MILLING CUTTERS + LASERS + PUNCH GRINDING

CANADIAN MACHINERY AND

metal WORKING

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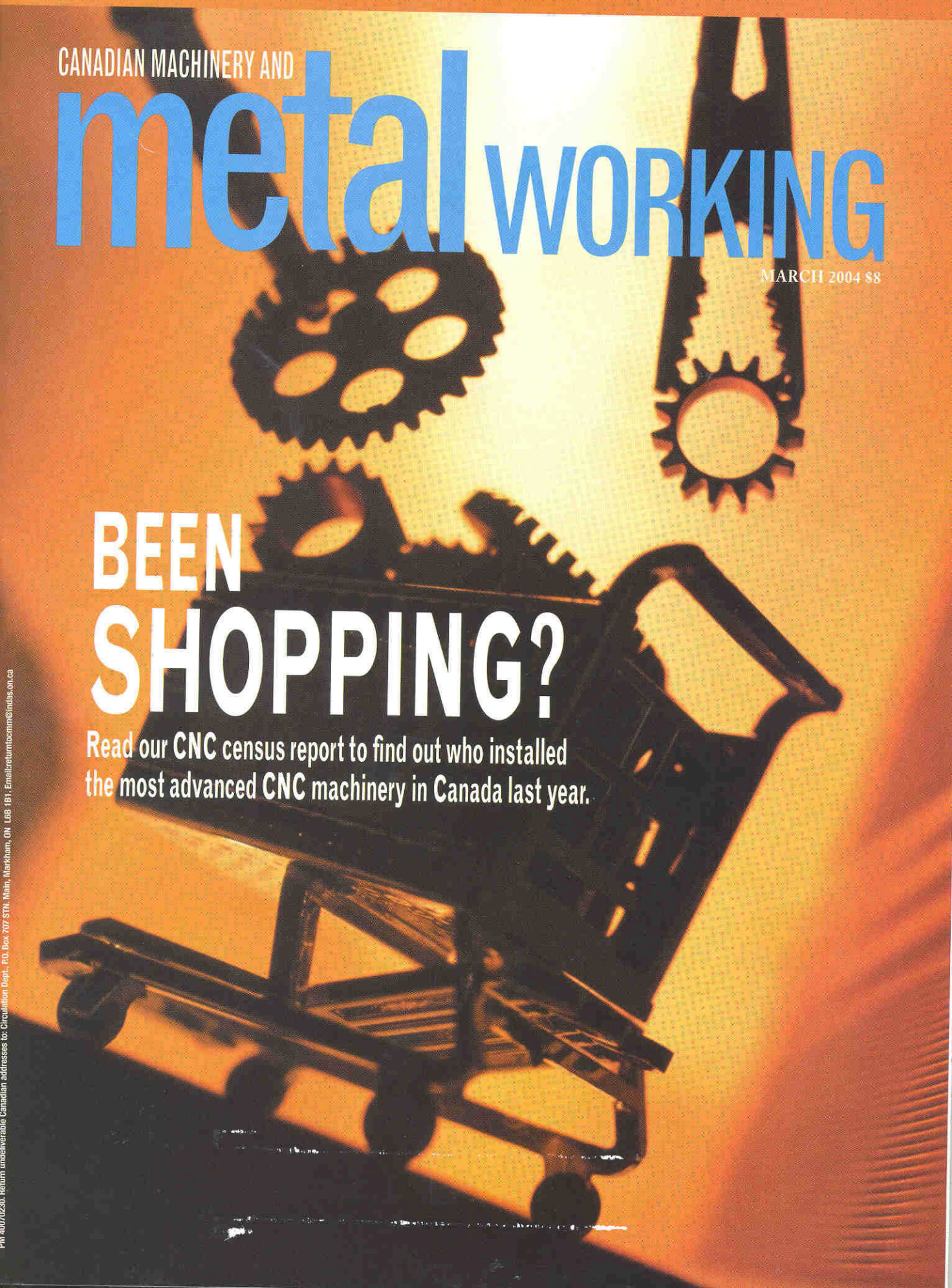


BEEN SHOPPING?

Read our **CNC** census report to find out who installed the most advanced **CNC** machinery in Canada last year.

VIRTUAL GRINDING REDUX

Grinding manufacturers need a standard simulation software application like Adobe's Acrobat Reader. What if, instead of PDF, we had GDF — Grinding Data Format?

BY JOHN MANLEY

The enhanced ability of new-generation CNC grinders to interact with offline PCs is adding phenomenal strength to both simulation and wheel path-data generation. Grinding is changing dramatically with PC-driven software that completely bypasses the machine's CNC control, thus the CNC controllers are merely slaves to a massive data stream. With the ability to continuously download this data to the motion controller, very complex programs can be developed and fully debugged, independent of the grinding machine. This data stream that defines the wheel's axis path, is configurable externally with all necessary tool-wear compensation data. The data has all velocity, acceleration and jerk (rate of change of acceleration) optimization for each axis fully incorporated. This function was historically performed in the machine controller, causing severe limitations to both the contouring speed and the accuracy of simulation.

It is mere speculation, but it will be interesting to see how industry software standards impact tooling and component fabricators in the grinding field.

