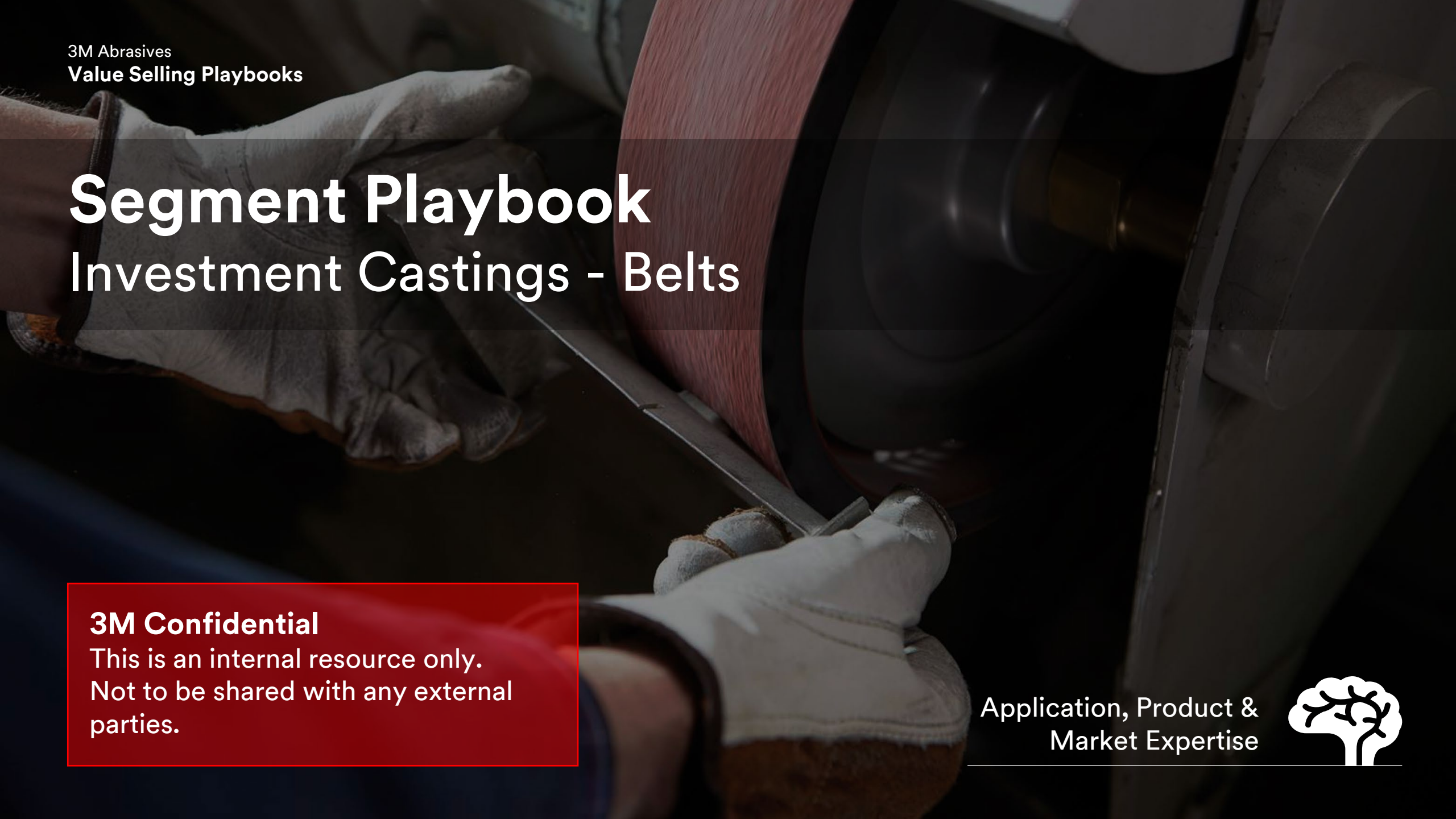
3M Abrasives
Value Selling Playbooks

Segment Playbook
Investment Castings - Belts



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Application, Product & Market Expertise

Quick Links

Use these links to jump to the specific information type you need

- Casting Methods
- Product Selection
- Casting Materials & Implications
- System Optimization
- Automation Considerations
- Running an Effective Customer Test
- Key Questions to Ask
- Communicating Value & Closing The Deal
- Application Fundamentals
- Value Drivers
- Application Steps & Grade Selection
- Objection Handling
- Belt Material Type Selection
- When to Call Your AE

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Investment Castings - Belts

Back to Quick Links

This playbook is designed to:

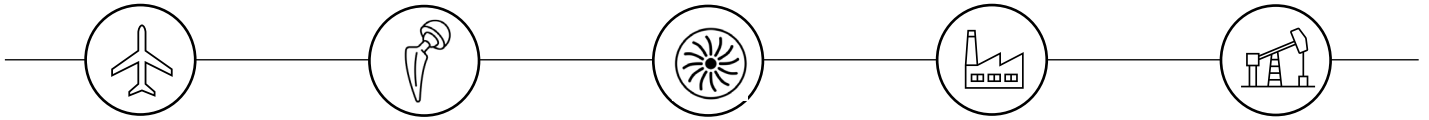
- ✓ Provide you with a foundational knowledge of what castings and forgings customers do and how they do it
- ✓ Give you investment specific application insights to help you sell abrasive belt value in a way that meets the customer needs
- ✓ Be used in conjunction with the following foundational knowledge modules:

Product Selection – Belt Grinding & Finishing — LINK

Optimising a Belts System — LINK

Running a Successful Belt Test — LINK

Investment Castings – Background Information



Aerospace Turbine Blades | Medical - Orthopaedic | Energy Turbine Blades | General Industrial | Oil & Gas

Investment Casting Methods

ALL Methods Require Abrasive Processes

Conventional (Lost Wax)

Process
Investment casting uses wax patterns and ceramic shells to make complex metal parts with strong accuracy and finish.

Substrates
Stainless, carbon and low-alloy steels. Nickel and Cobalt-based superalloys. Aluminum and titanium alloys.

Vacuum Investment Casting

Process
Vacuum investment casting melts and pours alloys inside a vacuum or inert-gas chamber to prevent oxidation and gas absorption.

Substrates
Titanium, nickel-based superalloys, cobalt based superalloys, high purity stainless.

Single Crystal (CX)

Process
Single-crystal casting forms parts (like turbine blades) with only one grain, using a ceramic mold and grain selector.

Substrates
Nickel-based superalloys.

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Investment Castings – Background Information

Types of investment casting materials, where you're likely to see them and related abrasive process implications to consider

Titanium

Key Elements

Ti Titanium | Al Aluminum

Common Industries & Parts
Aerospace and turbine components. Medical implants and instruments. High-performance automotive parts. Lightweight, durable industrial equipment.

Abrasive Process Implications
Titanium generates significant heat build-up requiring grinding aids or wet grinding applications.

Carbon Steel

Key Elements

Fe Iron | Al Aluminum

Common Industries & Parts
Industrial machinery components. Automotive brackets and housings. Agricultural equipment parts. Hardware and construction components.

Abrasive Process Implications
Wide array of grinding solutions, either wet or dry applications.

Cobalt-based Alloys

Key Elements

Co Cobalt | W Tungsten | Cr Chromium | Ni Nickel

Common Industries & Parts
Gas-turbine components (vanes, combustion hardware). Wear-resistant valve seats and pump components. Medical implants (orthopedic components). Cutting tools and hard-facing components.

Abrasive Process Implications
Extremely hard alloys requiring ceramic to grind and finish. Run wet and dry but require a grinding aid.

Nickel-based Superalloys (Inconel)

Key Elements

Ni Nickel | Si Silicon | Cu Copper | Mg Magnesium

Common Industries & Parts
Gas-turbine blades, vanes, and hot-section components, Aerospace engine hardware, Power-generation turbine components

Abrasive Process Implications
Ceramic belts needed due to toughness of substrate.

Aluminum Alloys

Key Elements

Al Aluminium | Si Silicon | Cu Copper | Mg Magnesium

Common Industries & Parts
Aerospace brackets and structural components. Automotive lightweight components. Electronics housings. Robotics and automation parts

Abrasive Process Implications
Soft substrate so required alumunia zirconia or aluminum oxide coated abrasives, PSG belts with lubricants also ok.

Stainless Steel

Key Elements

Fe Iron | Cr Chromium

Common Industries & Parts
Pumps, valves, and fluid-handling components. Food-processing and dairy equipment. Medical and laboratory hardware. Industrial machine parts.

Abrasive Process Implications
Stainless is prone to discoloration and gouging requiring grinding aids and PSG belts for consistent finish.

