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June 2006 volume 2 issue 6

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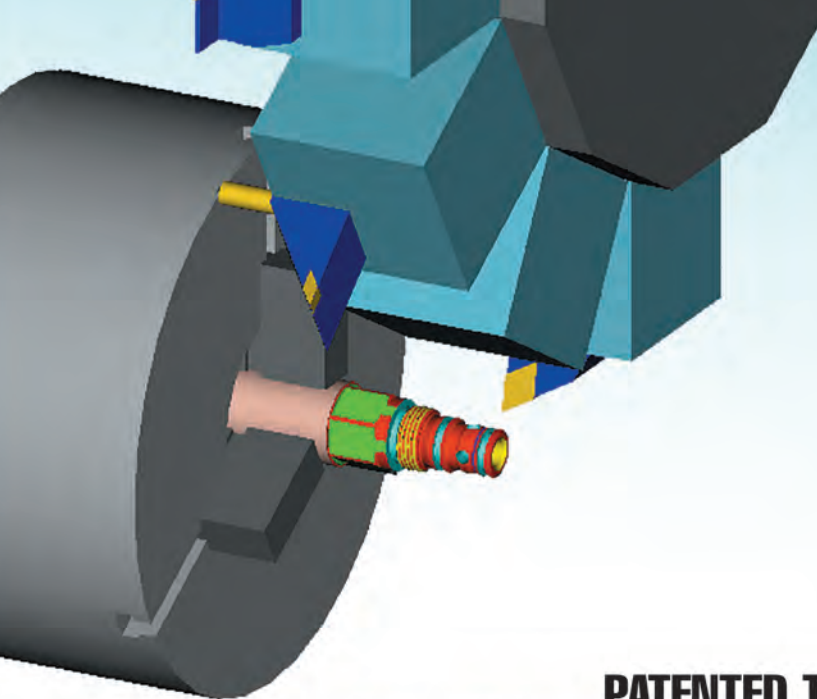
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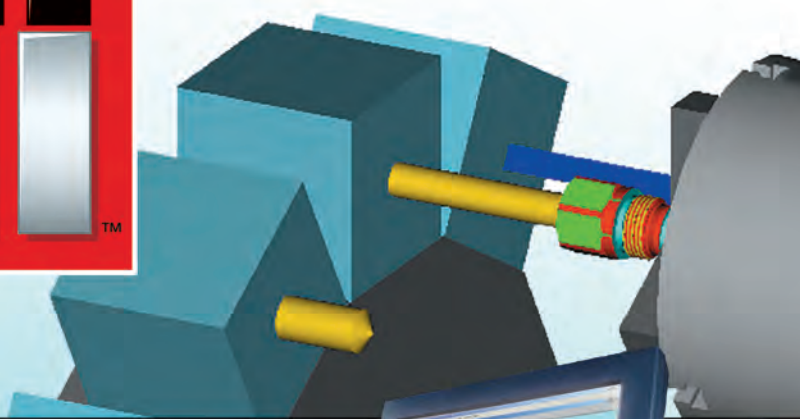
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editor's note

Time to Build

In one weekend, two of the great family-controlled businesses in the world – Iscar, the Israeli-based cutting tool-maker and Golden West Financial, the huge mortgage lender in California, decided to sell out.

Warren Buffet's Berkshire Hathaway Corporation is picking up 80% of the Wertheimer family's Iscar for \$4 billion, and Wachovia Bank is taking over Golden West from Herbert Sandler and his wife, who built the company over 43 years. Two of the wealthiest families in the world decided this was the moment to cash in their chips.

The Wertheimers and the Sandlers spent a lifetime building their businesses. They are both long-term players, as is Warren Buffet. They don't need the money, but they chose this moment to mitigate the risk of having most of their eggs in one basket.

What can we learn from the brilliant Wertheimer and Sandler families? "To every time there is a season," is the biblical proverb. "A time to reap, a time to sow, a time for every purpose under heaven," we are told. There is a time to refrain from building for most people, but not yet for Warren Buffet.

For *Today's Machining World*, this is the time to build. We keep adding new pieces – more issues, better art, sharper writing, astute technical articles, new advertisers, Next, Shop Doc, One on One, a clean, readable redesign.

We are taking the long view in building this magazine. If a buyer came along today, I'd tell them to come back in ten years. Then we might have something to talk about.

Lloyd Graff
Editor/Owner

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Puzzled

Regarding the April puzzle: There were 239 cats, but I have no idea what this has to do with internet security. I must say, however, that the extremely high opinion that I have always held for Lloyd fell a few notches last month when he published the answer to the length of the garland on the tower. Any machinist who has cut a double lead thread could tell that there were, in fact, two garlands twining up the tower, thus the answer provided was wrong. Is Lloyd getting too far from his machine roots in his new world of publishing? I still do love the mag with the new look and articles.

Dave Kudija
California Standoff, Paso Robles, CA

Objection

I was starting to like your magazine. Now I am disappointed with your Swarf article. As I read your opinion, it appears that you consider people opposed to immigrants who gain access to the United States "under the fences, through the cracks and out of the pores" as class-conscious know-nothings. I do believe that immigrants are necessary for every country to work in positions that support the way of life provided to all the citizens of that country. I disagree with you in that I believe they should enter legally.

I feel bad that you make such strong judgments regarding your fellow U.S. citizens that you portray them as wanting to keep out evil "furriners." I guess those citizens must be rednecks, as you apparently imply. They are looking for a "yellow peril," as you put it.

I would venture that you might gain a better insight of the problem if you really listened to what Lou Dobbs actually says,

rather than choose to disagree with one of the many Congressmen on both sides of any issue that he interviews.

I wish you success in your endeavors, but please remove me from your mailing list. I think I can find more realistic articles on manufacturing in other publications.

Gary Chmielewski
Apex Tooling, Defiance, OH

New Angle

Love the magazine from front to back most of the time. Regarding "Shop Doc" from April's issue, I have a comment. The Shop Doc's advice, while good, sort of had me baffled. Since when is a 2.250 hole in 12L14 extremely deep? I regularly drill 4-6 inch holes in 1018, 4340, 6150, 8620 and more. Heck, the lead cam on one job is the entire depth of the "extremely deep hole" the Shop Doc mentioned in his advice. I use Cleveland coolant drills at \$150 a piece for 43/64 for three and follow it with a Besly Turbo Flute Parabolic drill for the fourth drill to save costs, as they are only \$30 a piece. Lastly, I follow it with a core drill, going the whole length of the part of size. These parts are all aircraft piston pins, so all our materials are aircraft-grade alloys. Also, I drill these on vintage 1952 Conomatics. I've heard that Cones are much more rigid for these applications. I wouldn't know for sure, as I've never touched an Acme. I'm just trying to give another angle. Keep up the great work.

Mike Mallette
Ace Grinding and Machine Co., Walled Lake, MI

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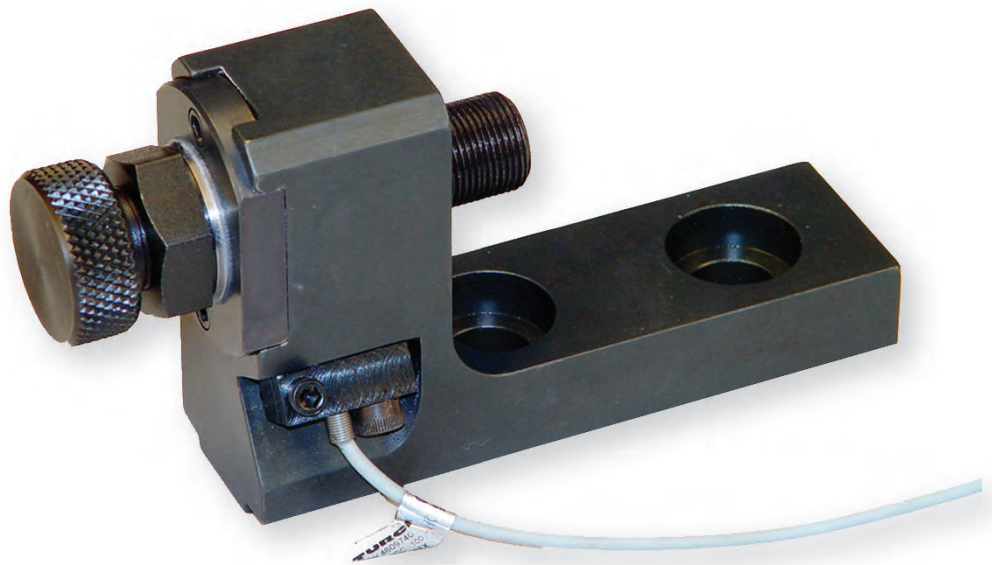
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Hot Commodities

The ride has been fun. Business has surged. Balance sheets have mended. We've started to forget about the China plague, and Bin Laden has been playing nicely in his cave.

But a funny thing happened on the way to the bank. The Fed started raising rates and inflation started inflating. I am not clairvoyant enough to know if the Federal Reserve is ahead of or behind the curve, but I do know gas is \$3 a gallon, copper is around \$3.50 a pound, and my bank loan has become a toothache. I don't like this curve.

Ten-year rates have popped out of the comfort zone, and Florida condos are accumulating like algae in a fetid pool. This is a good time to rent.

Commodities speculation has passed the crazy line. Has anybody asked how much copper China really needs in the wireless world? When New York lawyers are buying homes in the Hamptons for \$25 million on spec, we are seeing the bigger fool theory at work. When workers cannot move from the Midwest to take the available jobs in Florida because they can't find affordable housing, the market is on the cusp of a correction.

The machining world that we live in has happily avoided the inflationary goofiness, but in the vehicle market, big SUV's will have to fall in price dramatically to clear the dealers' lots.

My gut feeling is that oil could fall to \$40 a barrel

or go to \$100. The lower number is the approximate economic value of the commodity, with \$30 factored in for political risk and hedge fund tulip hunting.

Would I now take a machining job, gambling on a \$2 a pound price of brass in October? No way, but I would not be shocked by such a correction. Ben Bernanke of the Federal Reserve is being tested by the markets in his first months in office. He is likely to earn his bonafides as an inflation fighter, which could mean a big ouch in our world.

Lately, Warren Buffet has been purchasing General Motors stock and making a big deal about buying a Cadillac DTS for his five minute commute to his Omaha office. Booyah, Buffet. Obviously, Buffet is betting against bankruptcy. He usually has very good information on which to make his decisions. So far, Delphi and the UAW have acted like mensches and avoided the big confrontation. But I still worry about dead-enders in Dayton or Kokomo who could sabotage a settlement.

So I'm in my summer yellow flag period. Hopefully, by IMTS I will have more clarity, and the economic world will feel safe with Bernanke – or in spite of him.

The skills squeeze in the machining world seems to be getting more acute by the month.

We recently put up four National Acmes on eBay for a suburban Chicago client. The firm wanted to make space for several Nakamura CNC lathes. They were hoping to place the operator/set-up man, who had made the machines productive for them, in another job. We put this request into our faxed advertisement for the sale, and on eBay.

We received a dozen inquiries about the prospective employee from as far away as California and Ontario, Canada.

I had another call from an old customer in Nevada, telling me he wanted to sell his screw machine plant after 29 years. He said there was ample business available, but he just could not find the skilled people to keep his machines productive. He had decided to work for the state for ten years and then retire.

And I had a call in late April from a head-hunter trying to place a Hydromat set-up person. He said business was great. The first three months of 2006 equaled the best quarter he's ever had.

The irony of the strong movement of manufacturing to China, and the automotive plant closures, and the current explosion in the stock prices and earnings of American classics like Caterpillar, Deere and Cummins is striking.

The demand for skilled machinists in America has seldom been stronger, yet the supply continues to dwindle. This is an economic disconnect that cannot continue indefinitely. Hispanic workers are beginning to exploit this employment opportunity. If homebuilding continues to falter we may see a shift of some workers to machining. We could see a resurgence of manufacturing in Michigan, Indiana and Ohio to take advantage of automotive refugees, but my observation is that ex-Delphi and GM people do not covet the available machining jobs. If they cannot have their union sheath, they would generally prefer to leave the field.

swarf

There is an opening now for both non-profit and entrepreneurial training schools. It would be a smart product extension for a Haas or Mazak. The machining job opportunity has been poorly promoted by American manufacturing companies, but the upside for both buyers and sellers of skills is becoming so compelling that the void will eventually be addressed – either here or abroad.

Pricing of services is one of the trickiest pieces of doing business. I have struggled with this through the years as Graff-Pinkert has developed its expertise in refurbishing and servicing Wickman multi-spindles. We are also a purchaser of skills and services, such as metal-stitching and CNC programming and repair.

Our Wickman rebuilders are in high demand for outside field work. They also add value to our business by refurbishing the machines, which we own for stock. When they go into the field, they may not be working on Graff-Pinkert machines. So we price their services commensurate to the value they would add if they were working in-house.

One of the prickly pricing issues for such services is travel time. Time away from Graff-Pinkert is irrelevant to the client, but a significant cost for our business.

We also get into trouble by bundling service and troubleshooting with machine purchases. This may give the illusion to clients that such services are not extremely valuable. When they want to buy our services separate from a machine purchase, they are often stunned by the hourly rate we charge, which can lead to ill will.

One option is to operate the service business as a separate entity. Another choice is to hire outside contractors to handle the field work. Both have their pluses and minuses.

Whenever you have pricing anomalies in your business operation you risk alienating your customer or short-changing yourself. I compare it to charging \$25 per hour for an old job for a good machining customer, but charging \$75 per hour for new work. When the customer wants you to work for \$25 on everything, what do you say? Why does an airline charge \$49 for one seat and \$349 for another right next to it on the same plane? How does your business handle this?

