Portable Gear Inspection

R&P Metrology Measures Directly on the Production Machine

Matthew Jaster, Senior Editor

Compact, custom and portable solutions are gaining more attention in manufacturing today as companies seek out the tools that offer the greatest productivity gains on the shop floor. Gear inspection seems to be following suit. R&P Metrology (partnered with Kapp Technologies in the United States), offered a first look at its portable measuring equipment for large gears last fall at Gear Expo in Indianapolis.

Since Gear Expo, the company has been adding new measurement capabilities for the RPG PM 750/1250 Portable Gear Metrology machines. They are capable of a full range of 3-D prismatic metrology when used with the available docking station and can perform CMM measuring tasks with full CNC control and lab grade accuracy.

According to Hans Rauth, president of R&P Metrology, "The docking station, with the extremely accurate rotary table, extends the use of the PM system beyond the plant floor, to the inspection lab. Not only can it use generative metrology for gear inspection, it can become a precise CMM with the customer's choice of software." All R&P Metrology systems adhere to the I++ (Inspection Plus-Plus) protocol and can utilize any CMM software that is compliant, such as Wenzel and Zeiss. "When used as a portable system, the PM 750/1250 can measure gears of unlimited size," Rauth adds.

Rauth is enthusiastic about the potential for integrating inspection equipment throughout the machine shop. "The PM portable machines allow accurate independent inspections, with industry accepted reports. This translates into time savings because there is no need to realign gears taken out for external inspection. Because the system can be used on different machines, higher accuracy and quality assurance is achieved across the whole shop, all for a reasonable investment," Rauth says. "Integrated in-process inspection as part of the manufacturing plan for larger gears is now achievable. There is now the chance to upgrade older machines with no onboard inspection."

With the unique needs of each customer, many solutions require more than an off-the-shelf CMM. R&P specializes in custom equipment and works to develop a measuring solution that best fits the customer's machine requirements as well as their budget.

"With intense contact with customers, new ideas based on the variety of gears and existing facilities are the real drivers for the custom machines. Working with large set of "modules" and technologies at R&P, new functions such as surface finish and Barkhausen inspection can be added to gear measuring systems as needed. Economic factors drive customers to get exactly what they need and not to overbuy."

Flexibility is equally important. "Inspection of large gears has more factors to consider. Mass, inertia, fixturing, accessibility to references, loading/unloading, and integration to existing plants are only a few aspects. R&P offers a unique solution to every customer, in effect allowing the customer to design what best fits the needs," Rauth adds.

With the full integration of the rotary table, the RPC, for example, represents a convergence of technology yielding a universal metrology system encompassing high accuracy roundness/form/profile measurements, as well as "no compromise" generative gear inspection and 3-D CMM measurements. "With one setup, a part's gear features as well as all 3-D CMM measurements can be accom-

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plished with real inspection software and charts and real CMM software and outputs," Rauth says.

The PM 750 will be on display in September during IMTS 2014 in Chicago. "The focus is always on helping customers define their requirements and then designing and building systems that meet and exceed those needs," Rauth says. "Accurate mobile/portable inspection systems such as the R&P Metrology PM 750 can change how we look at gear metrology systems. When it is time for the replacement of older inspection machines, companies can now replace old machines at nearly the cost of a retrofit, and gain modern, state-of-the-art technology. With the high accuracy and flexibility of the RPC machines, gear shops without gear measuring machines now can get one machine to do both CMM 3-D measuring and generative gear inspection without compromise."

When a business invests, they want 100 percent of their needs met, according to Rauth. "They don't want, for example, to buy a larger machine than is needed if only one axis needs to be larger. So, custom and special machines will continue to gain momentum."

In gear metrology, the standard catalog is never enough. R&P recognizes this dynamic and has established a company and brand to meet the ever-changing needs of the gear customer.

"Our role is to be a niche supplier of custom and special machines – beyond the standard offerings of other manufacturers. We don't have a catalog of standard machines; rather, we offer platforms that are customized for each application ," Rauth adds.

