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editor's note

The Unfair Advantage

I love basketball and have spent countless hours perfecting my shot through the years. I developed a beautiful touch, but I never could overcome a severe case of the white man's disease—no hops. I've always been elevationally challenged. I used to dream of dunking when I played high school ball. And I did have a few two-handed flushes. The highlight and lowlight of stuffs came during a pregame drill against Illiana Christian. My legs were feeling particularly lively so I decided to go for a dunk in the layup drill. As an inexperienced dunker I caught my shooting hand's middle finger on one of the eyelets holding the net. The finger split open like an overripe cantaloupe. I ran to the bench and showed the bleeding finger to my coach, Sandy Patlak.

Sandy was nonplussed, like this was a common occurrence. He bandaged it tightly and then stuck a condom over the finger. I must admit, I didn't even know what the rubbery thing was, naïve kid that I was. I played the game, but it was the end of my dunking career.

I thought of my limited dunking highlights when I read about Adam and Ryan Goldston, brothers and shoe entrepreneurs who played a little college hoops at Southern Cal., but at 5' 11" were not exactly Blake Griffins. In 2009, just out of college they started Athletic Propulsion Labs, a shoe company with an idea—build shoes with hops. They drew upon their father's knowledge of the athletic footwear industry (he had worked for Reebok) and put tiny springs in their sneakers.

They got enough money together to make a small batch of shoes. They enjoyed good feedback from the playgrounds of L.A. and then had the chutzpah to send their shoes to the NBA, seeking an okay for players in the league to wear them.

The NBA banned them. The Goldstons claim the shoes can give a jumper an extra 3 1/2" of lift.

The rejection became marketing gold. They put a video on YouTube about "the shoe the NBA banned," which went viral. Immediately sales jumped through the roof. Every kid wanted the unfair advantage. With my bad knees, I think I'll buy a pair.

It reminds me of a business friend, Jake Grainger, who buys used machines, gets rid of the guts, and re-engineers them to give his company the "unfair advantage."

What we hope to do at *Today's Machining World* is to provide some information, insight or interpretation that gives you that little edge.

If nothing else, I hope you'll have a little more spring in your step after reading us.

Lloyd Graff
Editor/Owner



Lloyd Graff is a true lover of sports. A highlight of his sporting career was a tryout with the Chicago Cubs. Great photo opportunity, but it ended without a contract offer. Aside from baseball his favorite sport is table tennis. He met his wife, Risa, with a ping pong paddle in the pocket of his corduroy sport jacket. "Conversational ping pong" was a way of connecting with his children when all other approaches failed. Sadly, six eye surgeries for retina detachments have limited his ability to cover the backhand side.



Barbara Donohue volunteers as a weekend puppy raiser for young dogs in training to assist deaf or disabled people. The pups live in a prison during the week, where they are trained and cared for by inmates. Volunteers like Barbara take the puppies out on the weekend so they can experience the outside world. Her latest weekend pup, Fenway, was born January 5. Barbara, who often writes the "How It Works" technology articles, is an MIT-educated mechanical engineer and has worked as a journalist for almost 20 years.



Emily Aniakou joined *Today's Machining World* in June of 2008, just three months after returning from Benin, West Africa as a Peace Corps volunteer. Before that she lived at a meditation center in upstate New York and before that, she spent a year living in Bangladesh and traveling through India and Sri Lanka. Emily grew up in Hinckley, Ill., on a small non-working farm five miles south of town where when a winter storm hit, her family would be housebound for days until plows could reach the remote gravel road. So when the blizzard hit the Chicago area in February, she was thrilled to be living in a prepared Chicago suburb with plows aplenty.
Picture-Emily's front yard after the storm.



Todd Toborg TMW's creative director is getting ready to enjoy the warm weather. During his winter hibernation Todd got himself a new shoulder and has been going a bit stir crazy not playing any sports. But soon, he says, soon. Until then, he will transcend into spring by honoring his tradition of attending baseball's opening day for both the southside and the northside teams. Never playing favorites, he has only unconditional love for all of Chicago's sports teams. Go Sox. Go Cubs.

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Today's Machining World

forum

Dear Mr. Murphy,

In your "Shop Doc" in the Jan/Feb issue on "Push Back Trouble Using Collets" I don't see why would you use the formula $2\pi r^2 + 2\pi rh$ for the surface area of the collet bore and not just $2\pi rh$. The area of a cylinder surface (where the pressure is applied) is just $2\pi rh$ and you don't have to include two surfaces of circle with the diameter of 1", hence $2\pi rh = 2 \times \pi \times .5 \times 1.25 = 3.9269 \text{ in}^2$.

Mark Dmytrow

Dear Mr. Dmytrow,

You are correct! I made a mistake. I originally used $2\pi rh$ but while proofreading I decided to look up the formula to be sure it was correct and came up with $2\pi r^2 + 2\pi rh$. It didn't seem right, but I found it in three sources, so I changed my original math. Now, with no deadline looming, I realize that $2\pi r^2 + 2\pi rh$ gives the surface area of the top, bottom and periphery of a cylinder, which of course is not the case in a collet bore where the only surface in contact with the work is the periphery. I apologize for the oversight.

Dan Murphy
REM Sales LLC

Temp-to-hire

In response to the "Swarf" in the March issue on hiring temps, we too are having difficulty finding qualified people to run our machines, particularly our screw machines. We have been on a temp-to-hire basis for about eight months now. It takes a lot to get on the regular payroll—attendance, skill, quality and efficiency are looked at carefully before we offer a regular position to someone, and this can take up to six months. This is made clear to all people who are interviewed so they can decide if this is where they want to be employed. So far we have found one keeper and have let three people go. This is working better than our old method of getting people on the regular payroll and hoping they work out.

Bruce Renwick
North American Fabrication Co.
Loves Park, Ill.

Two Responses to "Swarf,"

Working Under the Table, March 2011

The last time congress was deciding whether to extend unemployment benefits the line at our front door was 20 people deep. As soon as benefits were extended we had no more applicants. We are back at 2008 employment levels, but our unemployment rate went from 2.3 percent in 2007 to 9.85 percent currently. This is costing my company an additional \$75,000 this year. By the way, 2009 was the first year we ever laid-off anyone after 30 years in business.

Jim Harrington
Engineered Material Sales, Inc.
Kalamazoo, Mich.

I agree that some people abuse the system, and there have been people like that for years. I also agree that unemployment benefits should start declining after a set time. But I do not agree with getting rid of unemployment benefits completely. What happens to all the money that has been taken out of our paychecks for years to cover us if we become unemployed? Yes, this money has already been used on others, but why should all the people who have worked for 20-30 years paying in benefits not have the security they've been paying for if their job goes belly up? Just because it is sunny today does not mean it cannot rain tomorrow.

Joe Crawford



Something on your mind? We'd love to hear it.

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Nielsen's Bakery

I had a hankering for a croissant and decided to drive over to Nielsen's Bakery, a local bakery I don't go to often, but they made nice croissants. All I found was a letter on the window saying they had closed after 21 years. The letter read like a note to a few insider friends and I could not really understand what it said, except that they were closing.

The letter confirmed to me why I had not patronized them for years. I always felt I was an outsider there, a tolerated visitor interrupting a local Kaffeeeklatsch (an informal gathering) at the local clubhouse.

Nielsen's was in downtown Homewood, Illinois, next to the commuter train stop. A Starbucks with a drive-through now operates on the other side of the parking lot. The Starbucks does \$20,000 a week in business and there are two other Starbucks in the area that do a similar amount of business. My guess is that Nielsen's was lucky to do \$5000 a week. Nielsen's was a daytime operation while Starbucks is open 5:30 a.m. to 10 p.m.

Another local bakery, Sweet Annie's, opened three years ago, and in my opinion that was the final blow that killed Nielsen's. Not only were Annie's baked goods superior, the ambience of the shop was warm and welcoming.

Another element most likely came into play in the demise of this small business. Homewood, like the rest of the south Chicago suburbs where I live, is becoming a predominantly African American community. Nielsen's was clearly an old school Homewood institution, patronized mainly by Caucasians—and proud of it. If I felt like an outsider when I walked in, I'm sure a black person would have felt uncomfortable there.

The restaurants and stores in my neighborhood need to feel like they are connected to their customers. Most businesses, even those that do business



online or on the phone, need to have a welcoming feel. Airlines with call centers in India lose tons of business because the people who finally answer the phone have no personal touch, are unable to connect with the customer, and are often hard to understand. Cold callers who read from a script rarely get more than a sentence out before I hang upon them.

A machining company owner that thinks he or she is just selling parts with no need for a personal connection with their customers does not understand how business works.

Nielsen's Bakery didn't fail because of the recession, though it didn't help. They failed for many reasons, but the primary one was that they just wanted their little neighborhood bakery to stay the same while the world around them was changing by the day.

There was an interesting juxtaposition of auction sales recently. Corporate Assets sold Die-Matic in Hamilton, Ontario. Gorgeous machinery including a 2004 L-20 Citizen and a 2003 M-20 Citizen. With buyers premium the L-20 brought \$115,000 and the M-20 brought \$127,000.

Two weeks later TCL Auctions, also in Ontario, sold a 2004 Star ECAS 20 for \$175,000 and a 2006 Star SR-2011, for \$180,000. A 2007 Willeman CNC Swiss fetched \$275,000.

In late January, J.L. Spear sold off Alessandro Co., an old Acme shop in Los Angeles. Acme-Gridley 1 1/4" RA6 machines in fair condition of 1970 vintage brought \$2-3,000. A little 2007 Okuma ECLII lathe, sold for \$23,500.

I can add that though the prices on Acmes were dirt cheap at Alessandro, the auction was hastily put together and not extensively advertised. My screw machine dealership, Graff-Pinkert, is seeing a renewed interest in National Acmes, but buyers are looking for tight machines at 2009 prices, of which there are virtually none left in dealer inventories.

Just a couple of years ago the skeptics saw General Motors as a hopeless joke run by bumbling fools.