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Our salesman, Rex

Magagnotti, recently returned from the 2006 PMPA National Technical conference in Dearborn, Michigan. The theme of the conference was "Best Practices Driving Change." He found all of the seminars to be relevant and helpful, but was particularly impressed by the seminar on "Lean/Best Practices" put on by staff from Micron Manufacturing Company of Grand Rapids and Vanamatic Corp. of Delphos, OH.

He said it would be impossible to go into all of the details he absorbed and all the benefits of the lean practices they cited, but one fact stood out above all others: Vanamatic showed ways they had reduced their average set-up times in the last ten years from 16.5 hours down to 5.11 hours. Their 10-year savings totaled 44,274 hours. Based on their hourly burden rate, that equaled a savings of \$2,213,700. Rex said their methods, down to counting out ways to reduce steps to the fax machine, were weighed and calculated.

When you think about it, the cost of the entire conference for a PMPA member was \$440. It seems to me that if a company put into action only 10% of the ideas gleaned from

a presentation like that, the investment in a PMPA membership pays for itself over and over again. I'd say it's a good time to look at becoming a member (and contact Monte Guitar when you're ready).

Guest "star" of the conference was none other than the legendary Ted Nugent. Yes, that's right - we're talking "Cat Scratch Fever," "Surviving Nugent: The Ted Commandments" television show Ted Nugent. Turns out, he's also a live-off-the-land, bow and arrow type guy, who had lots to say about everything; illegal immigrants, raising children, the 10 commandments, and especially, the right to bear arms. He is a huge supporter of the NRA and believes the country would be a safer place if everyone carried a gun. If nothing else, he was a very intense but genuinely nice guy who added a healthy dose of spice to the conference.

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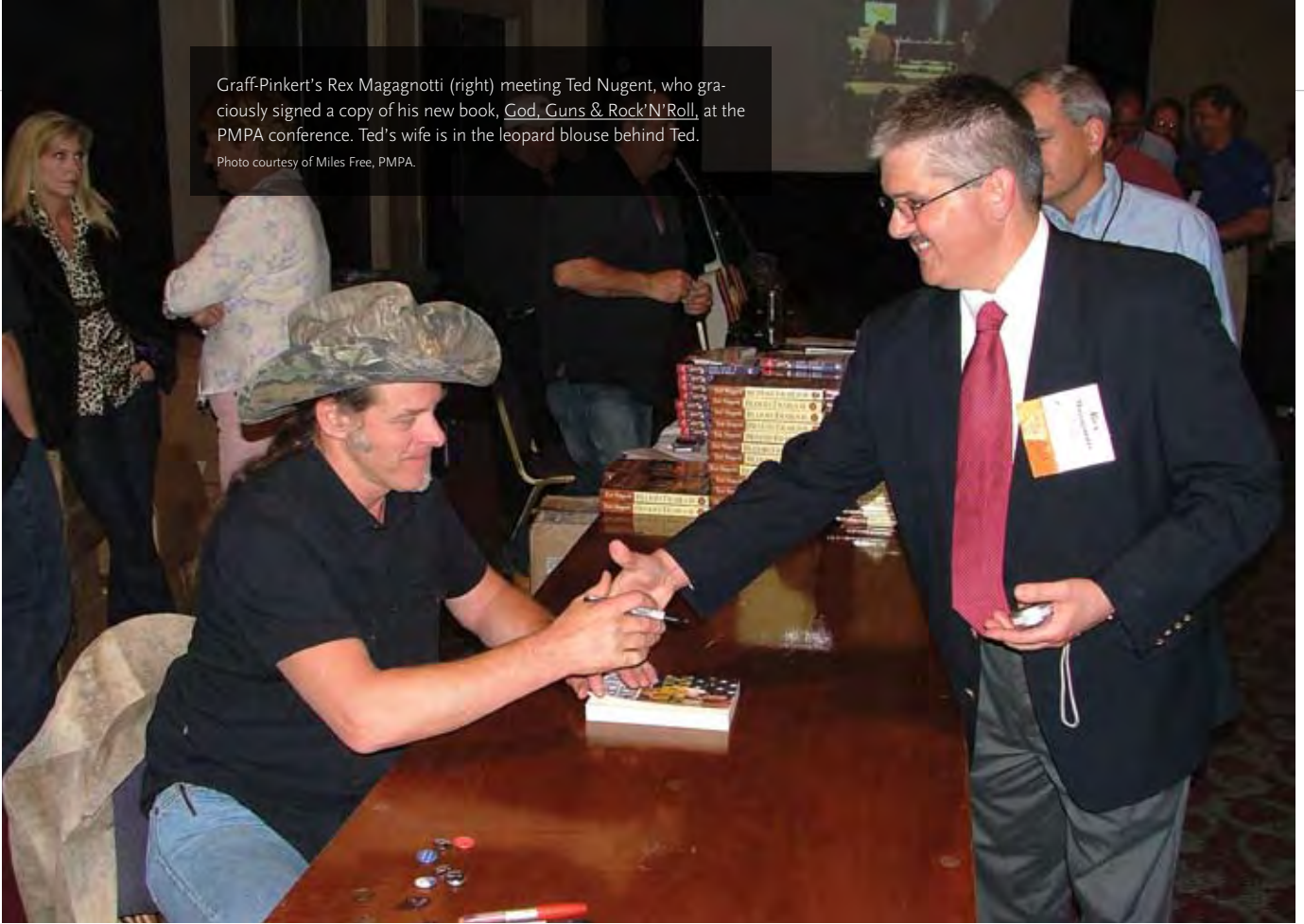
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Graff-Pinkert's Rex Magagnotti (right) meeting Ted Nugent, who graciously signed a copy of his new book, God, Guns & Rock'N'Roll, at the PMPA conference. Ted's wife is in the leopard blouse behind Ted.

Photo courtesy of Miles Free, PMPA.



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I made a trip down to Charlotte for the Lemca Barloader Open House in mid-May. The Buccis family, which owns Lemca, was there in force, and the event was graciously hosted by the Buccis and Manfred Sprenger, the head of the American subsidiary.

Lemca has a varied product line for CNC lathes and showed an elegant new product – a movable robot loader for pieces up to 2.5 pounds. About 60 % of their American sales are now for sliding headstock lathes with the Boss and Genius lines leading the way. They have several interesting loader products for the medical market, including the Trilogy and Smart models.

January 1st, Lemca pulled its American distribution from Hydromat, which had the line for 20 years. They struggled in the first quarter, as they were putting together a professional sales and service organization.

I thought the Charlotte exhibition was skillfully handled with well-planned demonstrations. The crowd was not big, but I wouldn't have expected barloaders to attract an array of users.

To my surprise, Manfred Sprenger resigned during the Charlotte Open House. Sprenger had worked for Lemca since 1999 and had spent 17 years with Chiron in the U.S. prior to that.

The Sprenger shift reflects the difficulty inherent in making big changes in distribution in a country as vast as the United States.

The machining community will be watching to see if the Buccis can quickly bring leadership to the American organization and offer a well-oiled assembly, distribution and repair group to match its excellent products.

Sea-changing innovations are often the simple, innocuous, virtually unknown ideas that appear without fanfare. Think of email, Starbucks – and the container ship.

In May, we marked the 50th anniversary of the ocean-going container, which has dramatically changed our world since 1956.

In the old days, pre-container ship, freight was unwieldy and expensive to send by boat. Longshoremen and their

tough unions controlled the docks. The efficient container dramatically cheapened international shipping of goods and ushered in the era of globalization. Is it a coincidence that Wal-Mart started in business four years later or that the European Union and the growth of Japanese trade happened concurrently?

Long Beach, California and Savannah, Georgia invested heavily in the new technology and became huge winners in the ports competition.

The amazing efficiency of container transport has made the cost of freight from China almost inconsequential. I have read that China to Long Beach freight costs average 5% of the cost of goods for Wal-Mart. Long Beach to the warehouse for Wal-Mart is another 5 to 10% on most goods. The impact on machined parts imports is obvious for low-tech items.

The Dubai ports purchase fiasco focused attention on container trade and its importance to security. The big story is that the big steel boxes have already dramatically changed the world.

I am a big fan of entrepreneurs, but I draw the line at entrepreneurial lawyers. I'm talking about the wise guys who organize the class action suits against asbestos, Vioxx or AIG for self-serving reasons. They have cheapened the legitimate plaintiff's bar and made the term "trial lawyer" synonymous with "shyster."

The indictment of the Milberg Weiss law firm, the king of the class action world, highlights the cynicism of this sector of lawyerdom. Allegedly, this firm routinely paid off plaintiffs with cash from a special partner's safe to be lead plaintiffs, with Milberg Weiss naturally being lead counsel. I am not totally naïve, but I find this rigging of the legal system by politically connected big time attorneys sickening. This kind of corruption promotes a distrust of both business and legal structure in America. I have read enough John Grisham to suspect Big Law at every turn, but Milberg Weiss's indictment makes Grisham look like a *Wall Street Journal* reporter.



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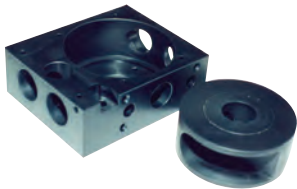
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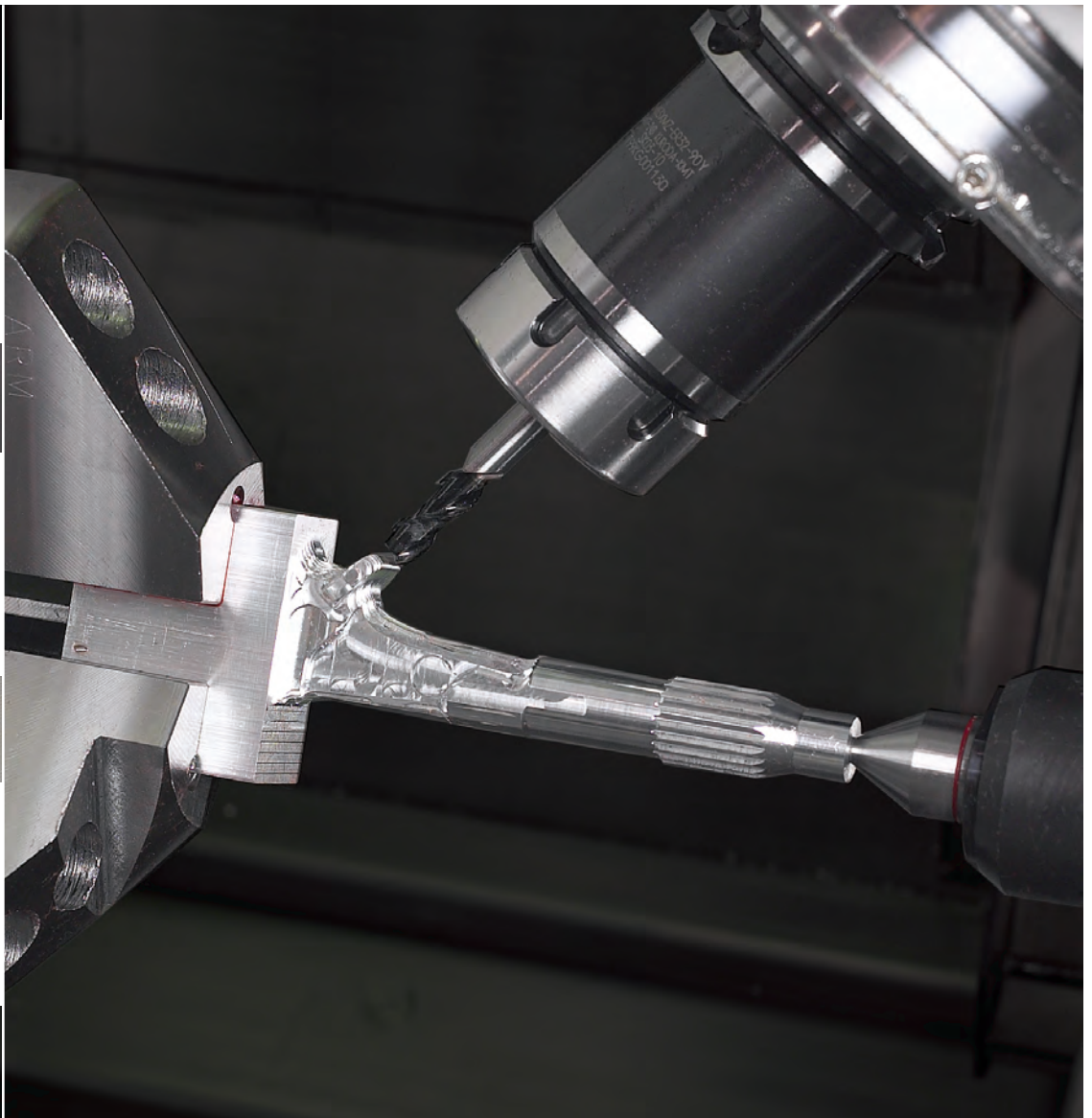
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book review

BY JERRY LEVINE

Collapse

For those who are waiting to curl up with the next doomsday book in the growing field of scary scientific literature, there's good news—Collapse, by Jared Diamond, is the latest entry in the field.

The book's message has been written before—200 years ago, by Thomas Malthus and then in 1968, by Paul Erlich in The Population Bomb. Both thinkers wrongly projected massive starvation before the year 2000, for rich and poor nations alike. Diamond recognizes their miscalculations but asserts that even though they were wrong, environmentalists are right more often than not.

