

NORTON

SAINT-GOBAIN

VITRIUM 

REVOLUTIONARY BOND TECHNOLOGY

NEW GENERATION,
PATENT-PENDING BOND SCIENCE

RESHAPING THE WORLD OF PRECISION GRINDING

COOL CUTTING | PRECISE PROFILE | HIGH SPEED



NORTON

SAINT-GOBAIN

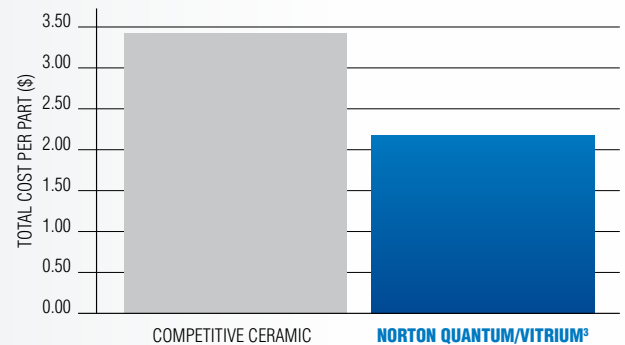
ENGINE COMPONENT/ TURBINE BLADE CASE STUDIES

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.

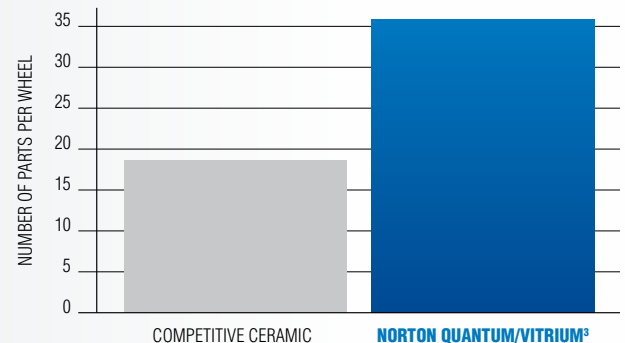
Case Study #1

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



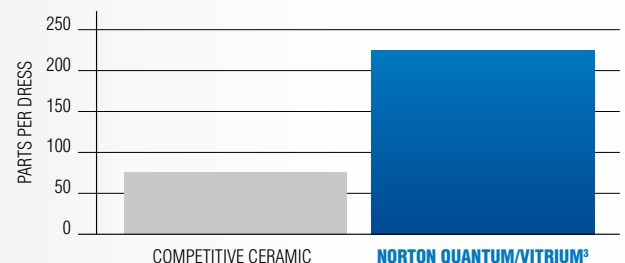
Case Study #2

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



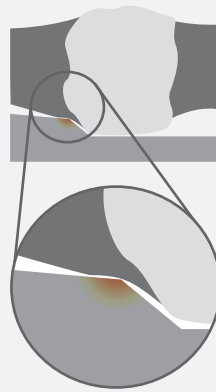
COOL CUTTING

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.

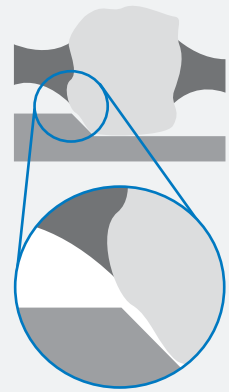
The reduced bond-part interaction also minimizes heat build-up, reducing burn and power consumption and grinding forces on the part. Thinner bond posts enable better coolant flow and chip clearance for a cooler cut and improved part quality.

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

STANDARD BOND
BOND-PART INTERACTION



VITRIUM³ BOND
BOND-PART INTERACTION

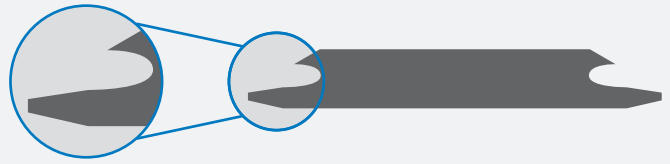


PRECISE PROFILE

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.

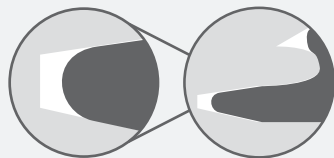
Norton Vitrium³ considerably reduces unit process cost.

BONDED WHEEL DRESSED, BEFORE GRINDING

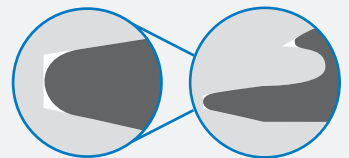


AFTER 5 GRINDING CYCLES

STANDARD WHEEL



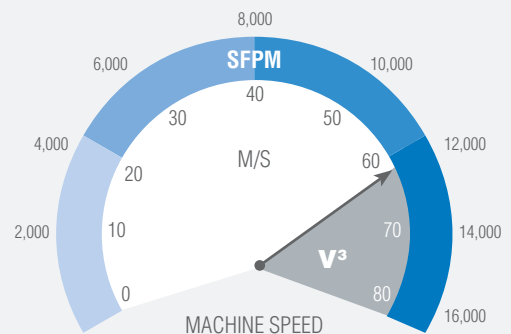
VITRIUM³ WHEEL



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.





