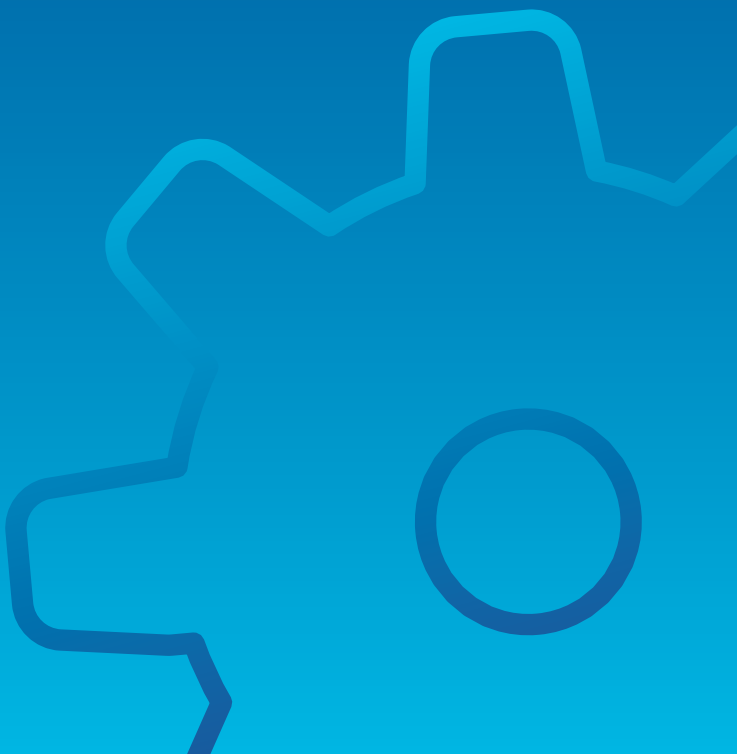
Science.
Applied to Life.™

3M Abrasive Solutions for Robotics & Automated Abrasive Processing



Abrasive Pairing Handbook

3M has a wide range of abrasive solutions and 30+ years in Abrasive Automation Expertise to help you find the right solution for your part & process.

Contact 3M Application Engineering Support for more help with choosing the right abrasives, the right process parameters and the right abrasive sequencing, for your automation project.

This Handbook is meant to be a high-level guide of which 3M Abrasives to start with when looking to automate your abrasive processing. This is only meant to serve as a directional guide. You also must run the abrasive under the proper operating conditions to get the best result. It does not cover all applications, as many applications need specific solutions.

Abrasive Processes

What automating your abrasive processing can do for your business

Help Reduce Labor Challenges

Manual abrasive processing is dirty, dusty and can be dangerous. Hiring, training and keeping skilled and unskilled labor can be a challenge.

Automation allows workers to move to higher skilled positions to grow business, can reduce turnover, and still incorporates skilled workers into the process.

Enable Consistent Quality

Provide more consistent output and quality with minimal down time required. Operate with fewer employees, run night shifts, and design for tighter tolerances.

Helps Increase Efficiency

Increase output of parts per minute, which in turn can help reduce scheduling issues and reduce waste.

Conformability on Complex Profiles

Achieve desired finishes with Scotch-Brite™ Abrasives with high conformability, to reach complex shaped parts, while delivering consistent performance.

Potential Savings

Potentially significant savings through helping to increase production speed, reduce scrap, increase quality, and increase manufacturing flexibility.

Increased Worker Comfort

Having fewer manual processes helps to reduce fatigue, increase social distancing, and potentially reduce workplace injuries.

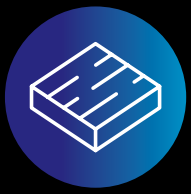

FANUC
S-430i F

A high level guide to determining your automation needs.

Just think F.A.S.T.: Finish. Application. Substrate. Tool.

Finish
Start with the finish:
What finish are you trying to achieve? Is it a visual or technical finish requirement? How will you evaluate tolerance specifications?

Application
What are you trying to do with the part? Are you prepping it for another step? Cutting? Grinding? Painting? Or is this the final step?



Substrate
What is your part made of? What kind of materials are you working with? What kind of steel or wood? What temperature will it be when received? Is it sharp or smooth?

Tool
What kind of tool are you using today? Electric, pneumatic, file belt, rotary vs orbital, flat finisher or robot.

Automation factors to consider

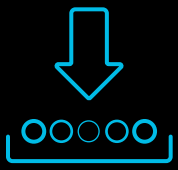
When it comes to Automating your Abrasive Processing, there are many factors to consider:

Does your final part need to meet aesthetic guidelines, surface finish specifications, or be prepped for a next step in the process? How many parts do you want to process per hour? How complex are your parts? How variable are they? What material are you working with?

These considerations, along with the ones listed here, affect which abrasives you should use, how they should be used, and in what sequence, to achieve your automation goals.