Diamond begins Collapse by asking why once thriving civilizations such as Easter Island, Norse Greenland and the Mayans fell. He concludes that those past collapses were the result of self-induced environmental problems, and that we have little hope of avoiding the same fate. Many of Diamond's concerns are based on pre-technological societies in remote sections of the world, but he also identifies many threats to today's environment such as global warming, toxic chemicals, energy shortages and limits on Earth's photosynthetic capacity.

Diamond argues that the root of the world's future crises is human population growth. Absolute growth of the world's population is a problem, but a far bigger problem is the increased demand for natural resources as people advance from third world to first world lifestyles. Diamond claims the average citizen of the U.S., Western Europe and Japan consumes 32 times the resources and produces 32 times the waste of a citizen of China, India or Eastern Europe. Economic development of the third world is already causing tremendous stress on the world's resources. Look at the impact China's growth is having on the price of oil.

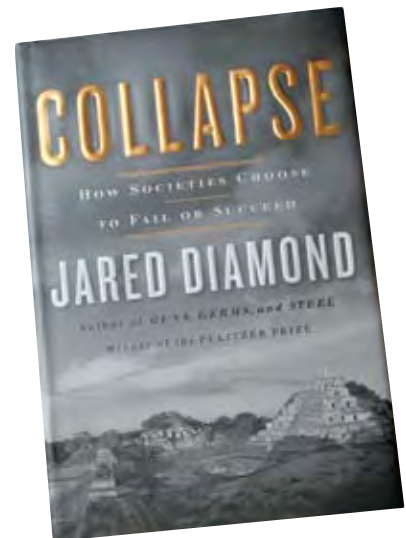
The world's food supply is also threatened. Diamond claims that farmland soil is being carried away by water and wind erosion at 40 times the rate of formation. The world's supply of fish, the main source of protein for about 2 billion people, is being wiped out as man destroys the fertile ocean bottom and coral reefs. Other plant and animal food sources are also becoming endangered or extinct.

In discussing why other civilizations failed, Diamond says they either didn't see the problems coming (unlike us), lacked the political will or found the problems impossible to solve (e.g.; "Little Ice Age" destroying Norse Greenland). We currently suffer from the latter two problems. Most people don't realize that even if every country strictly complied with the Kyoto Treaty, there would only be a minuscule reduction of global warming, while there would be significant negative effects on the U.S. economy and standard of living.

Diamond concludes Collapse with a few pages of upbeat platitudes entitled "Reasons for Hope," but those arguments are so short and poorly conveyed, that I suspect he doesn't believe them himself. He was probably pressured by his publisher not to end the book so pessimistically. Personally, I don't see the glass as bone dry as he does. Mankind has advanced and thrived over the past millennia and will continue to do so. As problems have grown, so have solutions.



Diamond identifies many threats to today's environment such as global warming,



toxic chemicals, energy shortages and limits on Earth's photosynthetic capacity.

Comments? You can email Jerry at jerroldlevine@yahoo.com.

Robo-Op

A new Fanuc robotic EDM cell from Methods EDM features a high-speed Fanuc 6-axis robot and can be configured to serve either a single or multiple Fanuc iC Series wire EDM machines. The design of the Fanuc M-710iB/70 robot provides a large work envelope in a minimum of floor space. With a standard Joint 1 rotation of 360° and the ability of Joint 3 to flip over and work behind itself, the robot can reach anywhere. Directly coupled drives on all axes ensure repeatability of ± 0.15 mm.



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Robot motion is controlled by exclusive CellMaster™ cell control software. After it picks up a workpiece from a designated loading zone, the robot places it on a storage rack, logging its location. The cell control software, which includes presetting functions, then matches the CNC program, cutting technology, robot gripper and any tooling or fixturing with the part. The software then allows the user to schedule jobs and monitor individual job progress and/or machine status. It also allows a user to monitor the status of cell machines and jobs for multiple cells.

A reliable auto wire feed system and large 35-pound spool capacity allow extended unattended operation. (An optional 100-pound wire spooler is available for larger, longer running or more complicated jobs.) With an extremely powerful, lightning-fast CNC, Fanuc iC Series machines offer cutting speeds of 31.0 in²/hour with uncoated wire and 33.6 in²/hour with coated wire.

For more information, contact Methods EDM at 978-443-5388, visit booth D-4114 at IMTS in Chicago Sept. 6-13, or visit the company website at www.methodsmachine.com.

No Friction

NTC's Z μ 3500 operates with a zero metal contact design, which eliminates major sources of friction and related thermal distortion. The Z μ 3500 functions without linear guide ways, roller bearings or ball screws. The Z μ 3500's use of temperature-controlled hydrostatic oil in the hybrid spindle bearing, static pressure guides and the linear motor cooling system virtually eliminates thermal distortion saturation time. The near-absence of friction (and therefore vibration) not only increases precision but also extends tool life and reduces noise levels.

The Z μ 3500's spindle is the world's first fluid hydro hybrid, incorporating hydrostatic and hydrodynamic technologies that virtually eliminate wear and run-out. At 25 HP, it reaches speeds of 30,000 RPM. The spindle utilizes HSK E32 tool holders. The 12-tool ATC is fully enclosed. Travels are 13.78" in the X-axis and 11.8" in the Y- and Z-axes. Positioning is accomplished with cooled scaled linear motors at 0.6G in acceleration.

For more information, contact NTC America Corporation at 248-560-1200, stop by NTC's IMTS Booth A-8161, or visit www.NTCMC.com.



Scan and Deliver

Mitutoyo America Corporation announces availability of new LSM-500S Series Laser Scan Micrometers. With a scanning rate of 3,200 scans per second and a repeatability of $\pm 0.03\mu\text{m}$ (LSM-500S), the LSM-500S Series are precise laser scan micrometers available for inspection of rapidly moving

or vibrating workpieces such as optical fiber, fine wire, micro shafts, films, ferrules and similar items.

The Mitutoyo LSM-500S Series incorporates an edge-detection circuit, which simplifies finding and aligning on workpiece edges. Easy operation plus robust construction and a wide measuring range (from $0.0002'' \sim 0.079''$ and $0.005 \sim 2$ mm for the LSM-500S up to $0.04'' \sim 6.3''$ and $1 \sim 160$ mm for the LSM-516V) make the LSM-500S Series ideal for a wide variety of production applications.

Data can be output via a standard RS-232C and I/O analog interface for use in multiple statistical analyses.

For more information, please contact Mitutoyo America Corporation at 630-978-5385 or visit the company website at www.mitutoyo.com.



Always an Option

CHIRON America has introduced several new productivity options for its Mill 800 Vertical Machining Centers. These

options include: new milling from bar, new turning from bar, a new a high capacity tool changer, a ± 100 degree swivel head and a trunnion table for 4- and 5-axis machining.

Milling from bar employs a 100mm thru-hole to feed bar stock to an indexer for five-sided machining. When the five sides have been completed, the part is automatically picked off the indexer and the sixth side is finished. The same sequence applies to turning from bar, but instead of an indexer, the part is fed to a 5000 rpm turning spindle. Maximum diameter stock for turning from bar is 2.5" (65 mm).

CHIRON also facilitates one setup machining with an optional swivel head that has 100 degrees of movement, clockwise or counter clockwise. It has exceptionally high rigidity and speed. It takes only a half second to swivel from 0° to 90° . Complex parts can be machined horizontally as well as vertically in one set-up.

For more information, contact CHIRON at 704-587-9526 or visit the company website at www.CHIRONamerica.com.



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Call Collet

Hardinge has introduced large part indexing, utilizing their collet-ready A2-5 spindle. A variety of standard 16C or 3J spindle tooling will mount directly in or on the high-precision spindle without the use of an adapter. Common spindle tooling can now be shared from indexer to lathe. Collets, expanding collets, step chucks and 3-jaw power chucks will automatically center the part, enabling superior grip force for heavy cutting.

A 6" (152.4mm) centerline is standard with a 1.625" (41.27mm) 16C or a 1.750" (44.45mm) 3J through-hole capacity. A pneumatic collet closer provides 4560-pound (2068kg) draw bar pull. A .625" (15.87mm) stroke allows the use of "power" chucks. Removable eyehooks locate on the top or on the face of the indexer for installation to a mill table or assembly operation. The spindle has dual angular contact spindle bearings. Speeds can be reached up to 50 RPM or 300-degrees per second.

The 16C model will accept round stock capacities up to 1-5/8" (41.27mm), hex capacities up to 1-13/32" (35.71mm) and square capacities up to 1-9/64" (28.97mm). The 3J model will accept capacities of up to 1-3/4" (44.45mm), 1-17/32" (38.89mm) and 1-1/4" (31.75mm) respectively. Emergency collets and step chucks can be bored-to-size on location for JIT machining.

Hardinge indexing systems are compatible with most brands of vertical machining centers and knee mills. Hardinge's servo control will store up to 50 programs with up to 1000 steps in each program. 16C and 3J indexers can be used with a Hardinge servo control, actuated by "M" functions or as a true 4th-axis of the machine.

For more information, call 800-510-3161 or visit the company website at www.hardinge.com.

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- Tombstone Machining
- Wire-EDM

SMART Part



REGO-FIX recently added the new SMART model and advanced TCAM2 model to its existing line of Toolmaster TM10 Presetters. The series now offers fine adjustment capabilities, a calibration master mandrel that comes free with any machine purchase, and a unique needle bearing basket, which successfully counteracts the effects of debris and scratches.

REGO-FIX's new SMART presetter is a basic camera unit with a 3" color screen that has displays for X and Z axis tool setting. This model is ideal for those requiring no contact. Precise glass AcuRite scales will accurately measure the dimensions of the tool and provides absolute and deviation measuring for each axis. The SMART comes standard with 40 and 50 taper models and has adapters available for other sizes.

All presetter models use electronic parallel correction. Each model also produces run-out less than 0.00008" with its patented Needle Bearing Basket. The compact tabletop units are suitable for all tool measuring and presetting applications and do not require any special computer or programming knowledge. All models are designed to be on the shop floor next to the machines.

Additionally, ToolManager's tool presetter interface is compatible with RealVision's webDNC. This DNC solution enables REGO-FIX presetters to communicate with machines. webDNC features automatic machine monitoring, download tool lists, download tool offsets and the ability to submit maintenance requests from the machine.

For more information on REGO-FIX, its products and services or to request a catalog, please call 800-REGO-FIX or visit the company's website at www.rego-fix.com.

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TODAY'S MULTI-SPINDLE WORLD – AN INTERVIEW WITH DUPAGE
MACHINE PRODUCTS PRESIDENT DAVE KNUEPFER

**DAVE, DO YOU CONSIDER DUPAGE MACHINE PRODUCTS
A JOB SHOP?**

We're still a traditional job shop. We run 5,000 and 500,000 pieces, but we're not always profitable doing that. I have thought about changing the mix, and we've gotten more into dedicated and longer runs, but we're still dealing with shorter runs, and I don't think we make money on those jobs. I know you want to know about the economics of buying an Index. Why would somebody spend \$1.4 million on an Index machine? The way I see it, at least for my survival, it is the only way we can survive as DuPage. We must get into a niche, and that is not doing commercial work.

HOW DO YOU DEFINE COMMERCIAL WORK?

I consider commercial work hardware-type parts, home appliance, plumbing; not the techy stuff that you're grinding and lapping and honing. I think hardware will be gone from this country, certainly in our lifetime. We had several million dollars worth of commercial work in fire suppression systems for restaurants, which we ran for years. It was a couple of nuts with different types of washers on them – Screw Machine 101. The customer came to us 3 or 4 years ago and said, "We're going to go to China with this thing." At one time, we shipped 100,000 of these into one of their 15 warehouses throughout the country. We said, "Listen, we will add some value. Rather

BY LLOYD GRAFF



than ship 100,000 of these for you to assemble, we will assemble, package them in your bag and identify the part number, and when the Denver warehouse needs 15, we will send them 15.” Out of sight, out of mind. That bought us about 2 or 3 more years; it finished last year. \$2 million worth of business they could buy delivered here for about \$1 million. They would have been foolish not to shift. I don’t think there is any future for that type of work in this country unless you’re interested in just getting along and not making a reasonable rate of return on your investment.

YOU’VE CHOSEN HIGH-VOLUME, HIGH-PRECISION.

It’s not all high volume to begin with. We hope it matures into that, but it is certainly high-precision. That’s how you afford an Index. We went with the Index for two reasons; one was to get that high-volume, high-precision dedicated part; and the other was to run a family of parts. We run a family of hydraulic cages, and these parts run anywhere from 500 pieces to maybe 7,000 to 10,000 pieces a week per part. Our biggest problem was the big run that ran 10,000 pieces a week. We were running 50,000 pieces and couldn’t get to the next job because we had all this production time, and everything was waiting in the queue before we ran the 50,000 pieces off. With the Index we can run 10,000 pieces or 2,500 pieces, switch over to a similar part where we run the same size stock, and it

reduces our inventory. But more importantly, it reduces that queue time, where we couldn’t get to the next job because the machine was tied up with a job and we couldn’t ship for 4 or 6 weeks.

AND NOW WITH THE INCREASE IN METAL PRICES THAT MUST BE EVEN MORE IMPORTANT.

That’s really been our struggle as an industry, and it’s been our struggle at DuPage too; the inability to raise prices. The profit margins aren’t great in any jobs today, not like they were in the ‘90s and certainly in the ‘80s. You could make a really good living at this. But you know, the profit margins are down in the single digits. Is it worth it, or should I buy the strip mall?