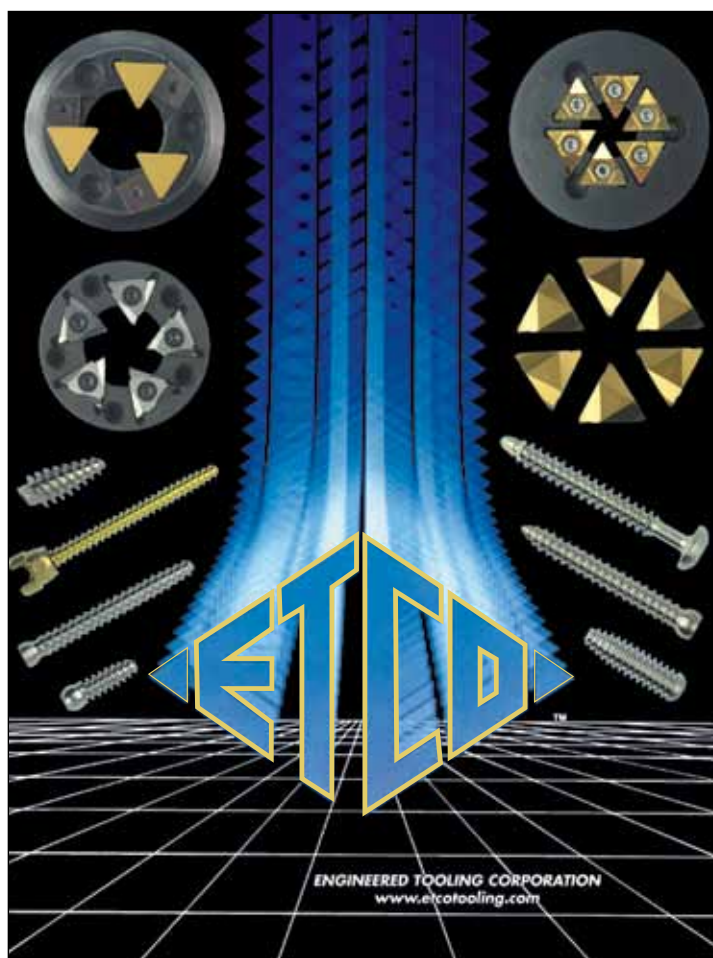
Today, General Motors is a public company that's making money, almost debt free, with the Volt adding another shift to production. Equally remarkable, the incredibly complex job of sorting out the \$275 billion in claims—750,000 contracts and 70,000 claims, has been 85 percent completed.

One of the remaining vestiges of the old GM, known as Motors Liquidations Company in the legal documents, is the Willow Run Transmission Plant in Ypsilanti, Michigan. This gigantic albatross, five million square feet in one building, is on a land site that used to be a Henry Ford-owned farm. It was built in 1942 to make the B24 Liberator bomber. At one point they produced 650 bombers a month.

The assembly plant was passed to Kaiser Motors and then to General Motors, where they made the Chevy truck, the Nova and the Caprice. They also made parts for the doomed subcompact, the Vega, and the illustrious Corvair during the 1960s. During the Vietnam War the plant made M-16 rifles and a 20 mm auto-cannon.

In recent years, the immense facility was devoted to making General Motors transmissions.

Maynards and Hilco Auctioneers have been selling off the machinery over the past year as production tapered off. In six months Willow Run will be a gigantic barn. Already one of the GM plants near Detroit is being converted to a movie studio.



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Another factory will be used to assemble hybrid vehicles for Fisker Automotive of Irvine, Cal.

Willow Run is interesting because of its sheer size, about 5 million square feet. I can imagine putting a dozen soccer fields laid out end to end, or the world's largest mushroom farm in it. How about America's biggest indoor zoo?

Caltech has had 32 Nobel Prize winners on its faculty, but in sports they are just a bunch of losers. The college basketball team had lost every conference game for 26 straight years; 310 games of futility against local colleges in southern California like Whittier and Cal Lutheran.

In baseball they have lost 412 conference games in a row. Why do kids even go out for teams that never win? This is the The Bad News Bears to the 10th power.

Caltech finally won a Conference game on January 29th against Occidental (Barack Obama's alma mater). Should we applaud their fortitude and perseverance, or castigate them for stinking up

their league with such pathetic teams?


I do have some sympathy for the Caltechers, being a lifelong Chicago Cubs fan. The Cubs were last in the World Series in 1945 and have not won the Championship since 1908, the days of Tinkers to Evers to Chance.

To fail is human. To fail and fail and fail and keep on trying is heroic—or is it just mad?


Perhaps college conferences and even pro sports should adopt the incentive system employed in European soccer in which teams that consistently fail to be competitive are dropped to lower quality leagues and replaced by aspiring minor league teams. If the New Jersey Nets or LA Clippers were to finish last three years in a row maybe they could be replaced by a D-League team like the Idaho Stampede or Bakersfield Jam.

In baseball it could be an incentive for a team like Pittsburgh or Kansas City to stop living off the luxury tax money from the Yankees and Red Sox and actually develop a team.

As for the Caltech Beavers, hooray for winning a basketball game. If I were them, I'd stick to Intramurals




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Dear Michael Bloomberg

(Mayor of New York City),

Just wanted to alert you that I am available, if the hours are right, to join the stable of writers of your new "Bloomberg View" enterprise. Our views on free trade (pro), taxes (don't like 'em) and tobacco (tax it like hell) are congruent. The \$500 grand a year you are offering to prominent journalists is a nice round number I could live with.

I could add knowledge about the manufacturing world, which your provincial New York Wall Street-focused crowd could certainly use.

As a fellow magazine publisher I can relate to your comment recounted in the March 1st New York Times concerning your purchase of Business Week. When a bevy of consultants recommended that you pass on buying the money hemorrhaging publication because they said in a good year it would lose \$25 million you said, "Do I look like a guy worried about losing \$25 million?"

With your net worth pushing \$20 billion, according to *Forbes*, and your age (late 60s) we have at least one thing in common. I was hoping you would run for President in 2012, but it is looking more like you are leaving the Iowa Primary to Romney and Pawlenty and other assorted losers. Apparently you have looked at the Ross Perot approach and figured it was a waste of time for 2012.

Mike, I think I understand where you are coming from. Better to be King than President. Considered it myself.

I'll FedEx my resumé. Keep reading my blog. You are one of the few billionaires who know what Swarf is.

Lloyd Graff
Owner/Editor
Today's Machining World



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BY EMILY ANIAKOU

The Glass Castle

Jeanette Walls' life story is so amazing that her memoir, *The Glass Castle*, reads like fiction.

Jeannette Walls is tall and pretty and has held her own in New York City's social circles for many years. She climbed the career ladder in journalism from newsroom girl at age 17 to gossip columnist for msnbc.com. No one from her life of glamour would have guessed that this put-together, successful journalist had grown up with two eccentric parents, and lived the life of a neglected, hungry, dirty and often homeless little girl in West Virginia.

Her memoir begins with a description of an evening in New York. She is dressed up, heading in a taxi from her Park Avenue apartment to a special evening function when she spots her mother, digging through a trash can. Jeanette ducks down so her mother won't see her and call out. Guilt washes over her. It is with this introduction that the tale of how her family arrived at this point begins.

To understand how Jeanette grew up you must get an inkling of what Rose Mary and Rex Walls, her mother and father, were like. Rex was a West Virginia native and alcoholic whose longest job ever lasted six months. When he worked up too many gambling debts or just had a hankering, he'd load up the family car and they'd "do the skedaddle" out of town. Rex always claimed he was up to something grand when he was really just drinking. He would talk about perfecting his "Cyanide Gold-Leeching Process" to build a tool, the "Prospector" that would find gold and make them all rich. Although it would have been easy for Jeanette to depict her father as cruel or even crazy, and she does speak of him with sadness, her love for him is clear.

Jeanette's mother, Rose Mary Walls, was an artist and idealist who rebelled against her own mother's sensible nature by falling in love young and marrying a dreamer who promised her an exciting life and a ticket out of town. She hated work and responsibility, and when her children would beg her to get a job so they could have food she'd say, "I'm an artist, why do I have to work? Your father doesn't do *anything*." Rose Mary's rationalizations for her bad mothering pour out throughout the book, and make her look hopelessly selfish and even mentally ill.

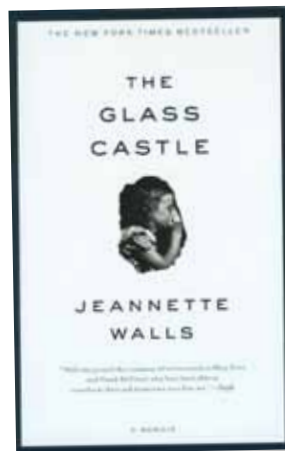
Rose Mary and Rex Walls claimed they would do anything not to live a boring life, but Jeanette describes her parents as people who "lived unruly lives battling authority and liked it that way." Rose Mary's unusual philosophies led to one crazy decision after another, like buying paint supplies instead of food when the fridge was empty, buying the dented cans in

the grocery store even if they weren't marked down because "they need to be loved too," and hoarding chocolate bars from her starving children as she claimed she had an insatiable sweet tooth. Rex's drinking and need for adventure trumped any sense of responsibility or structure for his family.

The four Walls kids were often hungry because Rex would take any money Rose Mary brought in from her sporadic bouts of teaching to finance "his gold research." She said the only research he did was on the capacity of a liver. The kids were always thinking about food and how to get it. They stole from other kids' lunch bags at school and dug through trash bins.

The Walls kids were "supposed to pretend that their life was one long and fun adventure," describes Jeanette, and at times she definitely felt that way. Her parents loved her and her siblings, and she had a special bond with her father. When her dad asked Jeanette what she wanted for her 10th birthday and claimed "if it's humanly possible, I'll get it for you, and if it ain't, I'll die trying," he tied himself to the bed with rope and went through a week of detox from the booze. It was the longest period of sobriety he ever had.