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Investment Castings – Background Information

Additional information on how each substrate behaves differently in relation to the abrasive process to be considered

Substrate	Relative strength	Heat resistance	Behavior over time under machining	Grinding & abrasive behavior	Belt Speed SFPM (m/s)	Production challenges
Titanium	High specific strength; moderate absolute hardness	Moderate service temp but heat-reactive	Prone to galling; surface damage increases as heat cycles; dimensional spring-back	• PSG and/or wet for heat management • Finish with Trizact/films to low Ra • Avoid contamination.	2,500 – 3,000 (13 – 15)	Low-temp finishing paramount; fire safety for dust; fixturing for low modulus
Cobalt-based Alloys	Very high; maintains strength at high temp	Very high	Work-hardens rapidly → gets harder as you machine; tool wear accelerates	• PSG at high pressure for removal • Often use poured coolant • Finish with Trizact/films for Ra • Force control critical	6,000 (30)	Extreme tool wear, burn risk, tight Ra in hot-section parts; rigid fixtures
Carbon Steel (Mild)	Moderate	Low–moderate	Stable; does not strongly work-harden in typical ops	• PSG for removal • Trizact for repeatable finish	6,500 (33)	Throughput & finish balance; scale removal on flats/rods
Stainless steel	Moderate–high; tough; work-hardening tendency	Moderate	Work-hardens locally if rubbed; surface finish drifts if heat isn't managed	• Heat management critical to success • Open-coat PSG + grinding aid for removal • Ensure optimized contact wheel selection	6,500 – 7,000 (33 – 36)	Managing loading and finish consistency on sanitary/architectural work
Aluminum	Low–moderate structural strength vs. steels; valued for lightness	Low–moderate	Tends to smear; surface can gall if overheated	• Open-coat + grinding aid for removal • Step to Trizact micro-replication for uniform Ra	<120 Grade 7,500 - 8,500 (38-43) Finer Grade 6,500 - 7,000 (33 - 36)	Managing loading/smear; dust handling; distortion if heat isn't carried away
Nickel-based Superalloys (Inconel)	Very high; maintains strength at high temp	Very high	Work-hardens rapidly → gets harder as you machine; tool wear accelerates	• PSG at high pressure for removal • Often use poured coolant • Finish with Trizact/films for Ra • Force control critical	6,000 (30)	Extreme tool wear, burn risk, tight Ra in hot-section parts; rigid fixtures

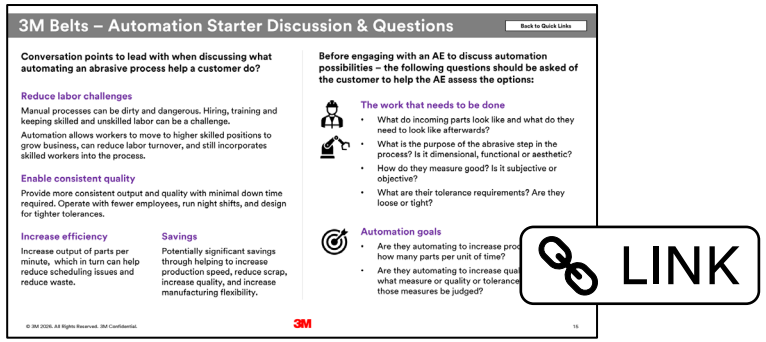
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Investment Castings – Background Information

Automation in Investment Castings

When considering robotic or fixed automation in this space, the primary goal is for our sales professionals to be able to talk confidently about the topic for FIVE minutes – then offering to bring an AE into the conversiona to discuss the topic further if there is interest.

The fundamentals to that 5 minute conversation don't change from one industry another – you can find details in our Automation Starter Questions Guide – linked below:



LINK

Additional Automation Considerations for Investment Castings

Headlines

Automation is possible and increasingly widely adopted in ALL investment casting abrasive applications
Automation particularly suits and economics and part characteristics of investment castings

Upside	Additional Context
Gate grinding optimised	• Productivity is amplified due to hard to grind material often in use • Robots can push harder for longer and by using more of the belt surface vs. humans = good for investment castings where this high pressure is common
Costly rework can be avoided	• Investment casting parts are high value in nature, meaning the cost to rework is amplified. Precision is needed automation delivers the best here.
Complex multi-step processes made efficient	• Multi-step processes can be more efficient when automated vs. manual • Can potentially in one cell including the possibility for multi-machine redundancy automated part hand off
Production efficiency amplified	• Investment castings are often characterized by low part mix, high volume – this suits automation the best
Critical finishes achieve with greater efficiency	• Robots can control the abrasive in a way that humans can't - meaning finish can be optimized in order to skip steps more successfully and deliver additional productivity gains
3M have expertise and partnerships vital to successful automation	• 3M have a system integrator network of partners which know how to work with investment castings and bringing value to customers with 3M abrasives. • The acute need for system optimization can be met by dedicated 3M automation experts

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Investment Castings - Belts

Back to Quick Links

Application Fundamentals

Investment casted part finishing has a vast array of finishes and variables that make it difficult to define a standardised solution for companies working in this space - this is not like selling a fibre disc!