While important to know your automation goals, the number of factors to adjust for can be overwhelming. That's why you should always call a 3M Automation Application Engineer. With 17 global labs and 100+ years of abrasive experience, we can run your part, for free, to determine the best solution for your needs.

Consider this part of our investment in your automation journey.



Input Part Variability

Input Part Complexity

Finished Part Requirements

Part Temperature Sensitivity

Dimension & Geometry Of Part

Part Material

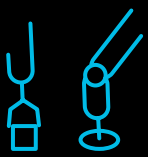
Process Steps

Cleanliness Requirements

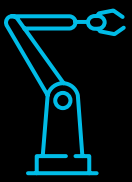
Force & Pressure

Adjust For Abrasive Wear

Fixturing Capability



Design Choice



Tool Path

Wet vs Dry

Flexibility & Durability

What are Fixed & Flexible Automation?

There are 2 main types of automation for abrasive processing: Fixed and Flexible.

Depending on the type of part and process you are looking to automate, your needs will fall into one of these two Automation types.

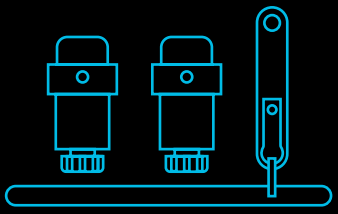
3M has deep expertise in both fixed and flexible automation solutions. This booklet is only a high level guide to our abrasive solutions.

Contact 3Msibgner@mmm.com, scan the QR code to the right, or visit www.3m.co.uk/Robotics for additional information on automating your abrasive processing, or to learn more about our abrasive technologies. We're here to help you on your automation journey.

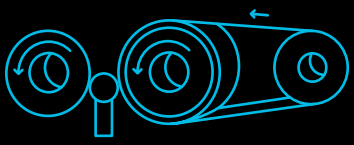
Fixed Automation

Commonly referred to as Flat Finishing, Fixed Feed Thru, and Centerless Grinding.

Fixed Automation is typically using a machine fixed into place, with parts processed inside the machine to complete the abrasive processing task. An example is a Feed Through Flat Finishing Machine. This is where a part is placed on a conveyor belt that runs through the machine. While on the conveyor belt, the part is touched by 1-8 automated abrasive “heads”, delivering different types of pressure and movement of the abrasive onto the part for the achieved effect. The part then comes out the other side of the machine ready for it’s next step. Fixed Automation is best for high volume, simple geometric parts.



Feed through
High volume and for simple geometric parts



Centerless Grinder

Parts created from fixed automation can range from:

Round

Flat

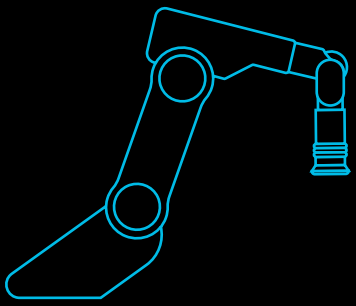
Simple geometry

Flexible Automation

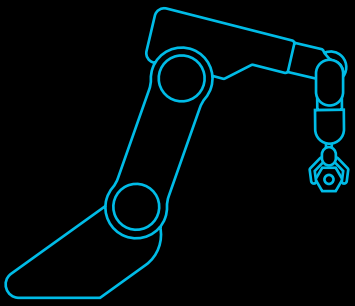
Commonly referred to as Robotics

Flexible Automation is where a robotic arm is used to bring either a part to an abrasive, or an abrasive to a part. It has a wider range of motion and can be adapted to handle a range of part types or part changes.

Flexible Automation is best used for production of a variety of different complex geometry part types.



Robot with abrasive in hand



Robot with part in hand

Some benefits to Flexible Automation are:

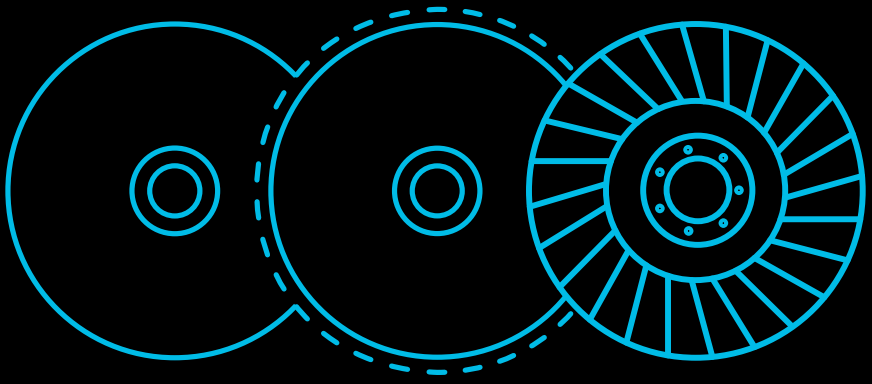
Manipulable

Reprogrammable

Repeatable

High and low volume

About 3M Abrasives



3M Abrasives are engineered for robotics and automation. They offer consistency, longer life, high cut rate and expert precision in design. All things that help your automation solution meet its needs and goals.

