NORTON

SAINT-GOBAIN

SPRING-END GRINDING

ABRASIVE TECHNOLOGICAL EXCELLENCE SINCE 1885

SPRING-END GRINDING SOLUTIONS

Spring-end grinding represents a significant part of the total cost of production of compression springs. To help reduce this cost it is essential to use the best grinding tools available.

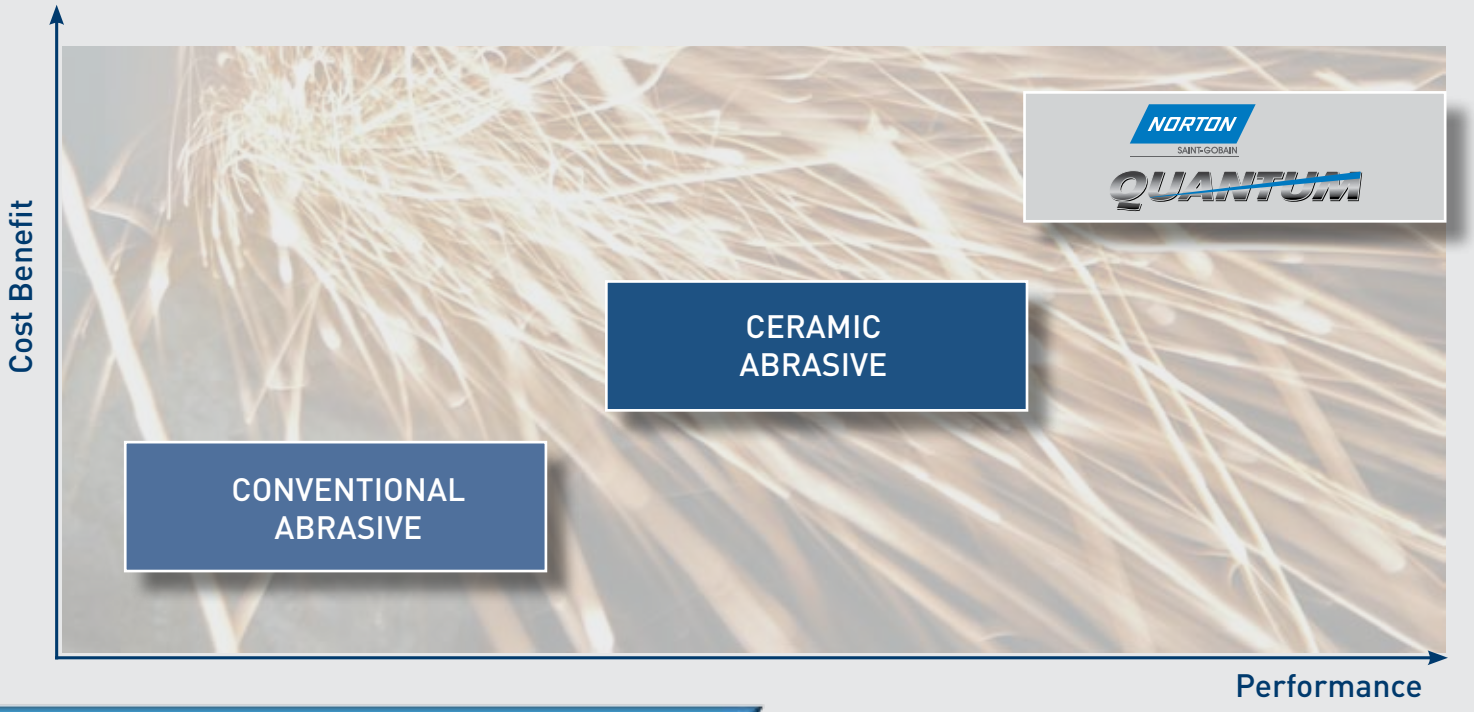
Norton offers a range of solutions for spring grinding operations.

