Gleason's Genesis 130SV Gear Shaving Machine

The 130SV shaving machine from Gleason is the newest of the company's Genesis family of gear production equipment.

Introduced to the gear community in February, the 130SV is designed for the fine finishing of soft spur and helical gears with outside diameters of up to 130 mm. Gleason reports plans to ship its first order to a large German automotive manufacturer in May, and two more machines will ship to a Korean automotive manufacturer in July.

According to the company's press release, the 130SV's shaving head has been simplified by controlling the Y-axis with Gleason's spheric software to provide the linear motion for precise correction. Therefore, plunge shaving and diagonal shaving can be performed on the same machine.

"The biggest difference from the previous machines is that for doing corrections on the tooth flank, we don't use a so-called cradle anymore but added a tangential axis," says Johann Mall, engineering director at Gleason Hurth. "This allows us to use the same machine configuration for several technologies like hobbing, shaving and threaded wheel grinding. The biggest advantage to the customer is that he gets a fully capable machine to do all the shaving technologies, like plunge and diagonal shaving."

Mall says that although previous shaving machine models allowed plunge and diagonal shaving, the mechanics were different and more expensive. When purchasing the machine, a customer had to know its uses ahead of time. A diagonal shaving machine needed more axes than a plunge shaving machine.

A new mechanical, cam-driven double gripper loader is fully integrated into the machine and can perform the load/unload sequence in approximately four seconds. It can also accommodate disk or shaft-type gears and readily integrate with common parts handling systems, including palletized, gantry, blue steel and robot systems for maximum throughput.

"Although there are also loaders on other machines in the market which work near to this speed, they are all dedicated, inflexible and very special. The loader for the Genesis machine is universal," says Mall.

Special features include a footprint of seven square meters (73 square feet) including all hydraulics, lubrication, chip removal, coolant and pneumatic systems; an easy access service module to consolidate hydraulics, lubrication and pneumatics into one location; a single piece, mineral cast polymer composite base/frame; a new shaving head that operates without a cradle; a stock dividing system mounted on the shaving head; a magnetic chip filter/conveyor that can relocate to meet different cell/system floor space requirements; direct-drive spindles; advanced Siemens Sinumerik 840D controls with Gleason Spheric shaving technology software, Windows-based user friendly software and PC front end; optional on-board chamfering, deburring and burnishing capability; and a common design with the other Genesis machines. The fully self-contained machine can be moved as a single unit.

A proprietary Power Shaving option is available, enabling the 130SV to be equipped like the ZS series of Gleason shaving machines. With this option, both the work spindle and shaving cutter are driven such that the workpiece is automatically meshed on the fly with the continuously rotating cutter. In addition, the shaving cutter applies a torque on the workpiece during the shaving cycle.

Gleason estimates a 20% time savings and recommends this add-on for especially small parts, such as pinions.

Process data calculation software is offered as an option to be run on the machine controls. After feeding in the gear data, the program suggests appropriate shaving parameters. For its software development, Gleason employed its knowledge from the design of the Spheric Honing machines, which have similar kinematics to the 130SV. Therefore, the linear axis moves similarly to the swiveling cradle axis' movements.

The Genesis stock dividing system mounts to the shaving head and adds one

second to the loading time, eliminating the need for adjustment from part to part. During loading, the stock divider sensor swivels in position between the cutter and part, finds the tooth gap and reverts back to its parking position as cutter and part are brought into mesh. Movement is conducted by the NC axis, eliminating the need for manual operations. The CNC machine uses part data for automatic positioning.

Gear producers should find this machine very competitive, says Mall. As a vertical machine, it can integrate into interlinked production lines and does not require additional part carriers or swiveling units.

"There is no comparable machine concept on the market. Customer interest has been very high," Mall says. "The best proof for the success of this is to have three machines out in the market five months after quotation. We've appointed a group of application and design engineers to answer all our requests for quotes. Several orders are expected within the next two months."

