Morris South Holds Atlanta Productivity Improvement Day

Morris South recently held a "Productivity Improvement Day." A number of Okuma productivity boosting machines configured with part-handling gantry robots and automated pallets were demonstrated.

An Okuma 2SP-35HG Turning Center was shown with double spindle productivity. It is possible to run the same part or different parts simultaneously. The machine has box ways and can be configured with a single or twin boom gantry.

The Okuma Millac 561V demonstrated has wide box type ways, large diameter spindle, optional two-speed geared head, and servo drive tool magazine.

The heavy-duty vertical turning center V80R was exhibited. The machine has a counter balanced saddle and integrated quill and spindle assembly for rigidity. The spindle motor is 40 HP and the spindle nose is A2-11. The machine can be equipped with a live tool turret with C-axis spindle.

In addition to several more Okuma machines being demonstrated with double spindles, pallet loaders or gantry loaders, a Tsugami SS20 Swiss-type turning machine was shown with live face and cross tools for the main and subspindle. A dual path Fanuc 31i-A CNC allows for true simultaneous operation of the main and sub spindle. SS 'Abile' software is provided standard with each machine. This CAD/CAM software utilizes a simple building block concept to design a part.

Seminars at the event featured productivity enhancements in the machining processes. The seminars were about cutting tools, cutting tool monitoring and CAD/CAM software.

Milling - Tool Design, Operation, Application, and Selection

Bryan Stusak, Kennametal's MTI (Machine Tool Industry) Sales Engineer, presented a seminar for milling cutting basics. "Milling cutter design is the first consideration," said Mr. Stusak. "Depending on the type of milling to be done, milling cutter styles are face mills, slotting cutters, solid carbide end mills, routers, die and mold, and helical end mills."

Milling cutter design: For general face milling applications, Kennametal recommends a milling cutter with a lead angle of preferably 45-degrees. Choosing the proper lead angle for the given application will greatly influence the cutting forces acting on the machine tool and workpiece. For example, a 90-degree lead angle milling cutter is more likely to produce higher radial forces than a 45-degree lead angle cutter. A 45-degree lead angle directs the cutting forces towards the machine tool spindle instead of the workpiece and also produces thinner chips. The customer can realize higher productivity and metal removal rates (MRR) by properly accounting for chip thinning during cutting, using a lead angle cutter. Axial and radial rake orientations are also important considerations with milling cutter designs. A negative axial and radial rake (double negative design) milling cutter works well for heavy cuts, cast iron, hardened materials etc. This cutter design consumes more horsepower and also directs the chips towards the workpiece, which could damage the surface finish. On the contrary, a positive axial and radial rake (double positive design) milling cutter will cut freely, consume less horsepower and also direct the chips away from the machined surface. This type of design is ideal for machining of non-ferrous materials (eg. aluminum) and is also used in a low rigidity setup environment. "Kennametal's modern Shear Angle design, such as the Dodeka platform, combines the advantages of the double positive and double negative designs to gain productive benefit. These designs employ a negative axial rake and a positive radial rake thereby providing excellent chip evacuation, freer cutting capability, lower power consumption than a double negative design and better edge strength than a double positive design," said Mr. Stusak.

Milling Cutter Pitch: Milling cutter pitch is also defined as the angular spacing between two consecutive milling teeth. Modern milling cutters are designed with variable pitch angles in order to reduce harmonics in the cutting process. A coarse pitch cutter has less teeth in the cut and is generally used for heavier cuts due to increased gullet space between teeth. A fine pitch design has more teeth which allows you to increase the IPM, however has decreased gullet space between insert

Dan Fike, Application Engineer, Morris South, demonstrates the Tsugami SS20 with 20mm diameter capacity.

(l-r) Steve Arnold, Sales Engineer; Doug Schulte, Regional Vice President; Glenn Cave, Application Engineering Manager, Morris South, Huntsville, Alabama

(l-r) Mark Elmore, Regional Vice President, Morris South, Charlotte, NC; Kent Burdett, Regional Vice President, Morris South, Duluth, GA

Gabe Morelli, Regional Manager, SMW-Autoblok Corporation

Kevin McKnerney, Sales Engineer, MP Systems

Mark Munroe, National Sales Manager, Caron Engineering

Sam Turner, Regional Sales Representative, ChipBLASTER, Inc.

