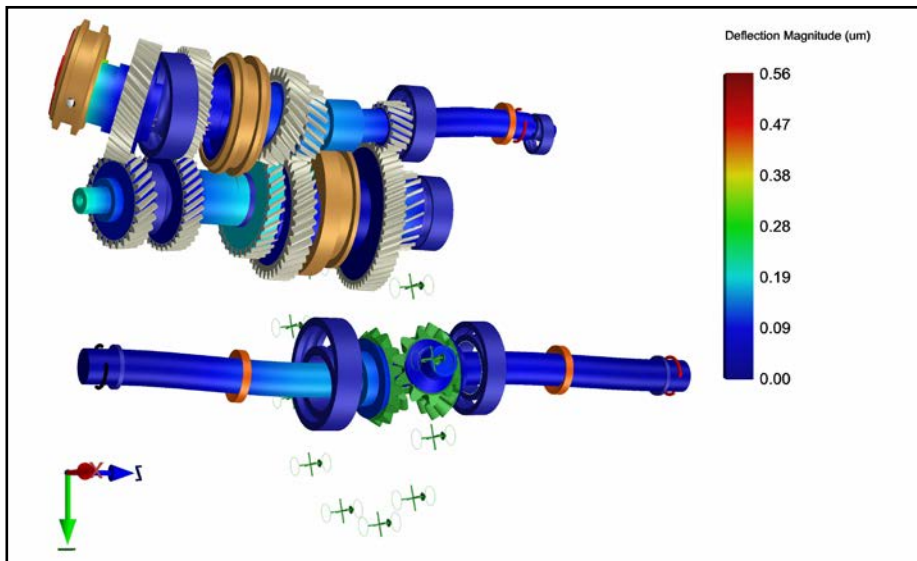


# Romax Technology

## SUPPORTS VOLKSWAGEN GROUP TO OPTIMIZE THEIR TRANSMISSION DESIGN



Example of mode shape analysis in *RomaxDesigner*.

With continued pressure to reduce development time and costs, along with ever-higher consumer expectations and the rise of electric vehicles (EVs) and hybrids, the need to understand and solve noise, vibration and harshness (NVH) issues has become greater than ever. Companies want to quickly and accurately assess the effects of design changes as early as possible in the development cycle — before the process moves into expensive physical prototypes and testing.

Romax Technology offers simulation software that allows designers and manufacturers to assess and optimize NVH characteristics while also maintaining or improving efficiency and durability, and in a single environment: a powerful integrated approach optimized for design improvements. Issues can be identified at the design stage, checking basic analyses for NVH at a concept level, saving time and money.

Volkswagen Group is one such company that Romax Technology have supported to provide a holistic approach to their design process using *RomaxDesigner* software for gearbox simulation, to perform fast and accurate NVH analysis at each stage of the design and validation.

Europe's biggest carmaker, Volkswagen Group delivers over 10 million cars to customers each year.

Almost one in four new cars (24.8 percent) in Western Europe are made by Volkswagen, a group which comprises 12 leading brands from seven European countries: Volkswagen Passenger Cars, Audi, SEAT, ŠKODA, Bentley, Bugatti, Lamborghini, Porsche, Ducati, Volkswagen Commercial Vehicles, Scania and MAN.

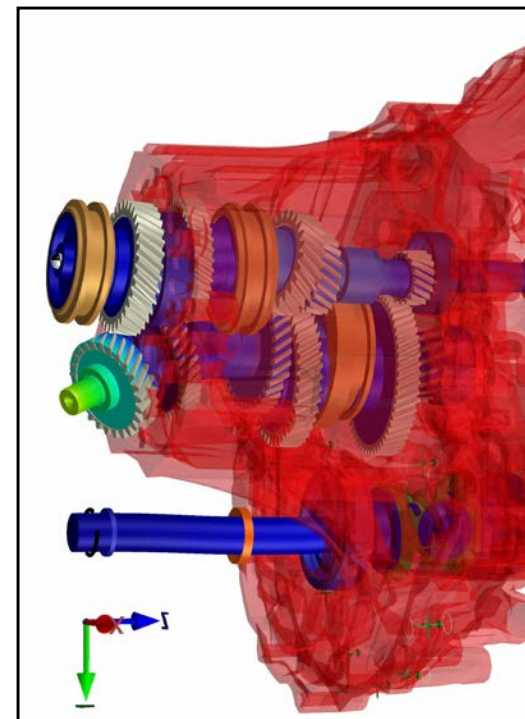
Its challenge was to develop a reliable validation strategy for gearbox NVH to allow design changes to be made with confidence, and satisfying the demanding needs of the market-leading brands. Romax's whole system simulation environment offers both a prevention and cure strategy for transmission NVH issues. Design from the earliest concept stages with NVH in mind for confidence from the start or use advanced analysis and optimization processes to improve the NVH performance of existing designs, whilst never having to compromise on efficiency or durability.