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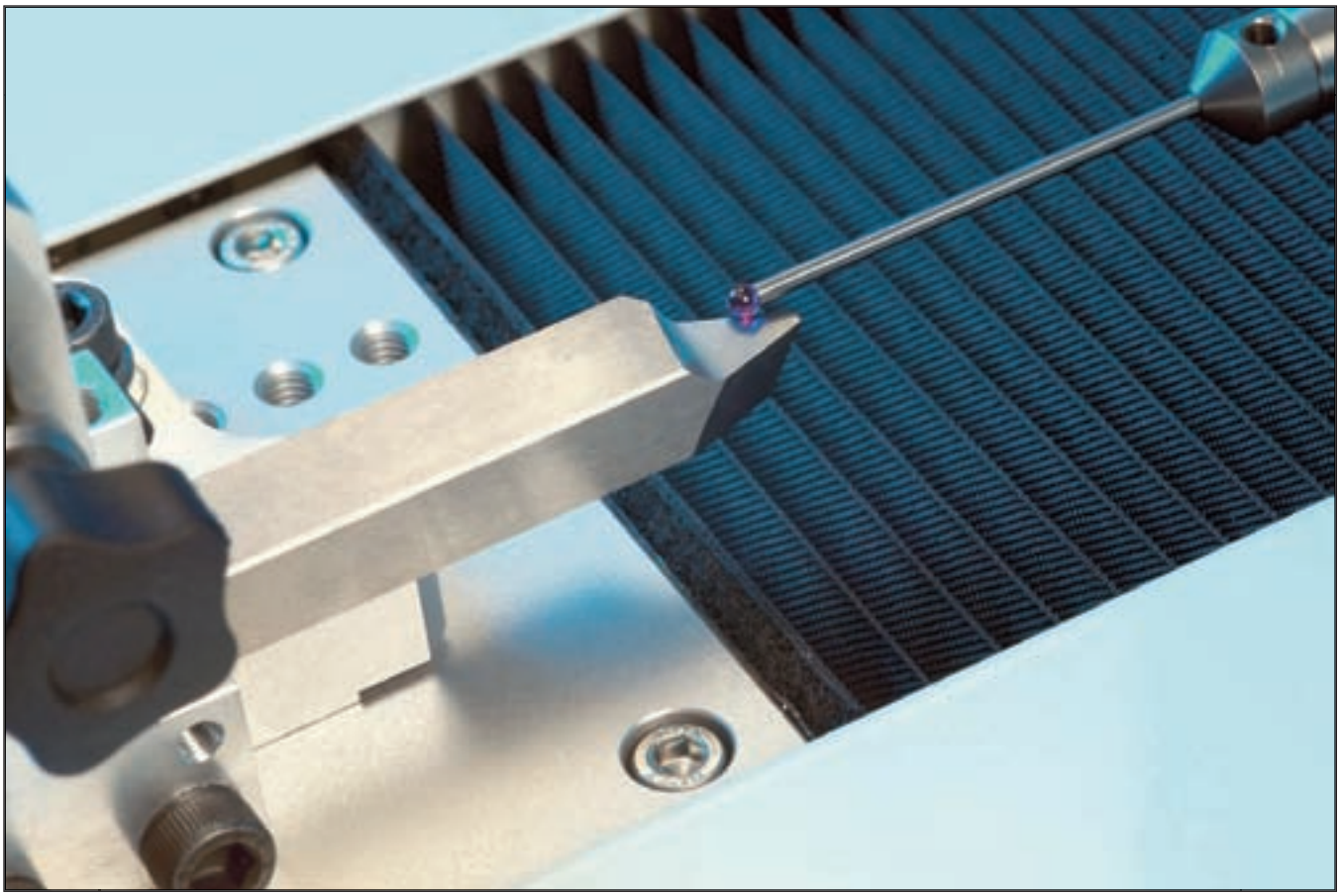
New Checker Scan-Measures Stick Blades with Ruby-Tipped Probes



Meant for use on the shop floor, the Oerlikon BC 10 scan-measures stick blades via ruby-tipped probes, collecting large amounts of information—like 200 data points on a blade's curved cutting edge—to ensure it properly cuts spiral bevel and hypoid gears.

