

AUTOMATED FINISHING SYSTEMS

World-Class Engineered Systems That Reduce Your Overall Unit Cost

**Designer and builder of
automated systems for:**

- ▶ Centerless Grinding
- ▶ Robotic Finishing
- ▶ Flat Stock Grinding (Strip and Coil)
- ▶ Custom Turnkey Finishing Solutions



BUFFING

POLISHING

GRINDING

DEBURRING

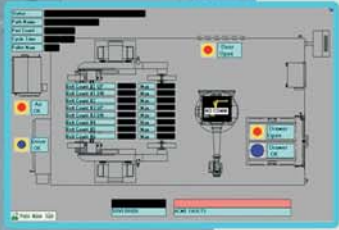
MICROPOLISHING

AUTOMATING AND OPTIMIZING THE PROCESS

Acme Manufacturing Company is a fully integrated designer and manufacturer of turnkey surface finishing systems that perform buffing, polishing, grinding, deburring and superfinishing operations. We have installed more than 80,000 machines and systems, in more than 35 countries, over the last century.

Acme's diverse applications span many industries: automotive OEM and aftermarket parts, heavy truck, medical implants, aircraft/aerospace components, plumbing and builders' hardware, cookware, motorcycle parts, off-road and agricultural equipment, hydraulic cylinders, stainless steel and specialty metals.

Our unique capability is this: hundreds of years of in-house finishing expertise, and decades of special machine building and robotic integration experience, combined with the knowledge of finishing media (including coated and structured abrasives, buffing wheels and compounds, and non-woven abrasives), that comes from solving thousands of finishing application challenges.



CENTERLESS BELT GRINDING SYSTEMS

Heavy stock removal rates, at high line speeds, with close dimensional size tolerances and low Ra surface finishes are the hallmarks of Acme's Centerless Belt Grinding Systems. Processes include sizing and tolerance grinding, superfinishing, deburring or decorative finishing of bar and tube. Machine model capability ranges from less than 3/32 in. OD bar to over 12 in. OD tube, with size tolerances to ± 0.0003 in., and stock removal up to 6 cu.in./min. Single pass operations utilizing multiple heads are our forte.

FLAT STOCK FINISHING SYSTEMS

Hot rolled or cold rolled stainless steel strip and coil are processed at over 150 ft. per minute with Acme systems. Condition grinding, polishing and hairline finishing are performed with abrasive belts and rolls.

DEDICATED FINISHING SYSTEMS

Acme also provides custom-designed systems that are application-specific to handle low and high volume deburring, buffing, polishing and grinding.



Glen "Fritz" Carlson III
(President) and
Glen Carlson Jr.
(Chairman).

Founded in 1910, Acme is a four-generation family-owned business.

ROBOTIC FINISHING SYSTEMS

From grinding to satin finishing, hundreds of Acme robotic finishing systems are in the field, producing 10 to 200 parts per hour, while significantly reducing unit cost by over 65%.

Besides improved productivity, media life is extended up to six times due to contact efficiency (time on the part), constant work pressure, cycle time repeatability, and media monitoring with automatic adjustment. Fully enclosed cells, performing one to 12 operations, are designed and built on a turnkey basis, complete with part program tooling, off-line programming and vision technology.

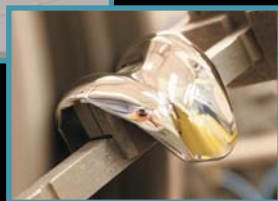
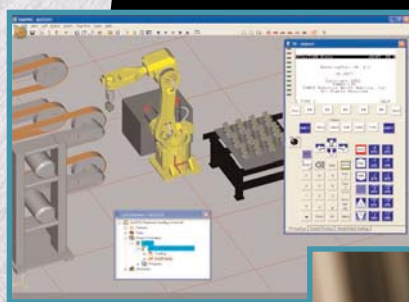
SINGULAR FOCUS ON FINISHING

For four generations of Carlson family ownership, and almost 100 years of dedicated service worldwide, Acme Manufacturing Company has maintained a singular focus: to develop cost-effective systems and solutions to meet both simple and complex finishing needs.

An exporter of machinery since 1950, Acme was recognized for "excellence in advancing the United States' Export Expansion Program" in 1991, when the company received the Presidential "E" award.

INTERNAL CAPABILITIES AND RESOURCES

50,000 sq. ft. engineering and manufacturing facility in "Automation Alley"
(Auburn Hills, Michigan); built in 1999.



- ▶ ***Complete process development laboratory***
- ▶ ***Mechanical Desktop and Autodesk Inventor Series 3D design tools for machine/system design and verification***
- ▶ ***Acme Universal Finishing Heads designed and manufactured in-house***
- ▶ ***Fanuc Roboguide off-line programming software; certified reseller and user***
- ▶ ***Off-line programming and download support***
- ▶ ***Software development and controls engineering for PC-based open architecture operating systems***
- ▶ ***System assembly, wiring, integration and testing***
- ▶ ***Service, training, documentation, and support; on-site programming services***
- ▶ ***Certified ISO 9001: 2000***
- ▶ ***Remote troubleshooting available via modem and/or remote network access***
- ▶ ***Retooling and refurbishment of all Acme equipment***
- ▶ ***Service parts support and complete preventive maintenance services***
- ▶ ***Level 4 servicing integrator for Fanuc Robotics***



Acme Manufacturing Company
4240 N. Atlantic Blvd.
Auburn Hills, Michigan 48326 USA
Phone: 248.393.7300
Email: acme@acmemfg.com
www.acmemfg.com

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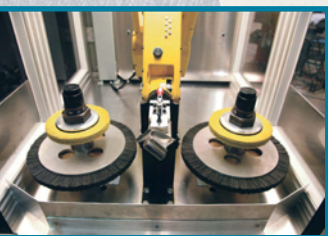


