

## **Advanced ultra-precision machine tools and application**

For the ultra-precision machining center UVM series, which have been already widely used in machining dies/molds, for products that require fine finish and high precision, a high-rigidity and high-torque aerostatic bearing spindle that has higher load capacity and emphasizes the efficiency of rough machining has been made optionally available. Also a new image processing on-machine measuring instrument has been developed in order to enhance the on-machine measurement function, which realizes dimensional measurement of fine shapes that cannot be measured with a touch probe with remaining any scratch or damage on a finished surface. In addition, the operator support software "UVM-TAS" (TSA:Total Support Application), which achieves automation of various on-machine measurements, reduction of workpiece placing errors and tool-caused machining errors, tool life management based on the amount of tool wear, etc., has enabled the construction of a more advanced automation system, securing high-precision machining reproducibility as well as labor saving. Furthermore, a shape error correction system that performs high-precision on-machine measurement of the cutting edge contour shape error of a tool to correct cutter pass automatically in real time has been developed. This eliminates the need to modify 3D models for correcting machining errors and re-create NC data with CAM software, which removes the workload required for correction and greatly reduces the die/mold manufacturing time loss at the same time .