This month, German automakers will receive the first three units of Klingelnberg's new automated blade checker designed for the shop floor. The Oerlikon BC 10 uses ruby-tipped probes to perform scanning measurement of stick blades, with direct measurement of a blade's shaft, rake face and relief face and indirect measurement of its edge for cutting spiral bevel and hypoid gears.

Introduced at EMO '05, the BC 10 measures the rake face, relief face, cutting edge, tip radius and shaft of stick blades with heights of 5–36 mm, widths of 9–36 mm and lengths of as much as 100 mm for use in cutter heads 2–16" in diameter.

The checker performs topographical, 3-D measurement of rake and relief faces to make certain they're in their proper places relative to the blade's shaft. The BC 10 also compares the faces' forms and positions relative to each other, uses its software to calculate the cutting edge's position and form, then compares the edge's actual form to its ideal form. Also, the checker can create a visual 3-D representation of the edge, with tolerances shown as double lines around the edge. If there are deviations, the BC 10 can use its software to calculate corrections for transfer to a stick blade grinding machine.

Roger Kirsch, head of Klingelnberg's division in Ettlingen, Germany, says measurement of both rake and relief faces results in more precise measurement of the cutting edge. "Measurement of a sharp edge is critical, especially when the stick blade is made of carbide," he adds. "The edge is very sharp."

In fact, the BC 10 doesn't directly measure the cutting edge because its sharpness could create wear on the probe. "We do not touch the edge," Kirsch says. "We calculate it. We make an interpolation."

The BC 10's use of scanning measurement allows it to collect a large amount of information in little time. For example, the checker can collect 200 data

points on a curved edge of a blade 10 mm long—more if the blade is longer. "The measurement time is about 90 seconds," Kirsch says.

The scanning is done via a series of machine measuring motions the BC 10 creates in its measuring program from neutral data in its database.

Besides the faces and cutting edge, the BC 10 can measure the shaft for width, thickness, parallelism, straightness and angularity, checking for inaccuracies, like concaveness, twist and waviness. These measurements ensure a stick blade's shaft fits well in a cutter head's presized slot. Such slots usually have tolerances of only a few microns. "The stick has to be manufactured very precisely," Kirsch says.

Deviations can be displayed numerically with tolerances or on the BC 10 monitor in a 3-D format with selectable scale.

The BC 10 measures stick blades via three probes. Each probe's size is based on its ruby diameter. The diameters are 1.5 mm, 3 mm and 5 mm. According to Kirsch, the three diameters cover the size range of stick blades. The smallest 20% of blades can be measured with the 1.5-mm ruby, the largest 20% with the 5-mm ruby and the 60% in between with the 3-mm ruby.

The BC 10 can check stick blades for all Klingelnberg cutter head systems: Arcon®, FN®, FS®, FSS®, Spiron®, and Twin Blade by Klingelnberg®. It also can check them for Gleason Corp.'s RSR® system.

The BC 10 was designed for use on the shop floor, next to the blade grinder to minimize distance—and therefore time—needed to grind and check blades. "You don't need a special measuring area," Kirsch says.

Klingelnberg's Roger Kirsch says about inspection of blades: "You assure the stick blades will meet your quality requirement. If you don't measure them, you don't know it."

A stand-alone workcenter, the BC 10 consists of measuring machine, controller, personal computer with the Windows XP operating system, keyboard, mouse, display screen and printer. The computer includes a CD-DVD burner for data transfer. There's also an oil-proof drawer for storing accessories and calibration tools.

As for its use, the BC 10's setup time depends on a stick blade's size, but the checker was designed to keep that time short.

Kirsch estimates the time at about 60 seconds if a different probe is required. In that case, an operator would need perhaps 30 seconds to unscrew one probe, screw in its replacement and use a ceramic ball to calibrate the new probe to an error margin of less than 1 micron. The stick blade itself is held in its fixture by two pressure springs. The operator would then need maybe 30 more seconds to access the BC 10's database, choose the right theoretical data for comparison, select the blade features to be measured and start the measurement program.