Robotic Table-top System

FINISHING PROCESSES

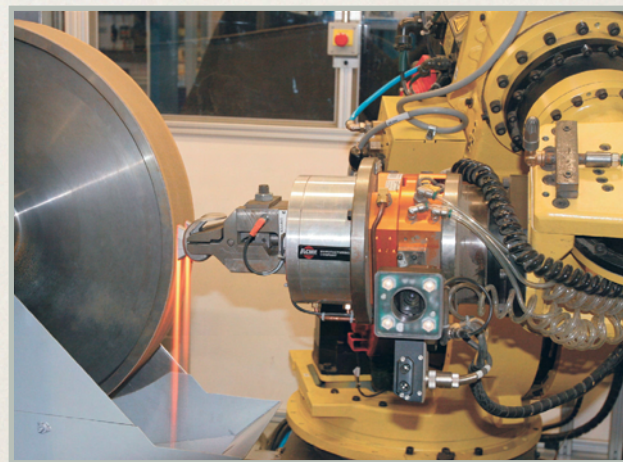
- ▶ Buffing
- ▶ Polishing
- ▶ Deburring
- ▶ Abrasive Belt Grinding
- ▶ Micropolishing
- ▶ Gate Grind
- ▶ Cut-Off
- ▶ Special Finishes

Integrated Robotic Systems
Abrasive Belt Centerless
Grinding Machines
Sheet and Coil Grinding Systems
Automatic & Semi-Automatic
Buffing, Polishing &
Deburring Machines



INDUSTRIES SERVED

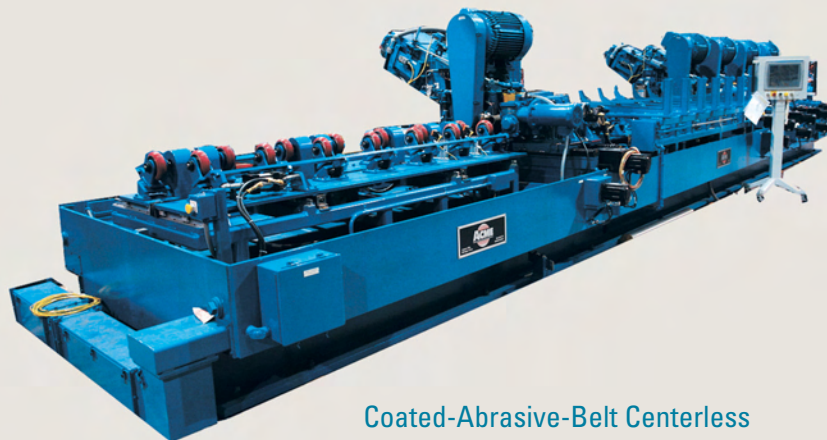
- ▶ Medical Implant Devices
- ▶ Aerospace & Aircraft
- ▶ Motorcycle Components
- ▶ Marine Hardware
- ▶ Hand Tools
- ▶ Cookware
- ▶ Builders' Hardware
- ▶ Off Road Equipment
- ▶ Automotive Components
- ▶ Nuclear Energy
- ▶ Musical Instruments
- ▶ Hydraulic Cylinders, Bars, Pipe & Tubing
- ▶ Gaming Equipment



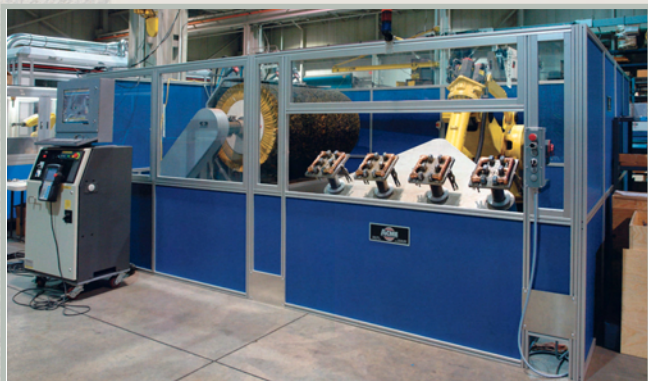
Robotic Table-top Deburring, Polishing & Buffing System

- ▶ Fanuc six-axis robot
- ▶ Acme finishing work heads
- ▶ Floating spindle configuration
- ▶ 12 different processes
- ▶ Programmable speed, feed and part manipulation
- ▶ Total machine enclosure
- ▶ Integrated dust collection
- ▶ Single part-flow concept
- ▶ Small footprint
- ▶ Affordable investment

COMPLETE LINE OF TOTAL TURNKEY FINISHING SYSTEMS



Coated-Abrasive-Belt Centerless Grinding Systems



Robotic Multiple Spindle Buffing System with One-Meter Diameter Buff Heads



Coil & Strip Grinding Systems



Robotic Cut-Off Systems

GLOBAL OFFICES



China



India



Ireland



Korea



United Kingdom



Brazil



Acme Manufacturing Company
Auburn Hills, Michigan 48326 USA

Phone: 248.393.7300
Email: acme@acmemfg.com
www.acmemfg.com

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CENTERLESS GRINDING SYSTEMS



Acme Centerless Belt Grinding Systems provide continuous high-production throughput at minimized operating costs. The systems use improved abrasive belt technology combined with either single or multiple head sequential belt grinding, integrated with proven part handling automation.



- **Tubing up to 12 in. OD (300mm)**
- **Bar stock up to 6 in. OD (150mm)**
- **Rod and tube as small as .060 in. OD (1.5mm)**
- **Lengths as short as 2 in. (50mm) and as long as 60 feet (18m)**
 - Hydraulic cylinder rods and tubes (telescopic)
 - Motor rotors, stators and other cylindrical components
 - Nuclear fuel rods and tubes; titanium and zirconium
 - Pipes, chrome shafts and cold drawn bars
 - Glass or composite rods and tubes

FINISHING PROCESSES

- **Heavy Stock Removal** for rough belt grinding with stock removal of .030 in. to .060 in. (0.75mm – 1.50mm) on outer diameter of tubes and bars
- **Tolerance Grinding / Sizing** from 3 to 100 feet per minute (FPM) (1.0 – 30.0 meters per minute)
- **Fine Polishing and Final Finishing** with surface finishes from 2 to 20 micro-inches (50 – 100 microns) Ra. Surface finishes below 1.0 μ in. (.25 μ m) are achievable
- **Deburring** with abrasive belts, wheels, brushes, and nylon abrasive products at 5 to 30 feet per minute (1.6 – 10 meters per minute)
- **Decorative Finishing** (buffing, polishing, and satin finishing) from 10 to 80 feet per minute (3 – 26 meters per minutes)

PROCESS EFFICIENCIES

Fast Process

Continuous through-feed in “one pass” combined with high speed rates up to 100 feet per minute (33 meters per minute).

