

# Taylor Hobson grinding 'true to form' with Okamoto

Leicester-based Taylor Hobson is a globally renowned, ultra-precision technology company operating at the highest levels of accuracy within the field of surface and form metrology. As part of the Ultra Precision Technology Division of AMETEK Inc. the business provides contact and non-contact measurement solutions for the most demanding of applications, Taylor Hobson's advanced grinding capabilities enables the manufacture of the company's components with industry leading surface finish, straightness and form standards. In addition, the business' skilled production staff have developed a range of techniques that push the boundaries of ultra-precision grinding. To support its activities, Taylor Hobson's grinding department boasts a wide range of cutting-edge grinding technologies sourced from some of the world's leading machine tool manufacturers. The latest hi-tech addition to the department is an innovative Okamoto 208 ACC-CHI<sub>Q</sub> double-column, surface and profile grinding machine.

Mark Bent, chief manufacturing engineer at Taylor Hobson, explains the reasons behind the recent purchase: "The knowledge and skill of our grinding staff and the resulting production of ultra-precision components has enabled a virtuous circle to develop.

"For example, Taylor Hobson's ultra-precision products are designed to measure components' surface finish and form characteristics. Therefore, our in-house knowledge of all aspects of surface finish and form has allowed our grinding department to develop procedures that



enable the company's components to be ground with outstanding levels surface finish, straightness and form precision. In turn, our ability to grind to the highest of standards of precision helps the company to develop and manufacture ultra-precision metrology products that measure surface finish and form to the very highest standards.

"Ultra-precision grinding represents one of Taylor Hobson's strongest areas of expertise. We produce the reference datums for our measuring instruments with a combination of dimensional, geometrical, straightness, flatness, and surface finish control, that are amongst the very best in the world. The levels of surface grinding precision that we regard as relatively

straightforward would challenge the vast majority of global businesses.

"As the straightness, flatness, and surface finish of the columns that we grind represent the foundations of the precision of Taylor Hobson's metrology products, we place severe demands on our grinding machines. Therefore, when a previously used surface and profile grinding machine began to show its age, we started a search for a large capacity, ultra-precision replacement.

"Having dismissed several options that lacked the required precision capabilities, we purchased an Okamoto ACC-CHI<sub>Q</sub> double-column machine from DF Precision Machinery Ltd. In order to achieve the required stability and ultra-precision performance, we installed our new Okamoto grinder on a substantial 0.8 m concrete foundation, with a further 14 piles that reached deep into the bedrock beneath the machine.

"Our challenging flatness value target across the entire working surface of the new machine was to reach a sub 2  $\mu\text{m}$  figure. Following the machine's installation and the installation engineers' precise adjustments, we were delighted to achieve a flatness value of just 1.2  $\mu\text{m}$ , a result that far exceeded our ambitious target.

"Our choice of machine, the solid foundations it was installed on, the fine-tuning of its working surface and the skill of our staff has resulted in our ability to achieve remarkable levels of grinding



flatness. For example, we now grind our 600 mm long columns to an impressive straightness value of 0.5 µm. In addition to the precision of the Okamoto ACC-CHI-Q, the machine's impressive speed is also enabling us to achieve the production efficiency levels we aim for."

Used throughout the world in some of the most challenging of grinding situations, Okamoto's advanced ACC-CHI-Q Series of double-column machines satisfy the demands for high accuracy grinding whilst also providing the production speeds required by today's manufacturers.

As the accuracy of a double-column grinding machine depends largely on the precision of its cross-rail, Okamoto has developed an ingenious cross-rail mechanism that enables minute mechanical adjustments to be made following a machine's installation. The company's fine-tuning correction system allows extremely high degrees of flatness and straightness to be achieved along machines' entire working surfaces without the need for NC corrections to be made.

Okamoto's ACC-CHI-Q series machines boast 22 kW spindle motors that deliver the maximum horsepower in this class of

machine. Complementing the advanced ACC-CHI-Q series precision grinding capabilities, the machines boast a number of features that provide impressive levels of production efficiencies. For example, dressing times have been shortened by combining upper dressing for rough dressing with tabletop dressing for finishing. Also, the machine's shift-plunge grinding cycles make a significant contribution to reducing processing times.

The use of feature rich, yet easy-to-use iQ software via the large colour touch screen FANUC control, makes the processing of large workpieces grinding a straightforward process. The smart software considerably simplifies data input and reducing cycle time. Data is automatically generated by inputting the grinding wheel's grain size, total machining allowance and precision machining allowance. Then, by inputting the grinding wheel size the optimum grinding wheel condition is automatically created based on grinding process theory. Data input can be achieved using only two screens, whilst panel buttons cover the full range of surface grinding and grinding operations.

Traditionally grinding processes largely



relied on operator's skill and intuition. To provide maximum assistance, Okamoto has developed a function for automatically setting the recommended process conditions based on grinding process theory and Okamoto's in-house knowledge. iQ software supports the use of both Alundum-type grinding wheels and ultra-abrasive-coating grinding wheels. Users are also able to input their own condition settings. The software graphically displays the position at which grinding is to be performed on screen. The cycle end time is also displayed, further saving setup time.

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## Supertec chooses NUM technology

Supertec Machinery Inc., one of Taiwan's leading machine tool manufacturers, has chosen to base new versions of its renowned Plunge type of CNC cylindrical grinding machines on NUM's Flexium+ CNC platform.

Founded in 1954, Supertec Machinery Inc. has grown to become one of Taiwan's top machine tool manufacturers. The company specialises in precision grinding automation and produces a diverse range of centreless, cylindrical and surface grinding machines. Based in Taichung City, Supertec operates sales and support facilities at strategic locations throughout Asia and Europe, as well as in the USA and South America.

Supertec has traditionally used FANUC CNC systems for most of its machine tools. However, when NUM added non-circular grinding functionality to its popular NUMgrind cylindrical grinding software back in June 2020, the company realised that this innovative CNC technology provided exactly what many of its customers needed on their cylindrical grinders.

NUMgrind simplifies the creation of G

code programs for CNC grinding machines through the use of a highly intuitive graphical human machine interface (HMI), and unlike conventional CAD/CAM workstation tools, it is designed specifically for use by shop floor personnel in a production environment.

After evaluating the software, Supertec immediately raised a purchase contract with NUM. According to Betty Chu, Supertec's assistant general manager, "NUM has an excellent reputation in the grinding industry. Much like Supertec, this has been earned over many years. The latest version of NUMgrind, which accommodates non-circular grinding, is a natural fit for our CNC cylindrical grinding machines. We also now benefit from very responsive local support, as NUM's Taiwan facility is less than 15 km away from our factory."

Supertec's plunge type of CNC cylindrical grinding machines offer a choice of six capacities, covering distances between centres from 500 mm to 2,000 mm. The machines can also accommodate grinding diameters from 300 up to 430 mm (3 sizes),



grinding wheel speeds up to 1,390 rpm and workhead spindle speeds from 30 to 350 rpm. The new versions of these machines are based on NUM's Flexium+ 8 CNC platform and use NUM's high performance MDLUX drives and brushless servo motors for the X, Z and C axes. In addition to the NUMgrind HMI, the software that is being supplied by NUM includes the Flexium 3D simulator, which can be used offline or online, and an application-specific profile editor which enables users to import DXF files.

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