Employing over 15,000 people, Volkswagen's primary transmission site at Kassel, Germany, supplies about four million manual and automatic transmissions every year. Volkswagen engineers at Kassel have used *RomaxDesigner* software for more than five years, to support the effective production of gearboxes and to ensure the required NVH quality is achieved. Kassel's Acoustics and

System Simulation department focus on NVH correlation and simulation: "Our main challenge is gear whine, and the need to support our high acoustic standards," said Carsten Schmitt, Ph.D. student of Volkswagen's postgraduate program. "NVH is such an important issue in the industry today because of the rise in electric motor developments, and the simultaneous increase in the production of complex gearboxes. We use *RomaxDesigner* so that we can perform accurate simulation of these new gearbox designs, and assess the NVH performance."

### From trial and error to simulation for development

Previously, sporadic correlation studies on the main parts of a gearbox would be conducted based on eigenfrequencies, which allowed for little correlation guarantee. "We have a requirement to develop simulation models that are representative of the real world, so that our design changes can be made with confidence," said Schmitt. "This gave rise to the need for an integral validation strategy, which we investigated in *RomaxDesigner*. We have already



used the software for over five years on multiple projects. The speed and unique system-level simulation which *RomaxDesigner* offers stand it apart from other products currently available on the market.”

### An integral validation strategy

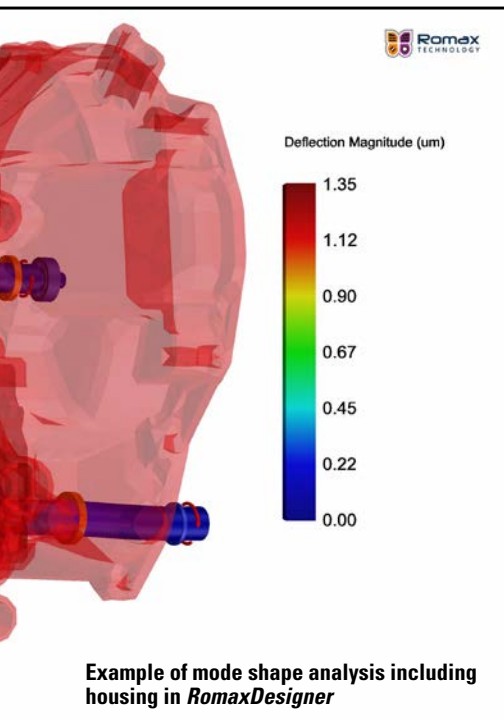
The strategy developed by Volkswagen focuses on a step-by-step process, allowing correlation between measurement and simulation along the acoustic transfer path at each of the following stages: gear excitation, shaft systems, bearings, gearbox housing, and whole vehicle testing. “If test and simulation are compared only at the end of the system development, then it is not possible to work out where discrepancies may arise, hence the need to perform correlation at each level. This gives us an understanding of exactly where problems are occurring, so that we can resolve validation errors quickly and easily, and avoid time-consuming investigatory work,” Schmitt explains. “And Romax software plays a big part in this investigation. Only with *RomaxDesigner* can we quickly and accurately investigate gear whine phenomena on a system level — looking deeper into models to work out where the problems are. This is what allows us to meet high expectations for NVH within even the most cutting-edge sys-

tem designs. Romax’s unique system level view is a huge benefit to us, as well as its easy-to-use bearing catalogues, which make it easy to model gearboxes even if you are not a bearing expert, and its reliable and accurate transmission error calculations.”