Companies will almost always have their own Standard Operating Procedures (SOPs) today - your initial goal is to understand their current process in detail, with the aim of make improvements to it.

Investment castings have FOUR common processing steps:

Top 3 boxes are always done

Gate Grinding | Refining | Finishing

Deburring can be done but not always

Deburring & Edge Breaking

Asking the KEY QUESTIONS opposite will build a deep understanding the process and challenges they face

Key Questions to Ask

PROCESS

- What is the substrate?
- What are their pain-points with the current process?
- What is their desired finish and how do they measure it?
- What is the current process and sequence to get to that finish?
- What material removal equipment do you currently use + operating parameters (abrasive speed, fixed or adjustable speed, contact wheel serrations/hardness/size)
- Would they be open to purchasing a different contact wheel/machine if it brought process benefits?

Without this information you won't be able to start helping them with process improvements

BUSINESS

- What are their challenges as a business?
- What is their competitive advantage as a business?
- What improvements do they expert to see from a potential new supplier like 3M?

Without this information you won't be able to create a compelling value story that talks to their business needs

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Belts - Typical Application Steps // Related Abrasive Type // Grade Selection

Coated	P24	P36	P40	P50	P60	P80	P100	P120	P150	P180	P220	P240	P280		P320	P400	P500	P600	P800		P1000	P1200		P1500	P2000	
	(24+) 36+			(40+ 50+) 60+		80+	120+		150+	180+	220+	240+	280+		320+	400+										
Scotch-Brite™									Coarse		Medium							Very Fine				Super Fine				
Trizact™								A160	A130	A110	A90			A60	A65		A45		A35		A30		A20	A16	A10	A6	A5

Process Step	Gate Grinding	Blending & Dimensioning	Finishing
		Parting Line & Flash Removal	

Markets in Focus

Turbine Blades
Coated to 120, Scotch-Brite™ or Trizact™ for finishing. Typically stop at A90 or Scotch-Brite™ equivalent and then onto an alternative final finishing process (i.e. bead blasting).

Orthopaedic Implants
Coated to 400, Scotch-Brite™ or Trizact™ for finishing. Typically goes down to A6.

When to choose one belt type over another?

Coated
Where heavy grinding pressures or complex casting features are involved

Scotch-Brite™
Where finishing, blending or deburring is needed without removing significant base material. It's the most forgiving.

Trizact™
Where more controlled, predictable, and repeatable finishing is needed. Ideal for automation.

Important to Remember!

Only by understanding the current process in detail will you be able to move to recommending improvements that must be tailored to each company

A process (number of steps, material type and grade sequence) from one company to the next can start and finish at different grades, even if the application is the same!

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Checklist for Successful Belt Testing

Topic	Points to Consider
Tooling	✓ For file belts, ensure you have 3M File Belt Tool, alternative contact arms, additional arm accessories and a toolkit (wrenches and tools to change air fittings, etc)
3M Abrasives	✓ At two one first choice belts you'll lead with based on application and value questioning + a different back up belt you have selected
Competitive Abrasives	✓ Make sure you baseline to the competition i.e. test their belt first ✓ Be sure to capture everything the customer likes and doesn't like about it
Factors Affecting	✓ Substrate & Grade Surface Feet Per Minute (SFPM) Guide (Page 3) for variable speed machines where SFPM is recognized and understood
Test Design	✓ Be clear with customer what needs to be measured to get to the outcome required to meet their needs from a 3M product ✓ Agree how end of life is determined (cut reduction, capping, loading, belt breakage, part heat/bluing) ✓ Have a clear view how you will be reflecting data collected in ValueMAX before you start the test ✓ Try to make sure there is enough time to get to end life and that there are enough parts available to complete the test ✓ If time is limited or there is reluctance to test a whole sequence – agree to prove our value in on one part or in one process step first and then agree to come back
During Testing	✓ Be aware of habitual 'perception of end of life', set expectations for operator to use full life of belt (to when stops cutting, not till existing belt EoL) ✓ Be prepared to stand around, be observant and push operators to take our belts to true end of life. Try to never leave a customer to test a belt on their own.
Data Collection	✓ Stopwatch, air gauge (for file belt tools) and notepad. Stopwatch and notepad ✓ Capture data according to the test parameters you have agreed with the customer in the test design – e.g. time per part or measured unit or length, # parts processed, surface finish and time to change a belt
Decision Making	✓ Be sure to understand and connect with the right decision makers in the account. ✓ Gauge and respond to the influence of the operator

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Belt Selection – Coated, Trizact & Scotch-Brite

Recommended is the potential best starting point based on the application.

