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Mouldmakers take stock

Auto shakedown forces diversification

TECH TALK

BY JOHN D. MANLEY

Moulding trade needs special grind

Offshore mould shops are competing with some of the most sophisticated mouldmakers in the world—Canadians. Fortunately, Canadian mould manufacturing protects itself by creating a niche in manufacturing complex moulds for high-end consumer packaged goods, including pop bottles, cosmetics, compact disk and jewel cases. Manufacturing such moulds to both the tight tolerances and fine finishes required by packagers, is technically challenging and labour intensive. Simpler software reduces the technical obstacles, while complete-machining-in-one-chucking reduces the labour intensity. Grinding, in particular, has seen dramatic developments in software and part handling. In this Tech Talk we will explore mould components that have been improved by recent grinding advances.

Cavities, cores, manifolds, taper interlocks and threaded neck rings are a few practical examples of the complex parts used in the mould industry. Historically, these parts were processed using multiple machines, including lathes, mills, sink/wire EDMs and various dedicated grinders, often requiring intermediate processing like heat-treating. Unlike traditional chip-making, grinding likes hardened surfaces; hence finished dimensions can be ground without the generation of post-process thermal distortion. Today, advanced cylindrical grinders are used to generate complex surfaces on both round as well as out-of-round moulds. Depending on how the workpiece is fixtured, bores, ODs (outside diameters), faces, tapers and even threads now can be performed in a single chucking, providing substantial labour savings and increased accuracy as concentricity and length positions do not vary.

Probably the greatest advance in CNC universal grinding has been the introduction of the **CNC controlled wheelhead turret**. Using highly accurate curvic couplings, multiple grinding wheels are indexed to within 0.000,1°. Mould core and cavities with varying tapers are now able to be ground in a single clamping with certainty of accuracy and repeatability. Multiple wheels have also aided the high volume manufacturing of nozzles, where manufacturers' specifications frequently require bimetallic parts for superior wear characteristics. These tight tip and step specifications are best ground with a combination of superabrasives and conventional abrasives. An automatically indexed dual wheelhead with CNC rotary disk touch dressing makes child's play of this task.

Like CNC milling, the advent of interpolation has had quite a dramatic impact on universal grinders. The introduction of a **coordinated workhead axis**, allows tapered and out-of-round form generation. Moulds for relatively complex consumer products, such as deodorant sticks and lipstick, may now be manufactured without either costly jig grinding or labour-intensive part handling.

High r/min ID spindles, with built-in software have helped to improve manifold production by automating the labour-intensive tight tolerance faces-to-bore grinds.

Lastly, neck rings, for the consumer bottling industry, have benefited from universal grinding that incorporates **parallel axis thread grinding**, with tremendous automation potential.

The future of moulds in Canada is clearly towards this higher tolerance work as we compete with China and other offshore industries that have far lower overhead and wages. Fortunately, higher tolerances are being driven by the end users, who want increasingly better finishes to reduce flashings generated by parting lines. End users are also increasingly trying to reduce material waste though consistent plastic part thickness. Bottlers are also pushing for better shelf life of carbonated products; hence pre-form moulds must be optimal. All of these emphases will help the complex mould industry remain alive and kicking in Canada.

Automation of these difficult processes—including grinding—is what will allow Canadians to maintain their competitive edge over other countries. CMM

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