### A step-by-step process

The gears are validated first, with testing and simulation performed across a range of loads. The gear contact pattern is checked; poor correlation indi-

cates either incorrect micro-geometry in the simulation, or deviations in the manufacturing process. The next stage is shaft system validation, which consists of modelling single parts and assemblies, then performing finite element analysis (including pretest analysis and experimental modal analysis, if necessary). This is again validated against test data, and if this is unsuccessful the model must be updated in *RomaxDesigner*. Whenever correlation is not successful, changes can be made which will improve



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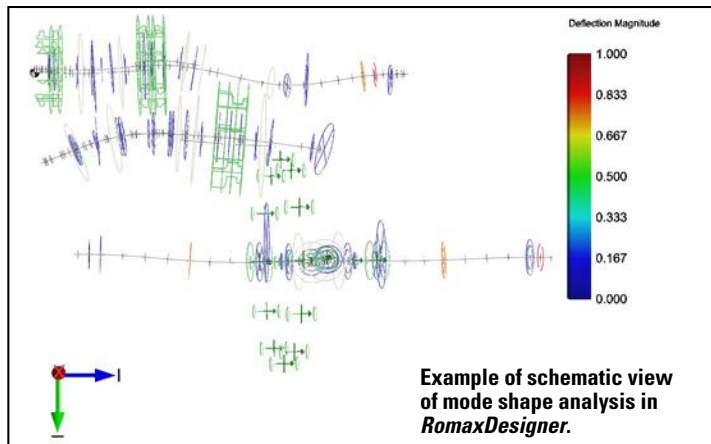
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the process for the future, as Schmitt explains: “In the first run we did, we found that the model did need updating. The updates that we performed, including accounting for Young’s modulus and part-to-part stiffness connections, improved the correlation significantly.”

The third stage is correlating the bearing stiffness, and the final step is the correlation for the gearbox housing, for which there are two options, as Schmitt explained: “The validation can be performed by building up the components separately using different tools and testing each individually, and then adding together to make the final model. Alternatively a single model can be created in *RomaxDesigner*, which means just one experimental modal analysis, one correlation analysis,



and only one model to update. We found that there was little difference between the methods, so the full housing assembly was done in order to save time and effort — this is a very useful way of doing the correlation.”

“Now we have developed the framework, we are confident that the work that we have put into this implementation will enable time and cost savings for future projects, as well as maintaining our customer’s trust in our ability to deliver their requirements,” Schmitt concluded. “We have developed a clear strategy to perform straightforward model updating procedures, and extended the validity and trust of our Romax gear whine models. Our design changes are not reliant on trial and error, but are based on proven, trustworthy simulation.”

**For more information:**

Romax Technology  
Phone: (248) 220-1201  
[www.romaxtech.com](http://www.romaxtech.com)

## Gleason

### EXPANDS P-SERIES HORIZONTAL HOBBING MACHINES

Gleason Corporation introduces the P90CD and P90iC horizontal hobbing machines. Now, two new machines from the P-Series enhance the current model line to provide solutions for specific applications which require high productivity and efficiency. Based on the P90 hobbing machine, the new P90CD hobbing machine with an integrated chamfering/deburring module has been designed for disc-type workpieces, like automotive pinions and short shafts.