Alternative is another option based either on a different flexibility and durability need, or possible lower belt cost. Value shown in bell process can be viewed as an increase and throughput lower overall belt cost and faster sanding or grinding time



		Portable File Belt	High Pressure Backstand	Low/Medium Pressure Backstand	Stroke Sander	Bench Top Belt Sander	Slack of Belt Sander	Centerless & Roll Grinding		Flat & Wide Belt Finishing	
								Dry	Wet	Dry	Wet
Carbon Steel & Cast Iron											
Grinding	**Recommended**	784F	1184F	1184F	767F	784F	726A	784F	1184F	767F	767F
	Alternative	767F	996F	784F	784F	767F	947A	384F	784F	767F	384F
Finishing/Polishing		726A 237AA	-	726A 237AA	237AA 327DC	726A 237AA	327DC 217EA	347FC	363FC, 347FC	461F	461F 253FA
Stainless Steel, Cobalt Based Alloys & Nickel Based Alloys (Inconel)											
Grinding	**Recommended**	784F	1184F	784F	784F	784F	784F	784F	1184F	784F	767F
	Alternative	947A	997F	1184F	947A	767F	947A	384F	784F	767F	384F
Finishing/Polishing		237AA, 726A	-	947A 237AA, 726A	237AA 327DC	237AA 337DC, 726A	327DC 217EA, 726A	347FC	363FC, 347FC	461F 237AA	461F 253FA
Aluminium & Soft Substrates											
Grinding	**Recommended**	981F	1184F	981F	981F	981F	726A	784F	784F	384F	384F
	Alternative	784F	767F	784F	784F	767F	947A	384F	384F	767F	767F
Finishing/Polishing		384F	784F	384F	384F 767F	384F 767F	384F 217EA	237AA	253FA	461F	461F
Titanium											
Grinding	**Recommended**	784F	1184F	1184F		784F	726A	967F	966F	967F	966F
	Alternative	967F	967F	967F		967F	947A		784F		767F
Finishing/Polishing		947A 237AA/461F		461F 237AA		237AA	217EA 461F		461F 463FC		461F 463FC

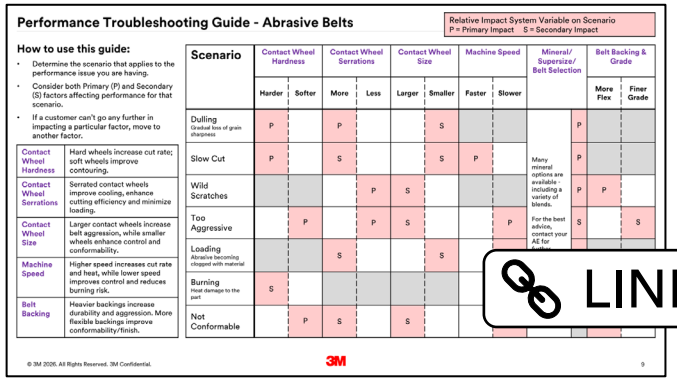
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Maximize Belt Performance with System Optimization

Investment casting processing relies heavily on an optimized machine system to maximise the value we can deliver:

- Parts vary in geometry
- Part finishing points vary
- Variations in part material behave differently
- Variations in belt mineral behave differently

When deciding on the right system composition, the starting point should be our standard Belt Performance Troubleshooting Guide:



Performance Troubleshooting Guide - Abrasive Belts

Relative Impact System Variable on Scenario
P = Primary Impact S = Secondary Impact

How to use this guide:

- Determine the scenario that applies to the performance issue you are having.
- Consider both Primary (P) and Secondary (S) factors affecting performance for that scenario.
- If a customer can't go any further in impacting a particular factor, move to another factor.

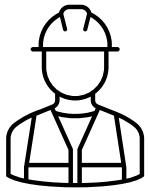
Contact Wheel Hardness	Hard wheels increase cut rate; soft wheels improve contouring.
Contact Wheel Serrations	Serrated contact wheels improve cooling, enhance cutting efficiency and minimize loading.
Contact Wheel Size	Larger contact wheels increase belt aggression, while smaller wheels enhance control and conformability.
Machine Speed	Higher speed increases cut rate and heat, while lower speed improves control and reduces burning risk.
Belt Backing	Heavier backings increase durability and aggression. More flexible backings improve conformability/finish.

