RESSHAPING THE WORLD OF PRECISION GRINDING
COOL CUTTING | PRECISE PROFILE | HIGH SPEED
The Norton Vitrium3 precision wheels with Quantum ceramic and IPA premium aluminum oxide abrasives produce great cost reductions.

Twenty-five events on aerospace and LBT blades, vanes, rotors, and nozzles in commercial and military applications were recorded using Norton Quantum and IPA abrasives with Vitrium3 bond — generating $1,877,476 cost savings.

Case Study #1

**APPLICATION:** Rene series material turbine blade grinding

**MACHINE:** Creepfeed grinder with 8% water soluble coolant

**DRESSING MODE:** Formed plunge roller

**NORTON PRODUCT:** 16” x 2.38” x 5” Norton Quantum X ceramic wheels (Quantum abrasive with Vitrium 3 bond) 80-E+28

**COMPETITIVE PRODUCT:** 16” x 2.38” x 5” ceramic blend wheels

**RESULTS:** Norton wheels’ cycle time reduces from 6.0 to less than 3 minutes, and parts per wheel increased from 325 to 500 pieces for $40,471 annual cost savings.

Case Study #2

**APPLICATION:** Rene series material aerospace panel grinding

**MACHINE:** Creepfeed grinder with 6% water soluble coolant

**DRESSING MODE:** Cemented diamond particle plunge form dresser

**NORTON PRODUCT:** 20” x 1” x 8” Norton Quantum X ceramic wheels (Quantum abrasive with Vitrium 3 bond) 46-F24

**COMPETITIVE PRODUCT:** 20” x 1” x 8” ceramic blend wheels

**RESULTS:** Norton wheels reduced cycle time from 4.5 to 3.8 minutes, and finished 36 versus 18 parts for a 25% cost reduction and annual savings of $46,500 on this part series.

Case Study #3

**APPLICATION:** Inconel forging hex shoulder bolt grinding

**MACHINE:** CNC centerless plunge grinder with oil coolant

**DRESSING MODE:** Norton Fliesen blade tool

**NORTON PRODUCT:** Norton Quantum X wheels (Quantum abrasive with Vitrium 3 bond) 100-H16

**COMPETITIVE PRODUCT:** Layered aluminum oxide wheel

**RESULTS:** Norton wheels and dressing tools yielded $8,544 annualized cost savings on this single part. Cycle time was reduced from 29.94 to 18.01 seconds; pieces per dress increased from 80 to 230 and dress compensation reduced to .000008.
A REVOLUTIONARY BOND THAT LOWERS PROCESS COST IN THREE WAYS

1. COOL CUTTING
An improved holding power utilizing less bond-to-abrasive ratio exposes a larger grain surface area. This enables the wheel to cut freely, improving cut rate.

The reduced bond-part interaction also minimizes heat build-up, reducing burn and power consumption and grinding forces on the part. Thinner bond posts enable better coolant flow and chip clearance for a cooler cut and improved part quality.

Use Norton Vitrium³ to improve part quality and ensure part integrity.

2. PRECISE PROFILE
Norton Vitrium³ provides superior grain-holding properties than other grinding wheels, significantly improving wheel form and corner holding. This reduces dressing time and dresser wear.

Norton Vitrium³ considerably reduces unit process cost.

3. HIGH SPEED
The Norton Vitrium³ bond provides the ultimate wheel strength. This allows testing and rating for high speed operation. Machines that can work at higher feed rates, speed and pressure, significantly increasing production.

Norton Vitrium³ maximizes equipment utility to improve your process and throughput.
TEST 1: REDUCED BURN AND POWER CONSUMPTION

The graph shows the increase in power consumption as Material Removal Rate (MRR) goes up.

At an MRR index of 200, Norton Vitrium® requires 15% less power to remove the same amount of material. This means less heat is generated on the work piece, resulting in less burn.