These utilize the same abrasive technology you use in your manual applications but can be engineered for R&A use. These are available everywhere you buy your abrasives today.

Scotch-Brite™ Abrasives

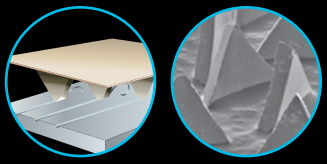
Best for:
Cleaning and Coatings Removal, Deburring, Weld Grinding and Blending, Finishing and Polishing

The 3M Technology Difference:
Scotch-Brite nonwoven web technology is made with nylon that has been coated in resin and abrasive mineral. The fibers and particles are bound together to form an open, three-dimensional structure - providing spring-like action that provides conformability and a consistent finish.

Scotch-Brite bristle technology includes abrasive grain uniformly distributed within a highly conformable bristle structure providing extreme compliance for accessing complex part shapes.

Some Scotch-Brite materials feature 3M Precision-Shaped Grain technology incorporated into the nonwoven web. This provides benefits of faster cutting action and abrasive life to the job.

3M CUBITRON II



3M Cubitron II & Coated Abrasives

Best for:
Heavy stock removal.

The 3M Technology Difference:
Precision Shaped Grain (PSG) for a faster, cooler cut-rate.

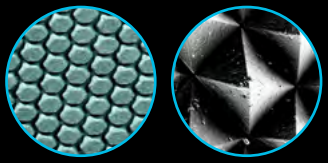
3M | Xtract™

3M Xtract

Best for:
Dust extraction for clean sanding, while increasing cut time and abrasive life.

The 3M Technology Difference:
3M Xtract Sanding Discs allow up to 97% of the dust produced during sanding to be extracted, creating a cleaner, virtually dust-free work environment.

3M
Trizact™

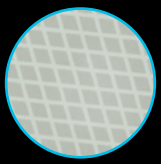


3M Trizact

Best for:
Consistent finish.

The 3M Technology Difference:
Made through microreplication for consistent finishing.

3M
Finesse-it™



3M Finesse-it

Best for:
Nearly invisible spot repairs on paint. Transportation Industry focused.

The 3M Technology Difference:
Made through microreplication for consistent finishing.

Ask an Expert

Visit www.3m.co.uk/Robotics to learn more.

About 3M Abrasives

Abrasives are made of many components, and each affects their performance. Choosing the right one for each step in your process can be challenging. As can ensuring the chosen abrasives are run under the optimum process parameters.

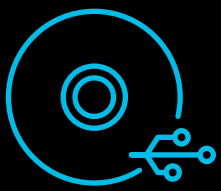
That's why 3M is here to help, with innovative technologies and expert application engineering support. Call us, send us your parts and let us guide you along the automation journey.

These different combinations of backings, minerals and technologies constitute the wide and precise range of the five 3M Abrasives product lines.

The goal in choosing the right abrasive for your needs is to choose an abrasive that is harder than the material you are abrading, capable of the application you are performing (cut, deburr, prep, finish, polish) and does so with the consistency and abrasive life you need.

Mineral Types

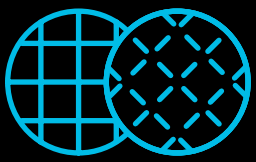
- 3M Precision Shaped Grain (PSG)
- Ceramic
- Diamond
- Aluminum Oxide
- Silicon Carbide
- + More



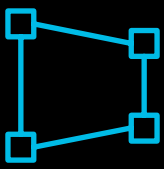
Abrasive Technology

- Micro-replication
- 3M Precision Shaped Grain
- Nonwoven

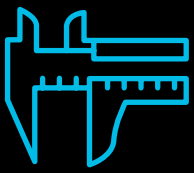
Backing
- Stiff
- Flexible



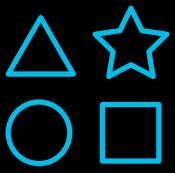
Mineral Amounts
- Open Coat
- Closed Coat



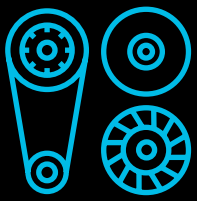
Mineral Design
- Friability
- Sharpness
- Hardness



Mineral Sizes
- Coarse
- Fine
- Ultra Fine



Mineral Shape
- Blocky
- Sharp



Abrasive Form
- Belt
- Disc
- Brush
- Wheel
- Sheet


Ask An Expert

3M Trizact™

3M Xtract™

3M CUBITRON™ II

3M Finesse-it™

Flexible (Robotic) Abrasive Solutions for Automation

- Random Orbital Sanding
- Weld Grinding and Blending
- Surface Prep, Weld Prep & Cleaning, Coating Removal
- Finishing & Polishing
- Grinding Cast & Forged parts
- Robotic Deburring
- Automotive Clear Coat Paint Repair

Visit www.3m.co.uk/Robotics to learn more.

