

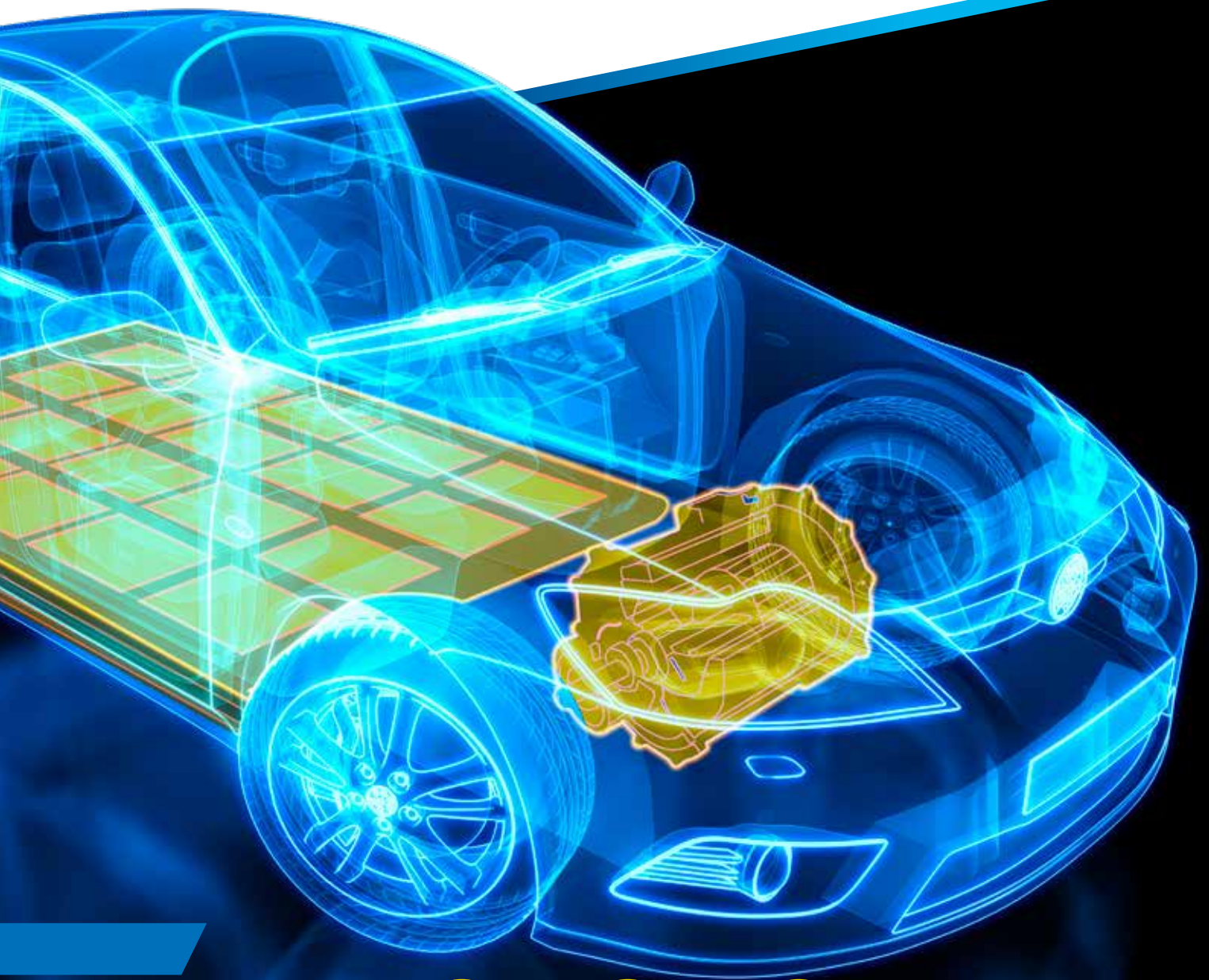


SAINT-GOBAIN

ABRASIVE SOLUTIONS FOR

ELECTRIC VEHICLES

E-AXLE & BATTERIES



LESS NOISE, HEAT
AND VIBRATIONS



INCREASED
EFFICIENCY



REDUCED
COSTS



E-AXLE SURFACE GRINDING SOLUTIONS

Saint-Gobain Abrasives is a pioneering developer and supplier of powerful, precise and user-friendly solutions for surface grinding of E-Axle components.

