

CANADIAN MACHINERY AND

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Quantum leap

High speed machining is here



A balanced
approach

Tool balancing
fact and fiction



The high speed punch grinder is here

Canada's hydroforming and precision fine-blanking industries have experienced dramatic growth over the past decade. Their rapid rise commands improved tooling quality from domestic suppliers. At the same time, pricing and lead times have shrunk. As customers seek price reductions they are sourcing punches globally. The demand to lower manufacturing costs and improve response time has been overwhelming for our domestic manufacturers until recently.

With the advent of CNC out-of-round grinders that use high speed grinding technology, ball lock and shoulder punches can now be ground from solid, heat-treated blanks to finish form in a single, cost effective, grinder. This leads us into this issue's Tech Talk — manufacturing punches using High Speed Punch Grinding technology.

Historically and, less commonly, in the present, punches are milled and turned in the green state from blanks. Subsequently they are heat treated, and then they go through a variety of cylindrical and out-of-round grinding operations. The grinding steps are critical, with runout and form concentricity being paramount. The setup, grind and inspect, followed by corrections can be very labor intensive — and expensive.

Often, the surface finish required poses another constraint, as it is not uncommon for hand polishing to demand additional costly labor. The excessive material handling, lead-time from roughing to heat treat to finishing, inspection and finally pol-

ishing, jeopardize the punch manufacturers of old.

Today, the industry is discovering the merits of Vitrified CBN (dressable Cubic Boron Nitride) grinding wheels, coupled with predictable rotary disk dressing and responsive grinding technology. The wheels yield Q1 values (metal removal rates in grinding, expressed as $\frac{\text{in}^3 \text{ of material removal}}{\text{in width of wheel} \times \text{minute}}$) that far exceed the conventional abrasive technologies of old.

Machines that are far stiffer, using

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synthetic, thermally stable and vibration-resistant bases, are very capable of supporting these aggressive abrasives.

Lastly, the motion control of the grinder requires sophisticated software to handle out-of-round forms rotating upwards of 100 rpm, married to drives that can handle the myriad of motion thrown at them.

All of this technology must be brought together with smooth harmonic motions; only possible with the coupling of hydrostatic guideways and high frequency drives, avoiding grinding wheel contact discontinuities that lead to dwell burns and/or form distortions. The high rotational speed, combined with micro infeeds, nets the process with a very high Q1.

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has typically worked from any number of customer prints, often an imposing brand of unique CAD software, specific to a limited client base. To ease the pain of the CNC transition, DXF compatible software is readily available.

What does the future of punch grinding have in store? Hard turning, right in the grinder, will allow the raw bar stock to be processed to near net shape, minimizing the stock remaining for finish grinding. Also, higher capital investments and the need for lower human

investments will drive the industry to round-the-clock manufacturing. As a result, there will be a need for automatic loading with specialized clamping.

The limiting factor to implementing High Speed Punch Grinding technology today is the required capital intensiveness, but this is often overcome with lease-to-own financing. Global punch manufacturing is changing rapidly; demanding cost effective processing more than ever. The implementation of High Speed Punch Grinding is the key to Canada's continued growth in the internationally competitive punch market. CMM

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