Deburring tool solves engine problem

Ford Motor Co. of Australia Ltd. realized some of its engines were showing reduced performance. At its production plant in Geelong, the automaker traced the problem to burrs and drill caps at the intersections of cross-drilled holes in camshafts.

Specifically, the burrs were breaking off and jamming the variable cam timing system, reducing engine performance. The jamming could even cause engine damage.

Each camshaft has two 5mm-wide × 28mm-dia. annular grooves on one end. Each groove has four 4mm-dia. radial holes. The holes in the rear groove intersect 4.5mm holes drilled into the face of the camshaft; the holes in the front groove intersect an axial bore.

Previously, after drilling, the intersecting holes included burrs and drill caps. (Drill caps are disks of material formed when the drill is about to break through; the last bit of material, the cap, is pushed out rather than cut off.)

To remove the burrs and caps, one possible solution was manual deburring. However, that process would have been labor intensive and would not have provided consistent results. An ideal solution would disturb the camshaft production line as little as possible—that is, it would solve the burr and drill-cap problem without forcing Ford Australia to reconstruct the line, which would involve downtime.

J.W. Done

The Orbitool permits Ford Australia to perform in-process removal of burrs and drill caps from the intersections of cross-drilled holes in camshafts. Previously, the burrs and drill caps were hurting engine performance when they would break off and jam the cam timing system.

The automaker turned to Okuma Australia Pty. Ltd., Rowville, for suggestions. The machine tool builder's solution consisted of a machining center installed next to the camshaft production line. The system applies Orbitool deburring tools from J.W. Done Corp., Hayward, Calif. The Orbitool permits in-process deburring of holes immediately after they've been drilled.

END USER
Ford Motor Co. of Australia Ltd.

CHALLENGE
Deburr the intersections of cross-drilled holes in camshafts.

SOLUTION
An in-process deburring tool.

Specifically, the Okuma Australia system removes the camshafts from the line with a robot, drills their holes, deburrs them and removes their drill caps using Orbitool cutters, and places the camshafts back into the production line.

The Orbitool for this application consists of an uncoated, 3.2mm-dia. carbide cutter with a flexible shank. The tool incorporates a disk that is slightly larger than the cutter itself. The disk prevents the cutter from damaging the areas adjacent to the burr or cap. Using a helical motion, the Orbitool deburrs and removes the drill caps from each camshaft in 2 seconds and lasts for about 8,000 holes. The system handles 240,000 camshafts per year.

However, for the Orbitool to work as designed, the drill can't become too worn because the burrs and drill caps will become too large for the Orbitool to remove in the process time allowed.

When the drill is properly monitored, though, the Orbitool allows Ford Australia to remove the camshafts' burrs and drill caps so they won't reduce engine performance.

"The [Orbitool] provides a simple solution to a difficult problem," said Leigh Milvain, Okuma Australia's technical and engineering manager. △

THE FOLLOWING COMPANIES CONTRIBUTED TO THIS REPORT:

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