Under the **Norton** and **Norton Winter** brands, we provide one of the world's most extensive portfolios of precision abrasives for grinding and finishing electric vehicle powertrain components. Our broad expertise includes working with demanding global OEMs and automotive companies, utilising our material know-how in manufacturing abrasives for critically demanding applications.

Our high-performance grinding wheels with the latest grain and bond technology innovations maximise efficiency and part quality, providing unparalleled productivity results.

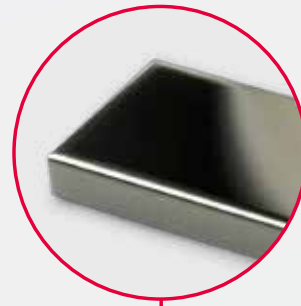


E-ROTOR SHAFT

E-Motors can reach 20,000 rpm, so the shafts must meet the tightest tolerances. Reducing friction at the contact seat of bearings and seals is key to motor longevity.

Our new CBN vitrified wheels with **Vitron7** technology perfectly match these requirements, offering higher efficiency and heat reduction.

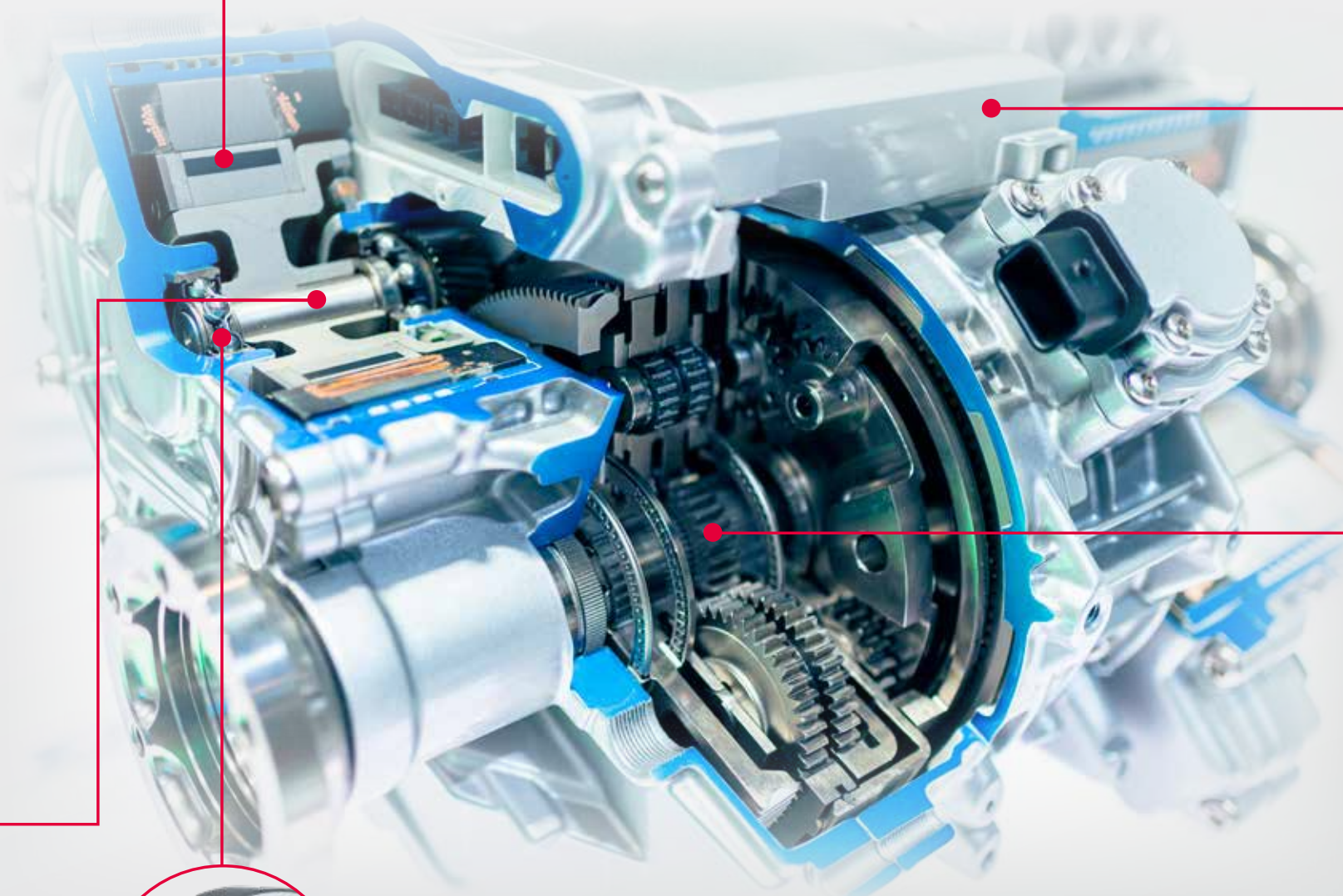
APPLICATION	NORTON PRODUCT RECOMMENDATION
Diameter Grinding	Vitron 7/Norton Quantum Prime
Seal Contact Grinding	Vitron 7
Seal and Bearing Seats Grinding	Vitron 7/Norton Quantum Prime



