



# RADIALLY-COMPLIANT DEBURRING TOOLS

## Product Description

ATI's line of Radially-Compliant (RC) Deburring Tools, also known as Flexdebur™, are robust, high-speed and light-weight air turbine-driven deburring units for deburring aluminum, plastic, steel, etc. with a robot or CNC machine. The RC Deburring Tool is especially suited for removal of parting lines and flash from parts. However, its flexible design allows it to be used in a wide variety of applications.

The RC's pneumatically-controlled, articulated design allows the cutting bit to follow the part profile and compensate for surface irregularities, allowing high feed rates with uniform quality in any orientation. The tool also requires no oil, allowing clean exhaust air to be vented directly into the work environment.

Compliance is supported by air pressure applied to the shaft of the unit and is used to perform consistent deburring on irregular part patterns. The motor's internal governor maintains high spindle speeds for optimum surface finish. The tools offer up to  $\pm 9$  mm of compliance. The RC Deburring Tool also utilizes standard industrial tungsten-carbide bits, which allows for adaptation to changing assembly lines and part requirements.

## Features

**Designed for removal of parting lines and flash:** RC Deburring Tools are particularly adept at flash and parting line removal and can also perform edge deburring. The RC Deburring Tool's flexible design allows the tool to perform a variety of deburring tasks.

**Quiet turbine motor:** Quiet air motor (less than 70 dbA) utilizes clean air (no oil). Exhaust air can be vented to atmosphere without reclamation.

**Patented design:** Patent #s 6,974,286 and 7,137,763 B2 with other patents pending.

**Radial compliance:** The radial motion of the RC spindle and cutter allows fast and simple programming of the robot.

**Flexible mounting options:** The RC Deburring Tool can be mounted to a robot, bench, or fixture from the side or rear.

**Industry-standard tungsten-carbide bits:** The collet system allows the user to select from a wide variety of standard industrial cutter profiles to fit their deburring needs.

**Minimal chattering and vibration:** The compliance unit supports the tool to provide stiffness for the cutter, yet allows motion in response to the part profile. Radial compliance allows the unit to perform where other deburring tools have failed.



A variety of Radially-Compliant Deburring Tools are available. left to right: RC-151, RC-660, RC-300/340, and RC-340-CNC.



The Radially-Compliant Deburring Tools have a patented design which provides radial compliance throughout 360 degrees of movement via internal pneumatic pistons which center the spindle during use.

## Single-Axis Compliant Deburring Tools

The RS-151 and RS-340 Radial, Single-Axis Compliant Deburring Tools allow a single axis of pivoting motion. The spindle and cutter pivot in one plane about a single-axis, providing great stiffness in the direction of motion while the cutter is free to pivot and follow the part profile for unprecedented surface finishes. Single-Axis Deburring Tools offer up to  $\pm 5$  mm of compliance and can utilize a variety of RC deburring accessories.