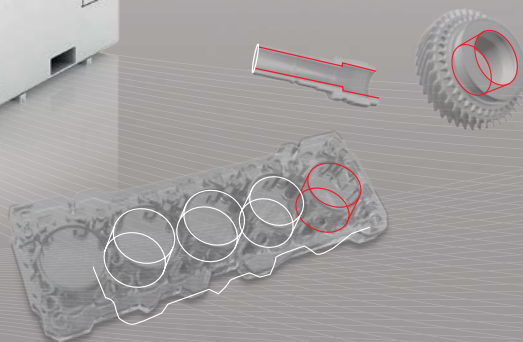
The P90CD features an integrat-

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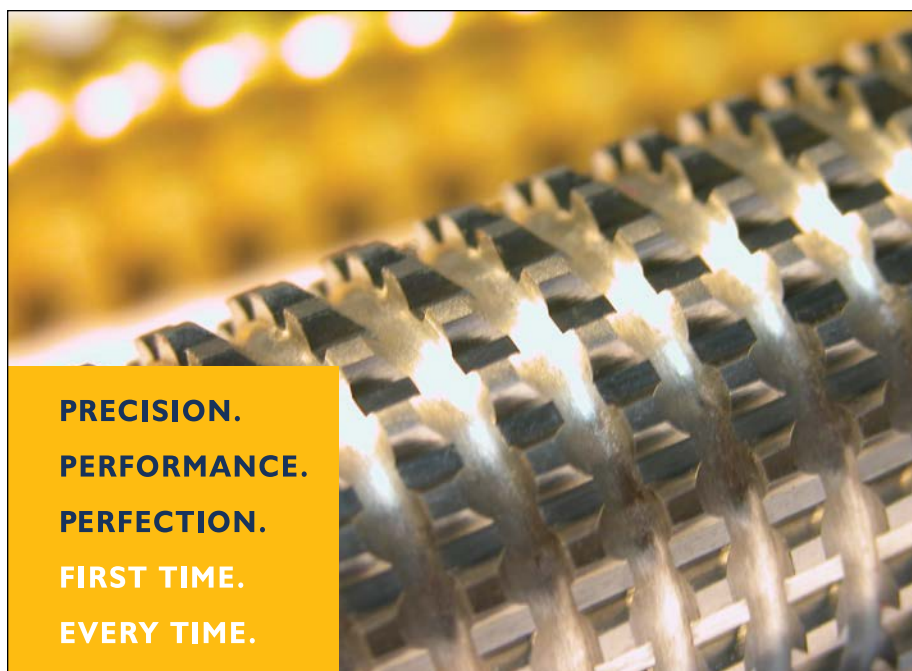


ed CNC chamfering/deburring station which works in parallel to the cutting process; hence productivity is not compromised by the added auxiliary process. The P90CD can hob parts up to a diameter of 60 mm and module 3 mm; larger diameters are available on request. Cycle times are as short as 10 seconds for planetary pinions. The chamfering/deburring station includes an auto-meshing feature which avoids tooth-on-tooth cut workpieces and chamfering tools for consistent cycle times and to avoid damage to workpieces.

The new P90iC hobbing machine with an integrated chamfering/deburring unit has been specifically designed for the hobbing and quality chamfering/deburring of geared shafts, but can be used for disc-type workpieces as well. The P90iC features an integrated chamfering/deburring unit which eliminates burrs and creates even and precise chamfers. The P90iC handles any workpiece up to a diameter of 100 mm and module 3 mm; larger diameters and modules are available on request. The P90iC is an excellent solution to employ one or two-cut processes for finish hobbing or to create a quality base for subsequent hard-finishing operations.

The two-cut process in particular is executed in a single setup (cutting-chamfering/deburring-cutting) and eliminates secondary burrs and residue on the gear flanks. This process is very beneficial for subsequent hard-finishing processes, protecting the tool life of expensive finishing and dressing tools, especially if a honing process is applied. For both machines direct-driven hob head options are available which offer the optimum adaption to many applications. For both machines Gleason provides hobs from state-of-the-art materials, with the latest wear coatings and high quality rotary chamfering/deburring tools with extremely long tool life as well as clamping fixtures to secure high machining quality.

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# Hardinge

## DEVELOPS LATEST 5-AXIS VERTICAL MACHINING CENTER

Hardinge Inc. has announced the release of their newest 5-axis vertical machining center, the Bridgeport XT 630 5-Axis.

Bridgeport's new generation full 5-axis vertical machining center is a fully digital, high-quality machine tool designed to achieve maximum capacity and performance in the aerospace, mold and

die, medical and automotive industries and many other manufacturing sectors. This machine has been developed to provide a powerful and precise solution to meet the requirements of the most demanding metal cutting user.

The machine offers a highly sophisticated yet user-friendly Siemens 840D



control with a 19" LCD. Axis travels are X: 762 mm (30"), Y: 630 mm (24.8"), Z: 610 mm (24"), A: 30 to -120 and C: 360

Standard machine equipment includes items such as the Big Plus CT40 spindle, 15,000 rpm direct-coupled spindle with oil chiller, coolant chip flush system, three color stack light, 24 tool swing-arm ATC, through-ball screw chiller, preparation for through spindle coolant (with rotary union), remote MPG hand wheel, auto central grease lubrication and an A-axis encoder.