E-ENGINE MAGNETS

NdFeB magnets are one of the key materials for the E-Engine and can account for up to 10% of its cost. Our high precision diamond tools optimise cutting and grinding applications with the lowest possible material waste.

APPLICATION	NORTON PRODUCT RECOMMENDATION
Cutting	Ultra Thin Diamond Blades
Grinding	Diamond Plated Wheels

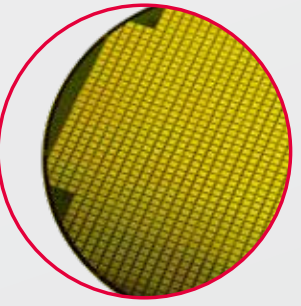


BEARINGS

To produce durable and neutral conductive hybrid bearing systems, you need high-performance solutions that meet stringent cost and quality requirements. **Norton Quantum Prime** organic and vitrified wheels are designed for grinding steel components with the highest productivity and optimal cost per part.

For ceramic parts, we recommend Norton Winter premium diamond solutions.

APPLICATION	NORTON PRODUCT RECOMMENDATION
Face Grinding	Norton Quantum Prime (Organic Bond)
Track Grinding and Superfinishing	Norton Quantum Prime (Vitrified Bond - Vitrium ³)
Outer Diameter Grinding	Norton Quantum Prime (Vitrified Bond - Vitrium ³)
Inner Bore Grinding	Norton IDEal Prime
Ceramic Ball Bearing Grinding	Metal Bond Diamond Cup Wheel



INVERTERS - SiC

Due to its high mechanical strength, the wafers are made of SiC. Norton has developed a high-performance **Prisma** range for wafers back grinding that provides a superior surface finish and longer tool life for overall cost savings.

APPLICATION	NORTON PRODUCT RECOMMENDATION
Front End Wafer Manufacturing:	
Cutting/Slicing	Fix Diamond Wire / ID SAW Blade
Grinding	Edge Grinding Wheel
Back End - Chip Making:	
Back Grinding	Norton Winter Prisma Coarse & Fine FAVS Back Grinding Wheels
Polishing	Lapping and Polishing Slurries (CMP)
Slicing & Dicing	1A8 Wheels



GEARS

Noise reduction is one of the biggest challenges in the production of E-Axles. The **Norton Xtrimum** dual worm wheel is a new unique solution that ensures quieter transmissions in electric vehicles thanks to the extremely fine surface finish it provides.