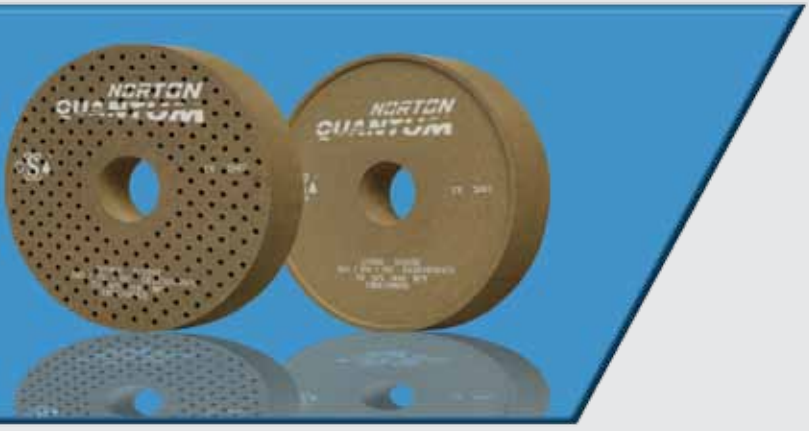
Our engineers provide the expertise to maximize application productivity by specifying the right combination of grain types with the most appropriate bonds.

NORTON TECHNOLOGY

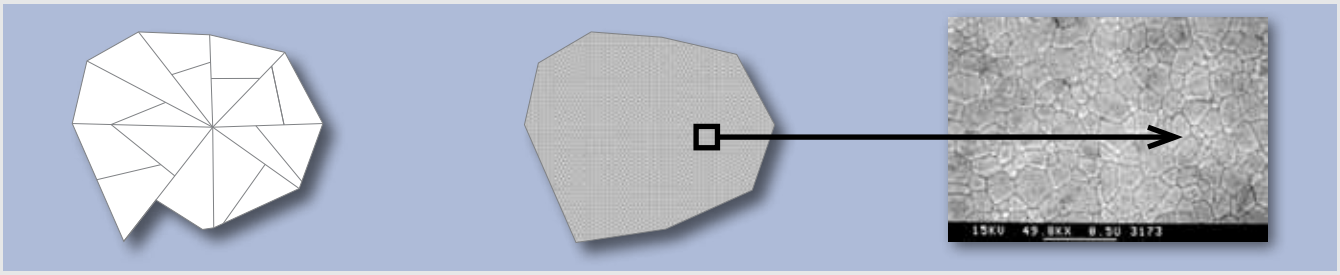
Norton offers 3 different types of product lines to adjust to all requirements, from cost effectiveness to high performance products.
All proposals are based on Resinoid products with Aluminium Oxide and Silicon Carbide grains. They comprise conventional and Ceramic grains and utilise the latest 'Norton Quantum' technology for maximum efficiency.

Ranking by Technology





WHY CHOOSE CERAMIC ALUMINA ?



Conventional Grain | **Ceramic Grain** | **Uniform Distribution of nano-crystals**

Ceramic grains comprise thousands of micro crystals. This micro structure allows a controlled fracture during grinding and provides continual exposure of new cutting edges, allowing the wheel to remain sharp and be more durable than conventional grains that lose macro grains while re-sharpening.

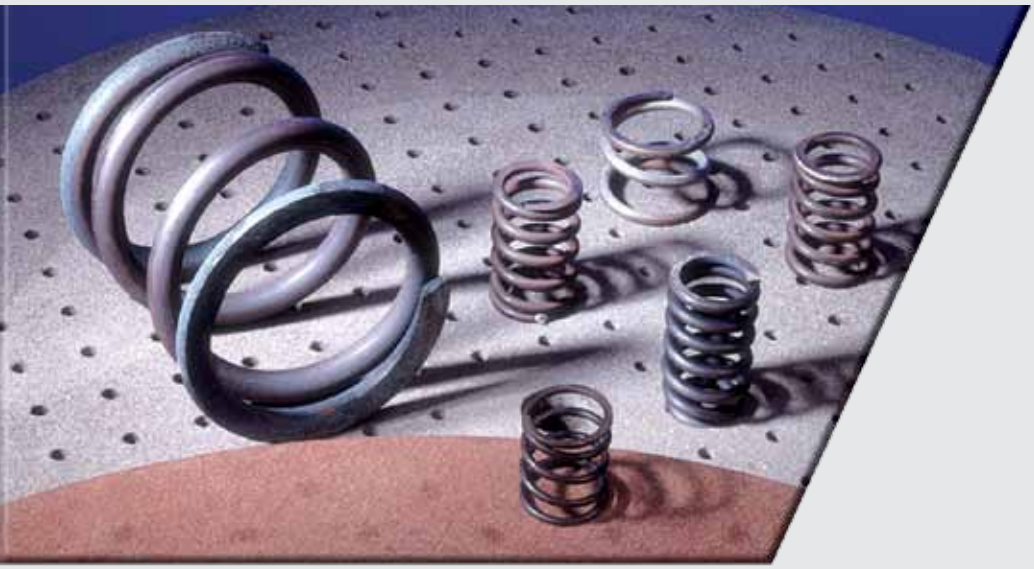
The resulting wheels made with the Norton ceramic grains are the most effective solution for spring-end grinding, permitting lower pressures to be used, whilst maintaining high metal removal rates and low wheel consumption.