HAVE YOUR EMPLOYEES KEPT UP WITH THE HIGHER TECHNOLOGY MACHINES?

Some have, some haven’t. Some of the older guys that we wouldn’t even bring into that arena have not embraced the quality revolution. That has been my biggest struggle in the last couple years. I don’t want to say we’re cleaning house, but we’re cleaning out some of the people who don’t want to jump in and work and play well with others. It’s a different world today in quality. Form, function and fit is out. It’s all about print dimensions and running the print. Very rarely do you get people who will accept something because it has the proper form, function and fit. If

High Volume, High Precision

AN INTERVIEW WITH DAVE KNUEPFER

it's not to print they won't take it. They're afraid they're going to have a recall. I can't blame them. It's been a real tough thing changing our people's mindset on that.

WHAT ABOUT RUNNING AUTOMOTIVE WORK?

We do a little bit of automotive work. Our sales guys have been telling me for 2 or 3 years now, "The only way we're going to take the next big leap is to get into automotive." We had a TS consultant come in and go through everything; tell us if we're TS compliant or how tough it would be to get there. There is a little tweaking we would have to do, and we would be TS compliant. So, it is not a big financial cost for us to take that step from a quality point of view. But I'm really at a crossroads. The volumes are terrific, but if you stub your toe once, you're dead. We're doing a very large job on a Hydromat for a client, and it has been terrific. But when you play with those guys, it is the real deal. If you shut them down, they will think nothing of handing you a bill for \$400,000. Control plans, we have them. You need a living document on the plant floor when you're dealing with automotive. You follow that control plan to the spec, and if you deviate one bit from it, you have to answer to somebody. We had a little catastrophe here a couple years ago where we got a pretty hefty bill from one of the automotive guys. We negotiated until it was, I don't even want to say, palatable.

A BUSINESS EXPENSE.

Yes, bigger than I've ever had. That's the downside to automotive. The upside is the volume. We have been dabbling in it only for about a year, bidding on large automotive contracts. We have been competitive on some, but I don't really see margins in it so far. My sales guys tell me I haven't seen enough parts yet. There is some truth to that. Some of the industries that we're serving right now have matured with the volumes, and we have to keep looking to move forward.

STAYING IN THE MULTI-SPINDLE BUSINESS, HOW CAN YOU EXPAND MARGINS?

The only way to expand margins is to bid the part upfront. You cannot take a part and expect to raise the price over time. In the '70s and the '80s and the early '90s you could do that. You cannot do that today. It has to be a part that is difficult, where you can drop it off complete where somebody else has second operations. If you can price that right, you can get a pretty decent margin out of it, and justify that \$1.2 million machine.

CAN YOU DO SOPHISTICATED WORK WITH UNSOPHISTICATED MACHINES?

I think not. There are some of my competitors out there who will tell you that they can do anything I do on an Acme, but they are fittings guys. We had good New Britain people back in the '80s, and we couldn't do it back then. We made and shipped parts, and our customers accepted them. But were we sophisticatedly capable? I think not. And I'm not saying we shipped defective parts to our customers. Those machines are not specifically capable of producing that part day in and day out for today's specifications. Plus or minus .005 used to be fine. Now it is plus or minus .002. Why? Well .002 is better than .005 isn't it? That's another thing, Lloyd – it has nothing to do with multi-spindles, but it is the kids today, the young guys who are in engineering today. They're bright, probably brighter than the guys that came out 30 years ago. I don't question that, but they don't really visualize things like some of the older guys. They think tighter tolerance means a better part. It does, but at what cost? The older guys could conceptualize things a little better. The newer group wants prototypes.





IF WE'RE TALKING COMPETING TECHNOLOGIES, YOU HAVE HYDROMAT, YOU HAVE STATE-OF-THE-ART MULTI AND YOU HAVE CNC SWISS, ANOTHER CATEGORY BUT WHICH COULD BE COMPETITIVE ON SOME OF THESE JOBS.

The CNC Swiss are competitive, but they're slower. They don't have quite the output, but they are less expensive machines.

BUT YOU COULD RUN THEM LIGHTS OUT, THEORETICALLY, AND PUT FOUR OF THEM SIDE-BY-SIDE, AND THEY WOULDN'T BE AS EXPENSIVE AS EITHER A HYDROMAT OR THE INDEX.

I could put eight of them side-by-side.

SO WHY NOT?

Good question. I think a lot of people are skinning the cat that way. You can get all the attachments for the Swiss CNC, and put four of them together and do that.

HOW DO YOU DECIDE? DO YOU HAVE ANY ARBITER WHO SAYS, "HYDROMAT, INDEX, EUROTURN, SWISS?" WHO MAKES THE DECISION ON WHICH WAY YOU'RE GOING TO GO?

We don't have enough Index machines in here right now to really have the luxury of saying, "We will run this here



or there." We have dedicated our Index multis to several different parts right now, but when we get 6 or 8 or 10 of them in here we will make those decisions. In my view it involves the type of part, sometimes the volume and certainly the setup. We are doing changeovers on the Hydromats on similar type parts in five to ten hours.

THAT'S DAMN GOOD.

Yes, on a family of parts. I'm not talking about significant changes. We're moving some heads but not doing a lot of that. We're doing changeovers on the Indexes in four hours or less. We don't change the collets.

ARE YOU DOING MUCH PROTOTYPING ON THE SWISS; MOVING THE JOB TO THE INDEX MACHINES AND THEN RAMPING UP TO THE HYDROMATS?

No, we haven't done that. When you spend \$1.5 million on a machine like a Hydromat, you try to utilize that machine as much as you can, so you really try to look for long running jobs that you can dedicate that machine to.

THEN THE JOB RUNS OUT. IT'S SUPPOSED TO RUN EIGHT YEARS, AND IT RUNS FOUR.

We have had that happen. I have a Hydromat stand-

High Volume, High Precision

AN INTERVIEW WITH DAVE KNUEPFER

ing right now. We thought that baby was going to run through 2008. Well, guess what? At the end of 2005, the job's gone, and I've had it standing for four months. We kind of got caught with our pants down. What I'm probably going to do in the interim is spend about \$150,000 and tool the thing to run similar type parts that we're running now on multiple pieces of equipment.

WHEN YOU BUY THE NEW INDEX MULTI, ARE YOU BUYING WITH A PARTICULAR FAMILY OF PARTS IN MIND THAT YOU THINK WILL RUN FOR TWO, THREE, FIVE YEARS?

The Index work we think will run for five to ten years because it's a running contract, and it's not an automotive thing where they'll tell you, "This is through 2008." Usually, when they tell you that, it doesn't extend much past that. We've taken work that we had here in-house. We have a track record of making it, and we understand what it takes to make it, understand the customer and know it has two or three subsequent operations on it. We throw this thing on the Index, drop it off complete in 10 seconds, and away we go. We don't have the ability to raise the price because we're putting it on the Index, but we try to work the math so it makes sense, and if it does, we do it.

YOU WILL STILL BUY A USED 5/8" WICKMAN. WHERE DOES THAT FIT INTO YOUR VIEW OF THE MULTI-SPINDLE SCREW MACHINE BUSINESS? HOW WOULD YOU DEFINE THAT BUSINESS?

I do believe we are job shop producer of precision turned parts. I do believe we are on the upper end, not the commercial side, of parts. The parts we're making on those 5/8" Wickmans are not commercial. They have some sophisticated tolerances on them that those machines are capable of handling. I haven't had any trouble with them. I bought two more Wickmans because the parts that I drop off them go into an assembly now, and I just couldn't keep up.

BUT WHY COULDN'T YOU ENVISION YOURSELF HAVING A BUSINESS BASED ON THAT KIND OF WORK?

It's a little different in our business. The parts I'm making on a Wickman go into a three-piece assembly. One of the three pieces needs to be made on my Euroturn. It can't be made on an Acme or a New Britain, with all due respect to my competitors. There is a sophisticated part that goes into that assembly.

SO YOU'RE SAYING YOU HAVE A MIX, AND TO PUT THAT ON A CNC SWISS.....

Would be overkill, yes. So it's a less sophisticated part in a more sophisticated assembly, and that's why I'm doing it. The other reason is when I had two less Wickmans, I had





to run them day and night, and if one thing went wrong, I fell behind. I figured with a couple more machines, the pressure wasn't on me to run them day and night. I do try to do that, but if I lose one for a half a shift or a day, it's not the end of the world. I have a little more capacity.

CAN YOU BE SUCCESSFUL RUNNING 10 HOURS A DAY, 5 DAYS A WEEK?

No, I need two shifts; 20 hours a day. I couldn't be successful running one shift. I have too much overhead to cover. And I'm a low overhead guy. For the size volume we have, our competition has many more employees than we do. I can show you financially the difference that our night shift makes. It is significant. We have to have a second shift in our business.

IF YOU BUY A \$1.4 MILLION INDEX, HOW IMPORTANT ON THAT JOB IS THE DIFFERENCE BETWEEN A \$12 AN HOUR VERSUS A \$25 AN HOUR GUY IN CHICAGO IN THE TOTAL SCHEME OF THINGS?

It's relatively insignificant. It's a small part of the equation. The key on an Index, and I learned this the hard way – you don't want to take that screw machine guy and put him on a CNC Index. You don't want some guy who's



used to taking a brass hammer to the machine. That includes the Euroturns. The first Euroturn I brought in (I have 25 now), the guys put it in, installed it, were running it and I saw a cross slide on the bench. They replaced the slide, had taken out the micrometer adjustment slide and put on another slide that they could hit with a hammer. I said, "Guys, that's what we're paying for."

LET'S TALK ABOUT YOUR WORKFORCE. WHERE ARE YOUR PEOPLE COMING FROM TODAY?

Most new people coming in here are Hispanic.

WHEN YOU SAY HISPANIC, ARE THESE GENERALLY PEOPLE BORN HERE?

No, they're all immigrants.

WHY IS YOUR WORKFORCE INCREASINGLY BECOMING HISPANIC?

Because those are the only people who want to go into this trade or into this industry. The young American white male shows no interest.

DID YOU HAVE ANY PEOPLE WALK OUT ON MAY 1ST TO ATTEND CHICAGO'S IMMIGRATION RALLY?

We had some people attend the rally downtown. I allowed that. I encouraged them to take a vacation day if that is what they wanted to do. We had seven or eight employees, although one of our customers had several hundred.

IN THE REAL WORLD IT WOULD BE CATASTROPHIC IF WE SENT EVERYBODY HOME.

It would be, but I will tell you that I know of no one in our plant who is illegal. We do a good job of policing that. Once we hire them, we check with Social Security. We had a problem about 10 years ago with eight employees. Social Security came to us and said, "You have eight guys whose numbers don't match," and we cleaned them out. They were some of our best workers. Our Hispanic managers are American citizens. Most of our workers are from Mexico, some from Guatemala, some from El Salvador, and we have a few Asians.

DAVE, KNOWING WHAT YOU KNOW NOW, IF YOU HAD A PILE OF MONEY TO INVEST TODAY, WOULD YOU PUT IT INTO A BUSINESS LIKE THIS?

I think guys would think twice about investing in this. I think there is money to be made in it today. I think it's more difficult than ever to do it, and I don't think the margins are as great as they used to be, so I think you have to offer something more than the average run-of-the-mill company to be able to have a plant like we have here.

I WILL REPHRASE THE QUESTION. A) WOULD YOU GO INTO THE MACHINING BUSINESS? B) WOULD YOU RECREATE THIS BUSINESS?

I would recreate this business for sure if I went into the machining business, because what we have here is a niche where we feel we can do things that other people cannot do. And I think we have an employee base to get it done.

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It's our future. It's not the high-volume commercial type work and certainly not the low-volume work. It's the high-volume precision work that not everybody can do, and that puts you in a class by yourself.



THANK YOU, DAVE.



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TMW TRADE SHOW
IMTS STUDY

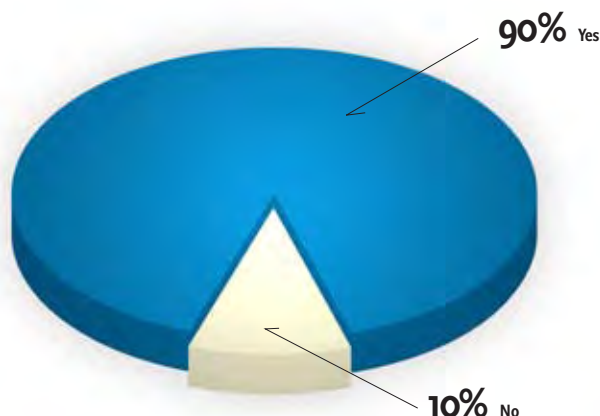


WHO, WHY & WHERE
DO THEY GO...

BY LLOYD GRAFF

TRADE SHOW ATTENDANCE & IMPORTANCE

DO YOU EVER ATTEND TRADE SHOWS?



Over the last five years I have written extensively about trade shows. Unlike some magazine folks who are in the exhibition business or see it to be in their financial interest to be cheerleaders for trade shows, I have looked at shows as part of the educational, social, and economic fiber of the manufacturing community. They are worthy of scrutiny because they attract huge money and energy.