Scenario	Contact Wheel Hardness		Contact Wheel Serrations		Contact Wheel Size		Machine Speed		Mineral/ Supersize/ Belt Selection		Belt Backing & Grade	
	Harder	Softer	More	Less	Larger	Smaller	Faster	Slower			More Flex	Finer Grade
Dulling (Gradual loss of grain sharpness)	P		P			S			Many mineral options are available - including a variety of blends. For the best advice, contact your AE for	P		
Slow Cut	P		S			S	P			P		
Wild Scratches				P	S					P	P	
Too Aggressive		P		P	S			P		S		S
Loading (Abrasive becoming clogged with material)			S			S						
Burning (Heat damage to the part)	S											
Not Conformable		P	S		S							

LINK

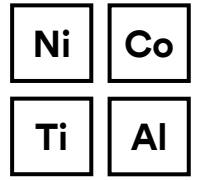
Additional Considerations in Belt Processes

Here is some additional guidance you need to know when working with Investment Castings:



In 'off-hand' applications, the operator is a big factor affecting test outcomes.

Consider their experience, mood, time on shift and operator effort.



Metal type also has a big impact of performance.

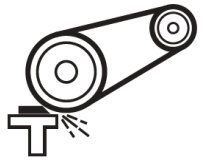
The running speed of the belt – often measured in Surface Feet Per Minute (SFPM) or Meters/Second (m/s) needs to be dialled in.



Pressure

The biggest factor affecting performance is often pressure between part and belt. Consider the following:

- Applied pressure
- Part geometry
- Belt slack
- Contact wheel



Hard to grind substrates are widespread in this space.

It's important to make sure the product is breaking down as expected

Important to Remember!

Get into the operators mind with open ended questions. Compliment this by really inspecting the incumbent abrasive product to 'find your value angle' with the decision makers.

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Communicating Value & Closing The Deal

A Understand

Centre your value proposition on the specific answers to the **Key Questions** you asked at the start of your interactions with the company

Think about challenges related to... Their **Process** Their **Business**

B Apply

Ensure that test results are set against our foundational belt value creation framework

Use this guide to support you

LINK 3M Belt Value Drivers

C Quantify

Use ValueMAX to get out of the price fight, visualise total process savings and illustrate throughput gains where required

Use this guide to support you

LINK 3M Belts ValueMAX Best Practice

D Socialise

Are you sure you have identified all the decision makers to change a process?



Prepare to engage multiple functions with compelling arguments aligned to their own priorities

- ✓ Production
- ✓ Purchasing
- ✓ EHS/Safety
- ✓ Quality
- ✓ Senior Management

E Objection Handing

Prepare for objections with the common answered on the next page.

Consult your AE to ensure responses are appropriate, if needed.

Document their objections and your responses in a visit report.

F Set the Specification

Lock out the competition by using the 3M Abrasives SOP Creator to build a specification document that the company can use with their operators

Use this guide to support you

LINK 3M Abrasives SOP Templates & Guide

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Objection Handling

Important to Remember!

Using newer technologies requires a fundamental shift in the mentality of how work is done.

Objection	Response
"Operators will not use the 3M belts to end of life - pushing the real cost higher"	In many cases, end of life issues are disproved after an extended trial where 3M belt consumption is carefully monitored over a period of a shift, days or weeks, combined with explicit operator instruction to ensure the full life of the belt is used. Full consideration of factors affecting performance (see Belt Test Troubleshooting Guide) will help to optimize the system and lead to better performance and value.
"3M belts with PSG are finishing coarser in grade-for-grade comparisons"	If grade-for-grade finish is not accepted, moving to a less aggressive grade should get to the required finish without compromising cut rate, thanks to the cutting power of PSG.
"3M belts are more expensive and we're trying to reduce costs"	Users that have made the switch to 3M have recognized the importance of total abrasive spend reduction over time, instead of just looking at initial belt price. Abrasive belts represent a small portion of overall variable costs in a business and should be put into context of labor savings or throughput increases.

When to call your AE

Apply the knowledge gained from this playbook first – it should set you up for success in many accounts and applications.

There may however be times you may need to call on the help of an AE in the following situations:

- **Complex finishing process, incl. extending into polishing**
- **Un-familiar customer insights not covered in the playbook**
- **Preparing a new process trial**
- **Failed new process trial**

You will get the best value from our AE teams by relaying the answers to the key questions you should be asking your customers.

Make sure you have this information when you reach to you AE for support.