## Radially-Compliant (RC and RS) Deburring Tools

Specification	RC-151	RS-151	RC-300	RC-340	RS-340	RC-660	RC-340-CNC*
Weight (without mounts)	2.4 lb (1.1 kg)	2.4 lb (1.1 kg)	2.5 lb (1.2 kg)	2.5 lb (1.2 kg)	2.5 lb (1.2 kg)	4.9 lb (2.2 kg)	4.0 lb (1.8 kg)
Compliance Travel @ collet	± 0.2 in (± 5 mm)	± 0.2 in <sup>1</sup> (± 5 mm) <sup>1</sup>	± 0.3 in (± 8 mm)	± 0.3 in (± 8 mm)	± 0.2 in <sup>1</sup> (± 5 mm) <sup>1</sup>	± 0.35 in (± 9 mm)	± 0.3 in (± 8 mm)
Compliance Travel Recommended	± 0.1 in (± 2.5 mm)	± 0.1 in (± 2.5 mm)	± 0.15 in (± 4 mm)	± 0.15 in (± 4 mm)	± 0.15 in (± 4 mm)	± .175 in (± 4.5 mm)	± 0.15 in (± 4 mm)
Compliance Force (Pneumatically Variable)	0.7-1.5 lbf <sup>2</sup> (3.1-6.7 N) <sup>2</sup>	0.7-1.5 lbf <sup>2</sup> (3.1-6.7 N) <sup>2</sup>	2.8-9.5 lbf <sup>3</sup> (12.7-42.3 N) <sup>3</sup>	2.8-9.5 lbf <sup>3</sup> (12.7-42.3 N) <sup>3</sup>	See ATI website**	2.8-9.5 lbf <sup>4</sup> (12.7-42.3 N) <sup>4</sup>	2.8-9.5 lbf <sup>3</sup> (12.7-42.3 N) <sup>3</sup>
Idle Speed	65,000 rpm	65,000 rpm	30,000 rpm	40,000 rpm	40,000 rpm	40,000 rpm	40,000 rpm
Air Consumption <sup>5</sup> (idle/stall)	3.0 cfm (1.4 l/s) 8.0 cfm (3.8 l/s)	3.0 cfm (1.4 l/s) 8.0 cfm (3.8 l/s)	6.0 cfm (2.8 l/s) 21.5 cfm (10.2 l/s)	6.0 cfm (2.8 l/s) 21.5 cfm (10.2 l/s)	6.0 cfm (2.8 l/s) 21.5 cfm (10.2 l/s)	11.5 cfm (5.4 l/s) 38.0 cfm (17.9 l/s)	6.0 cfm (2.8 l/s) 21.5 cfm (10.2 l/s)
Air Connections <sup>6</sup> (spindle/compliance)	1/8 NPT 1/8 NPT	1/8 NPT 1/8 NPT	ø 3/8" Tube ø 5/32" Tube	ø 3/8" Tube ø 5/32" Tube	ø 3/8" Tube ø 5/32" Tube	ø 1/2" Tube ø 5/32" Tube	Single line thru spindle or 1/8 NPT
Collet	ø 1/8" standard (3 mm opt.)	ø 1/8" standard (3 mm opt.)	ø 1/4" standard (others avail.)	ø 1/4" standard (others avail.)	ø 1/4" standard (others avail.)	ø 1/4" standard (others avail.)	ø 1/4" standard (others avail.)
Power	150 W @ 65,000 rpm	150 W @ 65,000 rpm	300 W @ 30,000 rpm	340 W @ 40,000 rpm	340 W @ 40,000 rpm	660 W @ 40,000 rpm	340 W @ 40,000 rpm
Mounting Feature	Side & Rear Patterns <sup>7</sup>	Side & Rear Patterns <sup>7</sup>	Side & Rear Patterns <sup>7</sup>	Side & Rear Patterns <sup>7</sup>	Side & Rear Patterns <sup>7</sup>	Side & Rear Patterns <sup>7</sup>	3/4" [19 mm] Weldon Shank

1 Single-axis of compliance 2 When supplied 20-60 psi (1.4-4.1 bar) 3 When supplied 5-60 psi (0.3-4.1 bar) 4 When supplied 10-60 psi (0.7-4.1 bar)  
5 Dry filtered air 6 Alternate air connections available, contact ATI 7 Accessories available: Bench mounting plate, Rear interface plate  
\*For more information on CNC models, go to page 9 \*\*Visit [www.ati-ia.com](http://www.ati-ia.com) for current specifications

## Cutting Tool Holding Systems (Collets)

All Flexdeburrr products utilize removable collets to grip customer-supplied cutting tools. Different collet diameters may be substituted to retain numerous cutter shank diameters. The collet retaining nut is loosened to open the collet allowing cutting tools to be removed and inserted. Once the tool is set to the desired depth, spanner wrenches are used to tighten the collet nut causing the collet to collapse and secure the cutting tool. The air motor design does not allow the installation of quick-change or drawbar collet systems.

The standard tool holding system for Flexdeburrr products is an economical, proprietary, single-angle collet design utilizing three gripping fingers. This is suitable for most applications where industry-standard shank diameter cutting tools are used and runout tolerances of up to 0.001" [0.025 mm] are acceptable. Special sizes are available upon request, but require custom machining.

