

CONVENTIONAL STROKE-HONING, SINGLE PASS DIAMOND-SIZING

In the past, manufacturing engineers – especially in the low- and medium-volume flexible production environment – had to choose whether to buy a conventional stroke-honing machine or a single pass diamond-sizing machine. Then, they had to try to make do; as new applications that were better suited for the other type of honing process came along.

The ECO Honing System series 40, 80, and 180 offer a new solution. The ECO series switches over from conventional stroke-honing mode to single pass diamond-sizing mode with the press of a button, and the series supports automatic tool-wear compensation during both modes. The ECO 40 hone can have up to three honing and post-process gaging stations, while the ECO 80 and ECO 180 can have up to two honing and post-process gaging stations. In a multi-spindle set up, users can choose to rough the part in single pass diamond-sizing mode and finish the part in conventional stroke-honing mode to achieve a particular cross-hatch pattern.

ECO Honing System represents a significant advance over manual compensation systems. In a manual compensation system, the operator has to frequently measure the finished bore in every station and manually compensate for tool wear. Over/under compensation is a common problem, leading to reduced control of bore size and excessive machine downtime, as the operator has to stop the machine frequently to compensate for tool wear.

In the conventional stroke-honing mode, ECO's tool wear compensation system minimizes non-cutting time while improving bore quality. Once

the tool is inserted in the bore, the tool expands at a rapid feed of 200 μ m/sec and at high torque – 45% of available – until it reaches a predetermined position close to the bore. It will then switch to a rapid stock-removal mode of about 4 μ m/sec at lower torques – 15% of available torque – to avoid tool damage. Toward the end of the cycle, the expansion rate is reduced to about 2 μ m/sec – or 10% of the available torque.

The system constantly monitors both the tool feed (μ /sec) and the applied torque (as % of available). If the desired feed is not reached at the preset torque, the operator can reduce the tool expansion rate – if tighter tolerances are desired, or increase the torque – if quicker cycle times are needed. Tool expansion is rapid when there is no cutting, and is slowest for the final finishing cut, which results in a consistent bore in terms of finish, size, and cylindricity. Where there is form error, for example like taper, hourglass, barrel shape,

ovality, bend, etc., the ECO Honing System senses the form error and makes automatic adjustments to correct it.

In addition, ECO's expansion cone-type tool design offers quality advantages over the sleeve-type design tools. For example, when the sleeves expand, the cylindricity is not always maintained as the expansion occurs due to deformation of the sleeve when forced over a cone. As a result, some sleeve-type tools perform well, while others are discarded quickly or do not cut at all. With the ECO design, a premeasured amount of abrasive is mixed in a centrifuge with metallic binder and sintered. The thorough mixing with centrifuge minimizes the variation in the distribution of the abrasives. In addition, the metal bonded abrasives are pre-dressed, which results in first part good part. **tmd**