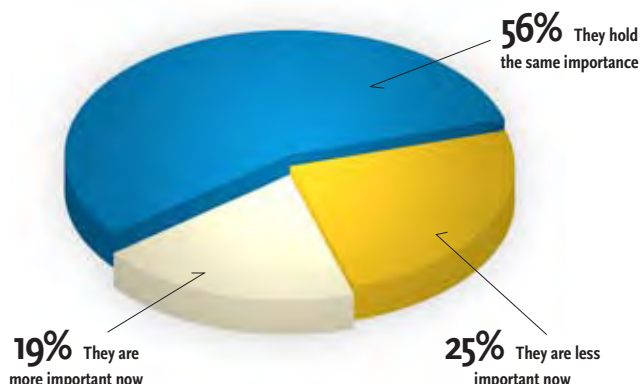
IMTS, the International Manufacturing Technology Show, squats into Chicago's McCormick Place every even year in September. It is the biggest North American show of its species. It used to be a place where sexy babes beckoned suits into carpeted machining pits. Today, the ladies are virtually gone and the big players are often Asian companies with American faces. Monogrammed shirts have replaced big lapels.

“It used to be a place where sexy babes beckoned suits into carpeted machining pits.”

I wanted to know if IMTS still resonates with the machining world. Is it still an economic mainstay of the business, or a hollow artifact of the Warner-Swasey era? TMW commissioned a study by an independent research firm, Irwin Broh and Associates of Des Plaines, Illinois to get a better feel for how our readers, who are in the sweet spot of the North American machining community, see the really big shooow.

The answers we received indicate that IMTS remains an attractive venue to collect valuable data leading to buying decisions. But I point this out with some reservation, because the response to this survey was smaller than others we have done, which may indicate disinterest in the

HOW IMPORTANT ARE TRADE SHOWS TO YOUR BUSINESS COMPARED TO FIVE YEARS AGO?



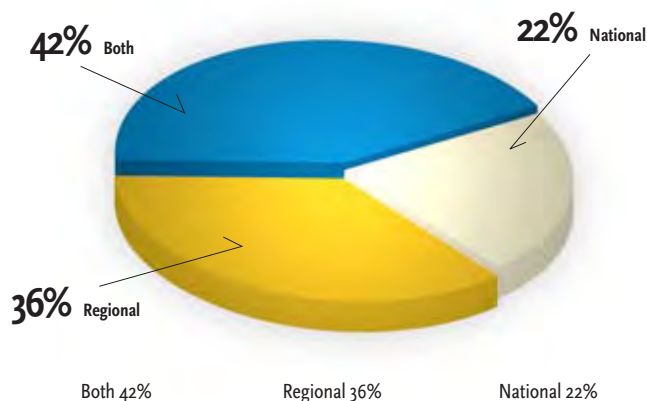
subject. It may also mean that we received replies from a self-selecting group which has a particularly favorable or unfavorable perception of the topic of trade shows and IMTS.

Exactly one half of the respondents said that somebody from their firm will attend IMTS in 2006. I consider this a strong endorsement of IMTS. They also said that they will send a bunch of people to the Chicago show. This reflects the increasingly egalitarian approach of machining firms today, as owners and managers attempt to engage workers from their whole employee spectrum in the assessment and purchasing process. It may also indicate that that business is good now.

Our respondents say that nine of ten of them attend trade shows, at least occasionally, and three-quarters of them view trade shows as equally or more important to their business as five years ago. So even with the internet, trade publications, direct mail and buzz, this group

TYPE OF TRADE SHOWS ATTENDED

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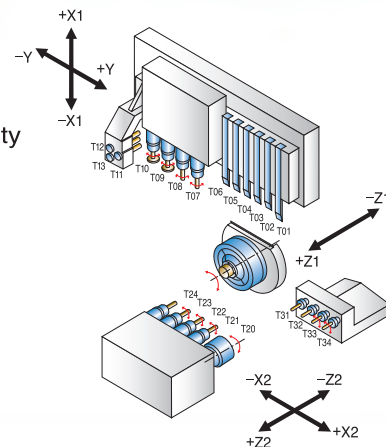
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of *Today's Machining World* readers seems to dig trade shows. Two-thirds of the respondents have attended trade shows in the last three years.

Why do these people still love to trudge the shows? The answer is clearly that they are searching for an edge. Learning about new processes and products easily trumped all other reasons for attending. Finding new suppliers and networking were less important but still significant. Educational sessions are deemed relatively trivial in comparison. Perhaps some booths should give up their power point shows and work the one-on-ones.

“Why do these people still love to trudge the shows? The answer is clearly that they are searching for an edge.”

I think people go to shows looking for a “wow.” They are seeking something to tell Joe or Jennie about back at the factory. They need something to make the aching legs and ringing ears feel worth it.

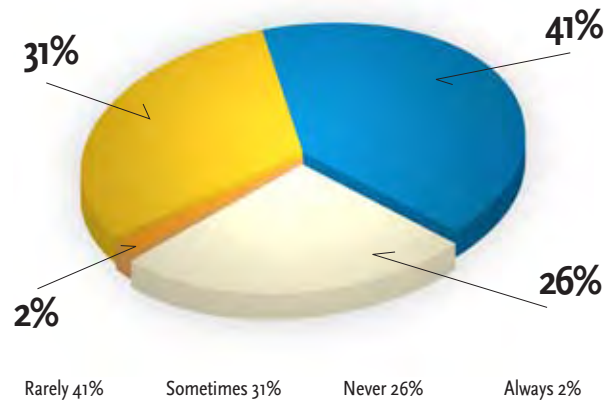
I believe for an exhibitor, the key to a big show is presentation. The smile, the flawless demo, appealing colors, clear, simple value propositions, succinct ideas, happy impressions, and an overriding sense of confidence in the body language of the exhibitor are the elements that make for a great trade show. Who is the best at what they do? Who is the leader in the industry? Who will supplant today's supposed leaders? These are the attributes attendees will assess.

Our readers are evidently going to IMTS this year. How many exhibitors will be really ready for them?



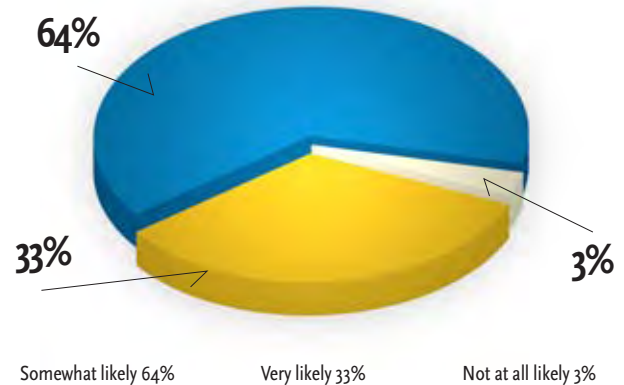
FREQUENCY OF ATTENDANCE

HOW OFTEN DO YOU ATTEND EDUCATIONAL/ TECHNICAL SEMINARS AT TRADE SHOWS?



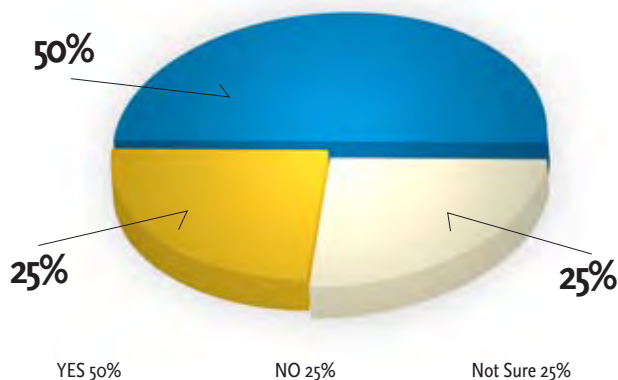
LIKELIHOOD OF PRODUCT PURCHASE

HOW LIKELY ARE YOU TO BUY PRODUCTS YOU'VE SEEN AT A TRADE SHOW?

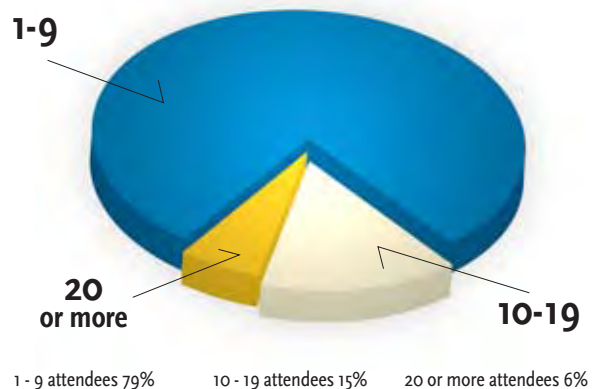


PLAN TO ATTEND IMTS 2006

WILL YOU OR ANYONE FROM YOUR COMPANY ATTEND IMTS 2006?



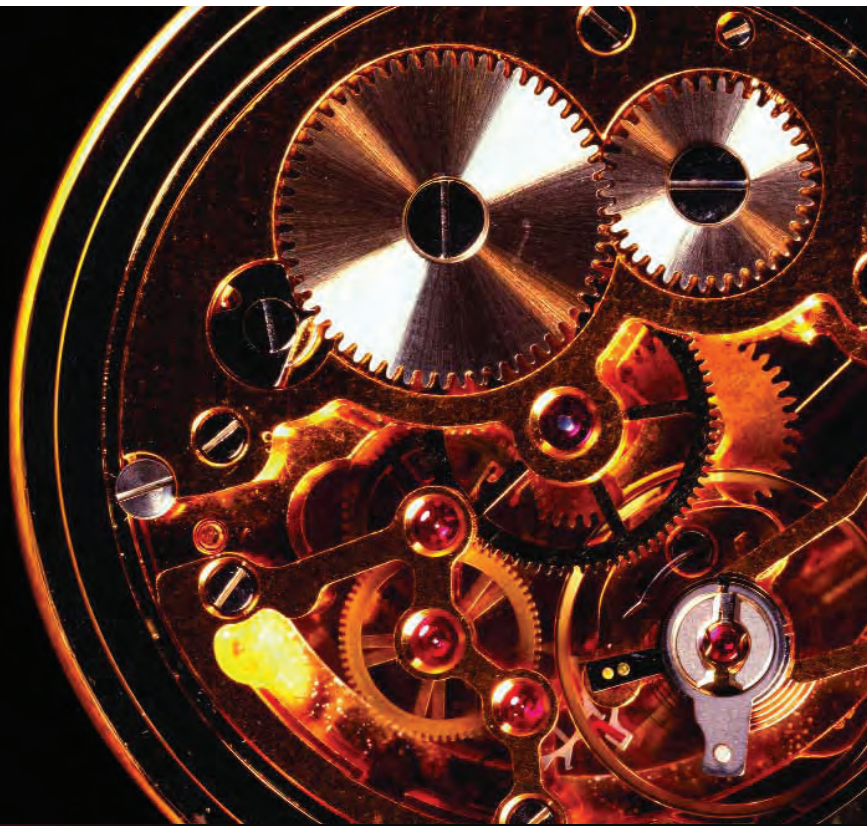
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L. to r.: Cathy Heller, Manuel Buenrostro, Martin Whitfield, Greg Buenrostro

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MARTIN WHITFIELD, our newest addition, was a Service Engineer at Wickman in Coventry, England. Martin's extensive knowledge as a long-term Wickman Engineer makes him the consummate technical expert on Wickman repair and attachments. He is another Wickman Repair Specialist, available for on-site repair in your shop.

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A continuing column in which we ask smart people to discuss their views on topics related to the future of manufacturing.

BY NOAH GRAFF

next

In today's information age, in which we can acquire and disseminate knowledge effortlessly in our office or living room, is it really necessary to fly across the country and spend big bucks to go to a tradeshow?

Are industrial tradeshows such as IMTS still worth the expense and energy?

They are for us. We have a product here at Hydromat that needs to be fully understood. Our Sales Staff and Technicians do a great job describing the technology as it's being viewed by the prospect. Someone who has only heard about and seen photos of, but hasn't seen the Hydromat in action, needs the experience of standing on the platform and watching it work. You can just see the light bulbs come on.

Kevin Shults
Marketing Manager, Hydromat, Inc

First of all, let me say that it is really up to the individual exhibitor to determine whether trade shows or any marketing medium is correct for their company. On a broader scale, I believe trade shows, especially large events, are vital to industry to answer the problem of extreme time poverty that we face today and in the future. In no other medium can a visitor see as much

technology in as short a period of time, while also networking with key executives and engineers and educating themselves on new technology, trends and market conditions.

Peter R. Eelman
Vice President - Exhibitions, AMT - The Association for Manufacturing Technology

Trade shows are worth the effort and cost necessary to attend. Anytime you can gather multiple potential customers in one location and demonstrate your products' capability to them, you have a worthwhile situation. Obviously, you want to minimize your cost outlay to perform a show, and that is why I am excited about the upcoming change in 2008, where IMTS will be reduced in days. This will help exhibitors improve their return on investment by lowering their total IMTS show costs.

Pat Ervin
President, Hardinge Inc.

the facts:

At IMTS 2006, **more than 1,200 exhibiting companies from over 30 nations** will occupy over 1,150,000 square feet of exhibit space at the McCormick Place complex in Chicago.

More than 15,000 new machine tools, controls, computers, software, components, systems and processes will be on display in 2006.

Provided by www.IMTS.com

IMTS is held every even-numbered year in Chicago and **attracts over 85,000 buyers and sellers from 80 countries.**

The first National Machine Tool Builder's Exposition (IMTS's predecessor) was held September 19-23, 1927 in Cleveland. **The show occupied 63,000 square feet, and attendance topped 12,000.**

IMTS Stats from recent years:

2000

1,354 exhibitors, over 100,000 attendees

2002

1,350 exhibitors, over 85,000 attendees

2004

1,277 exhibitors, 86,232 attendees

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Tim Roby

is president of the Chicago Convention and Tourism Bureau. Previously, he served in senior sales and marketing positions with Kerzner International Resorts Inc., MGM Grand Hotel and Casino in Las Vegas and Hyatt Hotels and Resorts.