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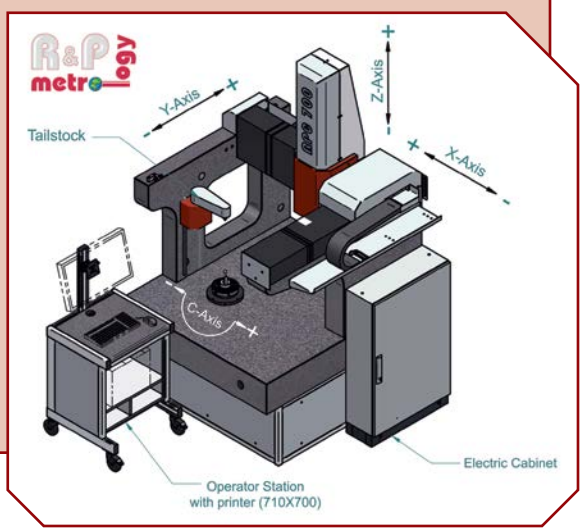
Product Round-Up

In addition to the portable gear inspection systems, R&P Metrology has added some significant offerings to the gear metrology market in 2014. Here's a quick rundown of some of the measuring equipment available to the industry today. Information on these and other products from R&P and Kapp Technologies will be available at Booth N-7036 during IMTS 2014 in Chicago.

RPC 700 Designed for Accurate Profile and Form Measurements

The RPC 700 is a new, smaller development based on well-proven technologies, extending the range of systems to meet customer requirements. It joins the RPC 1000 and the RPC 1600 in the R&P Metrology lineup of highly accurate systems capable of form, profile and generative gear inspection. The RPC 700 is designed for extremely accurate profile and form measurements on rotationally symmetrical workpieces, such as bearing rings and races, as well as demanding aerospace and cylindrical workpieces. According to Hans Rauth, president of R&P Metrology, "The RPC 700 is unique in the metrology world. This four axis machine utilizes the highly accurate air bearing, direct drive rotary table to measure form and profiles along with true generative gear measuring. The RPC 700 represents the perfect combination of metrological features." Rauth added, "Our use of linear motor technologies and granite air bearing guide elements provide wear-free, consistent and thermally stable measurements." All RPC systems are I++ compatible, allowing a variety of CMM software packages from various suppliers to be supported. A tailstock is offered as an option on the RPC 700.



The RPC systems are now available in three standard sizes, with the RPC 700 able to accommodate workpieces up to 700 mm in diameter. The linear travels are X = 600 mm, Y = 700 mm and Z = 500 mm. Parts up to 300 kg are accommodated on the rotary table. The larger RPC 1600 handles 1,600 mm parts and increases the X-axis travel to 900 mm. Rauth notes that, "By understanding customer needs, R&P customizes these special machines." The RPC 1000 is also available, with a maximum diameter of 1,000 mm. "Of course," nearly any custom and special requirements can be met," Rauth says.

SMS Siemag Chooses R&P Metrology

SMS Siemag AG understands that to be competitive in today's global business requires state-of-the-art equipment and technology. In 2012, the company installed the R&P Metrology RPG 4000/5500 gear inspection machine. The ability to quickly and accurately measure large gears (up to 5,500 mm diameter, 40,000 kg max. weight) allows SMS Siemag to better meet the requirements of its customer base. Thanks to ease-of-operation and support from R&P Metrology, the investment in the RPG 4000/5500 will solidify SMS Siemag's position in the market.

R&P Offers Special Measuring System

Responding to specific customer requirements, R&P Metrology GmbH announced a new model in their full line of custom metrology systems, the RPS 1350V. Designed for ball screws and shaft parts, this system boasts capacity for 1,350 mm between centers and 1,300 mm of vertical measuring travel. "A customer asked if we could design and build an inspection system for their specific needs. That is what R&P Metrology does, so of course we said yes," says Rauth. "The customer produces ball screws and gears up to 600 mm in diameter. The RPS 1350V is a generative, four axis gear inspection machine, and also measures 3-D CMM type features as well as profiles and forms. The X, Y and Z axes use linear motors for ultimate precision. Since the machine rests on an active suspension system, no separate foundation is required. The high precision, air bearing rotary table is mounted on a granite bed and is driven directly by a torque motor." The RPS 1350V achieves the highest European class for inspection equipment accuracy: VDI/VDE 2612/13 Group I. Using an industry standard CNC control system, the RPS 1350V is I++ compliant, allowing the use of many CMM inspection packages.