Additional options include through-spindle coolant (280 psi), X/Y/Z linear scale, coolant system with chip conveyor, part probe, tool probe, C-axis rotary encoder, dynamic collision monitoring, tool changer option 40, 48, & 60 and a mist collector.

"The Bridgeport XT 630 5-axis machining center is priced as a productive 5-face (4+1 axes) vertical machining center, although it includes the high degree of sophistication and functionality of the simultaneous 5-axis machining platform it is," states Brooke Sykes, director of sales and customer services North America.

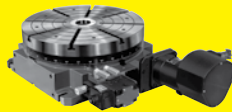
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#### 5-Axis CMM

The 5-axes computer controlled special coordinate measuring machine has four air bearing precision linear motions and an air bearing rotary table. Laser measurement incorporating a unique path layout and environmental monitoring compensates for pitch and sag. Air bearing electronic probes contact the part contour. The total system accuracy is .0000050" within the envelope of travel.



#### Two-Axis Servo/Rate Rotary System

Vertical 16" faceplate dia. table and horizontal 9" dia. air bearing table with integral motor drive and precision encoder.



#### Astro Guidance Test Platform

References the north star three axis (Ultradex) index system. System accuracy 0.3 arc second band, PC based control, IEEE-488 interface.



#### Air Bearing Rotary Table

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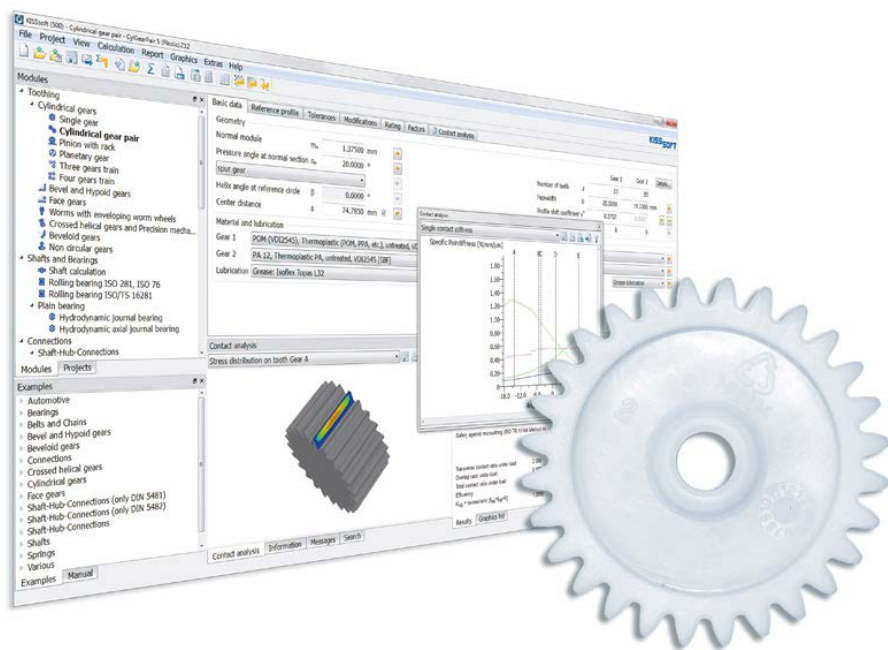


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# KISSsoft

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The application area of plastic gears has grown significantly in the last decade. The requirements from the industry to design stronger, lighter, quieter and more efficient gears have also motivated plastic manufacturers to produce custom made materials.

In the last two years, the new VDI 2736 guideline for the design of plastic gears was introduced. Unfortunately, its material data for lifetime calculations is limited. In order to design gears with custom made materials, it seems necessary to measure the fatigue data and

temperatures in gear tests prior to the gear design. If you are interested in this topic, this KISSsoft paper

([http://www.kisssoft.ch/english/downloads/pdf/article\\_kisssoft\\_vdi\\_2736\\_gear\\_temperature.pdf](http://www.kisssoft.ch/english/downloads/pdf/article_kisssoft_vdi_2736_gear_temperature.pdf)) presents an accelerated testing procedure for plastic gears that is based on different levels of testing. As a supplement to the VDI 2736 guideline, the calculation of plastic deformation and wear of plastic crossed helical gears (according to Pech) has been implemented in the KISSsoft Release 03/2016.