3M Trizact™ 3M CUBITRON™ II 3M Xtract™ 3M Finesse-it™ Scotch-Brite

Random Orbital Sanding

Part Substrate	Material Removal Goal	3M Product
Wood Stainless Aluminum	Prep surface for coating Blend to uniform RO finish Refine and flatten surfaces Remove small parting lines	**3M Cubitron II** 775L Film Disc *High cut rates, 80+ to 400+* 360L Film Disc *Finer Finish, P220-P1000* 375L Film Disc *Includes stearate for reduced loading, P80-P1500* **3M Xtract Disc** *710W and 310W, 80+ to 320+*

3M Trizact™ 3M CUBITRON™ II 3M Xtract™ 3M Finesse-it™ Scotch-Brite

Weld Removal

Part Substrate	Material Removal Goal	3M Product
Carbon Steel	To remove exterior welds. Quality finish for painted/powder coated parts.	**3M Cubitron II** 982CX Pro Fibre Disc *36+ only, fastest cut rate and longest life for fiber disc* 982C *36+, 60+, 80+ for lower grit sizes* **Scotch-Brite** Light Grinding and Blending Discs: Super Duty Heavy Duty Precision Discs
Aluminum	To remove exterior welds. Quality finish for painted/powder coated parts.	**3M Cubitron II** 987C *36+, 60+, 80+ with grinding aid for high pressure applications* 787C *36+, 60+, 80+ with grinding aid for low pressure applications* **Scotch-Brite** Precision Disc Surface Conditioning

3M Trizact™ 3M CUBITRON™ II 3M Xtract™ 3M Finesse-it™ Scotch-Brite

Weld Removal

Part Substrate	Material Removal Goal	3M Product
Stainless Steel	To remove exterior welds. Quality finish with linear scratch pattern.	**Check with AE** To achieve desired surface finish.

Ask an Expert

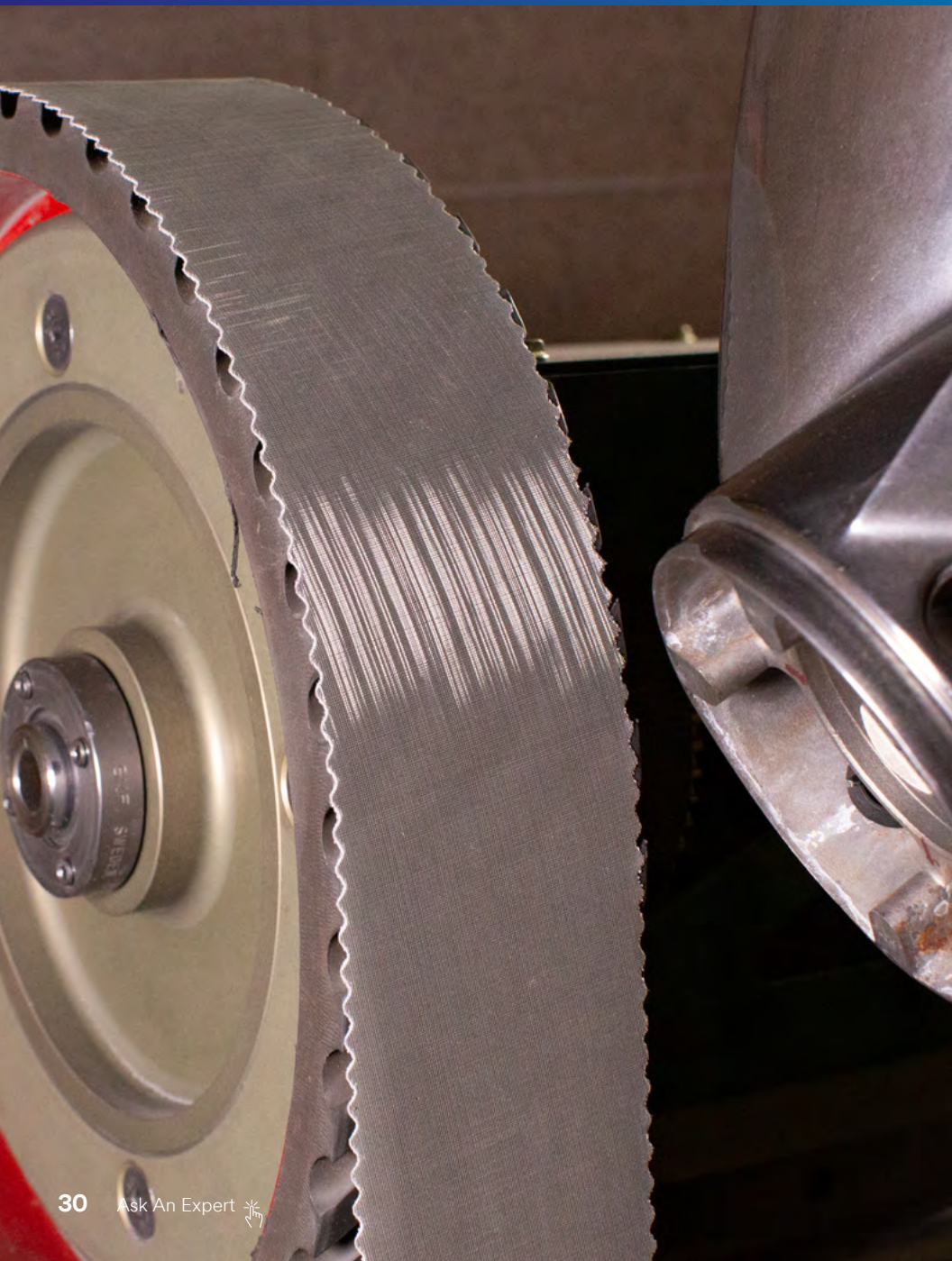
Visit www.3m.co.uk/Robotics to learn more.

