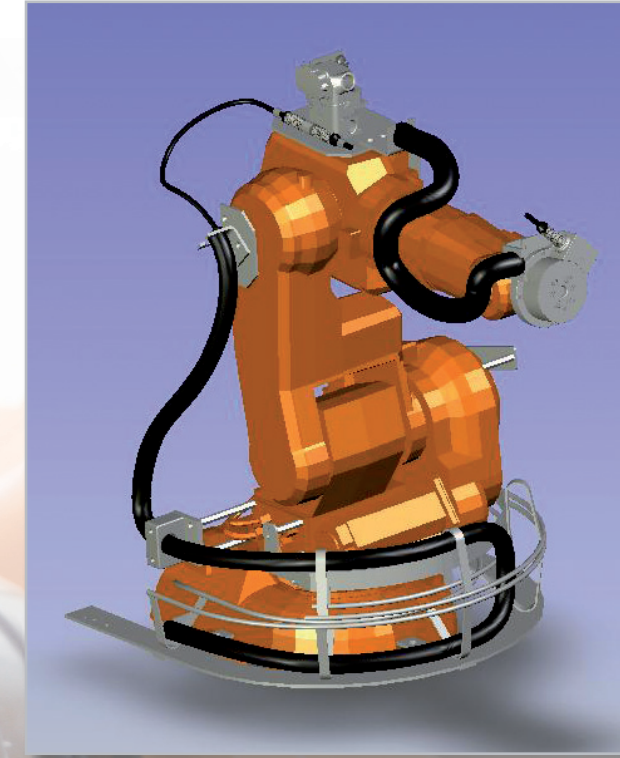
Flex Finishing Cell
ABB Robot Automation has developed a innovation called Flex Finishing Cell, a complete package which includes:
- an IRB 140F industrial robot
- Function Package Force Control Machining
- a manual 2 station turntable
- a 2 meters high, 2 meters wide base plate including cell housing
- the spindle
- tool buffer for use 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 / 50Hz
6bar (without oil, dry)

Spindle Power
3.3kW

Revolutions (max.)
50.000 rpm

Toolchanger
SKI 11.5

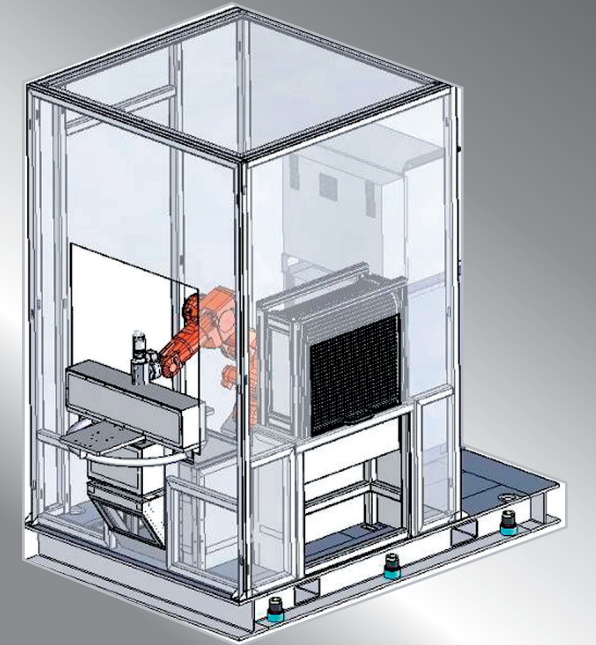### The benefits of Flex Finishing are:

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

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Flex Finishing, a globally available solution developed by ABB for…

Typical materials	Typical production processes
• Steel	• After CNC machining, to cut secondary flashes
• Stainless steel	• Grinding or polishing of edges
• Aluminum, magnesium	• Deflashing after die casting
• Wood	• Polishing of interior parts for automotive applications
• Plastic	• Deflashing, grinding and polishing
• Glass	• For rounding of sharp edges

These innovations can provide a solution for several known finishing problems.

Conventional result
Position controlled
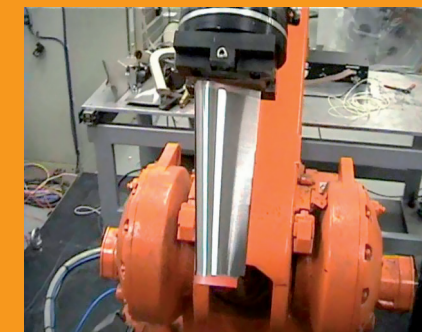
New result
Force controlled

Slow down to 10%