Why some people can go through a childhood of constant trials and craziness and then end up successful and relatively normal while others can't, is a question for the ages. Jeanette and her two oldest siblings have also done well as adults; brother Brian was a decorated policeman and is now a teacher, and oldest sister Lauri is a successful illustrator in New York. Her youngest sibling, Maureen, has struggled with addiction and mental illness. 11



Comments? You can email Emily Aniakou at emily@todaysmachiningworld.com.

WHO READS

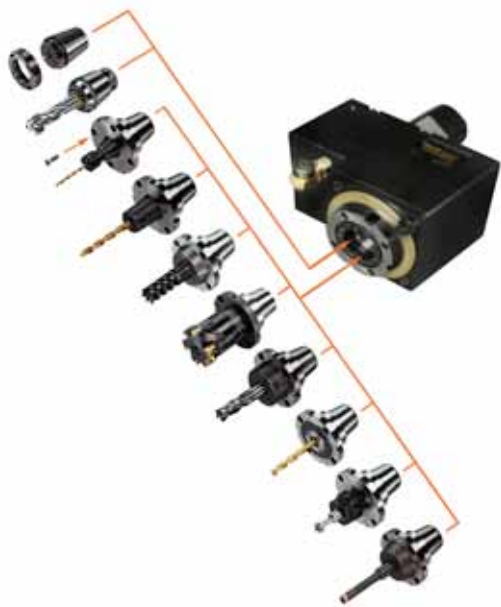


Driven folks like **Scott Volk**, vice-president of **MetalQuest Unlimited** in Hebron, Nebraska.



Since I could crawl I've loved hot cars. I've transferred my passion for mechanical things to our shop of 19 CNC machines making product for energy distribution, hydraulics, and transportation. I read car magazines like Hot Rod and National Dragster. The only manufacturing magazine I read cover to cover is Today's Machining World.

Today's Machining World?



◀ EXSYS Tool

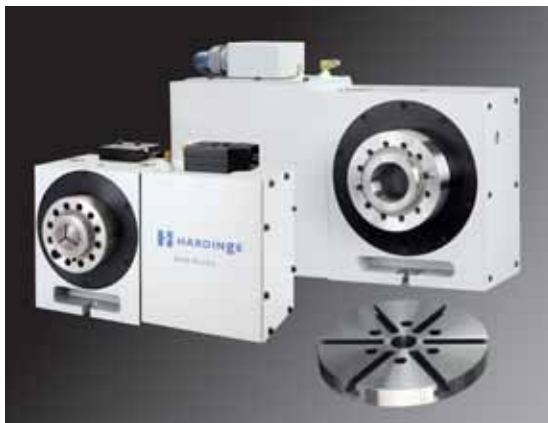
EXSYS Tool, Inc. has developed rotary and static tool holding concepts specifically for Mazak Corp. turning centers. The concepts streamline machine operations through the use of rigid, accurate and efficient PRECI-FLEX tooling products. The tooling concepts are heavy duty (CAT 40-taper and Standard ER Collet) configured specifically for Mazak Horizontal CNC Lathes. The different models that EXSYS supports tooling solutions for include Mazak QUICK TURN NEXUS 200/250/300/350/400/450 machines and previous SQT 15/18/200/250 M-MS/28 M-MS. EXSYS Tool offers the H and V-type drill/mill heads with Standard ER32 Collet, ER40 Collet, and CAT40 capability.

For more information, please contact EXSYS Tool, Inc. at 800-397-9748 or visit www.exsys-tool.com.

▶ FANUC

FANUC FA America introduces the Series 30i/31i-L MODEL B high-speed laser controls capable of supporting advanced levels of high speed laser processing. The new Series 30i/31i-L MODEL B CNCs have the capacity to deliver seamless choreography between axes motion and power modulation, even in cases of extremely high speeds when processing thin gage materials. Impressive internal laser power stabilizing characteristics deliver edge conditions on thicker materials. It also has smooth edge cross sections with superior edge finishes that quantify smoothness rather than surface roughness.

For more information, please contact FANUC FA America at 888-326-8287 or visit www.fanucfa.com.



◀ Hardinge

"Back in 2008, Hardinge introduced a low-profile rotary table as a standard, no-frills unit to compete against other 210 mm tables on the market," states Al Comstock, Rotary Product Manager at Hardinge Inc. "Now, by customer demand, we've redesigned the model to include the famous Hardinge collet-ready 16C spindle that provides the high-precision gripping options for which Hardinge is known. We've also extended the spindle nose for additional tooling clearance."

For more information, please contact Hardinge at 800-843-8801 or visit www.shophardinge.com.

fresh stuff



▲ Hexagon Metrology

Hexagon Metrology, Inc. announced that precision component manufacturer Milwaukee Machine Works has purchased a Leitz PMM-G ultra-accurate coordinate measuring machine. The Leitz measuring machine has a supersized measuring capacity of three meters wide by four meters long, and two and a half meters high, tailor made for the large scale machined components that are a Milwaukee Machine Works specialty. The PMM-G is a gantry configuration machine that allows large scale parts up to 30,000 pounds to be easily moved inside for precision measurement. It also boasts the highest accuracy specifications for its size, enabling ultra precision measurements to be made for case, cover and housing parts for the wind, off-highway and mining industries which comprise MMW's typical customer base.

For more information, please contact Hexagon Metrology, Inc. at 800-274-9433 or visit www.HexagonMetrology.us.

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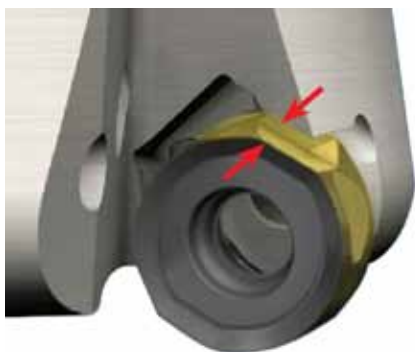


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◀ ISCAR

ISCAR has expanded its line of HELIDO ROUND H400 fine-pitch mills to improve profile machining and ramping over a wider range of applications. Included now are 10 mm and 16 mm inserts, to complement the original 12 mm insert. Matching cutters cover the 1.0" and 1.25" diameters for end-mills and 1.5" to 4" for face mills. Unlike true rounds, HELIDO 400 ROUND inserts have a periphery that consists of bounding arcs with radii that would be found on pure rounds twice their size. Each insert has four 120° arcs. This enables the cutters to have more flutes compared to existing standards resulting in higher feed capability.

For more information, please contact ISCAR at 817-258-3200 or visit www.iscar.com.

▶ LNS America

LNS America will display a broad range of productivity tools in PMTS booth # 145, including bar-feeders, chip conveyors, coolant management systems, automatic workholding devices and oil mist collectors. Featured products will be the Hydrobar Sprint 542 automatic bar-feed, which changes over in less than eight minutes and flawlessly feeds 12' round, hexagonal or square bar stock with diameters from ¼" – 1-5/8" (5 mm – 42 mm). The compact, rigid, heavy-duty frame dampens vibrations and minimizes stress for superior performance, while the new PLC PCD3 is 10 times faster and has Ethernet and USB connectivity for communicating with the lathe PLC.

For more information, please contact LNS America at 513-528-5674 or visit www.lns-america.com.



◀ Mazak

Mazak will be showcasing a variety of machine tool technologies geared toward increasing aerospace part production during the AeroDef Manufacturing 2011 show, which will take place on April 5 – 7 at the Anaheim Convention Center in Anaheim, California. Special featured machines at Mazak's booth #1350 will include the VARIAXIS 730-5X II full simultaneous five-axis machining center and the new INTEGREX i-200S Multi-Tasking machine. Mazak's high-performance VARIAXIS 730-5X II provides high-speed, heavy-duty, full simultaneous five-axis machining of large, complex parts such as those involved in the aerospace industry.

For more information, please contact Mazak at 859-342-1700 or visit www.mazakusa.com.

fresh stuff

► Seco Tools

Seco Tools has announced additions to its line of Feedmax™ solid carbide drills that avoid delamination upon entry or exit when drilling in carbon fiber reinforced polymer (CFRP) materials. The new –C1 geometry features a sharp optimized double point, while the –C2 geometry is specifically designed to drill stacked CFRP with an aluminum or titanium outer layer. To combat the abrasive properties of CFRP, the Feedmax –C1 and –C2 incorporate a polycrystalline diamond coating, which also provides good dimensional tolerance. The new drills are 5xD with diameters ranging from 0.1260" – 0.5". All –C1 and –C2 drills feature through-coolant holes.

For more information, please contact Seco Tools at 248-528-5444 or visit www.secotools.com/us.



▼ Sunnen

Sunnen's new HTG series tube hones are designed as oil field workhorses with high-volume throughput and increased part capacity. The standard HTG-10000 is capable of handling standard part lengths up to 30 feet (9.14 m) and weights up to 17,600 lbs. (8000 kg). The HTG's ID range is 2 to 24 inches (50.8 to 609.6 mm), double that of previous generation machines, with an OD capacity of 26 inches (660.4 mm) standard, and up to 48 inches (1219.2 mm) as an option. The machine is ideal for instrument piping and down hole equipment applications, such as pumps/motors and hangers, and large hydraulic cylinders like those found on offshore oil platform stabilizers.

For more information, please contact Sunnen Products Company at 800-325-3670 or visit www.sunnen.com.



► United Grinding Technologies

United Grinding Technologies (UGT) announces the new Studer S41 CNC universal cylindrical grinder, featuring outstanding technology and cost-effectiveness. The machine grinds with superior precision and at extreme metal removal rates. In addition, the longitudinal and cross slide, as well as the swivel axis for the wheelhead, feature electric direct drives, which move to the working position swiftly and precisely. It has higher precision, better surface quality, and higher metal removal rates.

For more information, please contact United Grinding Technologies, Inc. at 937-847-1253 or visit www.grinding.com.