Surface Prep, Weld Prep & Cleaning

Part Substrate	Material Removal Goal	3M Product
Carbon Steel	Remove Mill Scale Weld Spatter Removal Rust Removal	**3M Cubitron II** 982CX Pro Fibre Disc 969F Flap Disc **Scotch-Brite** Clean and Strip XT Pro Disc (Rust Removal)
Stainless Steel	Remove Mill Scale Weld Spatter Removal	**3M Cubitron II** 987C **Scotch-Brite** Clean and Strip XT Pro **Check with AE** to produce Linear Finish
Aluminum	Weld Spatter Removal	**3M Cubitron II** 787C Fibre Disc **Scotch-Brite** Clean and Strip XT Pro

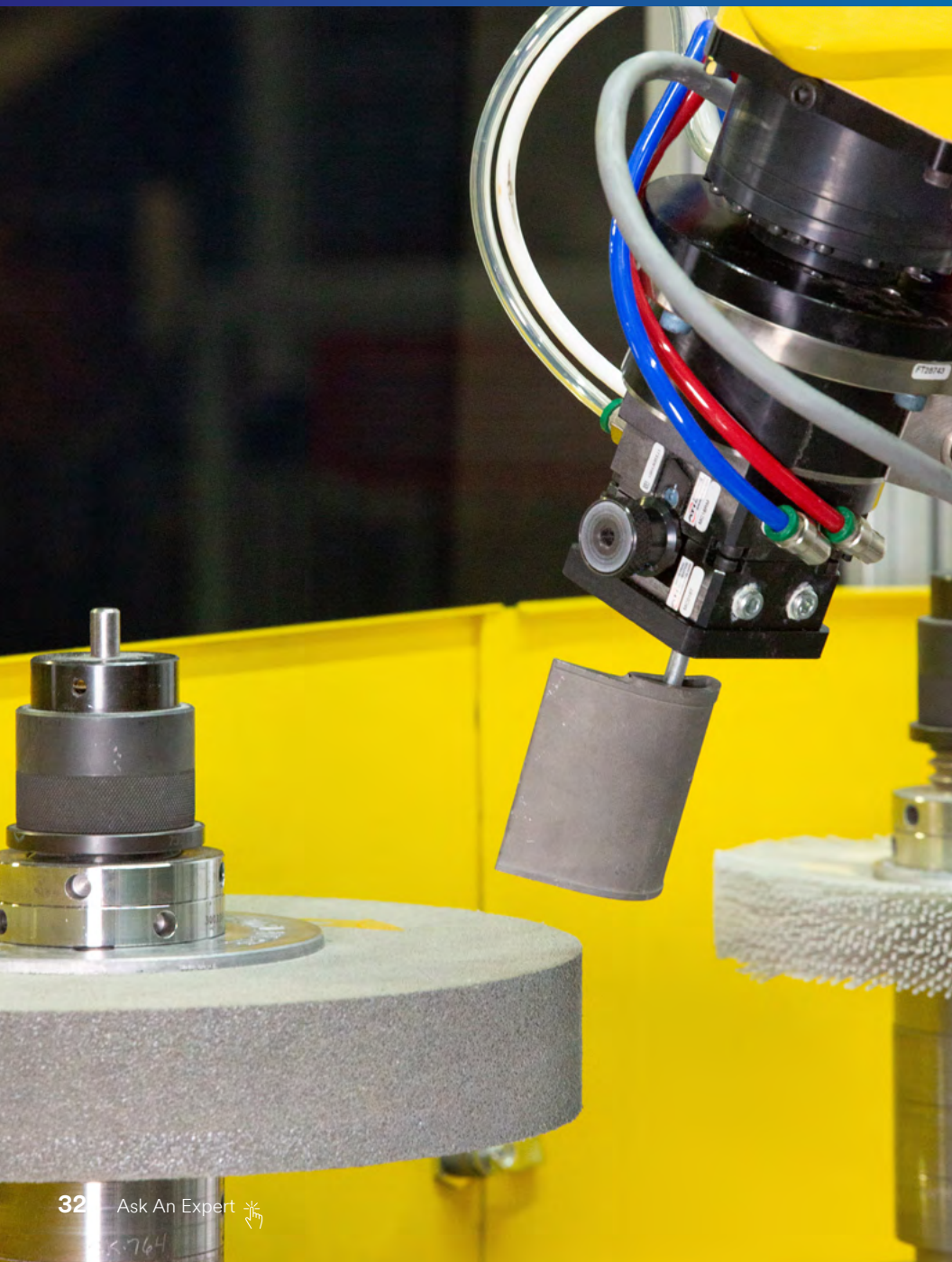
Mill Scale & Weld Spatter Removal:
Very dependant on substrate hardness - plenty of options to keep mineral cutting properly