*"The flexibility and consistency of the RC Deburring Tool will allow us to design more efficient cells with a smaller footprint. Also, the system's robot is quicker and easier to train (program) with a more forgiving finishing tool."*

Charlie Young  
Sales Manager  
Acme Manufacturing Company

## RC Collets

Part Number	RC-C-12142	RC-C-12149	RC-C-12442	RC-C-12443	RC-C-12444	RC-C-12445	RC-C-12446
Description	ø 3 mm collet	ø 1/8" collet	ø 3 mm collet	ø 1/8" collet	ø 3/16" collet	ø 6 mm collet	ø 1/4" collet
Fits Model	RC-151, RS-151	RC-151, RS-151	RC-300, RC-340, RS-340, RC-340CNC, RC-660	RC-300, RC-340, RS-340, RC-340CNC, RC-660	RC-300, RC-340, RS-340, RC-340CNC, RC-660	RC-300, RC-340, RS-340, RC-340CNC, RC-660	RC-300, RC-340, RS-340, RC-340CNC, RC-660

# RC DEBURRING ACCESSORIES

## RC Burrs\*\*

Part Number	RC-B-24033	RC-B-24061	RC-B-24063	RC-B-24065	RC-B-24645	RC-B-24862
Description	Diamond cut, 1/4" Burr Dia., 5/8" Burr Length, 1/4" Shank	Standard cut, 3/8" Burr Dia., 3/4" Burr Length, 1/4" Shank	Diamond Cut, 3/8" Burr Dia., 3/4" Burr Length, 1/4" Shank	Aluminum Cut, 3/8" Burr Dia., 3/4" Burr Length, 1/4" Shank	Aluminum Cut, 3/8" Burr Dia., 5/8" Burr Length, 1/4" Shank	Alt. Diamond Cut, 1/4" Burr Dia., 3/4" Burr Length, 1/4" Shank
Application	For hardened and tough materials, super alloys, and fiber-reinforced plastics.	For deburring, beveling, chamfering. Long life.	For hardened and tough materials. Higher cutting capacity than standard cut.	For deburring of cast aluminum and thermo-plastics. No loading of the flutes.	For deburring of cast aluminum and thermo-plastics. Rounded burr tip.	For metal or plastics. Weld removal, rough finishing, surface working.

Part Number	RC-B-26408	RC-B-17203	RC-B-17903	RC-B-18053	RC-B-73003
Description	Cut FVK, 1/4" Burr Dia., 5/8" Burr Length, 1/4" Shank	Cylindrical Double cut, 1/8" Burr Dia., 9/16" Burr Length, 1/8" Shank	Flame Double cut, 1/8" Burr Dia., 1/4" Burr Length, 1/8" Shank	Cone Double Cut, 1/8" Burr Dia., 9/16" Burr Length, 1/8" Shank	Fiberglass Router, 1/8" Burr Dia., 1/2" Burr Length, 1/8" Shank
Application	For trimming and contour milling of all glass and fiber-reinforced plastic. High feed rates.	For hardened and tough materials, super alloys, and fiber-reinforced plastics.	For universal use, for ferrous and non-ferrous metals, and plastics.	For hardened and tough materials, super alloys, and fiber-reinforced plastics.	For fiberglass and non-metallic materials.

\*\* In stock. Additional off-the-shelf burrs available.

## RC Accessories

Part Number	9150-FFR-90	9150-PPR-60	9150-GA-60
Description	Coalescing Filter/Regulator Assembly (for air motor)	Precision Regulator Assembly (for compliance)	60 psi gauge for setting compliance (for use with the CNC Flexdeburr model only)

Part Number	9005-50-1054	9005-50-1005	9005-50-1003	9005-50-1029	9005-50-1028
Description	Bench Mount Adapter Kit	Blank Rear Mount Adapter Kit	Bench Mount Adapter Kit	Bench Mount Adapter Kit	Blank Rear Mount Adapter Kit
Fits Model	RC-151, RS-151	RC-151, RS-151, RC-300, RC-340, RS-340	RC-300, RC-340, RS-340	RC-660 only	RC-660 only

## How to order Radially-Compliant Deburring Tools

- 9150-R□-□□□-□-□
- ➔ **Blank** = Standard (Inch) Collet and Air Ports **E** = Metric Collet and Air Ports
  - ➔ **Blank** = Standard Collet System
  - ➔ **151, 300, 340** or **660** = Motor Power (Watts)
  - ➔ **C** = Radial Compliance (360 degrees) **S** = Single-axis Compliance
  - ➔ **Designates the Deburring Product Series**

**Note:** Inch Flexdeburr units are orange and metric are black for quick visual identification.

## AXIALLY-COMPLIANT FINISHING TOOLS

### Product Description

ATI's Axially-Compliant Material Finishing Tool, also known as VersaFinish™, is a robust, low-speed, high-torque air tool with an axially floating spindle, suitable for a multitude of robotic and automated material finishing operations on aluminum, plastic, steel, etc.