Key Questions to Ask

- Their **Process**
- Their **Business**

Not every AE interaction will be a visit

- ✓ It may start with a call with you
- ✓ There may then be a call with the customer
- ✓ If a customer visit is still needed this can be arrange

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3M Belts - Value Drivers Simple Guide

Back to Quick Links

Increase Throughput	Maximise Quality	Increase Profit	Reduce Waste & Energy
By reducing processing time	**By creating a more consistent finish and minimising rework**	**By reducing total process cost and increasing production**	**By reducing abrasive consumption and tool time**
Grade-for-Grade Performance 3M Precision-Shaped Grain will almost always be faster at processing the part throughout the life of the belt.	**Abrasive Wear Behaviour** 3M Precision-Shaped Grain and Trizact™ belts wear more consistently and predictably over time so delivers a more constant finish throughout the life of the belt. Scotch-Brite™ leaves a more consistent finish through the life of the belt.	**We Focus on Spend Not Price** It's often possible to balance a higher 3M belt price by showing that the longer service life more than covers the cost difference.	**Less Waste to Landfill** Belt related processes can consume a lot abrasive units that go to landfill when used. By using fewer steps or lasting longer, 3M abrasives can cut this waste significantly.
⚠ **CAUTION** *Some competitors try to narrow this gap by adding coarser mineral than stated on the belt.* *This improves cut rate, but compromises finish.*	⚠ **CAUTION** 3M Precision-Shaped Grain *can have a tendency to cut coarser than conventional mineral – so find the right balance here.*	⚠ **CAUTION** *End user savings mean lower sales for channel partners in their existing accounts.* *Ensure they are bought into the sale and confront any objections they may have.*	**Less Energy Consumption** With reduced tool time or more throughput thanks to more efficient processing from 3M Precision-Shaped Grain, Scotch-Brite™ and Trizact™ products - energy costs per part can be reduced.
Sequence Reduction Starting at a higher grade or skipping steps with 3M Precision-Shaped Grain , Trizact™ or J-Weight belts will make a multi-step process faster.	**Finish at a Higher Grade** If grade-for-grade grade finish is still not accepted, moving to a finer grade will get to the required finish without compromising cut rate, thanks to the cutting power of 3M Precision-Shaped Grain as well as Trizact™ & Scotch-Brite™	**Total Process Cost Matters** Labour costs far outweigh abrasive costs in belt related tasks. When capacity is an issue, we can lower the labour cost per part. When capacity isn't an issue, we can reduce the labour required in this process.	**Per-Part Environmental Impact Reduction** Considering all the environmental implications of running a workshop, customers can increase their part throughput, thus reducing environmental impact per part.
⚠ **CAUTION** *Skipping steps can lead to longer times to get to the required final finish – so find the right balance here.*			

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3M Belts - Performance Troubleshooting Guide

Back to Quick Links

How to use this guide:

- Determine the scenario that applies to the performance issue you are having.
- Consider both Primary (P) and Secondary (S) factors affecting performance for that scenario.
- If a customer can't go any further in impacting a particular factor, move to another factor.

Contact Wheel Hardness	Hard wheels increase cut rate; soft wheels improve contouring.
Contact Wheel Serrations	Serrated contact wheels improve cooling, enhance cutting efficiency and minimize loading.
Contact Wheel Size	Larger contact wheels increase belt aggression, while smaller wheels enhance control and conformability.
Machine Speed	Higher speed increases cut rate and heat, while lower speed improves control and reduces burning risk.
Belt Backing	Heavier backings increase durability and aggression. More flexible backings improve conformability/finish.

Relative Impact System Variable on Scenario
P = Primary Impact S = Secondary Impact

Scenario	Contact Wheel Hardness		Contact Wheel Serrations		Contact Wheel Size		Machine Speed		Mineral/ Supersize/ Belt Selection		Belt Backing & Grade	
	Harder	Softer	More	Less	Larger	Smaller	Faster	Slower			More Flex	Finer Grade
Dulling Gradual loss of grain sharpness	P		P			S			Many mineral options are available - including a variety of blends. For the best advice, contact your AE for further support in addressing this performance factor	P		
Slow Cut	P		S			S	P			P		
Wild Scratches				P	S					P	P	
Too Aggressive		P		P	S			P		S		S
Loading Abrasive becoming clogged with material			S			S		S		P		
Burning Heat damage to the part	S							P		P		
Not Conformable		P	S		S			S			P	

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3M Belts – Automation Starter Discussion & Questions

Back to Quick Links

Conversation points to lead with when discussing what automating an abrasive process help a customer do?

Reduce labor challenges

Manual processes can be dirty and 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 labor 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.