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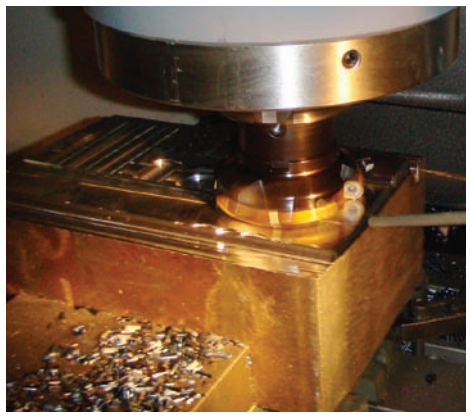
Chips produced from milling should be 6s or 9s.



The final finish cut is performed offset from the centerline.

(l-r) Bryan Stusak, MTI Sales Engineer and Kevin Callaway, Senior Applications Engineer, Kennametal Inc. demonstrate the use of the Dodeka Milling Cutter.

teeth and is intended for light depth of cuts. The choice of cutter pitch is governed by the machining application, but must be chosen so that it can be safely operated within the specifications suggested by the machine tool OEM.

Insert Shape and Edge Prep: Kennametal states that the round insert is the strongest and the triangle is the weakest insert shape, with the octagon, square and parallelogram in the middle. The choice if the insert shape is usually determined by the machining application and part complexities. Cutting edge preparation is also important while machining various workpiece materials. A sharp edge prep is generally very weak, however is ideal for machining of non-ferrous materials such as aluminum and light finishing operations. A honed edge on the other hand, provides a more robust edge and can handle a variety of complex operations and would be a good choice for general purpose applications.

Milling Cutter Basic Operation: Kennametal recommends "climb milling" for greater efficiency and tool life, especially with modern CNC machine tools. "We also suggest offsetting the cutter slightly from the workpiece/machine tool centerline at entry and exit from the cut with not all teeth engaged in the cut," said Mr. Stusak. "This application affects cutting forces for the insert edge, produces less chatter and better tool life."

Chip Thickness : Chip thickness is a very critical component in milling which ensures optimal cutting efficiency. This chip thickness in milling is variable throughout the length of cut and is complicated to determine. Accounting for these variables ensures proper chip formation by eliminating rubbing rather than shearing and also improves tool life. Kennametal has a chart available that finds the average chip thickness for milling applications. The chart is designed to assist in discovering the optimal feed per tooth for a specific edge specification. Contact Kennametal for further explanation of average chip thickness for milling applications.

Caron Engineering - TMAC and AutoComp Tool Monitoring

Caron Engineering National Sales Manager, Mark Munroe, presented a seminar on the company's software called AutoComp for automatic tool wear compensation.

The software works in conjunction with a "driver" from gaging devices such as Mitutoyo, Renishaw, Brown & Sharp, and others. It requires Ethernet protocol and a PC. The Okuma Thinc control and others have integrated PCs.

AutoComp prevents errors caused by manual measurements and manual tool offset adjustments. It works efficiently if you already perform gaging of parts on the machine or if you have a robot performing automatic gaging. AutoComp will process the gage data and update the tool offsets automatically for better tool control. The tool offset status indicates when tool life is reaching its limit. With AutoComp the part is machined, the part is measured, AutoComp determines if compensation is required and tool offsets are adjusted.

Caron Engineering also offers Tool Monitoring Adaptive Control (TMAC). The system protects a CNC machine while providing valuable information about the cutting process. "The system reduces the high cost of replacement tooling, lost production and rejected parts by measuring tool wear in real time," said Mr. Munroe. "It operates on the principle that the horsepower required to cut a part increases as a tool's cutting edge deteriorates. Adaptive Control reduces cycle time and optimizes cutting conditions to improve tool life. It regulates the machine's feed rate override, maintaining a constant spindle motor horsepower during cutting."

MasterCAM New Release X4

Alan Drost, President, CAD/CAM Solutions gave a presentation on the latest MasterCAM release, X4. The MasterCAM X4 version was released in August 2009. Some of the upgrades are in Feature Based Machining for milling and drilling. New toolpath tools are Dynamic Mill, improved 3D surface finish, Circle 5-axis toolpath, Multiple materials for generic MasterCAM Automatic Toolpathing (ATP), updated dialogs for Lathe C-axis toolpaths and tree-style dialog boxes for 2D toolpaths.

"Pre-planning and job quotations for a machining job are easier with X4," said Mr. Drost. "With features-based machining programming is also easier."

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