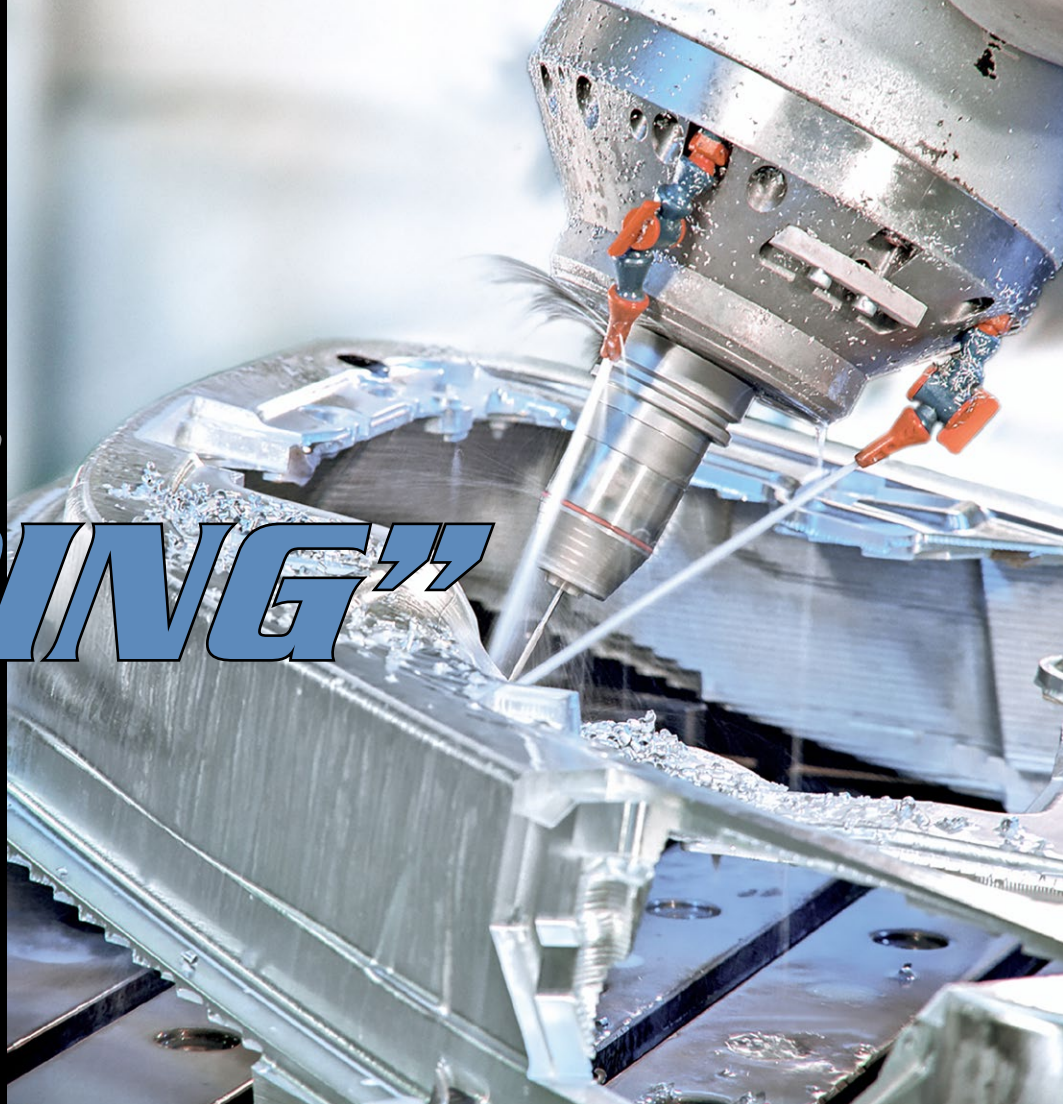
PROPER CARE AND "FEEDING" OF YOUR SPINDLE



By: Randy Pearson

CNC today allows spindle condition monitoring, adaptive control and part production "learning" entirely through software developments

OVER THE RECENT YEARS, THE EVOLUTION OF SUCH CONCEPTS AS CONDITION MONITORING AND ADAPTIVE CONTROL HAVE BEEN SUBSTANTIAL. Condition monitoring, as the name implies, watched the relationship between theoretical and actual speeds and feeds, making preprogrammed or set adjustments, as needed. Adaptive control was the next iteration, as the CNC could detect subtle differences in tool and workpiece conditions and adjust the cutting "on the fly" as the cycle proceeded.

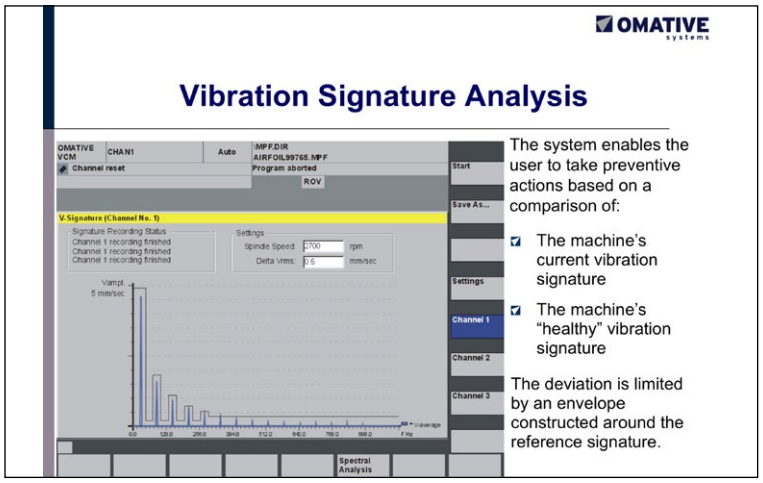
In the advanced world of highly complex, non-linear shapes found in the aerospace and especially the medical/ortho markets, the transformation orientation concept took the computation of the cutting path to a whole new level, basing it on the tool tip relationship to the workpiece, combined with a look-ahead function. Additional sensing hardware and probes were required and are still, today.