## For more information:

KISSsoft USA LLC  
Phone: (815) 363-8823  
[www.kisssoft.com](http://www.kisssoft.com)

# Cortec Corporation

DEVELOPS SUPER BARRIER VERSION OF ITS ECOSHIELD VPCI-144

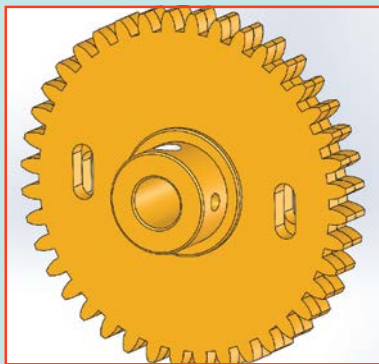
Cortec Corporation has developed a new Super Barrier version of its EcoShield VpCI-144 paper for protecting metal parts from corrosion. EcoShield VpCI-144 Super Barrier combines the corrosion protection of VpCI paper coating with a high gloss water-based barrier coating that prevents moisture from

reaching metal parts wrapped inside the paper. The enhanced moisture barrier of EcoShield VpCI-144 is an excellent environmentally friendly alternative to polyethylene and waxed papers. Under recent ASTM E-96 testing, EcoShield VpCI-144 Super Barrier exhibited a water vapor transfer rate (WVTR) highly

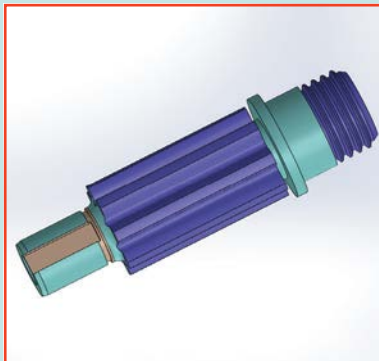
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comparable to that of polycoated paper.

Past testing has also shown EcoShield VpCI-144 Super Barrier to rival the moisture barrier properties of polycoated paper and commercial waxed paper. This is an important advantage since poly and wax coatings are not recyclable through normal channels and therefore create an environmental problem. In contrast, EcoShield VpCI-144 Super Barrier paper is environmentally safe and fully recyclable into other types of paper products such as boxes, cardboard, and other corrugated materials.

EcoShield VpCI-144 Super Barrier combines corrosion protection, moisture barrier properties, and oil and grease resistivity into one material to protect both ferrous and non-fer-



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rous metals. This eliminates the need to inventory multiple types of papers for different types of metal. Protected metals include carbon steel, stainless steel, galvanized steel, cast iron, aluminum alloys, copper, brass and solder.

VpCIs on the inside face of the EcoShield VpCI-144 Super Barrier paper vaporize and condense on metal surfaces to form a thin protective film that doesn't influence physical properties of most sensitive electrical and electronic components, including conductivity and resistivity. The protective film does not need to be removed prior to further surface finishing or coating application, and protected parts can be painted, welded, or soldered.

EcoShield VpCI-144 Super Barrier is useful in a variety of different applications including metal production, metal forging and die casting, metalworking, finished products and electrical and electronic products.

**For more information:**

Cortec Corporation  
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## Sumitomo Electric Carbide

OFFERS COOLANT THROUGH MODELS FOR WDX DRILL SERIES

Sumitomo Electric Carbide, Inc.'s WDX Series large diameter drill line now includes WDX-L coolant through models. Reducing the cost per part, the WDX-L Indexable Drill features side port cool-

ant. Because not all spindles are coolant-thru, the WDX-L allows for the use of coolant through the side port. WDX-L diameters range from 0.5625"–2.5000" in 4XD drill body lengths. The WDX-L uses the same inserts as Sumitomo's conventional WDX Series (WDX-T inserts). Diameters of the conventional WDX range from 0.5625"–2.625" in 2XD, 3XD and 4XD drill body lengths. The WDX Series is available in inch and metric sizes.

Sumitomo's vast selection of WDX and WDX-L bodies deliver a proven design for stable drilling. All drill bodies come with a four-cornered indexable insert design to provide a cost effective drilling solution and easy tool management. The series uses two inserts per drill, regardless of diameter size. Insert grades for a longer tool life include ACP300 for steel, ACK300 for cast iron and DL1500 for aluminum.