APPLICATION	NORTON PRODUCT RECOMMENDATION
Gear Grinding:	
Gear Grinding and Polishing	Norton Xtrimum (including Dual Worm Wheels)
Gear Bore Grinding	Norton Winter Vitron 7 ID Wheels
Axle - Input Shaft Grinding	Norton Winter AEON and Vitron 7

HOUSING AND BATTERIES



APPLICATION	NORTON PRODUCT RECOMMENDATION
Batteries Housing Deburring and Grinding	Robotic application using Norton Coated and Non Woven Speedlok Discs
Roller Grinding and Superfinishing	Roll Grinding with Norton Quantum Prime Organic Roll Grinding Wheels. Lapping and superfinishing with Norton Coated Alox, Diamond and SiC Film Range
Punching Tool Grinding and Sharpening	Norton Winter PCX Prime or SiC Vitrified Wheels

CR or HVOF rolls used in electrode manufacturing can be effectively ground and polished with Norton Quantum Prime and micro finishing film range. Alternatively, Norton Winter Paradigm wheels can be used for HVOF grinding.

Norton Winter PCX Prime is also recommended for grinding and sharpening carbide-based punching tools used to form electrodes.

All our products are designed to provide the highest performance and reduce production costs.

NORTON

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INNOVATIVE ABRASIVE SOLUTIONS FOR EV POWERTRAIN COMPONENTS

Less noise, heat and vibrations | Increased efficiency | Reduced costs



Norton Quantum Prime proprietary, nano-crystalline ceramic grain offers unparalleled sharpness and cutting efficiency, resulting in reduced power draw, allowing for increased Material Removal Rate (MRR) and faster overall cycle times.

BENEFITS:

- Reduced cycle time
- Improved part quality and surface finish
- Improved wheel life and more parts per dress



Norton Xtrimium offers the next level of high performance grinding wheels engineered, to deliver the complete technical solution for worm, dual worm and baby worm as well as profile and bevel grinding.

DUAL WORM GRINDING

The Norton Xtrimium dual worm wheel is a new solution designed to provide stronger transmissions in trucks and quieter gear reducers in electric vehicles thanks to the extremely fine surface finish it provides.

BENEFITS:

- Perfect gear geometry with no gear deformation thanks to a controlled resin elasticity
- Surface finish $Rz < 1\mu\text{m}$ and $Rpk \sim 0\mu\text{m}$
- High productivity
- Burn free grinding



Norton IDEAL-Prime utilises a new, nano-crystalline ceramic grain embedded in an optimised bond matrix to deliver excellent grinding efficiency and significantly longer life.

BENEFITS:

- Reduced cycle times
- Improved geometric consistency
- Improved wheel life
- Improved surface finish

TRUING AND DRESSING GRINDING WHEELS

Utilising proper truing and dressing tools to maintain the shape, profile, and sharpness of a grinding wheel is essential to achieving the best performance. The proprietary premium grain of Saint Gobain Abrasive wheels can benefit from dressing tool advancements such as CVD reinforcements for optimised dressing performance and longer tool life. Norton offers a complete line of both stock and made-to-order stationary and rotary diamond dressing tools.

**NORTON**

SAINT-GOBAIN

WINTER

Norton Winter AEON electroplated grinding wheels have been designed with one usable abrasive layer, with the Diamond or CBN grit particles mechanically fixed onto the core surface by an electrochemical process of nickel deposition which provides high grit retention levels for a very long wheel life.

BENEFITS:

- 50% increase in efficiency and life
- Superior wear resistance
- Highest accuracy and perfect profile stability throughout the entire wheel life



The high-precision Vitron7 was specifically designed for external grinding of cam and crank shafts and internal grinding applications in the automotive and bearing industries, providing reliable 30% longer life than any other vitrified cBN wheel.

BENEFITS:

- Reduced cycle times
- 30% more wheel life
- Higher quality parts
- More consistency & fewer defects



Norton Winter Prisma Fine Fixed Abrasive Vertical Spindle (FAVS) **ACHIEVE A SUPERIOR, DEFECT-FREE FINISH**

BENEFITS:

- Defect-free finish
- Less than 15 Angstrom Ra finish reduces required CMP time
- Low cutting forces for reduced sub-surface damage
- Long wheel life and self-dressing design

Norton Winter Prisma Coarse Fixed Abrasive Vertical Spindle (FAVS) **AGGRESSIVE ON MATERIAL REMOVAL WHILE SOFT ON FINISH**

BENEFITS:

- Grinds multiple incoming surface finishes on wafer and boule
- High stock removal
- Lower grinding power for reduced sub-surface damage
- Long life and superior finish



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