Also, during calibration, the BC 10 automatically runs a wear program to show the probe's condition. Moreover, an operator only needs to roughly clean a blade before checking it. The BC 10's measuring force negates a blade's oiliness, Kirsch says.

Measurement data can be stored in the BC 10's computer, on compact disc or via a gear manufacturer's KIMoS network. This network is created using Klingelnberg software that connects gear-manufacturing machines for computerized, closed-loop production of gears.

Electronic storage of data can speed production and reduce the possibility of error by eliminating repeated manual entry of necessary contour data. Kirsch says a stick blade might have 45 different input values for its contour data, with each value having a minimum of five characters: one to the left of the decimal point, four to the right.

Manually entering the data: "It takes some time," Kirsch says.

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DSM's Stanyl Precison Gears Help Disabled Patients Drive Independently

Precision gears made out of Stanyl, a high-performance polyamide 46 (PA46) resin from DSM Engineering Plastics, help keeps the Joyster moving. The Joyster, demonstrated at Hannover Messe 2006, is a new joystick-like system designed to enable drivers with arm muscle disabilities to drive by themselves.

Developed at the Bern University for Applied Sciences HTI-Biel, the new product augments a car's conventional steering wheel with a pair of joysticks mounted on either side of the wheel. These are electronically coupled to the vehicle's steering mechanism.

The Stanyl gears were fabricated by Mikron Plastics Technologies and are utilized at the joystick and the vehicle's steering shaft.

"The gear sets in both the motor drives and joysticks are zero backlash," says Hans Wennekes, Stanyl's business development manager. "That's the only way the joystick can deliver absolute precision for encoding, and it enables the tightest possible steering control without wander. Technical collaboration between DSM, Mikron and HTI Biel—or, if you will, the material maker, the gear cutter and the design team—was the only way such a precise mechanism could have been developed."

The joystick gears must precisely translate small movements to programmable encoder circuitry. The movement required is small, and the touch must remain light. The steering shaft gears, on the other hand, must apply strong forces to the vehicle's steering system.

A critical aspect of the design is feedback to the driver. Small motors in the joystick mechanism provide resistance that is sent back to the driver through the joystick gears. This resistance signals the severity of the turn and transmits the road feel of bumps and surfaces to the driver. This enables the system to give drivers the same kinds of tactile information a driver would sense while using a conventional steering wheel. The degree of feedback can be programmed for a given driver's muscle capabilities.

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Alpha Gear's Gearmotor Offers Significant Reduction in Inertia

The TPM from alpha gear drives Inc. is a geared motor containing a rotary actuator based on an AC servo motor and high precision planetary gearing.

The rotary actuator is characterized by a high dynamic response. With an overall length of 186 mm, the TPM 50 builds up a maximum output torque of 500 Nm at a mass moment of inertia of 2.9 $kgcm^2$.

This high dynamic response is due to the 50% reduction in the actuator's mass moment of inertia, according to the company's press release. This is because the rotor inertia is reduced by the low-speed motor and mass inertia on the gear side is reduced by about 90% since the gear pinion is directly integrated into the motor shaft, eliminating the need for a clutch.

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Faro's Power Gage Capable of CAD-to-Part Analysis

The PowerGage from Faro Technologies is a new measurement device that adds CAD-to-Part analysis capability to its Faro gage product line.

The gage runs exclusively on a version of Delcam's PowerInspect software. According to the company's press release, the software is used by a majority of the on-machine inspection market.

When equipped with both the PowerInspect's programmer and play-only modules, users can create inspection programs/routines for anyone in the facility, import all major industry CAD formats, perform surface inspection against master CAD files, receive on-screen instructions including images and video, access a full suite of geometric inspection tools, automatically optimize the viewing angle of parts measured and save all inspection data and run customized reports.

Instead of taking the part to a fixed CMM in a climate-controlled room, users can mount the PowerGage directly to where the part is being made. As the user traces the arm's tip over the part's entire surface, the system's laptop verifies all the 3-D measurements against the original CAD file to see if the part was made correctly. If it was not, the digital blueprint pinpoints where it needs to be corrected.