Within the family of ceramic grains, Norton Quantum is the latest innovation in grinding technology, designed for maximum performance and unrivalled precision, providing the fastest, finest grinding solution available.

Main Characteristics of Norton Quantum

- A new ceramic alumina grain chemistry and shape developed from the Saint Gobain patented Seeded-Gel Technology
- This revolutionary ceramic grain multiplies the cutting efficiency by controlling the grain breakdown at the micro-metric level
- A perfect blend between sharpness (free cutting) and toughness (life)
- Newly developed bonds to optimize the grain-to-bond adhesion and improve grain retention.

Norton Quantum wheels have demonstrated improved wheel life, lower dressing frequency, higher production rate and cooler cutting when compared to standard ceramic grain.



PRODUCT SELECTION

Below is a guidance table for first selection of Norton products

ABRASIVE SELECTION GUIDE		SILICA CARBON STEEL SPRINGS (Heat Sensitive)	SILICA CARBON STEEL SPRINGS (General Purpose)	STAINLESS STEEL SPRINGS
Price/performance ranking		Abrasive Type		
GOOD	Good - Conventional Grain	88A, 40A	57A	88AC, 40AC, 57AC
BETTER	Better - Standard Ceramic Grain	nXGJ, nXGR	nXGA	nXGJC, nXGRC, nXGAC
BEST	Best - Norton Quantum	nNQJ, nNQR	nNQA	nNQJC, nNQRC, nNQAC

C:	*Silicon Carbide*
88A (J)*:	*Very friable pure white aluminium oxide*
40A (R)*:	*Pure friable pink aluminium oxide, more durable than 88A*
57 (A)*:	*Semi-friable aluminium oxide*
nXGJ, nXGR, nXGA, nNQJ, nNQR, nNQA *(n= 1,2,3,4 and refers to premium grain %)*	
nXGJC, nXGRC, nXGAC, nNQJC, nNQRC, nNQAC *(n= 1,2,3,4 and refers to premium grain %)*	

** When used with diluent abrasive.*

GRIT AND GRADE SELECTION GUIDE	TYPICAL MACHINE TYPES [1]	RIGID SPRINGS		ELASTIC SPRINGS	
WIRE DIAMETER		Grit size	Grade [2]	Grit size	Grade [2]
1.5mm < Ø < 3mm	single pass or continuous downfeed	30 - 36 - 46	Q - S	30 - 36 - 46	P - R
4mm < Ø < 9mm	single pass or continuous downfeed	20 - 24 - 30	P - S	20 - 24 - 30	O - R
10mm < Ø	continuous downfeed	16 - 20	N - Q	16 - 20	M - P

[1] *For single pass machines, choose a hard grade, for down-feed grinding select a soft grade*

[2] *For wet applications, choose a softer grade*

APPLICATION INFORMATION

When contacting your local sales representative please provide the following data to enable us to provide you with our best product to suit your application.

Wheel	Machine
Wheel dimensions (diam x thickness x hole)	Name & Power (kW)
Working zone thickness	Machine type : continuous, downfeed or single pass
Dimensional tolerances (if any)	Coolant Type (if any)
Nut layout (if any)	**Spring**
Nut type	Wire and spring diameter (mm)
working zone pattern (perforated, plain..)	Wire composition and EU classification
Maximum Operating speed (m/s)	Spring hardness
Main customer requirement	
Please specify any other parameter(s) to be improved.	

PRODUCT AVAILABILITY

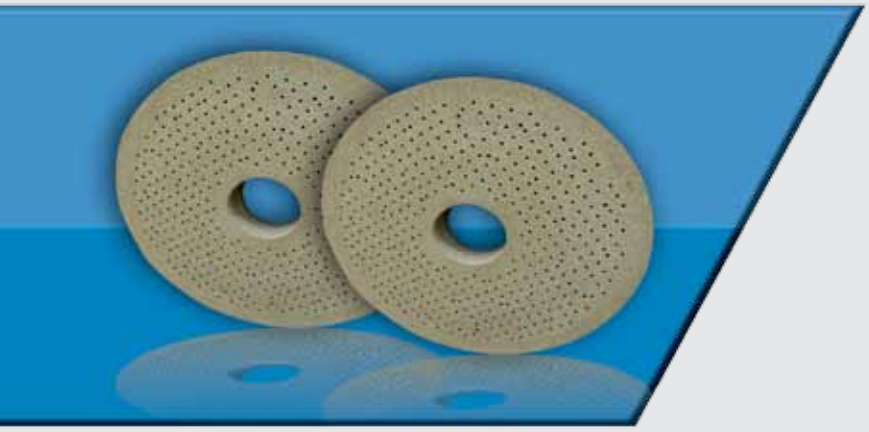
All regular wheel dimensions and shapes are available for both “single pass” and “downfeed” machines in wet or dry applications.