Dimensional Tolerance / Quality Assurance

No distortion of the workpiece, since it is supported by the regulating wheel and the work rest blade. Forces in the cutting area are low, minimizing heat and distortion of thin wall tubing, while a flood of coolant dissipates heat and removes grinding swarf for improved belt cutting action. Consistent quality is the result of high part-to-part and setup-to-setup repeatability.

No Abrasive Belt Dressing

Abrasive belts require no dressing, eliminating the time and cost that is prevalent when using hard grinding wheels. Belt changeover typically takes less than one minute, providing high uptime and process flexibility.

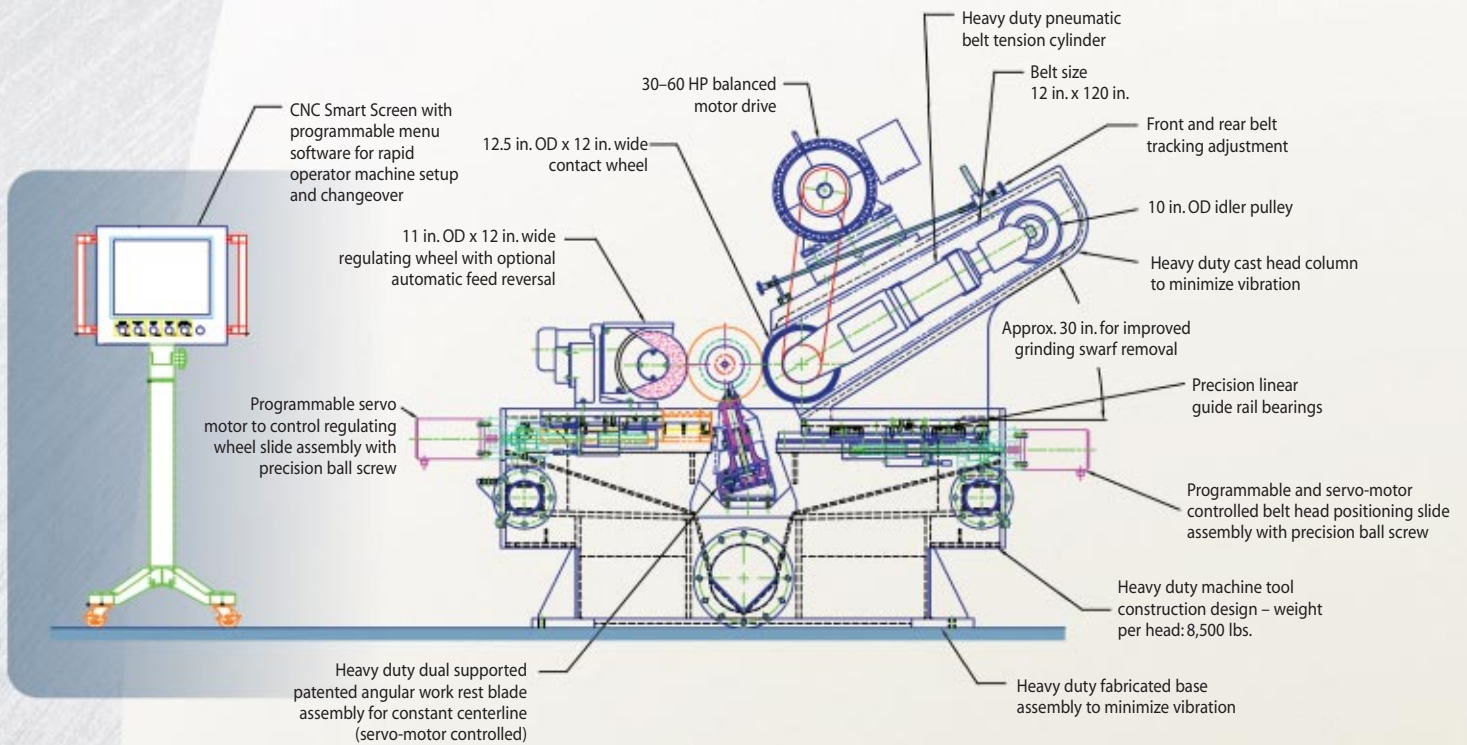
Minimum Heat Build-up

Abrasive belts run cooler for wet or dry operations due to the larger abrasive cutting surface of the belt.

High Uptime / Utilization

Machine setup and changeover to a different diameter tube or bar via CNC / servo-motor control permits rapid setups within two to five minutes for multiple belt head operations.

CENTERLESS GRINDING SYSTEMS



Note: new Acme Model #1210 provides several new and unique belt grinding advantages as covered under a recent patent application.



#67/2 (2-head) for finishing tube and rod from .060 in. to 4.0 in. OD (1.5mm - 100mm); used for tolerance grinding and final polishing



1210/7 (7-head)



1210/5 (5-head)

FEATURES

One to Eight Belt Heads - Wet or Dry

Current Standard Abrasive Belt Sizes:

4 in. wide (100mm) X 84 in. long (2100mm), up to 12 in. wide (300mm) X 120 in. long (3000mm)

Controls:

- Manual
- Semi-automatic
- Automatic



Acme Manufacturing Company
Auburn Hills, Michigan 48326 USA

Phone: 248.393.7300
Email: acme@acmemfg.com
www.acmemfg.com

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CENTERLESS GRINDING SYSTEMS

STANDARD MODELS

	SIZE RANGE	HP	BELT SIZE
Model 47	.060 in. to 3.0 in. OD (1.5mm-75mm) (cosmetic and tolerance grind)	5, 10 (3.75 / 7.5kw)	4 in. wide X 84 in. long (100mm X 2100mm)
Model 67	.060 in. to 4.0 in. OD (1.5mm-100mm) (tolerance grind)	10, 15 (7.5 / 11.25kw)	6 in. wide X 84 in. long (150mm X 2100mm)
Model 611*	.250 in. to 6.0 in. OD (6.3mm-150mm) (cosmetic grind, buff, deburr and satin finish)	20 max (15kw)	6 in. wide X 132 in. long (150mm X 3300mm)
Model 910	.250 in. to 8.0 in. OD (6.3mm-200mm)	50 max (37.5kw)	9 in. wide X 120 in. long (225mm X 3000mm)
Model 1210	1.0 in. to 12 in. OD (25mm-304mm)	100 max (45kw)	10 in. wide X 120 in. long (254mm X 3000mm)
Model 1212	1.0 in. to 12 in. OD (25mm-304mm)	100 max (45kw)	12 in. wide X 144 in. long (304mm X 3660mm)

*Note: equipped with floating regulating wheel for out-of-round material.