What does your job entail?

My job is to bring conventions into McCormick Place, to the city of Chicago and help the city and the state's tourism.

What has research shown about peoples' likes and dislikes about tradeshow in Chicago?

As far as Chicago is concerned, it's easy air access, there's drivable parking. We have 15 percent of the country's population within a 300 mile radius. You've got the cultural aspects of Chicago—The museums, the restaurants. We have some of the best restaurants in the world.

What has your research shown that people dislike in Chicago?

They don't like coming to a tradeshow in January.

Why do you think Chicago has fallen behind Vegas and Orlando for attracting tradeshow?

As far as Las Vegas is concerned, it's a capacity issue. Las Vegas has 130,000 rooms, we have 30,000. And the aggregate of Las Vegas, when you add the Venetian and the Mandalay Bay and all the other properties to all of their convention space – they have a bigger glass to fill. Therefore, supply and demand make hotels more attractive from a pricing standpoint, maybe. But if you compare apples to apples, we're in line with them.

What do you plan to do to compete with them?

We're not going to compete with them. We're not Las Vegas. We don't want to be Las Vegas.

Do you already have big plans for McCormick Place's new addition?

Yes. And it's much different than just building a large exhibit hall. This is actually a meeting space. It's what we call a

breakout space. It's very flexible, so organizations that require a lot of smaller meetings in addition to a trade show are being very attracted to this space. You don't see this type of meeting space in conjunction with exhibit space anywhere else in the country.

Are you worried about trade shows leaving Chicago?

I don't know if worry is the word. We're very competitive. We're adding services and enhancing our attendance building projects, which we do for most of our major customers. No other city can offer that service, and we've got a whole team that reaches out and finds new customers for tradeshow, and that's one of the reasons you see record attendance here.

Some people within our industry say McCormick Place is their least favorite venue for tradeshow. They say it's expensive. They're disenchanted with things like the food, the walking, the parking. How do you plan to make IMTS and other tradeshow a better experience?

That's a great question. And in fact, I just came from a 3-hour meeting in which we were talking to our customers, and they gave us both positive and helpful feedback. And those are areas from both a service issue and a product issue that we will continue to improve upon.

What do you see as the future for Chicago attracting more tradeshow like IMTS?

Based on our booking pace, our future is very bright. The numbers I've seen through 2012 – our pace is up. We're even more focused on the consumer and the customer, helping them increase tradeshow traffic and net square footage. That's what it's all about for them. They want results. So that's what we're focused on.

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INVENTORY



New! 6-26 Wickman



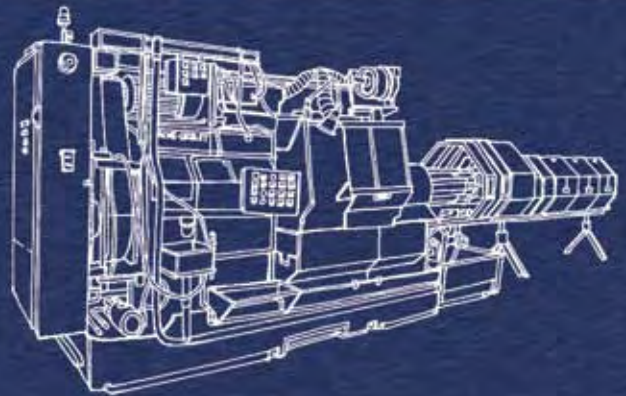
WICKMAN

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5/8" 6-spindle, thdg., pickoff, 1971-88 (8)
1" 6-spindle, 1960-1992 (9)
1" 8-spindle, 1979
1-3/8" 6-spindle, 1980
1-3/4" 6-spindle, 1965-1979 (3)
1-3/4" 6-spindle, 1965-1993
1-3/4" 6-spindle, thdg., 1969
1-3/4" 8-spindle, 1970
2-1/4" 6-spindle, 1973-79
2-1/4" 6-spindle ACW 2004
2-5/8" 6-spindle, 1982
5-5/8" 6-spindle, 1979
6-5/8" 6-spindle, 1979

ACMES

1" RAN6, 1975
1-1/4" RA6, 1973-1958-1982 (6)
1-1/4" RB8, 1956-1979 (5)
1-5/8" RB8, 1980, pickup (2)
1-5/8" RBN8, 2000-1975
2" RB6, 1979-1985-1956
2-5/8" RB8, 1975 (5)



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Hydromat HW 25-12, 1984
Hydromat HB3245-16 2002 CNC
Hydromat HW 25-12, 1984
Hydromat HW2 25-12, 1985
Hydromat HW 25-12, 1985
Hydromat V-12, 1986 Trunnion
Hydromat 30-60, 36-100, 20-80 units
for drilling, threading, recess

Swiss-CNC

Citizen L20, Type VII,
1998

Citizen L-26, 1996

Star SR-20, 2004

Star SA-12, 1999

Citizen M-32, 2003

Tsugami Model BS-26B III,
2001

Brown & Sharpe

#2 1-1/4" CNC Allen

Bradley 8200 1986

CNC Machines

Miyano ANC 35S, 1989

Davenport

3/4" Davenport chucker,
1986 (5)

3/4" Logan Clutches,
Rebuilt 2001

3/4" Model B, 1989

3/4" Model B, 1970-89 (7)

New Britain

Model 52 1-1/4", 1979

Model 62 2-1/4", 1970

CNC Lathes

Okuma LR-15, 1989

Bargain Corner

Davenport 4th position cross drilling \$1950

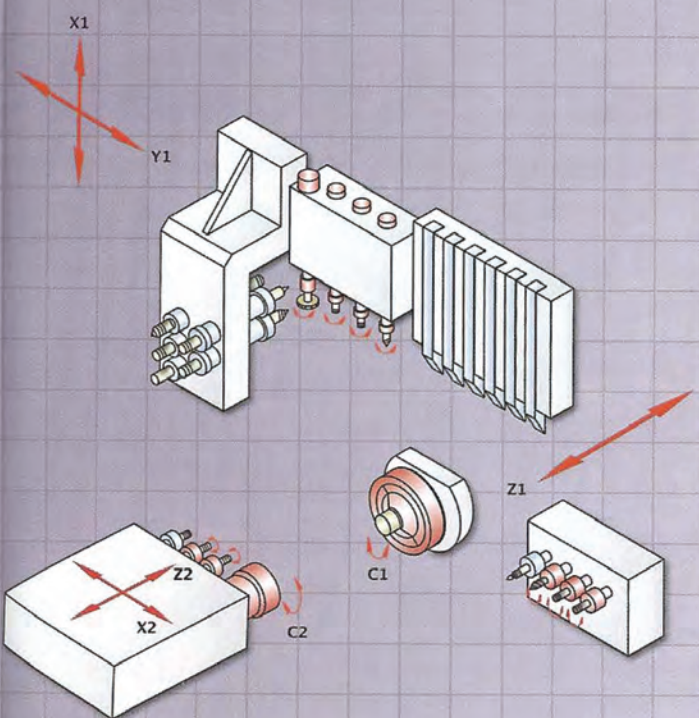
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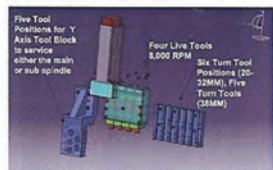
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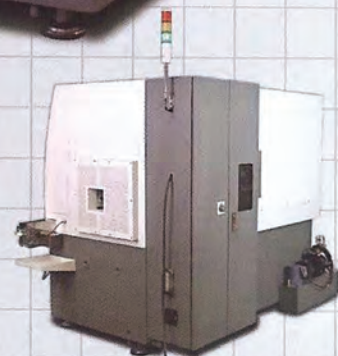
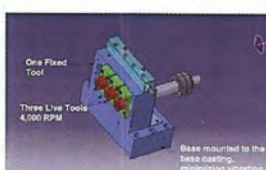
SQC Series Main Spindle Tool Layout



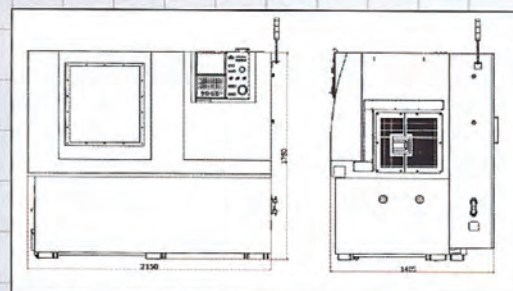
SQC Series Sub Spindle



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how it works

BY BARBARA DONOHUE

Beyond Calipers

Measuring completed parts can sometimes pose as much of a challenge as machining them. The many high-tech measurement instruments available today offer superb precision and accuracy, but measuring those parts can still be tricky.

"Everyone wants the 'Holy Grail' of measurement," says Mike Knicker, owner of Q-PLUS Labs, Irvine, CA, a full-service measurement and inspection laboratory. "They want one machine that does it all. It doesn't exist."

So the challenge becomes choosing the appropriate instrument or instruments from the many that are on the market. The good news is that not only do these electronic devices measure your parts, they can also collect and record the data for you.



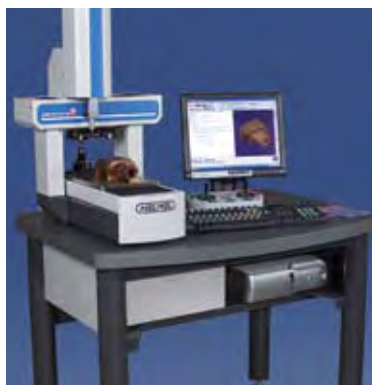
Conventional CMM (coordinate measurement machine)

Though it was invented decades ago, the familiar bridge-style coordinate measurement machine still has its place in the QC department, and the technology continues to evolve. This machine uses a touch probe to contact the measurement locations. Then, the machine does all the necessary calculations to obtain length, radius and other dimensions.

Helmel Engineering, Niagara Falls, NY, offers a range of CMMs. The Checkmaster model fits on a benchtop, offers accuracy in the range of 0.0003 – 0.0004, and sells for under \$14,000. For measuring critical, small parts like those used in medical or aerospace applications, the company's new MicroGage offers an affordable option for those who need a high-precision automatic CMM. With accuracy of better than 0.0002, MicroGage pricing starts under \$35,000.



Left: Checkmaster manual benchtop coordinate measurement machine from Helmel Engineering.



Right: High-precision, automatic fixed-bridge coordinate measurement machine from Helmel Engineering.

Art Whistler, vice president of sales and marketing, says Helmel CMMs have an affinity for the machine shop, as they are based on mechanical bearing designs and are “a bit more rugged and durable, suited for the manufacturing environment.” Also, Helmel CMMs do not require compressed air, so they are simpler to install than brands of CMM that require a source of compressed air to supply their air bearings, which are commonly used.

Arm-style CMM

A CMM with long, articulated arms can reach and bend to make measurements that are impossible with bridge-style units. “We developed it for the folks who don’t usually use CMMs,” says Darin Sahler, global public relations manager, FARO Technologies Inc., Lake Mary, FL, a well-known maker of arm-style CMMs.

These relatively compact, lightweight units, such as the FaroGage, can easily travel out on the shop floor or even be mounted on a machine as a dedicated measurement device. The FaroGage, which yields accuracy to 0.0004, costs about \$14,000.



Left: FaroGage, a coordinate measurement machine, uses an arm configuration for 3-D measurement.



Right: FaroGage Plus (left) provides twice the precision of the standard FaroGage 3-D coordinate measurement device.

One happy FaroGage user is Dave Hall, vice president of Hallcraft Machining, Melbourne, FL. “We use it for repetitive measurements,” he says, “also for our first-article inspection and for reverse engineering.” Hallcraft makes a lot of motorcycle parts, Hall explains, and he might not have the drawings for mating parts, so “we use the Faro to give us the number from a model,” or from the mating parts, he says. Without access to the parts’ drawings, he can use the FaroGage to measure for the bolt holes and other features upon which to base the design of a new mating part. The CMM also comes in handy for measuring radius, taper and surface contour.



Left: At Hallcraft Machining Inc., Melbourne, FL, Inspector Zane Lucke uses a FaroGage coordinate measurement machine to measure a top triple clamp, the part that holds the front fork tube to a motorcycle.



Right: At Hallcraft Machining Inc., Melbourne, FL, Inspector Zane Lucke uses a FaroGage coordinate measurement machine to measure a top triple clamp, the part that holds the front fork tube to a motorcycle.

“We do some of our work in final QC” with the FaroGage, Hall says. “We’ll check the part, and we’re able to send a [printed] document that states what we found. A QC person is more likely to believe [that] than a handwritten report.”

Hall recommends installing a FaroGage on a granite base and setting up an x-y backstop to establish the reference measurement plane where the part contacts the backstop. This is much quicker than trying to touch three points to set your zero, he says. This approach can be helpful with any of the CMM or video systems.

how it works

Video measurement system

Touching a part with a probe isn't always feasible, however. Flexible, small, intricate or delicate parts need special handling and special measuring. "To inspect a small, tiny part [you] probably would get some kind of non-contact CMM," suggests David DeVowe, executive director of quality, Inspection Division, QC Inspection Services, Inc., Burnsville, MN. A video system can measure most types of parts and is especially suited to some of the most challenging.

Mark Arenal, president of Kinematic Engineering, LLC, Laguna Hills, CA, explains: "A video, or vision, measuring system uses a camera to deliver a magnified image to a video screen where the operator can target selected features with a crosshair reticle for a manual system, or for an automated system, a computer can process the measurements. Systems can range from very simple manually operated units to CNC-capable systems that can be programmed to measure automatically, using powerful image processing tools built into the measurement software. Automatic systems and semi-automatic systems help achieve rapid measurements with a high degree of repeatability while minimizing operator intervention."

