Built in Cleveland, Ohio at Zagar Inc. this 3 station, multiple spindle, CNC machine drills, counter-sinks and taps (2) M6 x 1 threaded holes simultaneously at each of 3 stations. A total of 6 holes are machined each cycle. Each station features automatic drill to tap tool change (see video) The work piece is die cast aluminum with a steel drive shaft. Two M6 holes are drilled, counter-sunk, and tapped into the end of each arm of the work piece.

The hydraulic, automatic clamping system includes a central collet chuck and swing clamps at each arm. The specially designed collet chuck featured dual, independent pistons that clamped on two datum diameters of the work piece drive shaft. The chuck also applies a pull down force on the shaft to hold it against a height datum feature. Each arm of the work piece is supported by an hydraulically actuated, variable height work support. The work supports stabilize each arm in a neutral position before the swings clamps are actuated. The swings clamps clamp each arm against the work supports. This eliminates any spring in a work piece arm after release of the clamps.

Work pieces are loaded and unloaded by robot arms in an unattended work cell. Work piece and swing clamp arm positions are verified by proximity sensors.

Chips and coolant are processed thru an opening in the machine table. Chips are separated out by an automatic conveyor and carried to a container. Coolant is filtered as part of the re-circulating system.
The 3 station machine includes 4 identical multiple spindle drill - tap assemblies supplied on separate sub-base plates. The 4th assembly is the back-up station. It is provided to minimize down time in production. One complete drill - tap modular station with multiple spindle head, tool changer, feed unit, and servo motors, is kept on hand as part of a preventative maintenance program to assure 24 hour high volume production. The ball screw actuated MQ150 unit, multiple spindle heads, and tool changers are Zagar standards.

Each station features automatic CNC tool change. The machine cycle is programmed for automatic sequencing from drilling feed and speed, to counter-sinking feed, speed and dwell time; then rigid CNC forward and reverse tapping cycles. Tool holders included quick-change, z-lock, Zagar standard tap holders at the tapping spindles. The drilling spindles included ABS25 precision couplings and ER-16 collet holders. The ABS couplings enabled pre-setting tool length offline from the machine and quick changeover of the drilling and counter sinking, carbide step tools.

Modular drill-tap assembly is shown at left being loaded onto the machine (ref., video) A four corner, ball-lock mounting system is applied to precisely align and secure the station without the use of fasteners or dowel pins. The station is quickly re-connected to the CNC system using multi-pin connectors. 15 Minutes later the machine is operational and machining holes within the required capability SPC control factor.
The 9 axis CNC system includes Ethernet linked amplifiers to a single motion controller. Ethernet capability also enabled off-site access to the control system. A tool monitoring and broken tool detection system is included.

HMI Touchscreen is shown at left. Drilling and counter-sinking feeds, speeds, depths, and dwell times are individually programmable at each station. The CNC rigid tapping cycle is programmable for inch or metric pitch tapping and for right or left hand threads.

Modular station with Zagar MQ150 ball screw actuated, quill feed unit; ball lock mount with thumb screw, and hoist ring (typical at four corners of sub-plate)
Machine was concepted and engineered by Zagar Inc. in 3D using Solidworks. Software for viewing files is a free download; enabling concurrent design and inter-change of drawings with end user of machine. Assembly drawings include exploded views and bills of material that are accessible online to maintenance personnel.

Contact us soon if you have hole making requirements for high volume, production parts. We would appreciate the chance to talk with you.

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