At a power consumption index of 3, Norton Vitrium® removes 20% more material than the standard wheel, at the same power consumption, reducing heat generated on the work piece.

TEST 2: PROFILE HOLDING AFTER FIVE CYCLES

After five continuous cycles (without dressing) the profile radius of standard wheels has a considerably higher wear than that of Norton Vitrium®.

For a given Material Removal Rate (MRR), Norton Vitrium® holds the wheel profile better than the standard.

TEST 3: WHEEL STRENGTH

The product strength and improved grain adhesion of Norton Vitrium® allows softer grades to be qualified for high speed grinding. At the same grade, a Norton Vitrium® wheel is stronger than any other comparable product.

This allows the wheels to be tested and rated to run at higher speeds.
**IMPROVE YOUR PROCESS, PRODUCTIVITY AND COST POSITION**

WITH INDUSTRY-LEADING FEATURES EXCLUSIVE TO THE NEW PROPRIETARY TECHNOLOGY INTRODUCED WITH NORTON VITRIUM®.

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<tr>
<th>FEATURES</th>
<th>BENEFITS</th>
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<td>- Cooler cutting with better chip clearance</td>
<td>- Significantly reduced burn</td>
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<td>- Lower residual stress</td>
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<td>- Increased cutting efficiency and cut rate</td>
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<td>- Improved coolant flow</td>
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<td>- Reduced wheel loading</td>
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<td>- Improved part quality</td>
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<td>- Improved precision profile</td>
<td>- Ultra radius accuracy</td>
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<td>- Extended wheel life</td>
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<td>- Improved productivity</td>
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<td>- Reduced dressing frequency and cost</td>
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<td>- Improved cycle and process time</td>
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<td>- Able to run at higher operating speeds</td>
<td>- Increased throughput and productivity</td>
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<td>- Leverage existing equipment</td>
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<td>- Optimized machine efficiency</td>
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**GRAIN AVAILABILITY**

Performance improvements with Norton Vitrium® span abrasive grains from proprietary Norton Quantum ceramic alumina to premium aluminum oxide, to optimize grinding processes.

**BEST** – NORTON Quantum / Quantum X / SG / TG

Patented ceramic alumina provides the high performance for precision grinding.

**BETTER** – NORTON Vortex / Premium Aluminum Oxide

High performance engineered aluminum oxide blends adapted to the most common applications and materials.

**SHAPE AVAILABILITY**

- WHEELS
- SEGMENTS

Tip: Remember to dress the wheel with Norton Superabrasives.
TYPICAL COST REDUCTIONS

On average, abrasives and cutting tools only account for about 3% of total manufacturing budgets. Norton Vitrium³ products optimized with Norton’s proprietary PSP (process solutions program) helps to optimize your total cost and improve your productivity.

For information on how to achieve the greatest overall cost savings, see the example below or go to www.nortonindustrial.com/psp.aspx.

DECREASING THE PRICE OF ABRASIVES

A 30% price reduction will only reduce costs per part by 1%.

INCREASING THE LIFE OF ABRASIVES

Even a 50% increase in product life will only reduce costs per part by 1%.

INCREASE OVERALL PRODUCTIVITY THROUGH PSP

With a 20% decrease in cycle time per part, there will be a reduced total cost per part of more than 15%.

ENVIRONMENTAL BENEFITS

IMPROVING OUR CARBON FOOTPRINT

Increased productivity with existing customer machine capacity. Able to work with higher feed rates, speed and pressure, to significantly increase production while using fewer wheels.

Reduced energy consumption with optimal firing temperatures during manufacturing of Norton Vitrium³ wheels.

By choosing Norton Vitrium³ technology for your grinding operation, you help to preserve the environment. In addition, Norton Vitrium³ eliminates costly re-validation of processes associated with using certain chemicals.

BEST
NORTON Quantum / Quantum X / SG / TG

CANADA CUSTOMER SERVICE:
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GOOD
Defer to BETTER Product

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