CONTROLS:

Manual operator push-button controls are available on models #47, #67 and #611C.

Manual hand-wheel slide adjustments are provided for the operator to setup the machine for various tube and rod diameters, by positioning the belt head, regulating wheel, and work rest blade.

Semi-automatic and automatic touch-screen controls are available on models #910 and #1210. Semi-automatic controls include programmable PLC/servo-motor operator-machine positioning for single and multiple belt head systems.

Automatic CNC/servo-motor motor controls power-position all machine axes simultaneously to pre-position multiple heads (contact wheels and regulating wheels) and work rest blades in less than five minutes.

Acme's operator interface puts all setup, operation, diagnostics, and maintenance functions at the fingertips of production personnel.

Part programs, complete with speeds, feed rates, and other parameters are quickly called up using the touch screen for rapid setup during changeover. Complete maintenance and history logs are available for ease of operator monitoring and maintenance control.

TYPICAL APPLICATIONS AND PARTIAL USER LIST

Hydraulic /Pneumatic Cylinders:

John Deere, Caterpillar, CemcoLift, D. L. Martin, Parker Hannifin, Seabee Corp., Hydraulic Components, Edbro Ltd (UK), Dadco, Delta Hydraulics, Savik Super Chrome, Scot Industries, Commercial Honing, Hyco International, Grove Worldwide, and others.

Steel Manufacturers /Fabricators:

Nucor Steel, Mac Steel, Summit Steel, Whirlpool, Federal Mogul, Handy and Harman, Greenville Tube, Loraine County Automation, and others.

Nuclear Energy / Specialty Metal Producers

Westinghouse, Western Zirconium, Wah Chang, Nu-Tech, Johnson Matthey.

Electric Motor and Pump Manufacturers

A.O. Smith, General Electric, Franklin Electric, Regal Beloit, Glass/Composite Producers, Vitricom, Quadrant, and others.

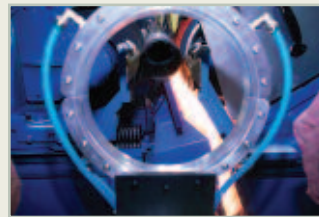
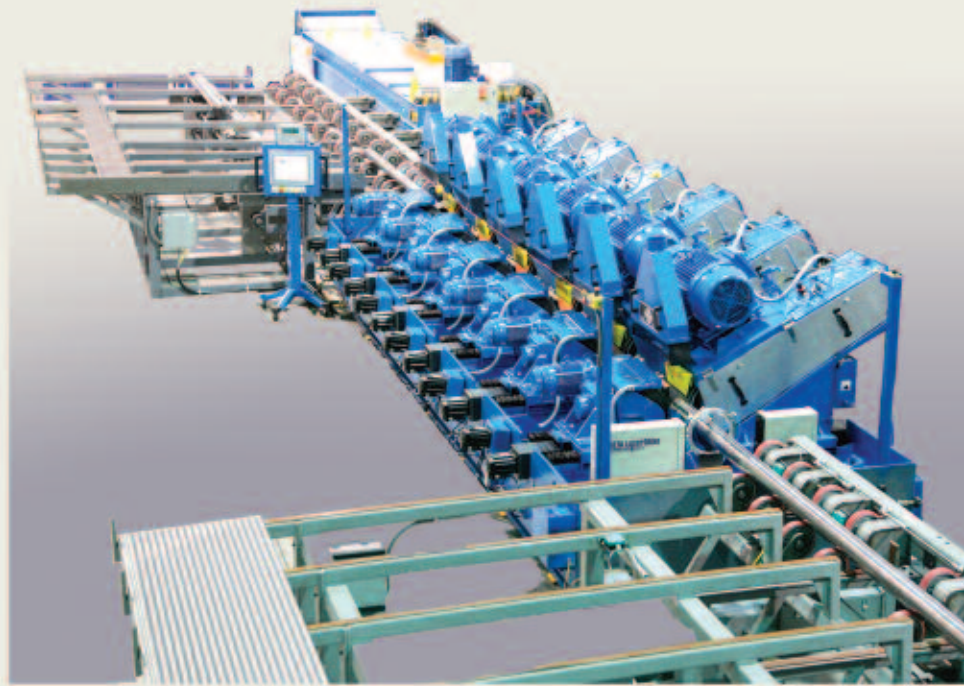
CENTERLESS GRINDING SYSTEMS

Acme 1210/6 Coated Abrasive Belt Centerless Grinding Machine



Machine with room enclosure

- ▶ Six 12 in. (305mm) wide Abrasive Belt Grinding Heads
- ▶ Automatic Servo-controlled Setup
- ▶ Powered In-feed and Exit Conveyors
- ▶ Load and Unload Tables
- ▶ Machine Room Enclosure
- ▶ Filtration and Coolant System
- ▶ Mist Collection System
- ▶ Laser Gage



Application History

Material: Steel Bars; rough turned; heat induction hardened 1045, 1050 (typical)

Diameter capability: 1.125 in. (28.6mm) to 4.5 in. (114mm)

Length capability: 20 ft. (6.1m) to 26 ft. (7.9m)

DOM Cylinder Tubes – 1026, ST52 (typical)

Diameter capability: 1.125 in. (28.6mm) to 10 in. (254mm)

Length capability: 24 ft. (7.3m) to 30 ft. (9.1m)

Stock Removal: OD – .020 in. (.5mm) to .030 in. (.8mm)

Size Tolerance: +/- .0006 in. (.02mm)

Line Speed: 5 to 20 FPM Surface Finish: 5 to 10 Ra

Machine Changeover time from size to size: 1 to 2 minutes



Acme Manufacturing Company
Auburn Hills, Michigan 48326 USA

Phone: 248.393.7300
Email: acme@acmemfg.com
www.acmemfg.com

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ROBOTIC FINISHING SYSTEMS FOR ORTHOPAEDIC IMPLANTS



Acme has designed and built more turnkey robotic finishing systems for Orthopaedic implants than anyone in the world, with over 80 systems installed in the U.S. and Europe. Robotic manipulation of the implant, combined with automatically-controlled abrasive belts and wheels or polishing media, replaces labor-intensive hand finishing operations.