Weld Spatter Removal:
Selection is important on aluminum to prevent products from gumming up



Finishing & Polishing

Part Substrate	Material Removal Goal	3M Product
Aluminum	Prep for Plating Parts to Be Buffed Satin Finish Parts Refine Scratches Remove Discoloration	**Typical first step: to achieve pre-buff or pre-plate finish** **3M Trizact** 307EA Belt *More contoured parts, more flexible backing, breaks down slowly* 237AA Belt *Flatter surfaces, more rigid backing, breaks down slowly* 337DC Belts *Slack of belt, best used under low / medium pressure*
Stainless Steel		
Carbon Steel		
Titanium		
High-Nickel		
Cobalt Chrome		



Finishing & Polishing

Part Substrate	Material Removal Goal	3M Product
Aluminum	Prep for Plating Parts to Be Buffed Satin Finish Parts Refine Scratches Remove Discoloration	**Typical final step for Satin Finish:** **Scotch-Brite** Flap Brushes *For complex areas* Durable Flex Belts *For a slack belt operation* Durable Flex Belts *Metal finishing, multi finishing, cut and polish, and light deburring*
Stainless Steel		
Carbon Steel		
Titanium		
High Nickle (HI-Nickle)		
Exotic Cobalt or Chrome		

3M Trizact™ 3M CUBITRON™ II 3M Xtract™ 3M Finesse-it™ Scotch-Brite

Grinding Cast & Forged Parts

Part Substrate	Material Removal Goal	3M Product
Aluminum	Removing excess material like: parting lines, gates, risers & flashing prior to machining	**3M Cubitron II** 984F Belt **General Recommendation. Designed for high pressure applications* 981F Belt *Aluminum Only* 994F / 997F Belts *Ultra-high pressure* **3M** 767F Belt *Versatile belt for low to medium pressure applications*
Stainless Steel		
Carbon Steel		
Titanium		
High Nickle (HI-Nickle)		


3M
Scotch-Brite
Deburr & Finish PRO 6C MED+

Robotic Deburring

Part Substrate	Material Removal Goal	3M Product
Carbon Steel	Deburring	**Scotch-Brite** **Unitized Wheels** Deburr & Finish Pro EXL **Convolute Wheels** EXL Pro EXL/ EX2 / EX3 **Belts** Durable Flex Belts **Discs** Surface Conditioning Disc **Bristle** Radial Bristle Brushes Bristle Discs **Coated Abrasive Products for Heavy Deburring:** **Check with AE** for Heavy Deburring applications
Stainless Steel		
Aluminum		
Other		


3M
Model No. 77539
Serial No. 80002 20
RATED SPEED 12000 RPM
OUTPUT RATING 1000 WATTS
3M

Automotive Clear Coat Paint Repair

Part Substrate	Material Removal Goal	3M Product
Automotive Clear Coat	Removing defects in clear coat that show up after vehicle exits paint booth in automotive production line	**Automation tooling:** 3M Paint Repair Controller 3M Active Compliant Tool 3M Servo Random Orbital Sander 3M Servo Random Orbital Buffer **Consumables:** 3M Trizact 3M Finesse-it Buffing Pads 3M Finesse-it Hookit Foam Pads 3M Finesse-it Polishing Compound

3M Trizact™

3M Xtract™

3M CUBITRON™ II

3M Finesse-it™

Scotch-Brite™ FINISHING STRONG SINCE 1958

Fixed Automation

- Flat Finishing & Deburring: Metal
- Finish Sanding: Wood
- Calibration Sanding: Wood
- Cylindrical and Centerless Grinding