SEE THE SCIENCE IN ANIMATION AT

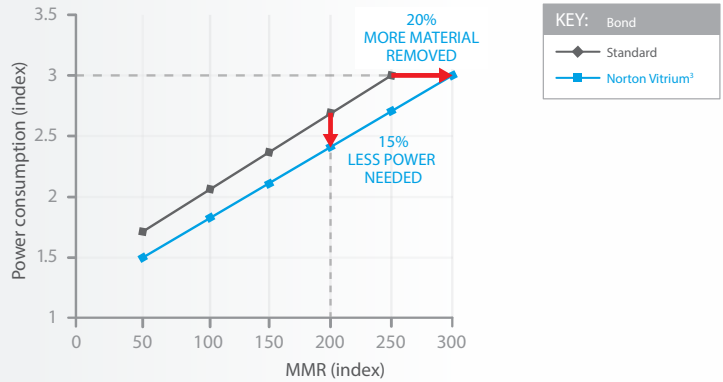
www.nortonindustrial.com

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 Vitrium³ 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.

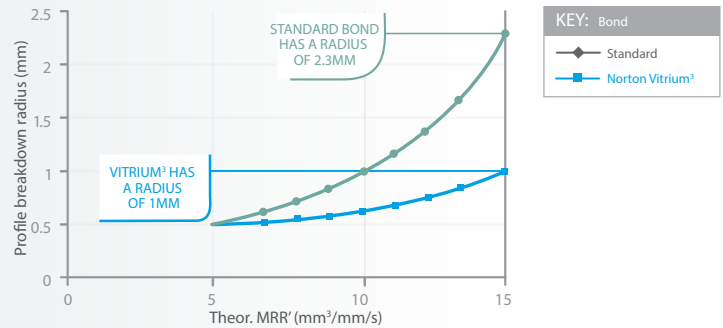
At a power consumption index of 3, Norton Vitrium³ removes 20% more material than the standard wheel, at the same power consumption, reducing heat generated on the work piece.



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 Vitrium³.

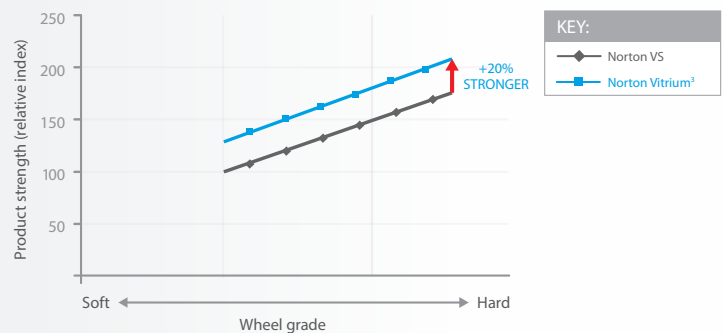
For a given Material Removal Rate (MRR), Norton Vitrium³ holds the wheel profile better than the standard.



TEST 3: WHEEL STRENGTH

The product strength and improved grain adhesion of Norton Vitrium³ allows softer grades to be qualified for high speed grinding. At the same grade, a Norton Vitrium³ 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 VITRIUM³.

FEATURES	BENEFITS
<ul style="list-style-type: none"> Cooler cutting with better chip clearance 	<ul style="list-style-type: none"> Significantly reduced burn Lower residual stress Increased cutting efficiency and cut rate Improved coolant flow Reduced wheel loading Improved part quality
<ul style="list-style-type: none"> Improved precision profile 	<ul style="list-style-type: none"> Ultra radius accuracy Extended wheel life Improved productivity Reduced dressing frequency and cost Improved cycle and process time
<ul style="list-style-type: none"> Able to run at higher operating speeds 	<ul style="list-style-type: none"> Increased throughput and productivity Leverage existing equipment Optimized machine efficiency

Our exclusive bond platform provides unprecedented grain adhesion with expanded product versatility across many precision grinding applications.

► GRAIN AVAILABILITY

Performance improvements with Norton Vitrium³ 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.

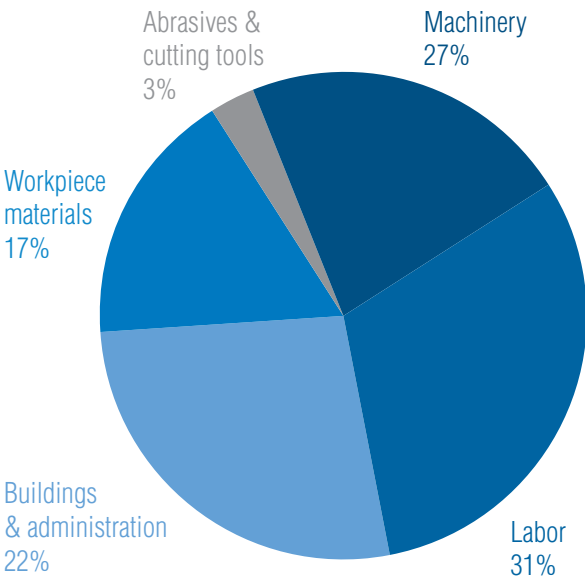


PSP *process solutions program*

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

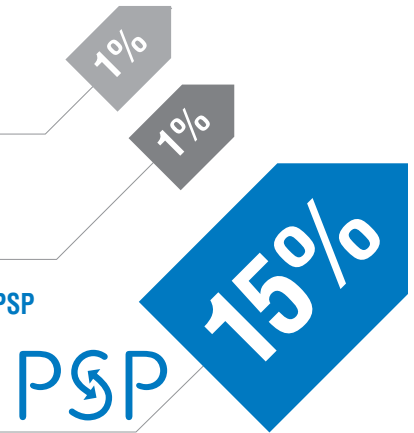
A 30% price reduction will **only** reduce costs per part by **1%**.

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

BETTER

NORTON Vortex / Premium Aluminum Oxide

GOOD

Defer to BETTER Product

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FORM #8442

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