Media usage can be cut by 50% or more. Modular tooling allows families of parts to be finished in the same cell. Each cell can include single and multiple media heads, accomplishing one to 12 finishing operations. Acme's patented triple-head helps reduce floor space and enclosure size requirements.



KNEES

- Chrome cobalt
- Zirconium
- Titanium

HIP STEMS

- Stainless steel
- Titanium

HIP CUPS and BALLS

Chrome cobalt

TIBIA TRAYS

Chrome cobalt

BONE PLATES AND NAILS

- Stainless steel
- Chrome
- Cobalt

HIP SHELLS

Titanium acetabular

FINISHING PROCESSES

- Removal of the casting gate with abrasive belts
- Grinding of the casting form with abrasive belts
- Abrasive belt polishing
- Cut and color buffing
- Ultra-high color buffing
- Removal of flash on forged hip stems with abrasive belts
- Complete finishing: hip stem, hip ball and cup, acetabular hip shell

PROCESS EFFICIENCIES

Media life management and control

Automatic media wear compensation software ensures consistent performance throughout the life of the media by adjusting cell process parameters to match the performance and life span of the media. Media life management software maintains media wear factors, such as belt life, and increases the SFPM (surface-feet-per-minute) cutting rate and the cutting force to compensate as the belt wears. Buff wheels are also automatically compensated for wear.

Monitoring and modification of process parameters

Heat monitoring allows automatic process modification to reduce effects of excess heat.

Off-line programming and simulation

Speeds up the program development process and increases utilization of the robotic finishing system. Programs for complex parts and shapes are created and verified quickly.

COST SAVINGS

Reduced media usage

Switching from manual to robotic automation finishing alone can give you up to six times longer media life, as a result of contact efficiency (time on the part), constant work pressure, cycle time repeatability, and part path programming capability.

Unattended operation with custom part queuing options reduces labor content.

Minimized maintenance time and costs

On-line diagnostics and documentation. Troubleshooting via modem and/or internet, with Ethernet host support.

Fast ROI

Typically less than one year

ROBOTIC FINISHING SYSTEMS FOR ORTHOPAEDIC IMPLANTS

FEATURES

- ▶ **Ultra-Light Floating Head reduces heat** (see Case Study below)
- ▶ **Flexible, automatic force control** for finishing heads, with variable-speed spindle motors, optimize compliance (response and reaction) to suit the operation. If one surface area needs more pressure, it gets it; a few seconds later, pressure is lessened as the robot repositions the part to another surface. Meanwhile, speeds and feed rate are adjusted. Greater uniformity and improved surface quality are the result.
- ▶ **Universal tooling concepts** developed by Acme for knee and hip finishing reduce system design, build and operational costs.
- ▶ **Off-line programming and Roboguide simulation** of a robotic finishing operation, even for complex parts and shapes, speeds up the application development process and increases utilization.
- ▶ **Integrated dust collection:** exhaust system in fully-enclosed cell confines airborne polishing and grinding particles to protect the plant environment.
- ▶ **Built to RIA and CE specifications**



SOLUTIONS AND EXPERIENCE

Our customers include Biomet, DePuy, Smith Nephew, Stryker, Wright Medical Technology, Zimmer and others. Decades of process knowledge are applied to analyze and interpret your requirements, select a configuration, design and build a turnkey system, perform part validation, and provide service and support (U.S. and Europe).

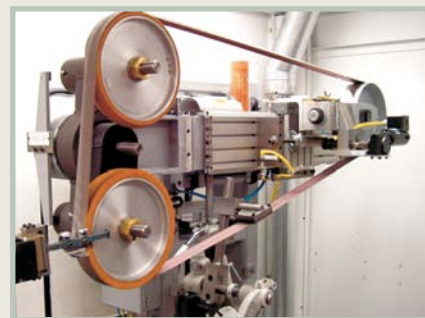
CASE STUDY

Parts: Orthopaedic implants including knees, hip balls and shells, tibia trays, cups, plates

Materials: chrome cobalt, zirconium, titanium, stainless steel

Objectives: prevent heat-related distortion of casting and burning of parent material; improve media life; reduce labor content per part; achieve faster changeover

The Solution: Acme's Ultra-Light Floating Heads reduce heat during finishing, with no burning of zirconium or titanium. Powerful controls with media life and process management capability, combined with modular tooling, allow complete finishing on families of parts with minimized media usage.



Acme-designed Ultra-Light Floating Head reduces heat.



Acme Manufacturing Company
Auburn Hills, Michigan 48326 USA

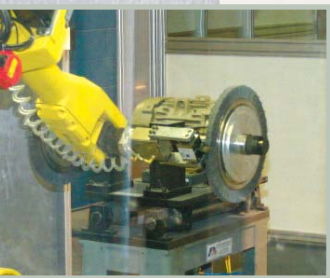
Phone: 248.393.7300
Email: acme@acmemfg.com
www.acmemfg.com

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ROBOTIC FINISHING SYSTEMS FOR AIRCRAFT / AEROSPACE COMPONENTS



From deburring of turbine engine components to polishing airfoils after milling, Acme robotic finishing systems for the aircraft, power generation, and aerospace industries reduce or eliminate manual labor, lower your unit costs, and achieve new levels of part quality.