End mill coated with CC AluSpeed, a titanium diboride coating from CemeCon developed for high-performance machining of aluminum and aluminum alloys.
Photo courtesy of CemeCon, Inc.

how it works

BY BARBARA DONOHUE

Coatings for Cutting Tools

The thinnest of thin layers can make a big difference in tool life and performance.

In the early days of tungsten carbide tools, before coatings, tool manufacturers realized the tools would last longer and resist cratering if they put a little bit of titanium carbide (TiC) in the mix when making the tool. This had the desired effect, but the more TiC that was added, the weaker and more brittle the tool became. Then someone hit on the idea of applying a thin layer of TiC to the surface of the tool. It worked. This was in about 1970, said Don Graham, manager, turning products and education services, Seco Tools, Inc., Troy, Mich.

A year or so later, tooling companies started using a titanium nitride (TiN) coating, and in 1973, aluminum oxide began to be used.

Graham described the properties of these three coatings:

- *TiC gives abrasion resistance and prevents the chip from dissolving the tool material, leaving craters.*
- *TiN prevents a built-up edge, where the workpiece material sticks to the cutting edge. This spoils the surface finish and also, when the buildup is dislodged, it pulls away part of the coating and maybe the cutting edge. This coating is the familiar gold-colored one.*
- *Aluminum oxide provides resistance to heat in two ways. First, it is an outstanding thermal insulator; second, and more important, it is stable to very high temperatures.*

These coatings are applied by a chemical vapor deposition (CVD) process, Graham said. The tools are placed in a chamber. At 950 – 1100 degrees C, gases are pumped into the chamber, where they react and deposit a thin layer of material on each tool.

The other widely used coating technology is physical vapor deposition (PVD), “a newer and more sophisticated process,” Graham said, “where you’re building up the coating by shooting ions into the surface.”

For the PVD process, the tools or inserts are placed in holders or on rods, which are mounted on a sort of carousel that goes into the coating chamber. The carousel rotates and so do the rods and holders. Meanwhile, a strong negative electric charge is applied to the tools. In the chamber a “hockey puck” of titanium or titanium-aluminum is vaporized with an electron beam. The titanium and aluminum



Above: Inserts with CemeCon coatings.

Photo courtesy of CemeCon, Inc. (Copyright © 2011 CemeCon AG, Germany)

ions have a strong positive charge, so they are drawn to the negatively charged tools, colliding with the surface. Then nitrogen gas is introduced, and “if you do it right, [the process] will form a nitride [TiN or titanium aluminum nitride] on the surface of the insert,” Graham said.

With both CVD and PVD many kinds of coatings can be applied.

These days, a CVD coating typically has multiple layers, said Bill Tisdall, development and turning manager of tooling manufacturer, Sandvik Coromant US, Fair Lawn, N.J. Starting from the surface of the carbide tool it might have the following:

- *TiCN (titanium carbonitride) provides flank wear resistance and provides adhesion between the carbide and the next layer.*
- *Aluminum oxide provides heat and crater wear resistance.*
- *Some grades might have a flash of TiN. The aluminum oxide is black, so this gives the operator the ability to see the condition of the cutting edge.*

Of the two types, the CVD coatings are usually appreciably thicker than the PVD coatings.

Thick coatings work very well in alloy steel and cast iron, Tisdall said. Thin coatings are best with materials that tend to be a little sticky, such as low carbon or stainless steels. If you cut a sticky material with a thick-coated tool, the material will tend to adhere to the tool. When the adhered material gets knocked off, it may take some of the coating with it.

how it works



The difference between a CVD tool and a PVD tool is more than just the type of coating. PVD tools have that thinner coating, but they also are designed with a finer structure in the tool material, a micrograin structure with carbide particles smaller than one micron. CVD tools have that thicker coating, but they also are designed with a medium-sized grain structure. This difference can help select the right tool for a particular application.

“If you are doing an interrupted cut with a CVD grade tool and get chipping along the cutting edge,” Tisdall said, “using a PVD grade might solve that,” because of the PVD-coated tool’s fine grain structure.

If a PVD grade insert is breaking, he said, try a CVD grade—it has that larger grain structure and resists shock. The tool and the coating are designed to work together.

You can tell what is going on with the tool by the way it is wearing. Each wear pattern will tell you something: cut off the coolant, try a harder or softer grade tool, look at PVD vs. CVD grades. “There are probably nine different wear patterns we see in the industry,” Tisdall said. “They can give you a much better understanding what’s going on in the cut” and help improve your process. (See “For more information.”)

Top Left: Mill with CemeCon TINALOX SN coating

Photo courtesy of CemeCon, Inc. (Copyright © 2011 CemeCon AG, Germany)

Top Right: CoroBore 820 in action.

Photo courtesy of Sandvik Coromant US.

Right: CB7015 tools for hard part turning.

Photo courtesy of Sandvik Coromant US.

Evolution and revolution

Recently most of the changes in coatings have been more evolutionary, Graham said. Changes to improve performance included using different thicknesses and polishing the layers.

Some new, different coatings have become available, however. Gary Lake, president, CemeCon Inc., Horseheads, N.Y., a manufacturer of PVD coating equipment and provider of coating services, talked about titanium diboride, a unique coating that resists material transfer from copper or aluminum. It was used by the casting industry to prevent aluminum from sticking to molds, he said, and now it has been adapted for use as a tool coating.

Diamond Coating

Diamond Tool Coating LLC, North Tonawanda, N.Y., coats

tools with polycrystalline diamond applied with a CVD process. The company works with tool manufacturers to develop the right combination of tool and coating to match such challenging applications as machining composites or graphite. The diamond coating can withstand the abrasiveness of these materials.





Left: CoroCut tool designed for parting and grooving.

Photo courtesy of Sandvik Coromant US.

Not just any tool can be diamond coated, said the company's general manager, Doug Mueller. "What tool material we can apply the coating to is limited. The best substrate is 6 percent cobalt, fine-grained carbide," he said. "That will produce the best adhesion, which is the key to the success of diamond coating."

You may be familiar with conventional polycrystalline diamond (PCD) tools, where a slice of diamond is bonded to the tool to provide a diamond cutting edge. That approach limits the available geometries, Mueller pointed out, while the CVD-applied diamond coating can coat complex shapes, such as helical geometries and chip breakers.

A CVD diamond coating works well for cutting anything abrasive, said Cyle Anthony, product manager at Niagara Cutter LLC, Amherst, N.Y. "We started with it about seven to 10 years ago for machining graphite for electrodes and things like that." The coating has since been used on tools for cutting metal matrix materials, green ceramic, and a lot of different composites: carbon fiber reinforced polymer, fiberglass, Kevlar-reinforced materials. Composites are used in applications for such industries as aerospace, wind power, military, medical and automotive.

Not just a tool, not just a coating

How is the coating matched to the application? At CemeCon Inc., which specializes in PVD coatings, Lake said, "we use an empirical process. A customer brings an application, such as milling stainless steel. We have probably eight different coating chemistries commonly used now. We will provide three samples, each a little bit different from the others, for a cutting test to see if there is a difference. It's an iterative process."

"As we have gone through the evolution of the coating process, we have learned to adapt the coating to the sub-


strate and cutting parameters," he said. "We've learned how to do edge preparation. A little bit of a break on the edge gives some support to the coating."

"We don't look at it as just the tool anymore, we look at it as a cutting system," Lake said. "It's a question of knowing what is happening at the cutting edge."

New on the horizon

New, challenging materials may be showing up on your customers' prints, Graham said. You may have already encountered composites as used on the Boeing 787, others are out there, such as compacted graphite iron for diesel engine blocks, and zirconium oxide ceramic for knee and hip replacement joints.

Graham recommended that shops stay abreast of new developments in tools and coatings. "They should make judicious selections of emerging technology. Sometimes a product comes to market that will be the best for them. The faster they jump on it, the better they'll compete."

Generally a shop can rely on tool suppliers to help match tools with tasks, but you should be sure to ask a lot of questions about a new or updated tool or coating. Why is it good for my application? What kind of improvement can I expect? Any downside? Then you must be willing to give it a try. 

For more information:

Abrasive Form, Inc.: www.abrasive-form.com

CemeCon, Inc.: www.cemecon.com; video on www.youtube.com – search for "coating center"

Diamond Tool Coating LLC: www.diamondtc.com

Niagara Cutter, Inc.: www.niagaracutter.com; video of machining with uncoated/coated tool: www.niagaracutter.com/coatings/ecoat_mov.html

Sandvik Coromant US: www.sandvik.coromant.com/us; for tool wear chart, click on "Online Catalogs," "Technical Guide," and "A-GENERAL TURNING," see pages 89 – 90

Seco Tools, Inc.: www.secotools.com/us

Today's Machining World, October 2006: "From Ore to Insert: Making Tungsten Carbide Cutting Tools." www.todaysmachiningworld.com/how-it-works-making-tungsten-carbide-cutting-tools

SURVIVOR 2008-2011

RECESSION SURVIVORS

HOW BUSINESSES MADE IT THROUGH

Four companies that are thriving after the recession, and how they are doing it

INTERVIEWED BY NOAH GRAFF, EDITED BY EMILY ANIAKOU



Miles Free is the Director of Technology and Industry Research for the Precision Machined Products Association (PMPA). He has 36 years of hands-on experience in the areas of manufacturing, quality and steelmaking.

How do you interpret the current situation for manufacturing?

MF: Our industry is probably in the best position it's been in 31 consecutive months. Our PMPA Business Trends Report is an index that reports on sales, and our last one with 80 shops reporting was at 111, that's up 20 points from December's 91, and it's the highest level we've had since 2008. (It had been as low as 64 in May 2009). So we're very confident that we have a recovery, and that our kind of components are going to be in high demand in the coming couple of months.

What's happening in the industry that gives you optimism?

MF: One of the things I've seen is a number of members trying to find out if other members have open machine time. That tells me they have orders they can't complete, so they're trying to find who has capacity in order to provide the products that are critical on time.