Kinematic Engineering offers a range of non-contact measurement systems. A small, general-purpose video measurement system with 8" x 4" x-y travel, the KineMeasure KM200 costs around \$16,000.



Left: KineMeasure, KM200XYZ manual, video-based measurement and inspection system with 8" x 4" x 7" XYZ travel. Available with video edge detection.

With automated video systems, DeVowe says, "you can program them and do repeat inspections. Once you have the program made, [the machine] finds the features itself, finds edges. [They] are especially good for profiles and overall dimensions in 2-D." And it's fairly easy to learn to use these video devices, he says.

Laser micrometer

For some parts, especially those with tight tolerances and fairly simple geometries, a laser micrometer might

be the most suitable choice. In one version, a laser beam shines on a spinning polygon-shaped mirror, which reflects the beam toward a lens that aligns the separated beam into parallel beams. On the opposite side of the measurement gap, a photoelectric cell receives the laser light. The photoelectric cell produces a voltage proportional to the amount of light that hits it. The item to be measured is carefully fixtured so it blocks some of the laser light from reaching the photoelectric cell. The laser micrometer calculates the dimension of the part in the measurement area, based on how much light it blocks from the receiver.

The Mitutoyo LSM-9506 bench-model laser scan micrometer measures parts from 0.02 to 2.36 in the dimension being measured, such as diameter. It is a self-contained unit, including laser and display, and costs around \$6500. It achieves repeatability of ± 30 microinches, and accuracy is also measured in microinches.



A benchtop laser scan micrometer, Mitutoyo LSM 9506

Profile measurement system

Some measurement machines are targeted directly at certain types of parts. For example, the TESA Scan and Profile systems from Brown & Sharpe, North Kingstown, RI, are designed specifically for round, cylindrical and turned parts, explains regional sales manager Ron Gardner.

In these machines, the part is held between centers or in a chuck, so it can turn. Parallel beams of light shine from one side of the measurement gap toward the other. When no part is in the way, all the light reaches a high-resolution CCD (light-sensing) array on the other side. When a part to be measured is in the way, it casts a distinct shadow on the CCD array, which registers, pixel by pixel, where it receives the light and where not. The system's processor calculates dimensions based on the signals it receives from the array.

A profile unit can measure length, diameter, radius, grooves and many other features, as well as concentricity, straightness and runout while the part turns. Many of these profile machines also have the ability to measure different kinds and sizes of threads by tilting the part so the helix angle of the threads is parallel to the light beams and the system can get a good reading on the geometry of the threads.

The TESA Scan and Profile systems come in a range of sizes. The smallest, TESA Scan 25 measures parts up to 1" (25 mm) in diameter and 8" long. It sells for \$33,700.



Left & Below: The TESA Scan 25 optical profile scanning device from Brown & Sharpe is specially designed to measure round or cylindrical parts, including diameter, length, runout, concentricity, thread forms and other features.



Using a profile measurement system, a TESA Scan 50+, big brother to the 25, has made a huge difference in inspection time at Mearthane Products Corporation in Cranston, RI. "It used to take us two hours to measure a 15-piece sample of parts. Now it takes 45 seconds for each piece," says Ray Perry, quality engineering manager at the custom polyurethane molding house.

Many of Mearthane's products, such as rollers for copiers, have shafts molded into the plastic. And many of the dimensions, both of the shafts and the finished parts, are critical. "Basically, we have shafts that have up to 20 different dimensions, including runout and concentricity, plus the location of the urethane [with respect to the shaft]," says Perry. "Before, we used laser micrometers and height gages and an optical comparator. [With profile measurement,] once you program a part, you just run it."

Hybrid techniques

Lots of people have both CMMs and vision systems and use them separately, says Knicker. Now, hybrid systems are available that integrate vision and touch probe technology.



The Kinematic CP8K video-based measurement and inspection system with 12" x 6" x 5.5" XYZ travel. The CP8K can be used to measure manually or run in a programmed mode for multiple and repetitive applications. Powered by Metronics QC5000 metrology software. Also available with touch probe and laser sensors as well as a rotary axis.

Kinematic Engineering manufactures video coordinate measurement devices that can also accept touch probes, so the two technologies work together. The company's CP8K unit can also accept a laser scanning head, and, according to Arenal, some power users make all three modes work together, video, touch and laser. A basic CP8K (CNC-video) would start

how it works

around \$40,000; touch probe, laser head and other accessories are additional.

For customers who already have a bridge-style CMM, Kinematic offers the MultiProbe MP100, a zoom optical-video head that mounts on the CMM, for \$8,000. You can also install a touch probe on the MP100, so this is an economical way to achieve contact/non-contact capability in one setup.

Laser scanning

Laser scanning was originally developed for medical and dental uses, DeVowe says, which need to have surfaces reproduced very precisely. A laser scan measures the location of thousands of points on the surface of an object. This produces a "point cloud," a file containing a great number of points located very close together, which describe the surface shape of the object scanned. The point cloud file can be used as a model for creating a CAD drawing. As the CAD drawing is developed, the engineer can compare the scan with the drawing. It would be nice if a CAD program could automatically create a drawing from the point cloud scan data, but so far, DeVowe says, this isn't possible, but likely will be at some point.

DeVowe's lab has laser-scanned some unusual things. One company that was designing prostheses to replace missing fingers found that their artificial fingers always looked, well, artificial, DeVowe says. So the company made a careful, very detailed cast of someone's real finger and sent it to Inspection Services to be laser scanned, and the resulting "point cloud" was used as a model.

These measurement technologies can save time and prevent errors, once you select the right tools for the job and take advantage of their capabilities. Some of the technologies are amazing, but no machine can do the job by itself, at least not until it's set up and programmed by a human being. Knicker appreciates the promise of the latest technologies but noted that the best measurement happens in a well-equipped lab with skilled people.



Above: The Kinematic MultiProbe MP100 adds video measurement and inspection capability to an existing coordinate measurement machine, enabling both contact and non-contact measurements. The user-installable MP100 includes a motorized zoom lens, LED illumination and an adapter that accepts a Renishaw PH6 touch probe head. Images are displayed on a 10" LCD display.



product focus

FOLLOWING ARE A LIST OF COMPANIES WHO
HAVE "BROACHED" THE SUBJECT OF THESE
MACHINES FOR US:

Each month, *Today's Machining World* works to help you understand how the precision parts marketplace works, what's available in the industry, and how you can use available resources, as well as knowledge, to run a more efficient and effective shop. In every issue, we'll feature a product category and focus on equipment key to remaining competitive in our marketplace.

Ken Nemec, a.k.a. "The Broachman" from American Broach & Machine says, "Broaching is a machining process that is fast, efficient and reliably repeatable for the manufacture of parts of all types. Broaching uses successive cutting teeth to generate forms, flats, slots, gear teeth, and more, in broached parts. Some typical applications include automotive transmission gears, drive lines and many other automotive applications, parts used in household appliances, power generation and airplane turbines, farm equipment, bicycle parts, door locks, conveyor rollers, ball bearing cages and more. Wherever machining is required that can't be accomplished capably or economically with milling or turning, broaching is a potential viable solution."



Broaching Machine Specialties

Broaching Machine Specialties (BMS) new 20-Point service and maintenance program is designed to help manufacturers utilizing broaching in their operations. The program addresses the critical maintenance areas in every major machine system; mechanical, hydraulic, electrical, coolant and lubrication. Broaching Machine Specialties' own in-house technicians perform the service so that users are assured that experts who specialize in broaching machines are at work helping them to achieve their production goals.

BMS Technicians utilize a checklist to ensure that no items are missed and repairs are either made on site, or recommendations are provided as to what other services are required or what components require more comprehensive repair or replacement to ensure uninterrupted production over the long term.

They have launched their new "20-Point" program as a way to put their extensive knowledge of broaching machines from all different manufacturers to work for manufacturers with broaching operations already in place.

In addition to in-field service, BMS inventories spare parts for nearly every broaching machine built in the U.S. since the 1940s.

For more information, please contact Broaching Machine Specialties at 248-471-4500 or visit the company website at www.broachingmachine.com.

product focus



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American Broach & Machine

American Broach and Machine offers a multitude of broaching machines, including hydraulic free. With the Full Frame Internal Pull-Down, the workpiece is located on the table, and the broach tool is pulled down through the part, maintaining excellent alignment and high quality parts. Many American Broach machines with this design are still in operation after fifty years. American Broach manufactures electro-mechanical broaching machines. The controls can be integrated with the systems in a transfer line. The machines are very compact and facilitate high-speed operation.

Horizontal broaching machines offer an advantage for large parts and can be used for both internal and surface applications. Automatic broach tool changers can be applied where frequent changeovers are required or the broaches are very large and heavy. American Broach remanufactures its own line of machines and its competition. The typical remanufacturing includes a new hydraulic unit, new lubrication, new coolant and new electrical systems. The hydraulic cylinders are remanufactured, and the guide ways and slide are reground. The remanufactured unit is given new machine warranty. American Broach has the broach sharpener for every application.

For more information, contact American Broach & Machine at 734-761-5021 or email ken@americanbroach.com

Broaching

Stenhoj Hydraulik

Stenhoj Hydraulik Company, headquartered in Denmark, with sales and service world-wide, including an office in Michigan, has developed an innovative broaching machine. The push and pull bridge is a steel structure designed with "in-line" force transmission, which eliminates internal frame and guide way stress and wear. The bridge is guided by two planetary spindles and a vertical (box) rail guide system. A gear-box/brake motor transmits the power through toothed

pulleys. A toothed belt and planetary spindles push and pull the main bridge.

The machine can be equipped with 1 to 5 broaching stations. The scope of part presentation includes a shuttle table, which is activated by means of horizontal pneumatic cylinders. The workpiece is conveyed on hardened ways into the broaching position and back again into the loading position. The part can be placed on the nest manually, robotically or conveyor feed.

Each single station part nest is designed and built for quick, "Lean" change-out, independently (tombstone style). The parts may be run in any combination on any station.

Two vertical pneumatic cylinders bring the two bridges together firmly and accurately, holding the broach tools in the upper and lower bridge collets and piloted on the workpiece. The broach tool is then pushed and pulled completely through the part. As the next part is prepared, the broach tool is handed off to the upper collet, and the next part can now be loaded.

On the top of the push bridge is a special broach-clamping device with a hydraulically activated collet chuck. There is also a special broach-clamping device with a hydraulically activated collet chuck on bottom.

For more information, contact Stenhoj Hydraulik at 231-768-5860 or visit the company website at www.stenhoj.de.



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product focus

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Today's Machining World

Broaching

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product focus

U.S. Broach and Machine Division

The U.S. Broach and Machine Division has announced the new Linear Machining System (model CMG – LMS) designed for metal removal from many types and shapes of machine parts. The LMS machine utilizes a vertical chain driven system, which pulls tool cars and work pieces for the purpose of removing metal in designated areas. Part processing can be in either a static fixtured or dynamic

rotating condition.

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sprocket design lends itself to maximum chain length, yielding a greater number of tool carts, providing more linear inches of tools and greater tool life. The LMS allows for reduced floor space and overall system height.

For more information, please contact the U.S. Broach and Machine Division at 517-787-3791 or visit the company website at www.usbroach.net.