Resinoid wheels can be provided with nuts (ISO shape 36) or without any fixture, to be mounted on metallic plates (ISO shape 35).

The grinding zone can be compact, compact with porosity inducer or with perforations (partial or throughout). For the most effective cooling, it is recommended the usage of throughout perforations (available on diameters 450/660/915mm).

This table highlights the most popular wheel dimensions available for spring-end grinding.
The list is not exhaustive and dimensions can be provided for most applications.
Contact your local Norton representative for more information.

Dimensional Availability	
355 x 50 x 150	600 x 90 x 215
355 x 60 x 140	610 x 65 x 0
355 x 60 x 152.4	610 x 74 x 140
400 x 60 x 80	610 x 89 x 139
450 x 60 x 0	650 x 80 x 350
450 x 65 x 0	660 x 100 x 150
450 x 70 x 200	660 x 100 x 300
455 x 50 x 250	660 x 105 x 200
457 x 83 x 150	660 x 90 x 300
450 x 90 x 0	660 x 90 x 305
450 x 90 x 40	660 x 93 x 200
450 x 90 x 50	762 x 85 x 152.4
450 x 90 x 90	800 x 90 x 220
508 x 63 x 152.4	800 x 120 x 300
557 x 74 x 89	900 x 90 x 305
600 x 40 x 215	915 x 120 x 200
600 x 50 x 304.8	



EFFECTIVE COST REDUCTION - CASE STUDIES

STANDARD CERAMIC GRAIN XG

Wheel

Norton Specification:

- Rough grinding: **3XGJ24S20B98** - 30% Ceramic
- Finish grinding: **3XGJ24M20B98** - 30% Ceramic
- Competitor Spec: 30% ceramic
- Dimensions: 660x80x150 mm
- Shape 36 with perforation
- MOS: 45m/s

Machine

- Name: Self made machine
- Cooling system: dry
- Infeed system: continuous downfeed
- Number of springs/charger (pcs): 240 - 280
- Cycle time: 3 min

Material

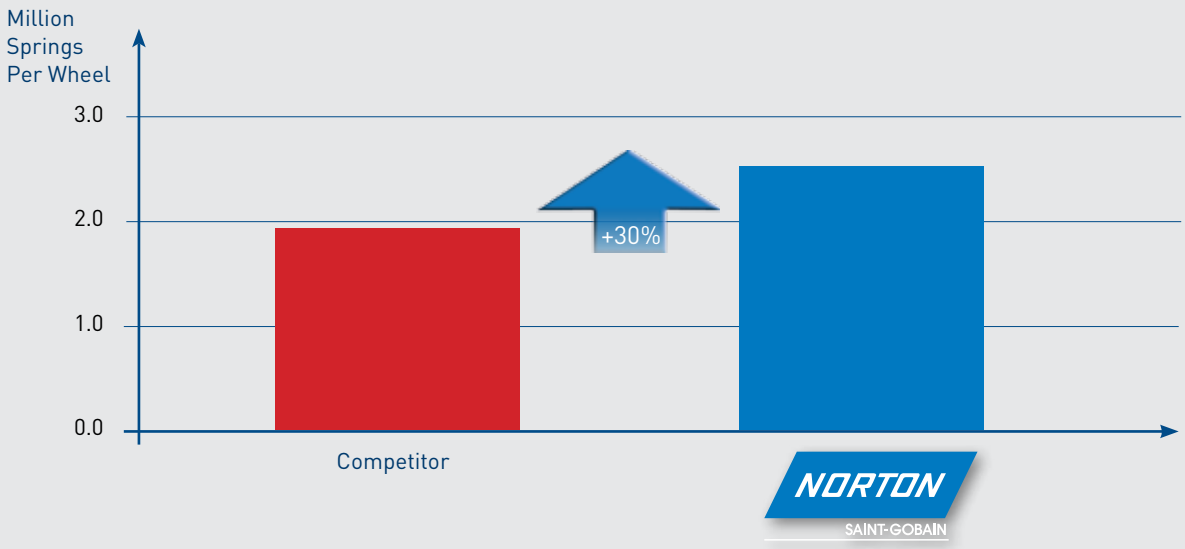
- Material composition: CrSi Steel
- Hardness of material ground: Hard
- Spring diameter: 25 mm
  Wire diameter: 4 mm