However, a recent development has come over the horizon that is based purely on software. This software is loaded into the CNC, provides custom screens to the programmer, operator and maintenance personnel. It monitors all spindle digital signals and literally "learns" the cutting condition, adapting the motor, drive, feed and spindle speed accordingly to compensate for a variety of conditions, including workpiece material variances, distance to workpiece, cutting tool wear and more.

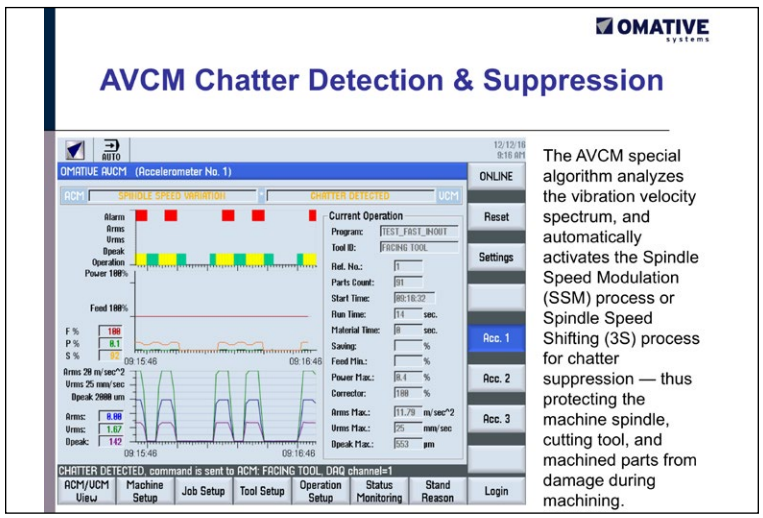
While additional sensors are still required to monitor vibration and tension, most other conditions are detected by the software, in process as the first parts are cut. The software adapts to any cutting machine, regardless of axes involved.

GEARED FOR PRODUCTION

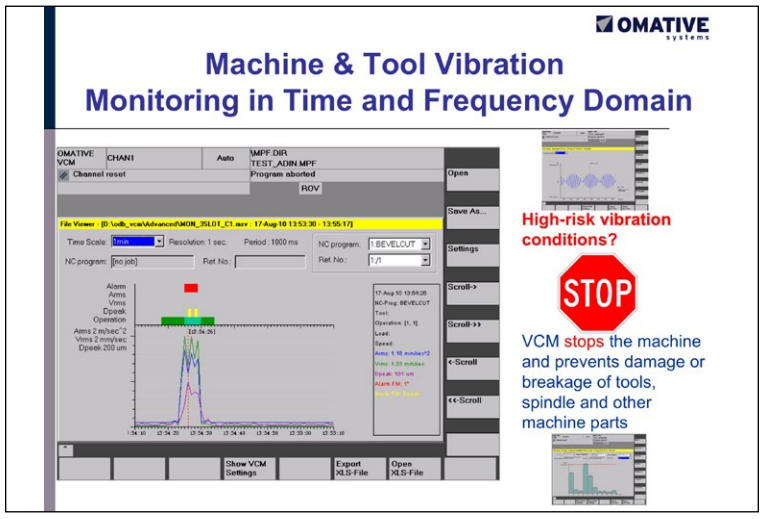
As a result, this new software development is geared more for the production department, but also for the mid-sized job shop or contract manufacturer producing a few hundred pieces. With the cost of software today, plus the fact this add-on can be done on a single machine up to a full work cell or production line with dozens



New software enables the proper care and "feeding" of machine tool spindles.



Screens provide all current cutting conditions for each part, helping the machine tool to learn as it works.



The software continually calculates the optimum feed rate for the current cutting condition of the tool, workpiece and spindle, alerting the operator or stopping the cycle, when tool wear is out of tolerance.

of "identical" machines involved. In that latter case, each machine learns on its own and makes adjustments in process, with all data available to the upstream control operation.

In practical terms, the software can drive cycle time reductions, prevent tool overload and breakage, extend tool life and protect the tool, spindle and machine, all the while furnishing real-time reporting.

The software allows full motion programming, automatically compensates feed and spindle speed, plus it provides all the background data screens in real time for instant monitoring or adjustments. As a result, with the ongoing movement toward digitalization in the shops and factories of today's competitive environment, such software can enable stats to be extracted from machines worldwide for a multi-national manufacturer or a machine tool builder looking to do comparative analysis on its install base.

In addition, the emergence of the cloud as a viable business platform today enables the CNC builder to interact with the machine builder and end user communities in ways never imagined, just a decade ago. This new software, for example, can be monitored by the CNC provider to track real-time spindle conditions in tandem with the machine builder for design improvement possibilities, as well as the end user for OEE data gathering.

The proper care and "feeding" of your spindles can help keep your machines happy companions to your production process. For more information on this latest development in CNC, give me a call. IMD

About Randy Pearson

Randy Pearson, a long-time veteran of the machine tool industry, is a Siemens International Business Development Manager. His special interests include the many levels of training on CNC machine tools, which he conducts through the various seminars, workshops and classes the company conducts with machine tool builders and dealers, at vocational/technical schools and onsite at shops, as well as at the Siemens training facilities around the country. If you have questions or comments on this article or CNC in general, Randy can be reached at (800) 879-8079 or (847) 640-1595.
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