TURBINE ENGINE COMPONENTS

- Compression Blades and Vanes
- Fan Blades
- OGV
- NGV
- Compressor Disks

SPARS AND STRINGERS

SEAT TRACKS

EXTERIOR SKIN PANELS

ALUMINUM BULKHEAD COMPONENTS

ALUMINUM MISSILE FRAMES

PROPELLER BLADES

FINISHING PROCESSES

- Edge radiusing and blending
- Brush deburring
- Hard tool deburring
- Flash removal on forged parts
- Removal and blending of gates and pins
- Airfoil polishing before and after milling
- Bright buffing

PROCESS EFFICIENCIES

Media life management and control

Automatic media wear compensation software ensures consistent performance throughout the life of belts, brushes and buffs by adjusting cell process parameters (such as cutting rate and force) to match the performance and life span of the media. Media life management software can provide three to four times longer media life than manual methods.

Monitoring and modification of process parameters

Heat monitoring allows automatic process modification to reduce effects of excess heat.

Off-line programming and simulation (Roboguide)

Speeds up the program development process and increases utilization of the robotic finishing system. Programs for complex parts and shapes are created and verified quickly.

COST SAVINGS

Reduced media usage

Switching from manual to robotic automation finishing alone can give you three to four times longer media life, as a result of contact efficiency (time on the part), constant work pressure, cycle time repeatability, and part path programming capability.

Unattended operation with custom part queuing options reduces labor content.

Universal tooling concepts developed by Acme for aircraft/aerospace applications reduce system design, build and operation costs.

Minimized maintenance time and costs

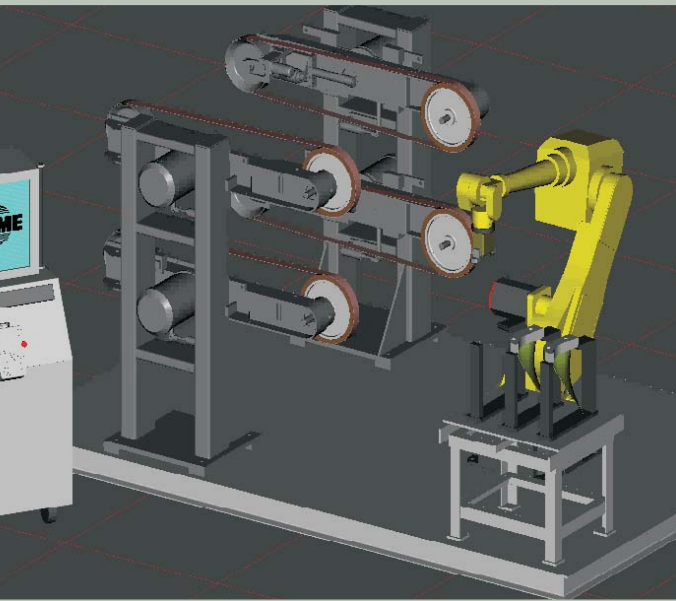
On-line diagnostics and documentation. Troubleshooting via modem and/or internet, with Ethernet host support.

Fast ROI

Typically less than one year.

ROBOTIC FINISHING SYSTEMS FOR AIRCRAFT / AEROSPACE COMPONENTS

FEATURES



Flexible, automatic force control for finishing heads, with variable-speed spindle motors, optimize compliance (response and reaction) to suit the operation. If one surface area needs more pressure, it gets it; a few seconds later, pressure is lessened as the robot repositions the part to another surface. Meanwhile, speeds and feed rate are adjusted, resulting in greater uniformity and improved surface quality.

Creative task programming maximizes process and productivity efficiencies.

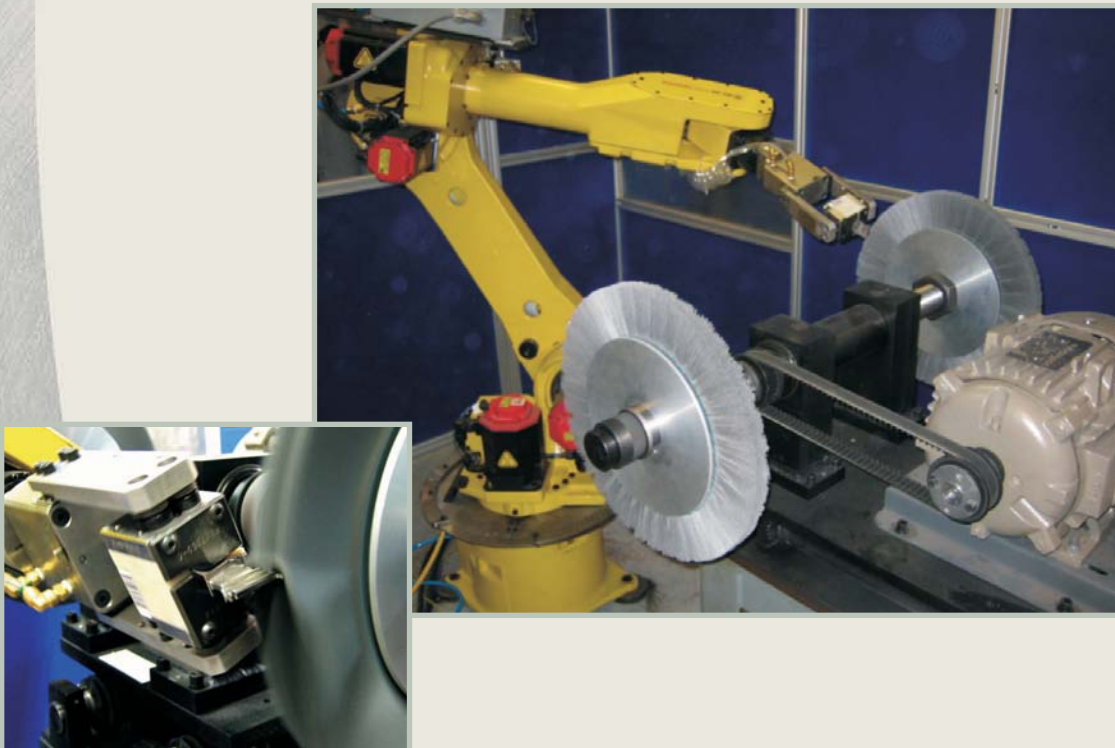
Off-line programming and simulation (Roboguide) of a robotic finishing operation, even for complex parts and shapes, speeds up the application development process and increases utilization.

Integrated dust collection: exhaust system in fully-enclosed cell confines airborne polishing and grinding particles to protect the plant environment.