What is happening to raw material supply?

MF: The pipeline is kind of dry for raw materials, so lead times are really extending. For some items you can be out four to six months.

The raw materials aren't available?

MF: They're not made. Nobody wants to have them in inventory. Imagine you want brass and it has a lot of copper content. Copper's up to a new high—over \$4.20. Traditionally, it's been a \$3 kind of item. So do you want to have that in inventory? If the selling price drops in the market, you're wiped out. The companies who came through the downturn are not going to

go out and just take a flyer on material. They're not gamblers, they're entrepreneurs.

How have shops been making do with fewer employees?

MF: From 2006 to 2007, the value of shipments increased 40 percent, but we did that as the number of employees increased by just 35 percent, and the value-added actually increased 41 percent. I think this shows that before the recession we were adding more value for the employees than we put in. What I think is going to happen after the recession is a huge increase in production per employee, because we've become really productive and focused in our shops. We've kept the talented people and we're working on the highest value projects.



Tim Shuell is Vice President of Metric Machining in Ontario, Cal., a large precision machine shop. www.metriccorp.com

How did Metric Machining survive the downturn?

TS: The basic strategy was a reduction of direct labor to reduce or stop the burning of cash. There didn't seem to be a whole lot of strategic thought put into it other than that.

What does your employee makeup look like?

TS: We're down to two divisions and one location in Ontario, Cal. Eighty percent of the management team is new to the company. Age-wise, they're in their mid 30s to early 40s.

How did you find your new workers?

TS: We brought in seasoned people but we also started a training lab that actually goes live next week. The lab will cover all of our New Britain, Davenport, Brown & Sharpe, CNC Lathes, CNC Mill Department and CNC Swiss machines. It's an in-house lab to get all of our operators at the same skill level and standardize how everybody's being trained.

What do you think about the skilled labor shortage?

MF: I think people are figuring out that having a college degree in some obscure subject may have been satisfying to get, but isn't paying the bills. I think there's a lot of talent that has a college degree that's really under-employed and I think we're at the point now where our manufacturing companies are looking for talent, not labor. We're going to start seeing some of these college people who are underemployed for whatever reason figure out that it's okay to work in manufacturing. It's going to be a real opportunity for talent to come in short-term, and I'm optimistic we'll find it.

Has Metric been diversifying its products since the downturn?

TS: Yes, we want to broaden our capabilities. Commercial irrigation-type products are still a primary line for us, but we want to get deeper into new energy products, re-open our aerospace supply division, and get some representation in the medical field. We're not making anything medical right now.

Is there less competition for jobs since the recession?

TS: We haven't really found that in our area competition has decreased much. Given the size of our particular shop, our main competitors are all still in business. I don't think we really saw any big shops go out locally, not like the Midwest and some places back East experienced.

Has foreign competition changed your business climate?

TS: We feel that the work that was already going to go overseas went five or seven years ago. We've already seen some of it come back. People now seem willing to pay more to get the product that they need here, on time and made correctly.

What type of equipment are you buying?

TS: Multi-spindles; New Britains, Davenports, Wickmans. Single-spindles; Brown & Sharpes. We just bought a brand new K16 Citizen CNC Swiss. We have three Hydromats and are keeping our eye out for deals on more of those. We have all these opportunities in front of us that without the proper workforce and machines, we can't get.

Are customers still asking for better prices despite the rise in material prices?

TS: Customers might not like the increases, but they're not withholding the POs, so we're still getting the orders even though prices are going up. I think their options are a little fewer. They don't have as many shops to source with, and everybody's busy.

Patricia Lewis is CEO of Berkley Screw Machine Products, Inc. in Rochester Hills, Mich. www.berkleyscrew.com

Did you lay-off people to make it through the downturn?

PL: Yes, we laid-off about 50 percent of our crew, so about 30 people in all. We're currently hiring though.

What kind of people are you hiring?

PL: We're training new people, but I've recalled all of my people that wanted to come back, too. My workers are the best in the world. We're very picky about who we hire. We are not necessarily looking for someone with skill sets, but the mental ability to do those skill sets. If they have that we can train them. No matter who we hire they will go through an extensive training program at our place before they're ever put on the machines. My single best asset are my employees. They're incredible.

Would you say that your employees are your competitive advantage?

PL: Yes, my employees are so bought into their jobs that when we get audited I let the people talk to the auditors all by themselves. They're always amazed at not only how smart the employees are but how well they know their process and how intense their interest is in what they're doing. We have a company culture that says, "The owners of the company are really interested in you as an individual," so that's how our employees behave. They know they're not just somebody who punches in and punches out.

How has foreign competition changed from two or three years ago?

PL: I see companies coming back to us because the quality of the product they're getting out of China is poor. We have a former customer who came back to us and wanted us to sell to him at the same price the Chinese sold to him. When I looked at the 12 parts he was getting from China, only one was in tolerance. There were 47 dimensions and they had just one dimension out of 47 that was in tolerance. He's buying from us now because he had so many problems for the three years he bought offshore; his product from there was crap.

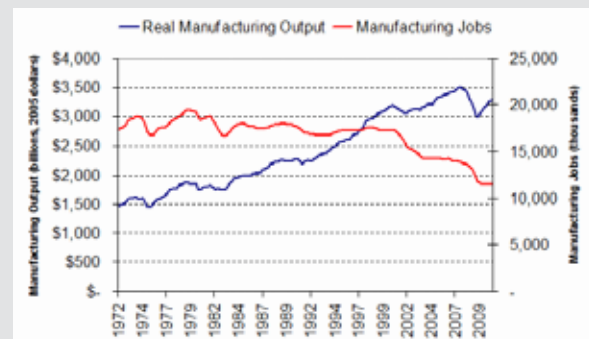
The Perspective of an American Builder

Steve Pinto is Vice President of Finance and Marketing at Southwestern Industries, Inc. in Rancho Dominguez, California. The company produces TRAK machine tools and ProtoTRAK CNCs.

Pinto says that 2007 was the company's last strong year and 2008 was decent. In 2009 the company's sales dropped 50 to 60 percent. They resisted any layoffs for several quarters but eventually laid off 15 percent of production employees followed by another 30 percent several quarters later. However, none of the service and support employees were laid off, as demand remained stronger for service than for new machines.

Southwestern Industries' sales came back significantly in 2010 and the company has hired many of the production employees back. Supply chain difficulties have kept sales down a little but bookings are up.

Pinto is quite optimistic about the coming year and says that throughout the downturn the company remained optimistic. "After being in business for 50 years we know we're in a cyclical industry. We won't extend ourselves recklessly in booms and therefore we're not in a precarious position in the busts," he says.



As material prices rise, are your customers adjusting their price expectations?

PL: No, they're not. I had a customer say to me the other day, "Well, just tell them you won't pay for it." And I said, "Yes, I'll tell a multi-billion dollar company that I won't pay for it." It's very difficult to convince people that in the last year and a half the base price for material has gone up. We have begun to explain to people that we have accepted and paid for the increase all this time and now they're going to have to join us and pay for it too.

Have you bought much new or used equipment?

PL: Right now we're in the process of buying some new equipment. But we've bought mostly used equipment. Since a new CNC multi-spindle is about \$1.5 million we're looking for good used machines.



Jack Steuby is President of John J. Steuby Co. in Hazelwood, Mo., one of the most diversified family-run screw machine companies in the Midwest.

www.steuby.com

What was the state of your business before the recession?

JS: In January 2009, when the sales really dropped off, we had 120 employees. Over the next two to three months we let 70 of them go. Our sales went from a million dollars a month to \$500,000 and we found we could do just as much work with a lot less people. So a lot of good things came out of the recession for us.

What was your first move when the recession hit?

JS: When sales started going down we immediately cut our overhead—we cut 70 people and we cut general spending.

Was it hard to let people go?

JS: There were too many prima donna setup men that had a gun to our head saying, “If you don’t give me a raise, I’m going down the street to such-and-such a place.” Well, that place went out of business. We had been running unnecessary overtime to compensate for low rates of pay, but that disappeared and we became profitable every month. For 14 months in a row in 2009/2010 we made a profit.

Do you still have only 50 employees?

JS: We haven’t brought back anybody we had let go of. We’re up to 80 now because we’re running a training program and have young trainees. The people we let go had been with us for a long time. One was with us 17 years, another 15 years, and a lot of the others were with us eight or nine years. Not one of them put up a fight about leaving. They knew they were riding on the sled and not producing.

Do you prefer to pay overtime or hire new people?

JS: We’d hire new people, but they’re not available. There are no skilled people in St. Louis.

Have you diversified your products or made other changes?

JS: We’ve invested in 14 Hydromats. We bought four 8.7, that’s New Britains with spindle stops on them.

Is the competition for business different now?

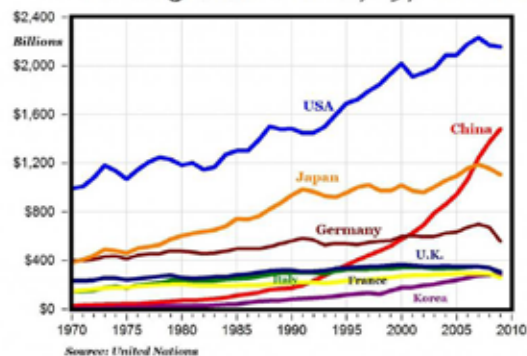
JS: Our business was 80 percent local and 20 percent out of town. Due to my son’s ingenuity we have diversified. We’ve gotten more into ammunitions, which is very profitable. There were 12 screw machine companies in St. Louis and now there are only two.

A Machine Tool Builder in Europe

Michele Tajariol runs the ZPS factory in Zlin, Czech Republic, which produces the multi-spindle Mori-sey (Euroturn), Manhurin CNC Swiss, and a line of CNC machining centers and lathes.