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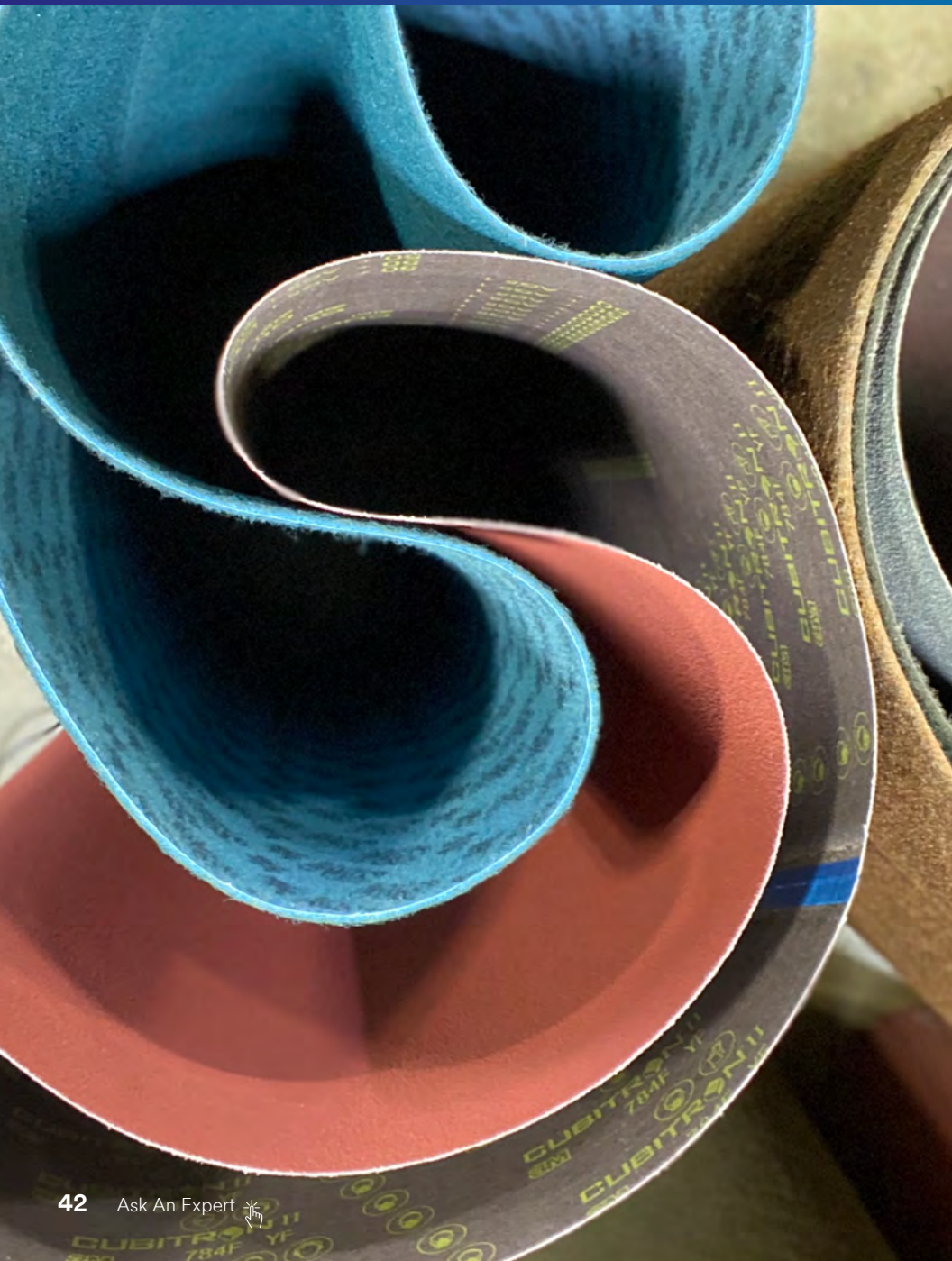
3M Trizact™ 3M CUBITRON™ II 3M Xtract™ 3M Finesse-it™ Scotch-Brite



Flat Finishing & Deburring: Metal

Part Substrate	Material Removal Goal	3M Product
Stainless Steel Aluminum Other	Deburring Polishing Cleaning Prep for Paint Finishing	**Wet or Dry:** **3M** 384F *Thinner Gauge - low defect* **3M Cubitron II** **Scale / Defect Removal:** 784F Belt *Aggressive, created for stainless steel* **Silicon Carbide Finish Requirement:** 461F Belt *Appliance* **Scotch-Brite** SC Surface Conditioning Belt (Low Stretch AMED & AVFN Belts) Cut and Polish Flap brush Clean and Finish Cleaning Brushes

3M Trizact™ 3M CUBITRON™ II 3M Xtract™ 3M Finesse-it™ Scotch-Brite

Flat Finishing: Metal

Part Substrate	Material Removal Goal	3M Product
Stainless	Polishing Cleaning Prep for Paint	**Wet Only:** **3M Trizact** 253FA Belt *Use for consistent, repeatable finishes and/or pre-buffed and plated finishes* 363FC Belt 463FC Belt 953FA Belt **Dry Only:** **3M Trizact** 237AA Belt *Use for consistent, repeatable finishes and/or pre-buffed and plated finishes*
Aluminum		
Other		