The rotating spindle is equipped with a 3/8" chuck for holding customer-supplied tools. These may include, but are not limited to, abrasive brushes, wire brushes, sanding disks, polishing points, and chamfering tools. While spinning at low speeds, the customer's tool is pushed against the workpiece using an adjustable air supply to control the contact force. This constant pneumatic force allows the spindle to respond axially to changes in part profile. The force control system provides very high stiffness in the path direction and a low stiffness in the contact force direction.

Optional sensing devices are available to detect the position of the spindle and monitor its speed for process development. The floating head design reacts quickly to any variances in part position or robot path. As a result, robot programming time can be reduced by up to 75 percent.

### Features

**Reliable vane motor:** Robust vane-type air motor with gear reduction designed with rugged components provides exceptional power.

**High-torque performance:** Vane motors increase their torque in response to loads introduced in finishing.

**Floating axial compliance:** Remotely-adjusted air pressure controls and maintains constant axial force on the floating spindle. The axially-compliant motion of the spindle allows the customer's tool to compensate for deviations in the part profile along the robot path, compensate for tool wear, and provide constant contact force with the workpiece.

**Mounting options:** The VersaFinish is provided with a mounting pattern on the side of its housing. Adapter plates may easily be customized for robotic, bench, or fixture mounting.

**Simple tool holder:** The VersaFinish is supplied with a simple key-actuated 3/8" chuck for holding common media. The spindle is threaded to allow replacement of the chuck with customer-supplied or custom-manufactured media holders.

**Easy teaching:** The axial motion of the spindle allows fast and simple programming of the robot. This movement also compensates for changes in part tolerances, part misalignment, tool wear, and robot path variation.



ACT-390 with nylon brush (not included)



ACT-390 mounted to a 6-axis robot

**Optional sensors:** To assist in process development or monitoring, the VersaFinish may be ordered with optional sensors to detect the spindle speed and forward or retracted positions. All units are supplied with a Forward (-F) sensor to detect when the media is in contact with the work piece (unless specifically ordered without a sensor option). Two other options are available:

- R = Retract Sensor (spindle pushed fully back)
- T = Tachometer Sensor (rotational speed of the spindle)



# ACT MODEL SPECIFICATIONS

## Axially-Compliant (ACT) Material Finishing Tools

Specification	ACT-390
Weight total (w/o adapter)	7.25 lbs (3.3 kg)
Compensation (axial)	0.6 in max. axial, ±0.30 in recommended (15 mm max., ±7.5 mm recommended)
Compliance force	3.2-16.7 lbs, @ supply pressure of 5-60 psi (14-74 N, @ supply pressure of 0.34-4.1 bar)
Idle Speed/Working Speed	5600 RPM / 2600 RPM
Power	390 W @ 2600 RPM (0.52 hp)
Torque (max. power)	1 lb-ft (1.4 Nm)
Torque (starting/stall)	2 lb-ft (2.7 Nm)
Spindle air pressure	90 psi maximum (6.2 bar)
Air consumption (approx. max.)	19 cfm (9 l/s)
Chuck size	3/8" standard (specials upon request) (10 mm)
Required lubricated air Oil Type Delivery rate	ISO VG32 Class 1 Turbine Oil, or equivalent 1 drop per minute by micro fog system