For a limited time, the WDX and WDX-L are available at special IMTS promotional savings. Through December, Sumitomo is offering kit pricing (including the drill body, 10 inserts, and a \$10 gift card) and buy two drills get one drill free.

**For more information:**  
Sumitomo Electric Carbide, Inc.  
Phone: (800) 950-5202  
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## Mitutoyo

RELEASES LATEST  
GENERATION OF LINEAR  
SCALE

Mitutoyo is pleased to announce the Absolute AT1100, the latest generation of assembly-type linear scales that incorporate Mitutoyo's electromagnetic induction technology, which provides resistance against contaminants such as cutting fluids, oil and water. The ABS AT1100 was featured in the Mitutoyo booth during IMTS. The innovative shape and location of the detector track in the aluminum frame provides a highly effective defense against the contamination of the scale and sensor, even in harsh environments. The sensor-to-scale air gap is approximately 0.4 mm, about 4x as wide as that of conventional optical or electromagnetic induction systems,



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## PTG Holroyd

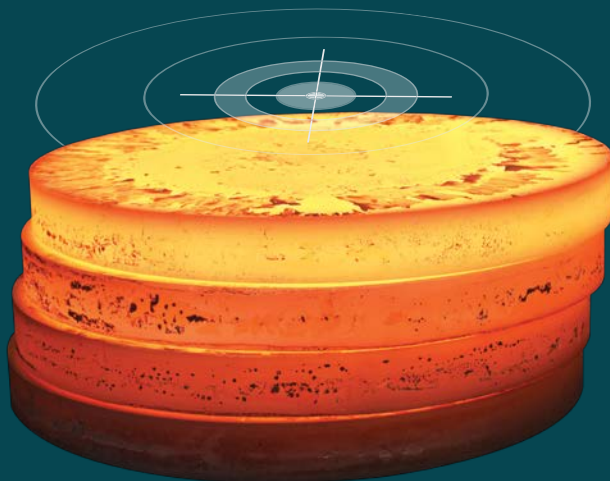
### RELEASES CUTTER GRINDING MACHINE

A newly developed 'large diameter' CNC cutter grinding machine from Holroyd Precision Ltd. is all set to bring considerable advantages to organizations that wish to achieve even greater levels of accuracy and repeatability when finish milling some of the world's largest helical rotors.

Called the CS700E Tool Management Center, the new machine has been designed especially for the grinding of high-accuracy profile forms on finish milling cutters of up to 700 mm in diameter, and follows on from the company's highly successful CS500E (500 mm max. diameter) model.



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“The new CS700E machine is generating considerable interest,” comments Holroyd Sales Manager, Mark Curran. “Indeed, a major compressor manufacturer that has only recently purchased its second Holroyd 8EX rotor milling machine (for producing rotors of up to 850mm in diameter), has already placed an order for a CS700E.”

Curran says that the accuracy of any helical screw form relates directly to the accuracy of the cutting tool that is used to create it. “Through the development of the CS700E Tool Management Center, we are enabling producers of larger helical components to benefit from complete control of all aspects of the cutting tools they use. The CS700E produces high accuracy profile forms on a wide range of tool materials, from traditional high-speed steel, to exotic materials such as carbide and ‘AS’ finish machining systems,” Curran said.

The CS700E Tool Management Center incorporates automatic dressing stations to ensure optimum integrity of the grinding wheel at all times. The stations are equipped to dress aluminum oxide, CBN and diamond grinding wheels, while use of HSK-A160 arbors (as fitted to 8EX rotor milling machines), enable rapid wheel changeover times and further enhance accuracy.

At the heart of the CS700E is Holroyd’s user-friendly advanced touch

screen programming system. This provides complete control over production accuracies, as well as invaluable on-screen modification of profile forms for the rapid evaluation of new profile shapes during the development and prototyping stages. Profile modifications are easily made thanks to the menu-driven system, which provides control of the cutting profile, with on-screen modification of profiles.

Automatic touch probing of the tool profile during the grinding cycle is

another major benefit provided by the CS700E. Following probing, the actual tool profile is graphically superimposed over the theoretical profile and displayed within user-defined tolerance bands to ensure that all cutter blades are ground within tightly controlled limits. Indexing and multi-pass grinding/trimming cycles are also fully automated.

**For more information:**  
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