Where is this offline programming capability heading? Look at the famous Adobe Acrobat Reader/Writer and let's draw a comparison. Adobe created a universal, downloadable program, free for all users, to view their Portable Document Format (PDF) files. Per their website, PDF represents…

"A standard adopted by governments and enterprises worldwide, Adobe PDF is a reliable format for electronic document exchange that preserves document integrity so files can be viewed and printed on a variety of platforms."

This was brilliant marketing that made the software ubiquitous. What if grinding manufacturers developed the same standard for simulation software? Perhaps our Grinding Data Format (GDF) explanation would read…

"A standard adopted by manufacturers and end users worldwide, GDF is a reliable format for electronic document exchange that preserves document integrity so files can be simulated offline and sent to production grinders on a variety of platforms."

Non-licensees would perhaps have the ability to create and massage virtual part models that could be e-mailed to potential bidders or eventually to the manufacturing environment. This capability already exists within the chipmaking industry with "LITE" or limited capability downloads of CAD (Computer Aided Design) software, but this technology does not support grinding with its complex wheel paths.

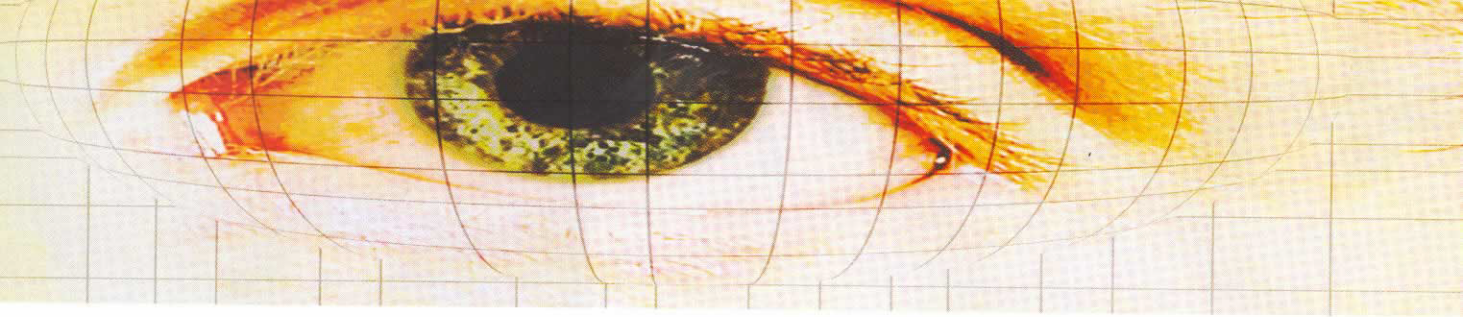
What are some industrial grinding examples where the GDF concept is taking hold?

•CUTTING TOOLS

The potential for the end user of the cutting tool, for example the automotive client, to develop solid models of the tooling itself, using machine-compatible software is enormous. Should the automotive engineer have this modeling software, but no machine tool, they could conceivably send the solid model to a number of vendors and request quotes with little or no interpretation. Thereafter, the chosen vendor could theoretically be in production the moment they obtain the PO, pending capacity and grinding wheel constraints.

• MOULDS

Much like machining CAD/CAM files, where it is quite possible to send a file to a machine shop and authorize them to go ahead with chip making, grinding has similar potential. Should a plastic mould manufacturer conceptualize a design and merely require finishing touches on a pre-machined component, it is conceivable that the complete internal, external, profile and thread-grinding program could be developed offline and forwarded to all interested parties.



PUNCHES

In the punch industry, the ability already exists to receive a DXF profile of the punch end geometry and to send that straight to manufacturing with a simple post-processor file modification. This is being done as we speak on CNC out-of-round grinders and has transformed the punch fabricating industry dramatically. Rather than punch blanks walking through a variety of grinding operations, the heat-treated blank can go from storage to a finished part in minutes. This is true JIT manufacturing with phenomenal cost savings.

• WOODWORKING PROFILE CUTTERS

The profile knife cutters used to make consumer doors and countertop trims are another perfect example of this concept having become reality. Many manufacturers of these carbide inserts are sent DXF-formatted profiles of the finished tool. Thereafter, the engineer simply sends this profile to a post processor and out it goes to a five-axis CNC tool grinder. Going forward, as both the end user of the tool—perhaps a production fabricator of household cabinets—and the tool fabricator standardize with the same software for both profile development and manufacturing, the interpretive post-processing step will be avoided.

It is mere speculation, but it will be interesting to see how industry software standards impact tooling and component fabricators in the grinding field. The impacts could be phenomenal, and could raise the following unanswered questions:

- Will there be a push towards just-in-time grinding?
- Will global sourcing create opportunity or a threat to our current practices?
- Will satellite manufacturing become omnipresent, with job shops having local service/sales offices and centralized grinding?
- Who will expose themselves to the liability of manufacturing defects brought on by running someone else's program?
- Who will take on the inspection procedure for someone else's design?
- Who will dictate the material standards in a bidding process?
- Who will control the number of standards to arise from such a concept as both the fabricators and the customers have a vested interest in these standards?

Although the potential for GDF is phenomenal, the open issues above may limit its proliferation. It will be interesting to revisit these examples in three to five years and see their progress. Ultimately, toolmakers must have faith in customer loyalty, based upon a firm track record and the hidden complexities of making a workable ground part. **CMM**

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