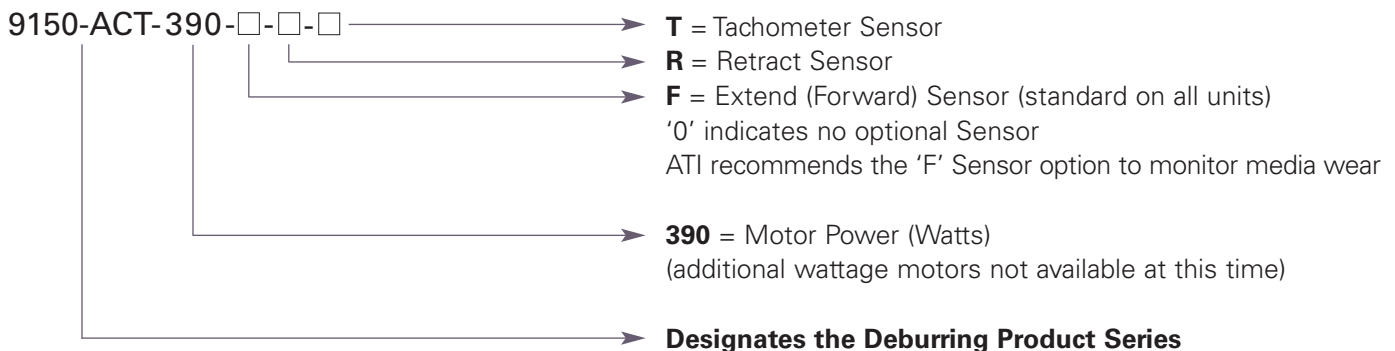


ACT-390 with wire brush (not included) mounted to a 6-axis robot

## ACT Accessories

Part Number	9005-50-1003
Description	Bench Mount Adapter Kit

## How to order Axially-Compliant Material Finishing Tools



## Product Description

ATI's line of Axially-Compliant (AC) Deburring Tools, also known as Speedeburr™, are a patented family of robust, high-speed, low-weight air tools with a floating rotary cutting burr for edge-deburring and chamfering of aluminum, plastic, steel, etc., with a robot. While spinning at high speeds, a rotary cutting burr or file (tungsten carbide, PCD, or CBN coated cutting burr) rides on a cushion of air that provides compliance while maintaining a constant force. Because the rotary burr has a 45 degree cutting angle, the compliance is both lateral and axial. This patented force control system provides a very high stiffness in the path direction and a low stiffness in the contact force direction that prevents chattering (a common problem with robotic edge deburring). Due to the extremely low inertia of the cutting burr, AC Deburring Tools can quickly deburr parts, greatly reducing cycle time.

AC Deburring Tools maintain a consistent deburring result from part-to-part. The floating head design reacts quickly to any variances in part position or robot path. As a result, robot programming time can be reduced by up to 75 percent.

## Features

**Designed for edge deburring and chamfering:** AC Deburring Tools are uniquely and exclusively designed for edge deburring and chamfering.

**Reliable vane motor:** Robust vane-type motor designed with rugged components provides long service with exceptional power.

**High-torque performance:** Vane motors increase their torque in response to deburring demands.

**Floating axial compliance:** Remotely set air pressure controls and maintains the constant axial force on the deburring cutter mounted in the Free Flying Piston (FFP). The axially-compliant motion of the FFP allows the cutter to compensate for deviations in the part profile along the robot path.

**Mounting options:** The AC Deburring Tools use adapter plates, which are easily customized for robotic, bench, or fixture mounting.

**Simple file-change system:** The cutting files mount to the unit using threaded shanks, and can be replaced easily and quickly without removing the tool from the robot.

**Easy teaching:** The axial motion of the FFP and cutter allows fast and simple programming of the robot. The movement of the cutter compensates for changes in part tolerances, part misalignment, and robot path variation.

**Extensive industry use:** AC Deburring Tools are being used by hundreds of customers throughout the world. Customers include Pratt & Whitney, Nissan, Volvo, Rolls Royce, Caterpillar, Saab, General Motors, John Deere, and many others.



AC-90 and AC-180 Axially-Compliant Deburring Tools



A floating burr rides on a cushion of air to provide compliance and to maintain consistently deburred parts.

*"ATI's [AC Deburring Tool] has proven to be an effective solution. The floating head provides a consistent chamfer around the perimeter of the part, allowing for variations in part tolerances and edge conditions."*

Scot Slosier  
Project Engineer  
Micron Manufacturing, Inc.