He says that the company had a significant workforce reduction in the slowdown. He has hired back 100 employees, all production people from the shop floor, and production is back up to 2008 levels. Michele said 2007 was his best year in sales, though 2008 had approached it. The difficulty now is the cost and delivery of raw materials. While sales have rebounded, profits are being held back because the market is not accepting price increases for his mechanical and CNC multi-spindle screw machines.

Manufacturing Output, Top 8 Countries
Real 2005 U.S. Dollars, 1970 to 2009



Demand is strong for big and small diameter machines, but mid-range, 32 mm sizes are soft. Strongest demand is from Germany, but Italy and India are showing life. He is selling higher quantities of mechanical machines than CNC, but both are selling briskly.

In the U.S. quoting is very active and he is hoping to close a lot of deals in the next few months.



Thuro Metal Products, Inc. in Long Island, New York, a precision machined component metal parts manufacturer, opened its doors in 1971. It is run by father and son team Al Thuro, CEO, and Dave Thuro, President.

www.thurometal.com

What has your business looked like over the past few years?

DT: In 2007, both in headcount and sales, we peaked. But it was back in 2005 that we started seeing things that were concerning; like being asked to make parts for less than the cost of the raw materials because of China. Many of our key accounts were multi-national firms who were transferring business to low cost regions.

How many facilities do you have?

DT: We have two facilities in the same industrial park. We had a location in Texas too, which we sold in June of 2005.

Have you laid-off a lot of people?

DT: Even before the recession hit we went from 58 to 39 employees. Some of those people were at retirement age, so when business dropped in 2008 and 2009 by 20 percent, we had people retire. Another 5-10 percent of our workforce we didn't feel really belonged with us or were temporary workers we had hired for a specific project. We wanted to keep our core staff.

Did you get rid of overtime?

DT: Yes, for a while. Our average skilled person now works about 48 hours a week, but there was a period in 2009 from June to September where we offered virtually no overtime. A lot of people in our industry opted to go to a four-day workweek; instead, we opted to part ways with staff that didn't have a long-term future with the company.

Are you adding capital equipment now?

DT: We've added a new CNC, a high production, multi-axis lathe in one facility, and multi-spindle machines in the other. We spent about a half million dollars on the new CNC machine. Some people would go with all new or used, but we buy what's necessary to serve the market that we're in.

What is your competition like now compared to before?

DT: There's less of it. I believe about 30 percent of our competition went out of business.


What are your current business challenges?

DT: The challenge for us right now is finding skilled workers. We have gone back to 52 full-time employees. We've also had to upscale our product, even before the recession. Like I tell everybody, companies in the U.S. can no longer make nuts and bolts for barbecues. The low-tech, high-volume machining has gone overseas. Some of it is coming back now, but there's less risk in the marketplace that medium- to high-precision parts will head offshore.

What did you do to find new business during the recession?

DT: We increased our service to the government or military when the industrial sector almost came to a grinding halt in 2009. We're about 20 percent automotive, 25 percent oil and gas, 25-30 percent industrial equipment, and about 15 percent military—although that's the one segment that's declining.

What is your current game plan?

DT: Right now we're leveraging. We're taking advantage of low interest rates, penetrating deeper into our current markets, and rebuilding our workforce and infrastructure. We bought new computers, new phones, new equipment, and we've refurbished the facilities. Cash flow started to become very positive back about a year ago. We had a glut of inventory from the downturn which resolved itself in February/March of 2010. We've started to become bullish on the prospects for this industry. 

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WITH BARBARA DONOHUE

is it good

“Is it Good” investigates how new or unique products work by interviewing the people who developed them. In this interview, Pete Paulin, president of 300 Below Inc., describes why he believes that freezing metals at -300F can save you money, time and increase your bottom line.

300 Below Inc.

Cryogenic Processing

300 Below, Inc., in Decatur, Ill., cryogenically treats more than a million pounds per year of all different kinds and sizes of things—from tools to trombones to the optical bench for the \$3 billion Cassini spacecraft. The company also sells cryogenic treatment systems.

Cryogenic processing's claim is that it can improve material properties and performance for parts, tools or products made from metal and other materials. It gradually chills items from room temperature down to cryogenic temperatures, holds them at that temperature for a period of time, and then gradually warms them up again. There is science behind this process, even though it seems like black magic. When he was starting in the business back in the 1980s, 300 Below's president Pete Paulin was told, “People will accuse you of being a snake-oil salesman.”



What happens in cryogenic processing?

We take the part and gradually transition the temperature into the cryogenic region, keeping the whole thing, surface and core, in equilibrium. We're operating at 300 below zero, Fahrenheit. Then we gradually bring it back to room temperature. The net result is slow thermo-mechanical compression and expansion. This produces advantageous effects:

- With steel, any retained austenite is converted to martensite, a harder form.
- In many metals, micro-fine eta-carbides are created, which giving coherence to the material.
- Residual stresses are significantly relieved.
- The material is stabilized, so the part does not distort with changes in temperature.

It's not a miracle process to use instead of heat treating. It's in addition to heat treating. The cooling part of heat treating does not stop at room temperature. If you look at the charts, steel with more than 0.4 percent carbon needs sub-ambient cooling to complete the change to martensitic structure.

Most metals respond well. We also treat other materials such as carbides, polymers, or crystals; many show improvements from the process, some do not. If they work, the results are very consistent.

We deal with both manufacturers and end users. Customers send in their parts and we turn them around in 72 hours. We have treated items as small as nanoparticles and as large as a 28,000-pound canopy die for the F-22 Raptor fighter from Boeing.

Left: President of 300 Below, Pete Paulin (left) and employee Bob Reed, shown with an engine block submitted for cryogenic treatment.

Photo courtesy of 300 Below, Inc.



Above: Model 921 computer-controlled cryogenic processor from 300 Below.

Right: Cryogenically processed cutting tools..

Photos courtesy of 300 Below, Inc..

How was cryogenic processing developed?

The nearest thing we have been able to understand is that hundreds of years ago, caves were used for sub-ambient cooling. The Swiss and Swedish used sub-ambient cooling in early steel making and for making watch parts. Even before that, sub-ambient cooling was used for knife and sword blades. Today, castings are often left out in the weather to age before machining.

During WWII, cold processing at 110 degrees below zero was done with alcohol and dry ice.

The first commercial use of cryogenic treatment was developed by Ed Busch in 1966 in the Detroit area. He purchased air reliquifiers used in submarines to provide liquid air to produce very low temperatures, later using liquid nitrogen. He did the process by hand, sitting there with a clock and a thermometer. In the 1980s, I connected a microprocessor to control the process.

What can it do? Can it save money for the user?

We often see longer life by 300 percent. Some applications improve by 50 percent, some by 700. Some materials don't respond to cryogenic processing.

At a heavy equipment company, we treated their hobs at a cost of \$7 each; the increased tool life saved over \$200.

Suppose you use a particular type of twist drill that cuts 300 holes and can be reground four times. The same model drill after cryogenic treatment might cut 600 holes. That appears to be a 100 percent increase in life. However, because of the more refined grain structure of the treated drill, when you regrind it you need to remove only half as much material—you can do twice as many regrinds. So the treated drill cuts four times as many holes.



A screw machine company might have \$5-10 million revenue per year. Of that, the tooling budget might be 5 percent. In a good year, the net operating income might be 5 percent. If you cryogenically treat your tools and double the tool life, the cost of tools goes from 5 percent to 2 1/2 percent, increasing the operating income by 50 percent—increased profit without doing anything else.

Since 1975, We've had a special process for brake rotors, which consistently gives three times the life. Cryogenically treated engine blocks for motor racing show increased life and higher horsepower.

Every year we process 4000 miles of guitar strings. It makes them sound brighter, prevents attack by acid from the fingers, and makes them last longer before breaking.

Sometimes it's about product improvements, rather than saving money. We've stress-relieved musical instruments, knives, golf clubs, aluminum baseball bats, and 68,000 gun barrels.

Is it good?

Absolutely. It's the coolest technology available today.

For more information visit www.300below.com

THE FOLLOWING COMPANIES HAVE PROVIDED
INFORMATION ON CUTTING TOOLS

product focus

Cutting tools are used to remove metal from the workpiece by means of shear deformation. In order to last, cutting tools must be made of a material harder than the material that needs to be cut, and be able to withstand the heat generated in the metal cutting process. They also must have geometry specific enough that the cutting edge can contact the workpiece without the rest of the tool dragging on its surface.

► BIG Kaiser

BIG Kaiser has introduced the new, large diameter Kaiser 318 Series—a complete tooling system supporting a variety of aluminum and steel components optimized for twin cutter rough boring, precision finish boring and precision OD turning operations. The new series features a standard boring range of Ø7.87"-13.39" for ISO40/HSK-A63 tapers, and Ø7.87"-24.41" for ISO50/HSK-A100 and larger tapers. Special components allow the system to extend up to Ø118". The mounting flanges feature Kaiser's new CKN modular connection with a 3-screw interface, developed for high torque transmission with light-weight tools. The system supports spindle speeds of up to 6,600 SFM thanks to safe and secure "pinned to fit" light-weight aluminum mounting components. The high strength aluminum components are hard coated to protect against wear and corrosion, and all assemblies deliver high pressure coolant through the tools to cutting edges.



For more information, please contact BIG Kaiser at 847-228-7660 or visit www.bigkaiser.com.

◄ GenSwiss

GenSwiss will be featuring the GenBore® ID Triple Tool Holder that adds three ID tool stations in place of a standard OD turning position on most Swiss-Type CNC machines at PMTS. With The GenBore Tool Holder, ID work can be expanded to include spotting, boring or drilling, all from one position, for more cost-effective machining of complex parts. The tool holder features easy integration of high pressure coolant delivery systems, and can be configured for thru-coolant delivery through one, two or all three tool positions. The GenBore includes (3) ER11 5/8" shank collet sleeves, removable location screw to re-position the holder on the gang plate, and set screws on both sides of the holder to suit RH & LH machine layouts.

For more information, please contact GenSwiss at 413-562-4800 or visit www.genswiss.com.