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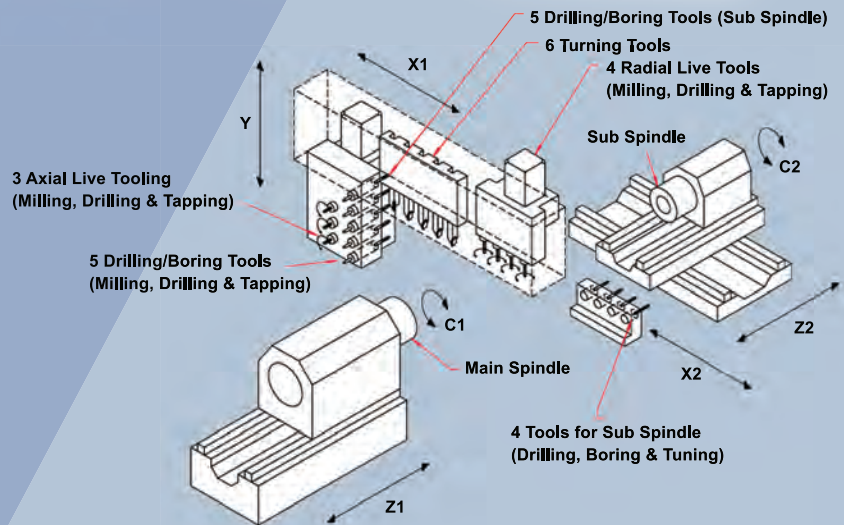
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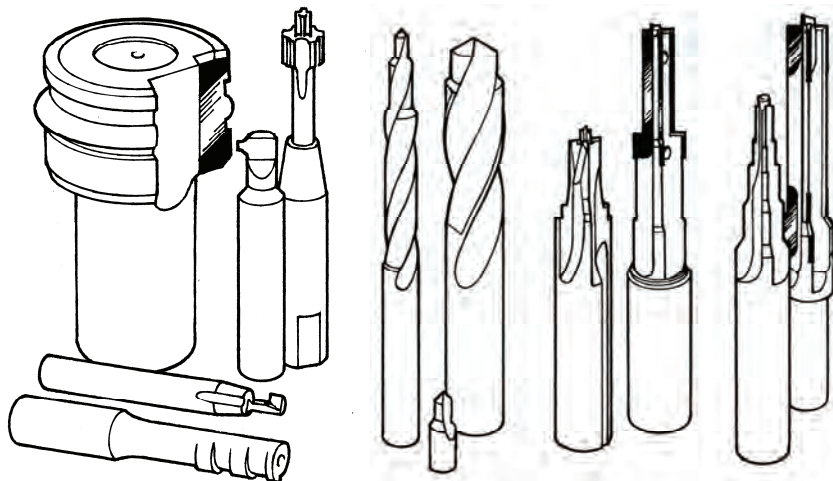
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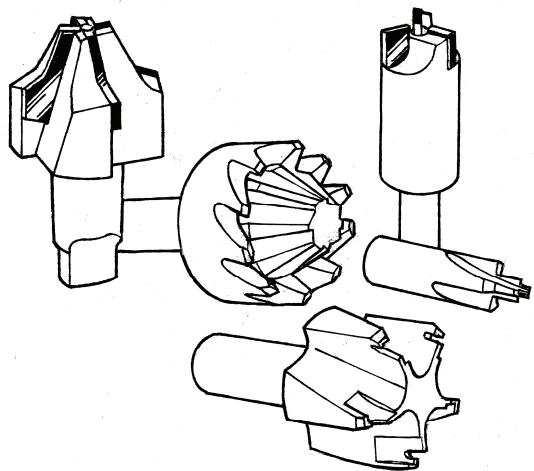
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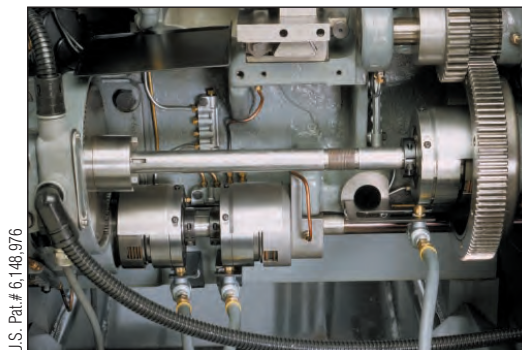
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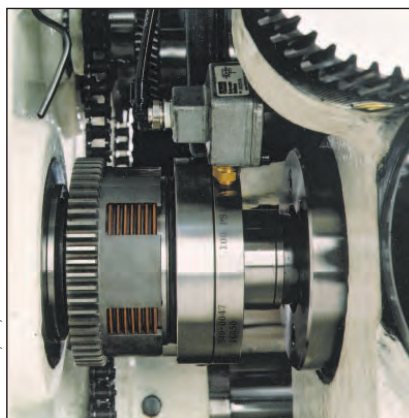


U.S. Pat. # 6,148,976

For Model B Davenport

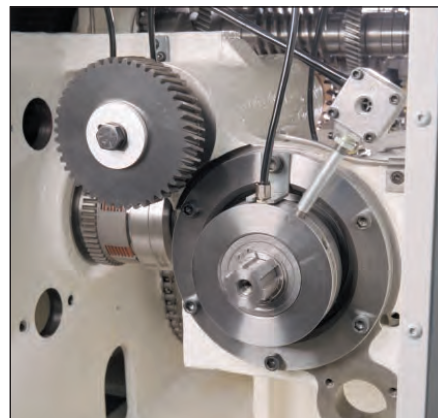


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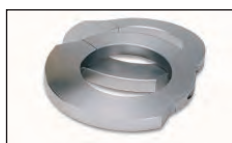
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By Tom Minuto,
V.P. of Operations, Somma Tool Co.

Have you got a favorite ride? Looking for antique cars, skateboards, motorcycles or anything else that gets you around. E-mail your story and photo to jill@todaysmachiningworld.com.

Me and my Miata

This is the story about a perfectly good, used Miata that I turned into a racecar to compete in the SCCA Spec Miata series. I had been racing an MG Midget for over a dozen years. I had won seven out of my last eight races and collected a couple of class championships along the way. I felt it was time for me to seek a more competitive series.

I had been eying the Spec Miata class for some time. I looked at the rules over and over again on the Internet. No engine mods are allowed, you can only change the sway bars, springs and shocks, and each has to be a specific part number. For the intake, you are allowed to install a cone filter, and the exhaust you can change from the catalytic converter back. Sounded like a couple of weekends and I would be rolling!

I found the right car and stripped out its entire interior, which I then sold on eBay. I looked at dozens of roll cages, and I chose a mail order kit from down south. A local fabrication shop welded it in for me, and the car was ready in no time. I entered a couple of races the same year and finished middle of the pack, but I was psyched for the next season.

April of '05 rolled around, and the first race I entered was in the New England region. This is where the rulebook hit the fan. The tech inspector crawled under the dashboard to look at my dash tube support: "No good" he said. "You have

to do it over." It seems that over the winter, about 40% of the roll cages in this class became obsolete. No worries – money and time fix everything. So I went home, stripped the car again and then went to DWW Motorsports to have another cage welded in.

In the end, I felt all the aggravation was worth it. Racing in this class is very intense. A 25-car field is considered small; most races I entered had more than 30. The starts are like high-speed traffic jams. The flag drops, and you're hurtling into the first turn at 90 miles per hour. Identical cars all around you are just inches apart. The cars aren't very fast, but you always have someone near you to race against, regardless of your skill level or the level of preparation done on your car. One missed shift and you will lose a couple of positions.

Amazingly, I have never been taken out on the start, but I have been intentionally hit towards the end of the race several times. In one double race weekend, a competitor pushed me off the track from behind and got ejected for rough driving. The following day, someone drove into my side on a straightaway. Turns out they were father and son!

I'm looking forward to doing battle again this season, hopefully with some top ten finishes.



WITH NOAH GRAFF

shop doc

Today's Machining World's "Shop Doc" column taps into our vast contact base of machining experts to help you find solutions to your problems. We invite our readers to contribute suggestions and comments on the Shop Doc's advice. If you consider yourself a Shop Doc or know a potential Shop Doc, please let us know. You should also check out the TMW online forum at www.todaysmachiningworld.com.

Have a technical issue you'd like addressed? Please email noah@todaysmachiningworld.com.

We'll help solve your problem, then publish both the problem and solution in the next issue of the magazine.

Dear Shop Doc,

I have a customer who needs me to hold a .0005 tolerance ID on a part made with C12L14. I've been having trouble getting the tolerance close enough on my 6 spindle Acme bar machine. I've been trying for days to ream it up to specs, but I've never had to go this close before and I'm starting to run out of patience. Are there any tricks to getting the tolerance right.

Holding Tight

There is a technique, which may help you hold your tolerance on the part, known as ballizing. It can actually give you tolerances as close as .0001-.0002. Ballizing isn't anything new, but usually it is utilized after machining, when you have a ball that you press through a through-hole to size the ID.

What you can do is this; First, ream your part the best that you can, and then afterward, silver solder a carbide ball to the end of a shank and put it in one of your open spindles—probably your fourth position spindle on a six spindle Acme. At the same time, for this to function properly as you're sealing everything off, you will need a little hole that will go through at an angle that doesn't interfere with the OD of the part, to let air behind there escape as you're ballizing the part. Then run your operation. It's just in and out, so it doesn't limit your cycle time of making the part. You can now complete the part on the screw machine and hold a very close tolerance, usually getting better than a 10 - 6 micro inch finish on the hole.

Things to remember

The balls are made of carbide, so you will have to experiment a little bit with size because what you're really doing is displacing material, and it will spring back. So if you would have to hold, for example, closer than .0005 tolerance, then you will need to experiment with two or three different balls to find the result you are looking for. Also, like anything, the balls are only as good as how close you ream. In other words, the reamed hole would need to be held close to keep consistency on the ball that you're working with. They both work a little bit together. So if you had a hole that was varying .002 before you ballized it, I still think you could ballize it and hold it within .0005. If you wanted it any closer, you would probably have to ream within .001. Then, I think you would be able to hold within .0002 or better. Also, you need to make sure that you are using, the same gauging that your customer is using.

Good luck!

Henry Bradlock
St. Joe Tool Co., Bridgman, Mich.

think tank

Text Twist

How many words can you form using the following letters? The women of Graff-Pinkert and TMW found 181 three to seven-letter words (no proper names)! Extra points for the 9-letter word. Try it at

the office – or at home with your kids. Prizes will be awarded to the folks with the highest number of words.

V N E P R A O D T

Send in your answer—quick! Fax Jill at 708-535-0103, or email at jill@todaysmachiningworld.com

The four factor

There are four factors of the number 6 – that is, the whole numbers that can divide into 6 and leave no remainder. Between 1 and 100, there are five numbers that have exactly twelve factors. Can you find all five?

The five numbers between 1 and 100 that have twelve factors:

60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

72: 1, 2, 3, 4, 5, 6, 8, 9, 12, 18, 24, 36, 72

84: 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84

90: 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90

96: 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96

Who factored correctly?

Nathan Torberson of Hydratight in Antigo, WI; **Joe Cibulskis** of Aurora Air Products in Aurora, IL; **Jason Tepp** of S & S Cycle in Viola, WI; **Ron May** of Hunter Engineering Company in Bridgeton, MO; **Greg Roan** of Roan Manufacturing, Inc. in Odessa, FL; **Rick Hybben** of Hyco Machining Inc. in St. Paul, MN; **Uli Kuster** of Blaser Swisslube, Inc. in Rohnert Park, CA; **Kirk Wallace** of Peregrine Manufacturing, Inc. in Kenmore, WA; **Andrew J. Cousin** of Amersham Corporation in Louisville, CO; **Joe Kovalenko** of Key Machine in Elkhart, IN; of Methods Machine Tools, Inc. in Wixom, MI; **Bill Maloney** of Manchester Tools in Akron, OH; **Debbie Cook** of D & D Precision Machining in Paradise, CA; **Al McBride** of Threading 101, Inc. in Menomonee Falls, WI; **Richard Clark** of Honematic in Boyleston, MA; **Randy Cowart** of Innovative Manufacturing Technology in Huntsville, AL; **Jim Herrington** of RCM, Inc. in Payson, AZ; **Chris Morgan** of K & M Precision Products in Dexter, MI; **Mike Radu** of Claude's Accurate Machining, Inc. in Vancouver, WA; **Thomas McCrill** of Lanford Manufacturing in Lawrence, MA and **Tanner Mayhew** of Vektek in Emporia, KS.



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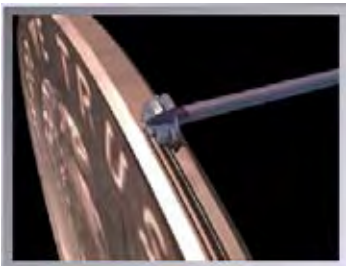
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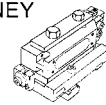
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afterthought

World Playing Field

If you are planning to build a new factory for your machining operation, don't forget the soccer field.

Unemployment is falling to the squeeze point now. Skilled people, who really want to work, are getting scarcer and scarcer. The great untapped reservoir of potential workers is immigrant Latino men and women. The story I hear across the United States, from Rock Valley, Iowa to Houston to the Bay area and Chicago is, bring me your huddled masses (with good I.D.s, of course) and we will hire them.

The clear conclusion for me is that Hispanic workers are the future of manufacturing in the U.S.

Yes, we have the Tom Tancredo Know-Nothing faction in Congress, abetted by the Lou Dobbs xenophobes on the air. They raise the specter of America being overrun and bankrupted by a brown horde of marijuana-ed Mexicans. In the real world of cutting metal, spraying insulation and gyros slicing, the eager Latino workers step up to fill the void left by Generation X-ers who'd rather barista.

And what about all those Delphi and Ford guys being laid off or bought out? A few of them may migrate to a DuPage Machine Products of Chicago or PGI in Houston, but most of them will refuse to work as hard for \$12 an hour as workers from Juarez.

In the ruthless global marketplace, the Latin immigrants, who have courageously left their families, friends and poverty – to earn a living and send money home to their poor village – the American job shop is the ticket.

For Gene Haas, these are the workers who are building his 200,000 square-foot addition and assembling his mills. For Dave Knuepfer in Chicago (see interview) these workers make the parts that are sent to Reynosa, then Nafta-ed back to Texas for shipment around the world. For Spence Nimberger of PGI in Houston, these workers allow him to make oil and gas fittings in the U.S. instead of at his smaller facilities in Mexico and China.

In today's machining world, recruiting and training talented young Hispanic workers is the big enchilada, the path to manufacturing success. Even in rural Rock Valley, Iowa, a town

Dutch to its core, growing shops are searching for young Latino men who want a better life than boning pigs in Sioux City. Machining in America is good work, and it's a shame that so many kids coming out of American high schools and colleges regard it as medieval serfdom. Fortunately, many Hispanics from Mexico to Guatemala do not.

The politics of immigration is confusing. The Republicans are split between business and provincials, and the Democrats want to hold organized labor but not offend their Latino bloc. Most people believe the border should be sealed but don't want to bankrupt their landscaper or the strawberry farmer.

There will be a settlement in Washington because all the nannies there come from El Salvador. Which brings us back to the soccer fields that you will need for future recruitment.

At DuPage and PGI, the noontime soccer games for the young Hispanic machinists are almost religious events. They earn their wages working for the Americans, cutting the metal, packing the parts, but on the soccer field it smells more like home. The juices of competition bubble up as they run around the green field like kids.

Thirty years ago, the activity might have been on a softball diamond. Ten years ago, more likely the action would have revolved around a basketball hoop. Today, in the world market, it's the world's game – "futbol."

If you are going to be a player in the world manufacturing game, remember your goals.

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