A REVOLUTIONARY NEW GENERATION BOND THAT WILL RESHAPE THE WORLD OF PRECISION GRINDING.

Through Saint-Gobain Abrasives' extensive research and development program in grinding wheel technology, comes Vitrium™ a new generation, patent-pending bond technology.

This revolutionary bond platform features an exclusive chemistry that delivers an entirely new grain adhesion science, resulting in improved product versatility across a wide range of precision grinding applications.

FEATURES & BENEFITS

COOL CUTTING: IMPROVE PART QUALITY
- SIGNIFICANTLY REDUCED BURN
- LOWER RESIDUAL STRESS
- INCREASED CUTTING EFFICIENCY AND CUT RATE
- IMPROVED COOLANT FLOW, REDUCING HEAT BUILD-UP AND WHEEL LOADING
- IMPROVED CHIP CLEARANCE

PRECISE PROFILE: REDUCE COST
- ULTRA RADIUS ACCURACY
- EXTENDED WHEEL LIFE
- IMPROVED PRODUCTIVITY
- REDUCED DRESSING FREQUENCY AND COST
- IMPROVED CYCLE AND PROCESS TIME

HIGH SPEED: INCREASE THROUGHPUT & PRODUCTIVITY
- WORK AT HIGHER MACHINE SPEED/PRESSURE
- LEVERAGE EXISTING EQUIPMENT
- OPTIMIZED MACHINE EFFICIENCY

IMPROVED COST/PERFORMANCE RATIO

GRAIN AVAILABILITY

Performance improvements with Vitrium™ span abrasive grains from proprietary Quantum ceramic alumina to conventional aluminium oxide, to optimise grinding processes.

BEST

NORTON QUANTUM & CERAMIC GRAINS
Patented ceramic alumina provides the high performance for precision grinding.

BEFTER

CONVENTIONAL ALUMINIUM OXIDE GRAINS
High performance aluminium oxide blends adapted to the most common applications and materials.
After five continuous cycles (without dressing) the profile radius or ‘edge corner’ of wheels with standard bonds has a considerably higher wear than that of Vitrium³. For a given material Removal Rate (MRR), Vitrium 3 holds the wheel profile better than the existing ceramic VX bond and even the traditionally high profile holding VBE bond.

Product strength and module of elasticity are linked to the amount of bond used in grinding wheels. Wheel strength increases as the module of elasticity goes up. Norton Vitrium³ always provides higher product strength than any other bond. At the same grade, a Norton Vitrium³ product is more resistant than any other comparable product. This allows higher pressure grinding at higher working speeds.

**Test 1: Reduced Burn and Power Consumption**

The graph shows the increase in power consumption as Material Removal Rate (MMR) goes up. At an MRR index of 200, 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, Vitrium³ removes 20% more material than the standard bond, at the same power consumption, reducing heat generated on the work piece.

**Test 2: Profile Holding After Five Cycles**

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**Test 3: Wheel Strength**

Product strength and module of elasticity are linked to the amount of bond used in grinding wheels. Wheel strength increases as the module of elasticity goes up. Norton Vitrium³ always provides higher product strength than any other bond. At the same grade, a Norton Vitrium³ product is more resistant than any other comparable product. This allows higher pressure grinding at higher working speeds.
INTERNAL DIAMETER GRINDING

MARKETS
- Bearing (cylindrical) - Internal track, bore
- Gears - Bore
- Hydraulic components - Fluid diffusion
- Pipe connections

APPLICATION CHARACTERISTICS
- Large contact area
- Low grinding force per grain and bond post
- Difficult access for coolant
- Risk of part deformation when cut quality is not high enough

BENEFITS OF VITRIUM®3 IN ID GRINDING
- Decreased risk of part deformation (ovality) on thin rings
- Excellent coolant diffusion throughout the wheel for cooler cutting and reduced burn on the work piece
- Free cutting capabilities, and improved cut rate
- Faster cycle with limited grinding force on part
- Longer wheel life

OUTER DIAMETER GRINDING

MARKETS
- Bearing (cylindrical) - Centerless, external track
- Automotive components - Cam/crank/gear box shafts
- General engineering - Bars/tubes (centerless)

APPLICATION CHARACTERISTICS
- Small contact area
- High force per grain and bond post
- In general, no problem with coolant access

BENEFITS OF VITRIUM®3 IN OD GRINDING
- Improved profile holding
- High wheel speed capability for increased throughput
- Increased free cutting without wheel speed reduction
- Shorter cycle time with limited risk of burn, improving part quality
- Lower stress on work piece, especially on long components (bars, tubes)

SURFACE GRINDING

MARKETS
- Aerospace (crisp-feed or regular surface grinding)
- Bladed, NGV
- Gear - All modules, including bevel
- Bearing (linear) - Track, base, top
- General engineering - Flat surfaces with profiles
- Toolroom
- MRO