Built to RIA and CE specification

Unique tooling capabilities

Bench-type mini-robotic cells reduce floor space



Acme Manufacturing Company
Auburn Hills, Michigan 48326 USA

Phone: 248.393.7300
Email: acme@acmemfg.com
www.acmemfg.com

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ROBOTIC FINISHING SYSTEMS FOR AUTOMOTIVE AND TRUCK WHEELS



Acme turnkey robotic cells for automatic deburring or finishing wheels reduce unit costs, with production rates up to 60 parts per hour achieved using single or multiple 6-axis robots. Aluminum or copper-plated wheels ... cast or forged ... from 14 in. to 24 in. OD, have been finished on Acme robotic systems using flap wheels, buffs and other media.



- ▶ *OEM and Aftermarket*
- ▶ *Two-Piece Wheels*
- ▶ *Aluminum Truck Wheels*
- ▶ *Billet Aluminum Wheels*
- ▶ *Motorcycle Wheels*



FINISHING PROCESSES

- ▶ Cut buff, color buff, satin finish, abrasive polish, soft polish, deburring and copper buffing
- ▶ Backside and curbside finishing
- ▶ Edge deburring and radiusing
- ▶ Window finishing
- ▶ Optional valve stem hole deburring with automatic part orientation

PROCESS EFFICIENCIES

- ▶ Highly-repeatable part finishing
- ▶ Automatic media wear compensation software ensures consistent performance throughout the life of the media by adjusting cell process parameters to match the performance and life span of the media.
- ▶ Quick part and media changeover
- ▶ Dry operation
- ▶ High horsepower to maximize brush potential; up to 50 HP at the work spindle
- ▶ Material handling integration

COST SAVINGS

Semi-automatic cell reduces manual finishing of wheels by 50% to 100%

Reduced media usage

Switching from manual to robotic automation finishing alone can give you twice to four times longer media life, as a result of contact efficiency (time on the part), constant work pressure, cycle time repeatability, and part path programming capability.

Universal tooling concepts

Developed by Acme for wheel finishing to reduce system design, build and operation costs.

Minimized maintenance time and costs

On-line diagnostics and documentation. Troubleshooting via modem and/or internet, with Ethernet host support; service and support in the U.S., Asia, Europe and South America.

Fast ROI

Typically less than one year.



ROBOTIC FINISHING SYSTEMS FOR AUTOMOTIVE AND TRUCK WHEELS

FEATURES



In this application, wheels are fixtured on a dial index table. 6-axis robots are tooled with the abrasive polishing media, rather than carrying the parts to belts or wheels. Hard-to-reach surfaces within the wheel windows are buffed here in this rotary system.

Twin-spindle system (patented)
doubles your throughput by allowing one robot to handle two wheels simultaneously. This system uses our patented 7th axis to maintain full robotic capabilities.

Mid-cycle brush reversing as required; part oscillation as required.

Variable wheel speed

Maximum 50 HP spindles; minimum 20 HP

Teach pendant programming
developed by Acme specifically for wheel finishing applications.

Dual compound systems for cut and color applications.

Integrated sound and dust containment room enclosure confines airborne polishing and grinding particles to protect the plant environment.

Optional Unattended Operation capability.

Acme menu-driven software developed specifically for wheel finishing.

Off-line programming and simulation (Roboguide) of a robotic finishing operation speeds up the application development process and increases utilization.

Built to RIA and CE specifications

OPTIONS

Ethernet host computer support

Part Handling Automation, including incoming and outgoing part conveyors.

SOLUTIONS AND EXPERIENCE

Over 400 robotic systems in operation in the U.S., Europe and Asia.

CASE STUDY

Wheels: Aftermarket wheels: multiple styles, with sizes from 16.5 in. OD (419mm) to 24.5 in. OD (622mm).

Material: Forged Aluminum

Strategy: Use of Acme's patented twin-spindle robot tooling allowed two wheels to be finished simultaneously in a single-robot cell.

Objectives Met: Production doubled to rate of 25 to 30 wheels per hour. High repeatability achieved.



Acme Manufacturing Company
Auburn Hills, Michigan 48326 USA

Phone: 248.393.7300
Email: acme@acmemfg.com
www.acmemfg.com

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FINISHING SYSTEMS FOR MEDIUM TO HIGH-VOLUME AUTOMOTIVE COMPONENTS



FINISHING PROCESSES

- ▶ Brush deburring
- ▶ Microfinishing
- ▶ Bright buffing
- ▶ Deflashing
- ▶ Belt grinding



Planetary disc brush deburring is performed at 1500-2000 parts per hour on this Acme magnetic over/under conveyor system.

Acme designs and builds single and multiple robotic finishing cells, as well as custom-engineered, application-specific systems for medium to high-volume finishing of automotive components.



Triple-spindle planetary disc brushes (10 in. OD) deburr various automotive flat parts.



TRANSMISSION COMPONENTS

- ▶ Shafts

ENGINE COMPONENTS

- ▶ Cylinder Blocks
- ▶ Cylinder Heads
- ▶ Connecting Rods
- ▶ Camshafts
- ▶ Piston Pins
- ▶ Crankshafts

DRIVELINE COMPONENTS

- ▶ Axle Shafts

CLIMATE CONTROL COMPONENTS

- ▶ Compressor swash-plates

POWDERED METAL PARTS

FUEL HANDLING COMPONENTS

EXHAUST STACKS AND COMPONENTS



This dual-robot cell processes seven different styles of forged, near-net-shape connecting rods at up to 400 parts per hour. 14 surfaces and bosses are ground.

FINISHING SYSTEMS FOR MEDIUM TO HIGH-VOLUME AUTOMOTIVE COMPONENTS

ENGINE COMPONENTS



Example: Single-Station Unit Deburrs Cylinder Heads
(see photo at left)

PROCESS: deburr leading and trailing edges of cam towers on cast engine components

MEDIA: wire or mono-filament brushes (radial or disc), dry operation

FEATURES: automatic brush pressure control and wear, programmable stroke settings, easy set-up; automatic lubrication

FLEXIBLE CONFIGURATION: arranged for integration into new or existing transfer systems; can be provided with or without controls; smart screen operator interface available.