# AC MODEL SPECIFICATIONS

## Axially-Compliant (AC) Deburring Tools

Specification	AC-90	AC-180
Weight	1.12 lb (0.51 kg)	1.35 lb (0.51 kg)
Max Burr Compensation	± 0.16 in (± 4 mm)	± 0.16 in (± 4 mm)
Recommended Burr Compensation	± 0.08 in (± 2 mm)	± 0.08 in (± 2 mm)
Axial Force Range <sup>1</sup>	0.2-5.6 lb (1-25 N)	0.2-5.6 lb (1-25 N)
Cutting File Surface Speed <sup>2</sup>	25-35 ft/sec (7.5-10.5 m/sec)	25-35 ft/sec (7.5-10.5 m/sec)
Air Consumption @ 75 psi, 5 bar <sup>3</sup>	14 cfm (6.7 l/s)	14 cfm (6.7 l/s)
Cutting File Rotation Speed <sup>4</sup>	18,000 to 25,000 rpm	18,000 to 25,000 rpm
Sound Pressure Level/ Value	75 dB(A) [87 dB(C)]	75 dB(A) [87 dB(C)]
Power	250 W @ 20,000 rpm	250 W @ 20,000 rpm
Torque at lower speeds	0.30 ft-lb (0.4 Nm)	0.30 ft-lb (0.4 Nm)

1 When supplied 0-43.5 psi (0-3 bar) 2 Measured at 8 mm dia. (halfway between tip and outer rim)  
3 Lubricated filtered air 4 Idle RPM is at 30,000



AC-90



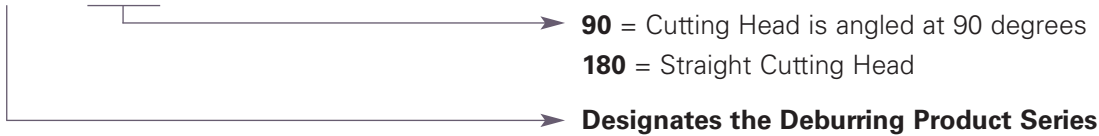
AC-180

## AC Accessories (required)

Part Number	9150-H/T-3178
Description	Mounting Adapter for Pneumatic Connections (Required for AC-90 and AC-180 models)

## How to order Axially-Compliant Deburring Tools

9150-AC-□□□





# AC DEBURRING ACCESSORIES

## AC Accessories (optional)

Part Number	9150-FRL-3	9150-FRL-4
Description	Filter/Regulator/Lubricator (for air motor)	Filter/Regulator/Lubricator with oil level switch (for air motor)
Part Number	9150-XMC	9150-P16-B-G
Description	Muffler and oil recovery device	High precision pressure regulator kit (for compliance)

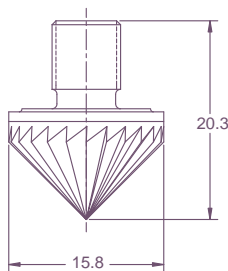


FRL-3 Filter-Regulator-Lubricator

## AC Burrs\*

Part Number	4579-C2	4579-C5	4153-C5	43967	1010-C2
Description	Straight fluting, C2 micro-grain, 90 degree cone	Straight fluting, C5 micro-grain, coating added	Spiral fluting, triple segmentation, C5 coating added	Straight fluting, 90 degree cone	Straight fluting, C2 micro-grain, 80 degree cone
Application	For hard metal, i.e., Steel.	For faster speed and longer life.	For faster speed and longer life.	For reinforced plastics.	For soft metal, i.e., Aluminum.

\* Specially designed burrs only available from ATI.



**AC-90 Burr Dimensions**  
(except 1010-C2)

## CNC Models - Radially-Compliant Deburring Tools

ATI's CNC deburring products are designed to be held with common end mill tool holders in CNC machining centers. They utilize the part positioning capability of the machining center's table to manipulate the workpiece while the deburring tool is held stationary. The integrated compliance compensates for part and path inaccuracies and provides a consistent finish. Air is supplied to the deburring tool through the center of the machining center's spindle, eliminating the need for separate air supplies.

The Radially-Compliant CNC Deburring Tool is an ideal choice when necessary to reach into part recesses. The Radially-Compliant CNC Deburring Tool utilizes a patented air supply system allowing articulated motion of the deburring tool without the use of external hoses or fittings that might otherwise limit the free, compliant motion of the tool.