APPLICATION CHARACTERISTICS
- Average size contact area
- Medium grinding force per grain and bond post
- Wide variety of applications: horizontal spindle (wheel), vertical spindle (cyinders, segments, cups, disc)

BENEFITS OF VITRIUM®3 SURFACE GRINDING
- Improved form holding
- Reduced dressing
- Longer wheel life
- Higher working speed, for improved productivity
- Faster and deeper cutting capabilities
- Cool grinding (significantly reduced burn risk)

CASE STUDY
LARGE TAPERED RING
Wheel with Vitrium®3 bond:
- Size: 200x20xY13
- Shape: Shape 01
- Grain: Norton Quantum
- Specification: 3N20Y00103Y3P
- Competitor wheel:
  - Specification: x00Y0013
- Part:
  - Material: Steel 60 HRc
  - Part diameter: 632mm, width 180mm
- Cycle:
  - Over thickness: 1.5mm
  - Wheel speed: 50m/s

RESULTS
- Feed rate increased by: +30%
- Cycle time reduced by: -15%
- Total cost per part reduced by: -15%

At a slower wheel grade, a higher G ratio is achieved, reducing stress on the work piece.

CASE STUDY
CENTRELESS PLUNGE GRINDING, SHAFT
Machine: Cincinnati Viking
Wheel with Vitrium®3 bond:
- Size: 310x13x23-13
- Shape: Shape 01
- Grain: Norton Quantum
- Specification: 3N20Y001103Y3P
- Wheel with standard bond:
  - Grain: Norton Quantum
  - Specification: 3N20Y001103Y3
- Part:
  - Material: Mild steel 20HRC
- Rough cycle 1:
  - Infeed: 5mm/min
  - Removal: 0.25mm
- Rough cycle 2:
  - Infeed: 5mm/min
  - Removal: 0.25mm
- Finish cycle:
  - Infeed: 5mm/min
  - Removal: 0.15mm

RESULTS
- Infeed increased by: +50%
- Cycle time reduced by: -15%
- Total cost per part reduced by: -15%

At the same wheel grade and bond volume, the Vitrium®3 bond allows faster process time, with limited risk of burn on the work piece.

CASE STUDY
GEAR GRINDING - WORM
Machine: Kapp KX300P
Wheel with Vitrium®3 bond:
- Size: 300x15x15 63mm/s
- Shape: Shape 01
- Grain: Norton Quantum
- Specification: 3N20Y00103Y3P
- Wheel with standard bond:
  - Grain: Norton Quantum
  - Specification: 3N20Y001103Y3P
- Part:
  - Material: Steel 60HRc
  - Diameter: 210mm, width 450mm
  - 50 teeth, module 2.5

RESULTS
- Number of passes per cycle: reduced from 3 to 2
- Parts between dress: increased from 25 to 45
- Cycle time reduced by: -16%

Improved form holding properties of Vitrium®3 showed a vital reduction in dressing frequency and shorter cycle time.

CASE STUDY
GEAR GRINDING - PROFILE
Machine: Gleason-Pfauter P1200
Wheel with Vitrium®3 bond:
- Size: 600x5x127 32mm/s
- Shape: Shape 01
- Grain: Norton TG
- Specification: 3T00Y00103Y3P
- Wheel with standard bond:
  - Grain: Norton TG
  - Specification: 3T00Y001103Y3P
- Part:
  - Material: Steel 60HRc
  - Diameter: 200mm, width 650mm
  - 50 teeth, module 6

RESULTS
- Dress compensation per part: -40%
- Cycle time reduced by: -13%

At one grade softer, Vitrium®3 maintains the same MRR than the wheel with a standard bond, reducing the risk of burn and maintaining consistent performance.

CASE STUDY
SURFACE GRINDING - SEGMENTS
Machine: Blanchard
Wheel with Vitrium®3 bond:
- Size: 200x20x150
- Shape: Shape 01
- Grain: Norton Quantum
- Specification: 3N20Y00103Y3P
- Wheel with standard bond:
  - Grain: Norton Quantum
  - Specification: 3N20Y001103Y3P
- Part:
  - Material: 1020 Steel plate

RESULTS
- With the same parameters, and at one grade softer, Vitrium®3 grinds with no surface damage.

With the same parameters, and at one grade softer, Vitrium®3 grinds with no surface damage.
ENVIRONMENTAL BENEFITS

NO CHEMICAL PORE INDUCERS
Pore inducers used in the manufacture of many high porosity products are harmful to the environment. Vitrium³ wheels require no artificial pore inducers (chemicals) to achieve a high level of permeability, unlike other porous vitrified wheel technologies. By choosing Vitrium³ technology for your grinding operation, you help to preserve the environment. In addition, Vitrium³ eliminates costly revalidation of processes associated with using certain chemicals.

REDUCED CARBON FOOT PRINT
Increase productivity with existing machine capacity. Work with higher feed rates, speed and pressure, significantly increasing production leveraging existing equipment. In addition, Norton Vitrium³ is manufactured using a low firing temperature, reducing energy consumption and lowering carbon footprint.