COMPRESSOR COMPONENTS

PROCESS: see case study below

FEATURES/BENEFITS: reduced operating cost; full enclosure with dust collector / air scrubber; integrates with conveyor automation

FLEXIBILITY: replaces hard automation (6-head dial table); flexible cell can process other parts; cell requires minimal floor space

CASE STUDY

Parts: compressor swash-plate

Material: aluminum

Objective: complete finishing cycle in 15 seconds (240 parts per hour); high repeatability.

The Solution: robotic cell that simultaneously chamfers top and bottom edges; pallet conveyor automation allows unattended operation.



FLAT STOCK GRINDING SYSTEMS (COIL AND STRIP)



Acme coil grinding systems are used to grind, polish and hairline finish stainless steel coil and strips. Multiple-head systems are designed to perform top and bottom finishing operations at up to 50 meters (164 ft.) per minute.

FINISHING PROCESSES

- ▶ Corrective grinding
- ▶ Salvage grinding
- ▶ Hairline finishing
- ▶ Decorative grinding: #3 & #4 SS Finishes
- ▶ Polishing
- ▶ 3 to 50 meters per minute (typical)

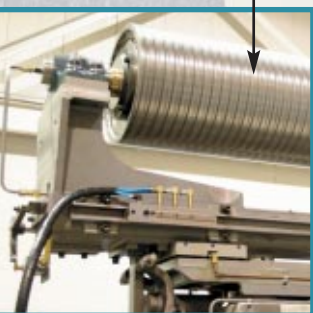
Contact Roll drives the abrasive belt against the material. The hardness and groove pattern of the contact roll play a significant role in the amount of stock removed and the surface finish of the stainless steel strip. Contact Roll coverings include neoprene, polyurethane or "buna-n" for mineral oil and water soluble oil.



CONTACT ROLL

BILLY ROLL

IDLE ROLL



STAINLESS STEEL STRIP AND COIL

- ▶ Hot Rolled: 2.0mm to 6.0mm
- ▶ Cold Rolled: 0.4mm to 2.0mm

System shown above:

1600mm Top/Bottom Side Coil Grinding/Polishing System

Billy Roll applies work pressure to the stainless steel strip against the contact roll and abrasive belt. Tilt adjustment conforms for material taper. Roll is hardened and ground alloy steel. For fine polishing, rubber or polyurethane covered rolls can be provided.

Idle Roll (image at left) tensions the abrasive belt and oscillates to ensure even edge wear. The roll is grooved to expel coolant from the backside of the abrasive belt. Special Acme pneumatic belt tracking system provides reliable and controlled positioning on wide abrasive belt grinding and polishing operations.

FLAT STOCK GRINDING SYSTEMS (COIL AND STRIP)

FEATURES

SYSTEM COMPONENTS AND FEATURES

- ▶ Acme systems feature extra heavy duty construction, with precision machined mounting surfaces.

PROCESS EFFICIENCIES

Automatic belt tracking and hydraulic/ pneumatic belt tensioning ensures optimum consistency and minimized operational costs. Self-cleaning machine base helps eliminate sludge build-up.

Media Selection

- ▶ Abrasive Belts
 - Coated Abrasive
 - Structured Coated Abrasive
 - Nylon
- ▶ Coated Abrasive Rolls
- ▶ Water Soluble Oil Coolants
- ▶ Mineral Oil Coolants

IN-HOUSE CAPABILITIES

Design and complete manufacturing of turnkey systems, including stock handling systems, in-process gaging, coolant and filtration equipment, and controls.

PRODUCT ENHANCEMENTS

- ▶ Filtration Systems
- ▶ Grinding Swarf Shredders
- ▶ Centrifuge Systems
- ▶ Squeezer Systems
- ▶ Briquetting Systems
- ▶ Mist Collection
- ▶ CO2 Systems
- ▶ Inverted Breaker Rolls
- ▶ Squeegee Rolls (rubber or special nylon materials)
- ▶ Drag Wipes

Acme's grinding technology has an installed base that spans the globe.



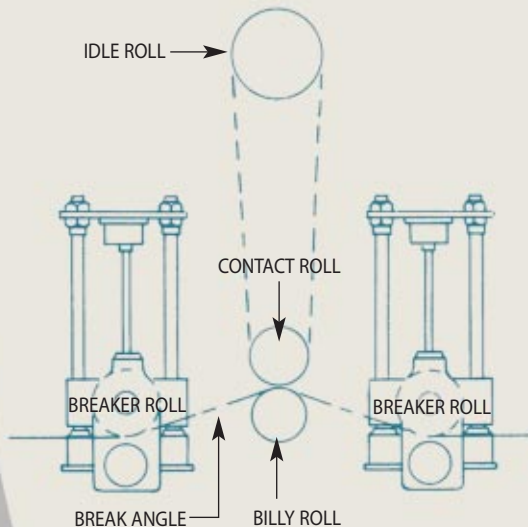
Breaker Roll flattens the strip against the Billy Roll, ensuring the material is level for grinding. The Breaker Roll can increase the amount of material wrap around on the Billy Roll.



Acme Briquetter System

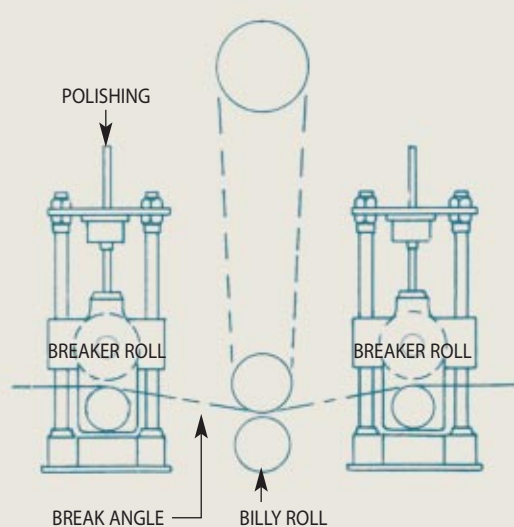
TYPICAL GRINDING ARRANGEMENT

(for standard or heavy gauges)



ACME POLISHING ARRANGEMENT

(for light gauges)



Acme Manufacturing Company
Auburn Hills, Michigan 48326 USA

Phone: 248.393.7300
Email: acme@acmemfg.com
www.acmemfg.com

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