RC-340-CNC mounted to a CNC machine

## Radial Compliance vs. Axial Compliance: Which Deburring Tool best fits my application?

Radially-Compliant (RC) Deburring Tools use a turbine motor which requires filtered, lubrication-free air. Standard industrial burrs may be used.

Axially-Compliant (AC) Deburring Tools use a vane-type motor which requires filtered, lubricated air to operate properly. Use of non-lubricated air will result in motor failure. This design utilizes specially designed burrs only available from ATI.

### Edge deburring in tough-to-reach areas?

Radially-Compliant Deburring Tools, in many cases, can reach deeper and into more confined areas than the AC units. The design allows for a greater range of access points for robot programming.

### Removing Parting Lines or Flash?

Radially-Compliant Deburring Tools are the only models designed to remove parting lines and flash.

### Edge deburring or chamfering?

Axially-Compliant Deburring Tools are faster and preferred over the RC units for edge deburring.

## Applications

ATI Deburring Tools are in use in hundreds of successful applications around the world including:

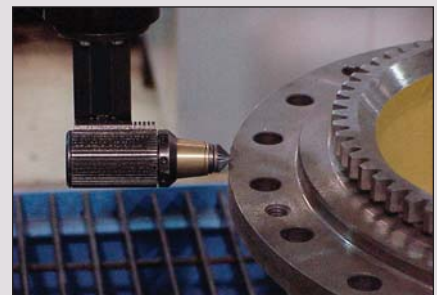
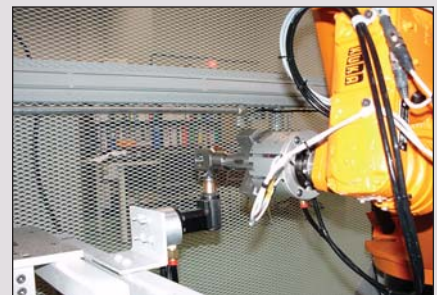
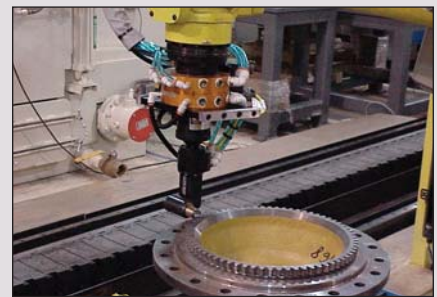
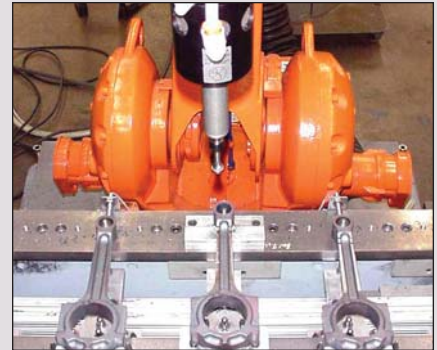
- Crankshafts
- Aluminum bumpers
- Silver spoons
- Steel steering knuckles
- Automobile exhaust manifolds
- Steel and titanium jet engine parts
- Aluminum cylinder heads and casings
- Forged steel brake keys
- Plastic child car seats

*“The compliance feature [of the Radially-Compliant deburring tool] was the real selling point as the plates shift a bit from part-to-part. We are quite happy with the units’ performance to date.”*

Andy Morwood  
Robotics/Welding Engineering  
Dana Canada

*“ATI has proven itself as a first-rate company with first-rate products. ATI’s automated deburring tools are unchallenged in the industry.”*

Mike Olson  
Sales Application Engineer  
Automated Concepts, Inc.



## Radially-Compliant Deburring Tools: Fanuc Robotics

"Most large manufacturing companies have a number of deburring needs that warrant the purchase of a robotic cell. The key to success is to assure that the automated deburring operation can satisfactorily and repeatedly perform the deburring task," says Bob Howard, Systems Integrator for Fanuc Robotics Southeast. "Creating a deburring cell that can satisfy more than 90 percent of all industrial applications is our goal."

"We are convinced that the RC Deburring Tools will provide a 35 to 40 percent gain in productivity due to improvements in the deburring process. The first successful application was an automotive parts manufacturer in the southeast that had a very complex part. The application needed the flexibility of the deburring tip to access several crevices that were hard

to reach, even with manual deburring systems. We can now maneuver the tip to reach all areas of the part and at a pace of two parts every 190 seconds."