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Marposs' Gage Head Designed for Internal Grinders

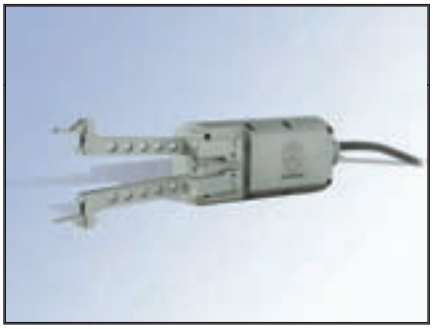
The Thruvar from Marposs is a through-the-spindle gage for in-process measurement application on internal grinding machines and was introduced at Eastec.

According to the company's press release, the gage reduces downtime and eliminates the special tools that are sometimes necessary. Using an automatic setup feature, it is possible to reset the gage without operator intervention for a size variation up to 25 mm. Similar gages that use a special tool for manual adjustment may require about five minutes of changeover.

The gage is mounted inside the grinder's workhead spindle, and it measures workpiece inner diameter as the part is ground. Signals are sent from the gage to the monitor, providing outputs to the grinder control based on real-time measurement of the workpiece size. Outputs are used to control the wheelslide infeed for precise size and finish consistency.

Access to the fingers and contact is obtained without removing the gage from the spindle. Finger retraction is pneumatically controlled, and the retraction distance is selectable in three increments: 92 mm, 6 mm and 10 mm.

One set of fingers and contacts covers a 25 mm diameter size range with no downtime for changeover.



The gage is available in two sizes—the Model 50 with a 50 mm (1.97") body diameter for measuring inner diameters from 50 mm (1.97") up to 170 mm (6.69") and Model 70 with a 70 mm (2.75") body diameter for measuring inner diameters from 75 mm (2.95") up to 220 mm (8.66").

Marposs says the gage head complements the Unimar line of in-process gages for OD measurements. Therefore, it is possible to cover the application

range for grinding components, including width or face grinding, OD grinding and ID grinding using two gage head styles.

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Alpha Gear's New Gearhead Follows Trends in High Reduction Torque and Ratios

The new SPK+ right-angle gearhead is designed for applications with high reduction ratios and torques.

This product combines features of the company's planetary gearhead and right-angle gearhead. The SPK+ is also lighter than conventional bevel planetary gearboxes, the company says.

The SPK+ achieves higher reduction ratios than other right-angle gearheads, according to the company's press release. In particular, handling tasks, which often necessitate a reduction ratio of $i = 30$ to $i = 40$, are best suited for this gearhead.

In the output stage, the gearhead assures improved positioning accuracy and synchronism due to the fatigue-resisting design of the alpha hypoid and planetary gearsets.

A smooth-running hypoid gearset on the input and optimized helical teeth in the SPK+ facilitate a lower noise level. On the output side, noise emissions have also been reduced.

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Kapp to Highlight Gear Center and Profile Grinder at IMTS

The Kapp Group plans to display its Kapp KX300P and Niles ZE400S machines at this year's IMTS show.

The KX300P utilizes either dressable or non-dressable worms and form wheels and features on-board inspection and integrated balancing. A vertically-oriented workpiece spindle allows for efficient integration of automatic loading systems.

Kapp also plans to showcase an integrated ring loader system for the machine as well. According to the company's press release, the ring loader reduces part-to-part exchange time over gantry or robot-type automation systems. With the optional integrated ring loader, the KX300P can achieve cycle-stop to cycle-start times of approximately four seconds.

The Niles ZE 400S features an additional 150 mm of stroke length that improves internal capabilities. The machine is designed for finishing internal and external spur and helical gears using either dressable or non-dressable form wheels. Other features include a cast-iron machine base for all machine components, torque table and common CNC dressing device with a high precision spindle for both internal and external applications. The machine will be displayed with an optional dressable internal attachment and features integrated inspection and GMG (grind-measure-grind) technology. Niles ZE grinders range from 400–1,200 mm capacity and have Siemens Sinumerik 840D controls.

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