Customer requirement

- Decrease overall abrasive cost per spring

Results

- Despite similar amounts of ceramic grain, Norton specifications outperform competitor specifications without changing working parameters and maintaining burn free quality



NORTON QUANTUM

Wheel

- **Norton Specification: 3NQJ24PBQN**
  30% Ceramic - Quantum
- Competitor Spec: 30% ceramic
- Dimensions: 660x100x150 mm
- Shape 36 with perforations
- MOS: 50m/s

Machine

- Name: Wafios
- Cooling system: dry
- Infeed system: continuous downfeed
- Number of springs/charger: 60 (CrSi)
- Cycle time: 3.5 min (CrSi) and 20 min (Stainless)

Material

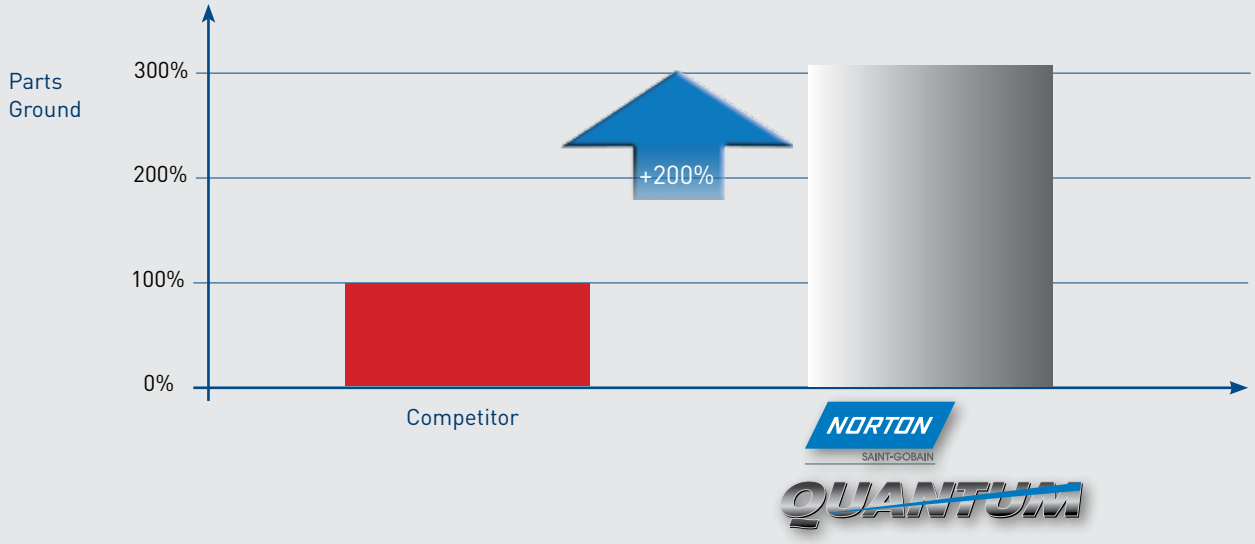
- Material type: CrSi Steel & Stainless Steel
- Hardness of material ground: Various
- Spring diameter: 59 mm
  Wire diameter: 8 mm (range 2-8 mm)