Howard says the RC was the right deburring tool for the job, and the flexibility of the tool opens up a larger world of possible applications. "We must exhibit the ability to handle both large and small burrs and have the built-in compliance and flexibility to satisfy the most challenging jobs."

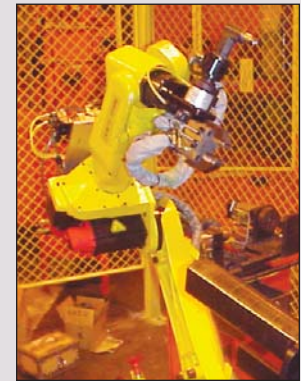


## Axially-Compliant Deburring Tools: Ellison Machine Tools and Robotics

Ellison engineers, builds, integrates, services, and supports customers who need turnkey integrated systems for a variety of industries.

This system uses an AC Deburring Tool to deburr the slots on aluminum wheel rims. The burrs, remaining after casting and machining processes, are 0.01 inch thick with varying heights from zero to 0.1 inch. The requirement is to remove the burrs and break the edge with a chamfer. A six-axis robot is programmed to track the path of the slot with the AC Deburring Tool mounted on the robot flange. Because of the unit's  $\pm 0.16$  inch compliance, the number of points are reduced when following the path around the arcs in the slot.

The AC cutting file length is 5/8 inch with 24 cutting flutes and a small negative rake angle. The chamfer size is controlled by the path speed and the axial air pressure of the robot. When the robot runs at about 2 inches per second, the chamfer cuts are approximately 0.035 inch. Each rim has approximately 120 inches of edge to deburr, and after 1,000 rims are deburred, the cutting file is still usable, exhibiting very little wear.



## Other ATI Products

### Robotic/Automatic Tool Changer

A high-precision rugged device that automatically changes tooling. Patented fail-safe locking mechanism uses No-Touch Locking™ technology, allowing plate separation when locking.

### Robotic/Automatic Tool Changers for Heavy Automation

This series of modular Tool Changers are designed specifically for high-payload and high-moment applications. **Utility Modules** to pass air, fluid, and electrical signals are also available for use in non-tool changer applications. Useful for processes requiring repeated connection/disconnection of utilities.

### Manual Tool Changers

Cost-effective solution for quickly changing tools by hand. Compact design combines high strength and excellent repeatability while preventing loosening.

### Multi-Axis Force/Torque Sensor

Measures the full six components of force and torque. High overload protection and high signal-to-noise ratio. Used in robotic and research applications.

### Utility Couplers

Quickly connects utilities such as air and electrical signals in docking and fixturing applications. Features a unique compliance mechanism that compensates for severe tooling misalignments. The modular body design is capable of mounting any of ATI's standard add-on **Utility Modules**.

### Robotic Collision Sensor

Designed to prevent damage to robotic end-effectors resulting from robot crashes. Features include: Automatic reset, high-repeatability, and large moment rotation.

### Automated Assembly Alignment Device

An insertion device using Remote Center Compliance technology that helps assembly machines automatically align close-fitting parts, preventing jamming and galling.

## Company Profile

ATI Industrial Automation is a world-leading developer of Automatic Tool Changers, Multi-Axis Force/Torque Sensing Systems, Utility Couplers, Robotic Collision Sensors, Robotic Deburring Tools, and Compliance Devices. Our products are found in thousands of successful applications around the world.

For over 20 years, our engineers have been developing cost-effective, state-of-the-art products and solutions to improve manufacturing productivity.

Our Mission is to provide customers around the world with high-quality robotic peripheral devices, tooling and sensors that enhance customer profitability by increasing the effectiveness, flexibility, safety and productivity of their automation applications. We accomplish this through continuous improvement of existing products, product customization and new product innovation.

Our engineering-centric staff focuses on providing customer solutions to robotic, automation and sensing applications.

## Our Quality Policy

ATI Industrial Automation strives to provide customer satisfaction through continual improvement of on-time delivery, quality and reliability, and a constant focus on innovation and profitability.



*Engineered Products for Robotic Productivity*

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