► ISCAR

ISCAR has launched a line of improved CUT-GRIP grooving inserts for ID grooving that features the N-type chipformer that has proven so effective in OD turning of problematic metals.

Internal groovers with the advanced chipformer are available for diameters down to 22mm (.866"). In OD grooving applications, the N-type chipformer has outperformed competitors in numerous automotive parts in steels that consistently prove excellent performance compared to other chipbreakers: 42CrMo4, 20MnCr5 38MnVS6, 1045 and 4340. Several Tier-One suppliers report that it begins to reliably break up chips at feed rates as low as 0.002"/rev.

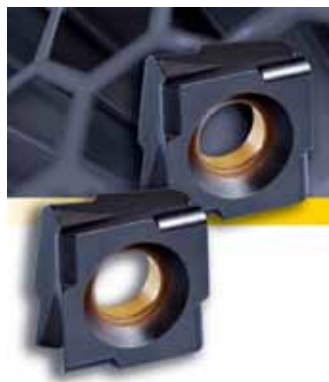
For more information, please contact Iscar at 817-258-3200 or visit www.iscar.com.



► Kennametal

The innovative Beyond™ platform of high-performance tool grades from Kennametal has garnered exceptional reviews from customers worldwide for their long life and exceptional performance. Now Kennametal is introducing the first Beyond inserts for Kennametal's ground-breaking FixPerfect™ system, promising improved toughness and wear-resistance, resulting in higher turning productivity and safety. The FixPerfect system features a proprietary shaped pocket that, together with a clamping stud, locking pin, and tangentially mounted precision ground insert, result in high clamping forces and very low cutting forces for excellent chip control and improved process stability. The FixPerfect inserts are shaped to match the pocket, which protects unused cutting edges. Productivity improves as well because the FixPerfect pin simply needs to be loosened, not removed, to index the insert.

For more information, please contact Kennametal Inc. at 800-446-7738 or visit www.kennametal.com.



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product focus



◀ OSG Tap & Die

OSG Tap & Die (OSG) is proud to introduce a revolutionary 3-flute coolant-through carbide drill this summer. The Mega Muscle Drill is designed specifically for drilling at feed rates 1.5 to 2 times faster than 2-flute drills. It may also be used at lower rpms, which decreases the amount of wear and prolongs tool life. This design also leads to higher hole accuracy with less work hardening, which gives secondary operations such as tapping even more tool life.

For more information, please contact OSG Tap & Die, Inc. at 800-837-2223 or visit www.osgtool.com.

▶ Sandvik Coromant

The successful quick change capability of the Sandvik Coromant QS holding system for sliding head machines can now be combined with high precision coolant. Small part machining of demanding, long chipping materials always creates issues with chip breaking. With this introduction of sighted nozzles, accurate coolant delivery is ensured, significantly improving chip breaking and performance from as little as 10 bar. This new coolant function is easy to apply in existing machines and provides problem-free machining and improved component quality to small part machining.

For more information, please contact Sandvik Coromant at 800-726-3845 or visit www.sandvik.coromant.com/US.



◀ Slater Tools

Slater Tools has created a line of external rotary broaches to further reduce manufacturing costs for its customers. Using the same tool holder, customers are able to produce both internal/ID and external/OD forms by simply interchanging the broaches. Standard external rotary broaches today are limited to forms larger than 1/8" and require a separate tool holder. Slater Tools' line of small external broaches allows customers to produce external forms as small as .056" and up to .225" in any custom size, satisfying the demand for small and micro manufactured parts such as bone screws and other micro fasteners. Combined with the current line of rotary broaches and Slater Tool's rotary broach tool holders, screw machine shops and CNC machine shops can now have any internal or external form available at any desired size.

For more information, please contact Slater Tools at 586-465-5000 or visit www.slatertools.com.





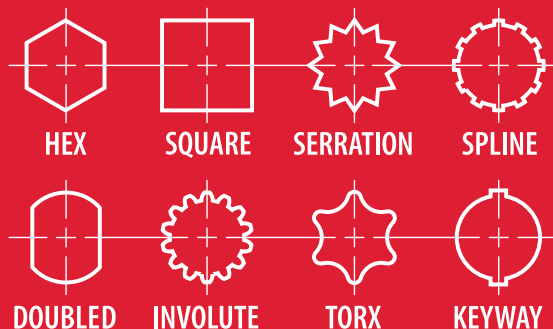
▲ Somma Tools

Somma Tool Company offers an expanded range of cut off blades for use on Davenports, Brown & Sharpe, and all multi-spindle automatic screw machines. Blades available from stock include T-Type and Hollow Ground blades in M2, Cobalt, and T15PM, Solid Carbide T-Type blades, Carbide Tipped blades in T-Type and Hollow Ground, "short length" T-Type blades, Acme "B" type cut off blades, and Empire ® Twin Type blades. Quantity pricing is available and blades are available with optional coatings such as TIN for general purpose coating, TICN for machining high carbon steel, high silicon aluminums and tool steels, and TIALN for cast iron, high nickel and titanium alloys, hardened steels, stainless steels, and for interrupted cuts.

For more information, please contact Somma Tools at 203-753-2114 or visit www.sommatool.com

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WITH NOAH GRAFF

shop doc

Today's Machining World's "Shop Doc" column taps into our 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 can also comment on these articles on the Shop Doc Blog at www.todaysmachiningworld.com.

Dear Shop Doc,

I recently bought a shop with CNC lathes and mills. In one room there are old #00 and #2 Brown & Sharpes. I have nobody with the expertise to run these machines. A dealer I trust said I should scrap them. What do you think I should do?

Ambivalent

Dear Ambivalent,

First, I would consider how much of the current revenues come from those machines. I know of shops who claim that during the last recession, their Brownie department kept them afloat. Other shops used the downturn as a reason to eliminate their Brown & Sharpes. So let's attack this by defining the issues.

How old are the machines? Are they G series machines or Square Base (Pushbutton) machines? If they are and you do not currently enjoy any revenue from these machines, then your dealer's advice is sound. You might be able to sell them for a few bucks, but it's unlikely to be worth the trouble. If they are Ultramatic series machines, and especially if they are Ram Slide machines (the latest two series), then they would be worth some money to a user out there. Put a small ad in the classified section of a trade magazine (maybe *Today's Machining World*) and most likely someone will buy them, but don't expect too much out of them, depending on condition.

What kind of CNC turning will you be doing? If your CNC lathes are large ID bores and you don't envision running production turning work, then absolutely get rid of the machines. If you plan on doing production turning, then you must

consider what type of production work. If you're doing close tolerance work in low lot sizes, then go with the CNC lathes. If you're machining production runs of medium tolerance parts in the 200 – 500 pieces range; stay with the CNC lathes over cam-operated Brownies, especially if you have no skilled personnel. In order to be profitable in the machining business you must match the lot size, part complexity and tolerances to the right machine.

If you have no experience on the Brownies and cannot (or do not want to) hire someone with experience, you definitely should scrap or sell them. It takes a couple of years, minimum, to train someone on the cam machines. And that's if you have someone to train them. So unless there are jobs tooled up and these machines are providing an income stream, parting with them makes sense.

If they are the later model Ultramatics there is an option to have them upgraded with CNC controls. This eliminates the need to set cams, trip dogs and tool timing. Typically, training time is reduced from years to weeks. I know a company who started a person with zero machining experience and he was setting up jobs on his own in a few weeks! But keep in mind

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.

that he did have resources at that shop to help train him. The practical lot size also goes down and productivity goes up tremendously with servomotor controls.

So get rid of the machines and open up the floor space if the machine capability does not match your business model. Hire someone to run them if you have an income stream from the machines (you can always get rid of the machines later). Or upgrade later model machines with CNC controls and servomotors if production precision turning fits your business plan.

Greg Knight
AMT Machine Systems

Greg Knight is the Vice President of Machine Tool Automation with AMT Machine Systems in Columbus, Ohio, a company specializing in equipping Brown & Sharp's with ServoCam CNC systems.

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Elijah Malik using a Landis 12
Leather Stitching Machine
Photo courtesy of Noah Graff



Elijah Malik, has been in the shoe repair business since 2003. Four years ago he opened his shop, Your Shoe Repair, a full service shoe repair shop in Chicago's hip northwest-side neighborhood of Wicker Park. His services include fixing buckles and rips in leather, replacing soles and heels, waterproofing, conditioning, dying, and shoe shines.

Who are your main clientele?

EM: Initially, it was mostly business people. You could count on them to keep their shoes shined and their heels looking good. But now it's become more across the board because of the economy. People who would have normally bought some Payless Shoes and then chucked them are deciding to fix their shoes. And, I'd say 85 percent of my clientele are women. Even though I might get a higher portion of men's shoes, the women are bringing them in.

What's the most typical repair you do, and what is your biggest challenge?

The most common repairs are heels and shines, shines are considered a repair. Our toughest challenge is customers who have unrealistic time expectations. Some people don't have a good understanding of what's really taking place for the repair.

What's one of the most interesting repair jobs you've had?

I had some boots come in that a dog had eaten up horribly. The customer came in with tears in her eyes but when she left she was all smiles. She couldn't believe the shoe could be restored like that. To me that was special, to be able to touch a customer who really valued the service.

What are some of the things people can do to prevent needing to bring shoes in for repairs?

I think the biggest mistake people make is not doing preventive maintenance—not spraying, not waterproofing, not doing routine polishes and cleanings. When they've got leather bottoms, people don't put taps on the shoes to prevent the heel from running down so fast. These are things we can do to preserve shoes. They won't prevent you from coming to a shoe repair shop, but they will cut your expense down.

What is a common mistake people make when polishing shoes?

Perhaps the most common mistake is not cleaning the shoes first. You should wipe them down with some type of soap and water, to make sure that you're not shining more oil or dirt into the shoe.

If you were to stop being a shoe repair person what would you miss the most about the job? What would you miss the least?