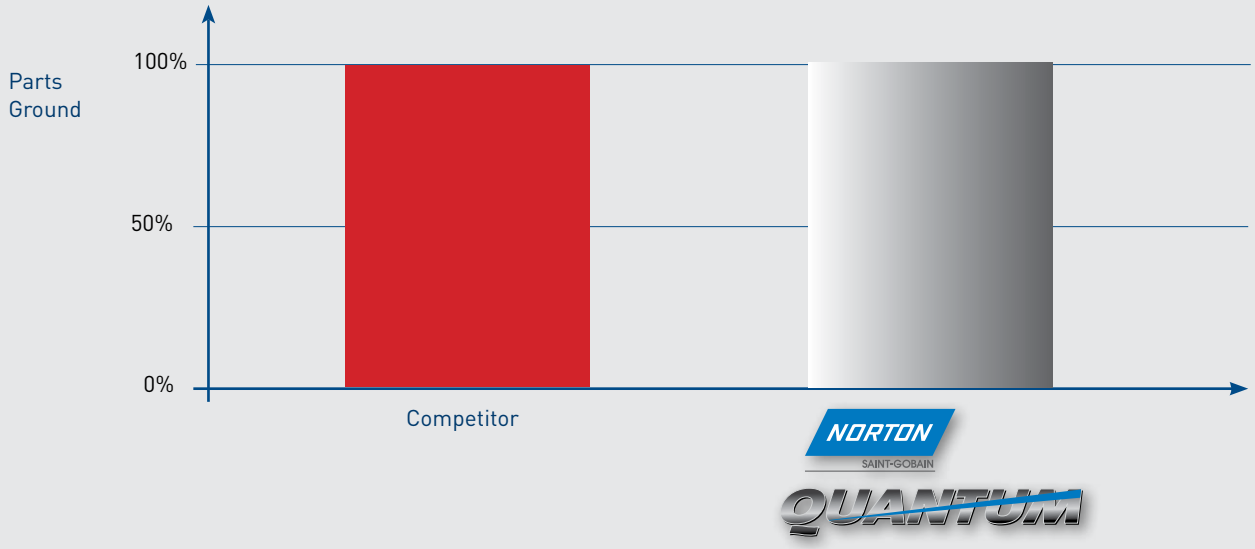
Customer requirement

- Increase wheel life and productivity

Results

- **CrSi steel:** Norton Quantum grinds more than 3 times the number of parts before dressing versus the leading competitor specification.
- **Stainless steel:** Equal performance to the leading competitor specification.





NORTON QUANTUM

Wheel

- **Norton Specification: 3NQJ24MBQN**
  30% Ceramic - Quantum
- Competitor Spec: - 35% ceramic grain
- Dimensions: 915x120x200 mm
- Shape 36 with perforations
- MOS: 35m/s

Material

- 1) Type CrSi Din 17223-2 FDSiC
  2) Type piano wire - Din 17223-1 Class C
- Hardness of material ground: high strength oil hardened valve spring steel.
- Spring Type1: Wire diameter: range 12-14 mm
  Spring Type2: Wire diameter: range 10-11.5 mm

Machine

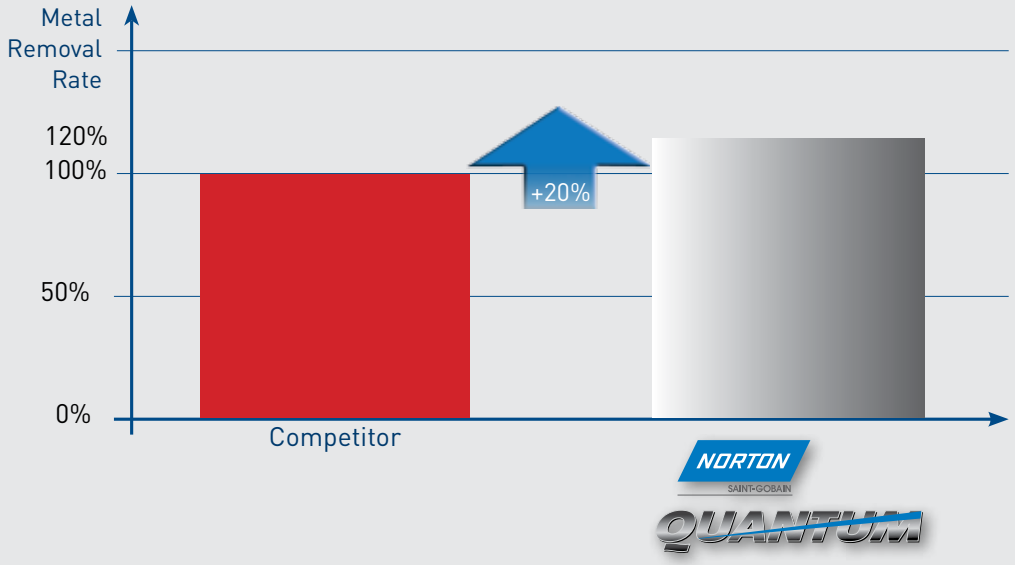
- Name: OMD
- Cooling system: dry
- Infeed system: continuous downfeed
- Number of springs/charger: 15 (CrSi) , 24 (piano wire)

Customer requirement

- Improve efficiency whilst maintaining quality

Results

- Norton Quantum showed a 20% faster grinding process



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Form # 1788

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