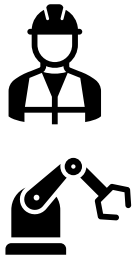
Increase efficiency

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

Savings

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

Before engaging with an AE to discuss automation possibilities – the following questions should be asked of the customer to help the AE assess the options:



The work that needs to be done

- What do incoming parts look like and what do they need to look like afterwards?
- What is the purpose of the abrasive step in the process? Is it dimensional, functional or aesthetic?
- How do they measure good? Is it subjective or objective?
- What are their tolerance requirements? Are they loose or tight?



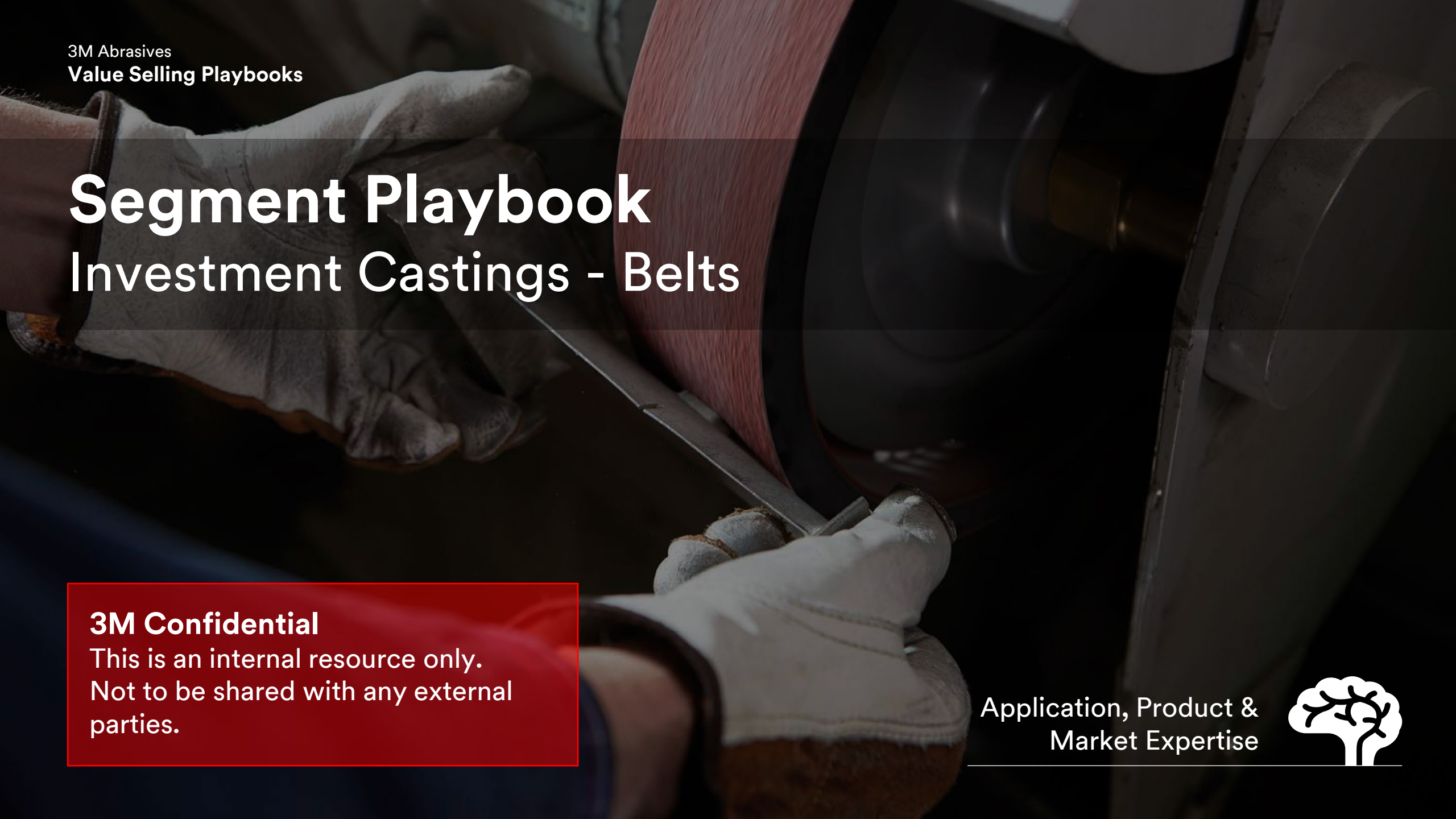
Automation goals

- Are they automating to increase production? If so, how many parts per unit of time?
- Are they automating to increase quality? If so, to what measure or quality or tolerance? How will those measures be judged?

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