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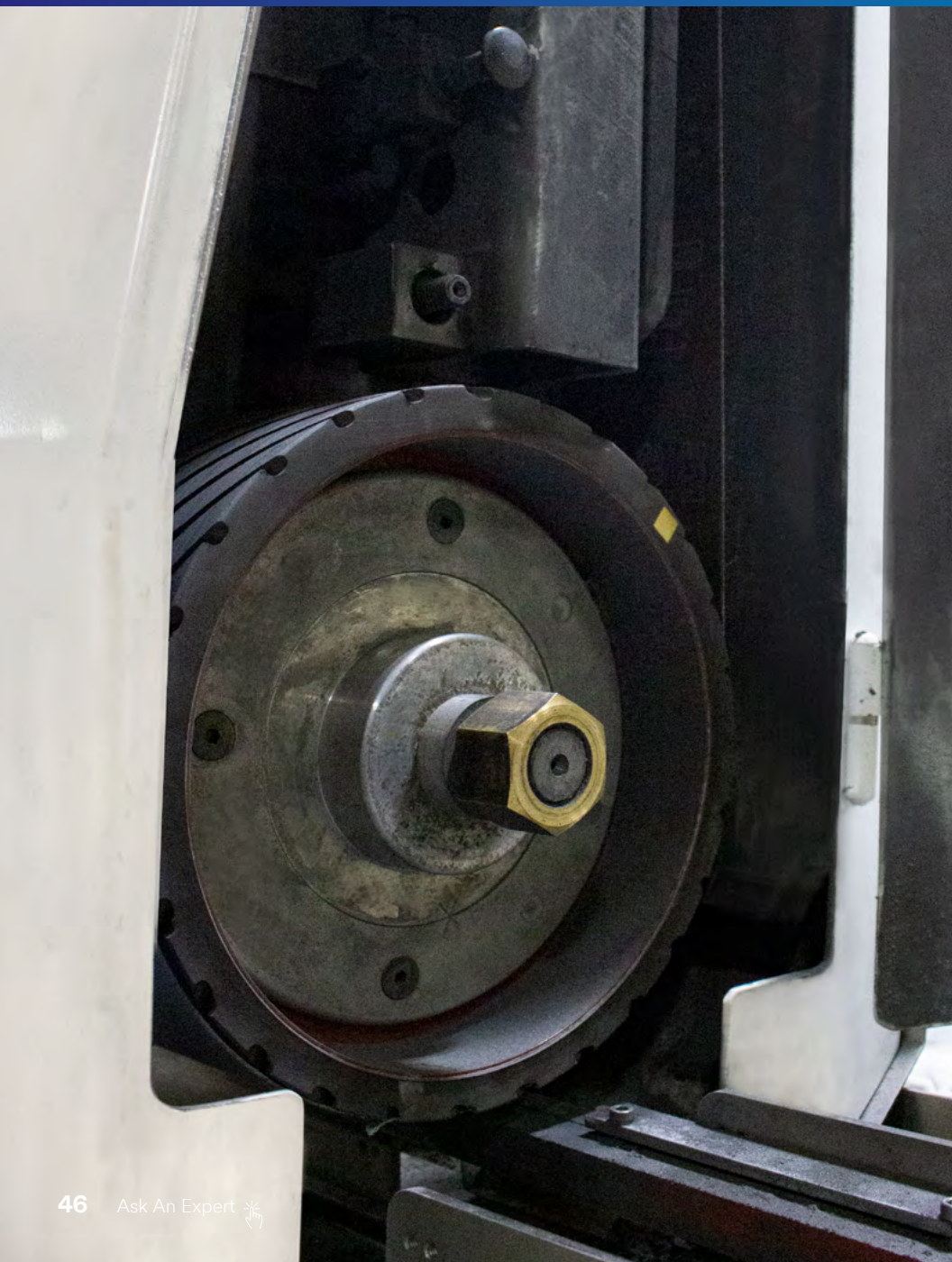

Cylindrical and Centerless Grinding

Part Substrate	Material Removal Goal	3M Product
Stainless Steel Carbon Steel	Dimensioning	**3M Cubitron II** **Wet or Dry** 984F, 784F **Wet** 966F
	Dimensioning or Blending	**3M Trizact** **Wet** 363FC, 953FA, 253FA, 347FC **Dry** 347FC, 237AA, 337DC 337DC
	Finishing	**Wet** **3M Trizact** 463FC, 253FA, 953FA **Dry** **3M Trizact** 237AA, 347FC 337DC **ScotchBrite** Belts

3M Abrasive Solutions for Robotics & Automated Abrasive Processing

To learn more about 3M Abrasives and get Free 3M Application Engineering Support for your automation journey, contact a 3M Application Engineer at:
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