I would miss the connection I make with the customers—even sometimes the disagreements. Those things give you room for more thought, more productivity. The shoe repair shop is like going to the barbershop, it's a good place to gossip and talk about problems; it's a good place to share with someone the different things that are going on in your life. The thing I wouldn't miss is spending all my time in one place all day long.

Do you spit on the shoes when you shine them?

Well, if the customer's not here, I might spit on the shoe, but never if the customer is in his shoes (laugh). It seems like there might be something to the spit. You get the same effect with water, but I think it's something about that saliva that adds that sticky, shiny look to the shoe. I had heard people talk about the spit shine, then I tried it, and that shine came out really good. It looks really pretty, man.

When do you throw in the towel and decide it's not worth repairing a pair of shoes?

Well, we try to go the extra mile. Sometimes it's time to throw in the towel, but then you have to take into account how much a customer loves their shoes. People have shoes that their grandmother or grandfather gave them, that a loved one who passed away gave them. It may be the shoe they bought when they met their first girlfriend, and they just don't want to get rid of them. Shoes make us look a certain way, and they make us feel a certain way. People have a personal connection to them.



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1" 6-spindle, 1966-82 (8)
1" 8-spindle, 1980
1-3/8" 6-spindle, 1978 (4)
1-3/4" 6-spindle, 1965, 1984 (3)
1-3/4" 6-spindle 1984
2-1/4" 6-spindle, 1962, 1973-79 (3)
2 5/8" 6-spindle Wickman, 1978

ACME

7/16" RA6, 1975 & 1964
3/4" RA8, 1970
1-1/4" RA6 1978-61 (9) - some
w/threading pickoff
1-1/4" RA6, dbl. thrdg. p.o. 1987
1-5/8" RB8 CNC slide
1-5/8" RBN8 CNC slide, 1996
1-1/4" RB8, 1981, thdg., pickoff (2)
1-5/8" RBN8, 1968
1-5/8" RB8 thdg., pickup '68-'72
2" RB6, 1967 & 1980
2" RB8, 1966
3-1/2" RB6, 1970
2 5/8" RB8, 1960 w/CNC slide
2 5/8" RB6, 1980
1 1/4" RB8, locked spindle, '68 (2)

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HW 25-12 chucker 1998
HW 25-12, 1994, 2001, 1989
HB45-16, 1997, bar and chuck (2)
Pro-20, 1998
HB 45-12, 1991
HB 45-12 chucker, 1996
HB 4516, 1993

SCHUTTE & GILDEMEISTER

SF51, 1985-79 (3)

SWISS

Tornos Deco 20 mm, 2000
Ganesh Cyclone 32 w/ LNS express, 2006

NEW BRITAIN

812, 1 1/4" 8 sp., 1981
Model 52 1 1/4" 6-spindle, 1979

CNC Lathes

Mori-Seiki ZL150, 2002
Murata, MW120, 2004
Haas SL-20. 2005

ESCOMATICS

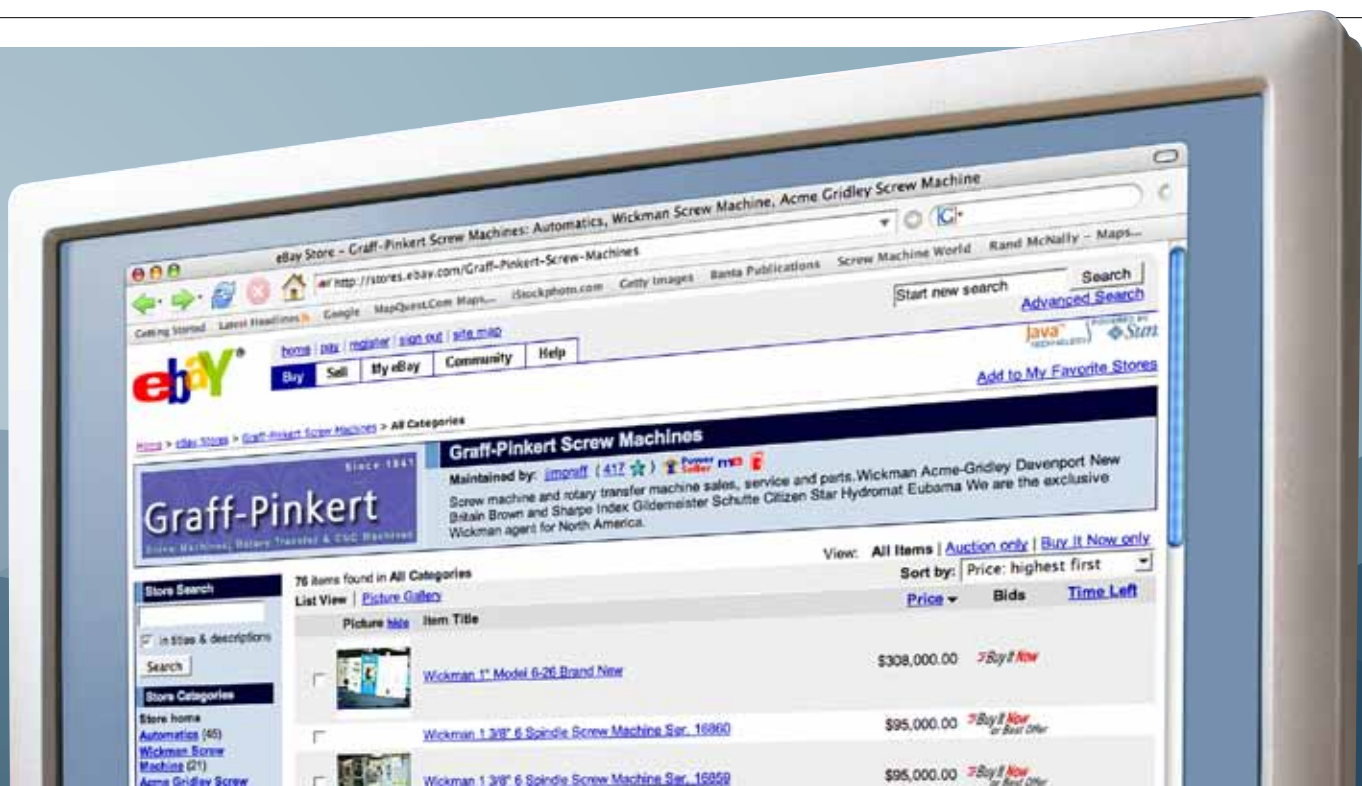
D9 (2), 1995
D6SR (2)
D-2, D-4, 1975

MISCELLANEOUS

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Pick-up Polygons

Ten regular polygons lie in a heap. Each polygon can be picked up, but only when no other figure lies on top of it. Can you tell in what order the polygons may be removed?

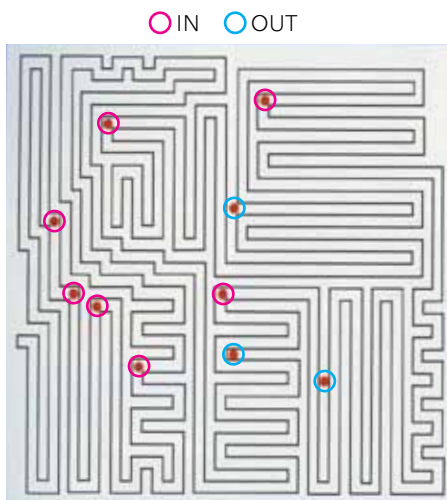


Puzzle found in the Jan/Feb issue.

SOLUTION TO “In or Out?”

A simple closed curve is one that does not cross itself. A loop of string that follows that rule can always be pulled to form a loop. But with a loop or a circle, there is always an inside and an outside.

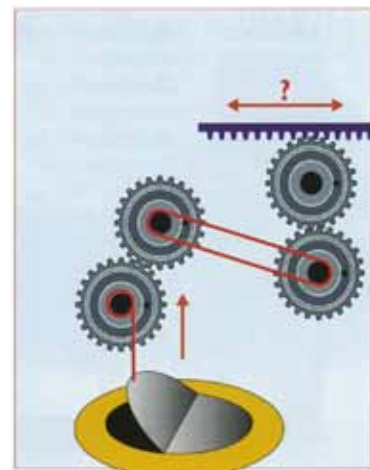
One way to determine whether a point is on the inside or the outside is to carefully shade in all the interior spaces of the loop. A short solution is to draw a line connecting the point to an area clearly outside the loop and count the number of times the line crosses a curve. If it crosses an odd number of times, the point is inside the loop; if it crosses an even number of times, it is outside the loop.



Puzzle found in the March issue.

SOLUTION TO “Open the Trapdoor?”

To the left.



Who answered the Jan/Feb puzzle or March puzzle?

Sheldon Wheaton of Garmin International in Olathe, Kan.; **Jordan Levenson**; **Victor Rivers**; **Mary Fasano** of Fasano Corporation, Inc. in Cranston, R.I.; **John W. Smith** of Smith Consulting in Burlington, Iowa; **Tom Nelson** of Clarke Manufacturing, Inc.; **Randy Grezenski** of Pointe Precision, Inc.; **Chris Prenatt** of Ring Precision Components; **Michael J. Reader** of Precision Plus Inc.; **Jason S. Habib** of Hi-Tek Manufacturing, Inc. in Mason, Ohio; **Kevin Albright** of Gear Headquarters in Kansas City, Kan.; **Gary M. Sulzer** of Sulzer Machine & Manufacturing, Inc.; **Tim Wert** of Maxijet, Inc. in Dundee, Flor.; **Timothy Greutman** of Apex Tool Group in Hicksville, Ohio; **Greg Tetrick** of Cass Screw Machine Products in Minneapolis, Minn.; **Ron May** of Hunter Engineering Company in Bridgeton, Mo.; **Tom VanOss** of micro machine inc.; **John W. Smith** of Smith Consulting in Burlington, Iowa; **Abdul Khatri** of Kamet Manufacturing Solutions in Sunnyvale, Cal.; **Larry Mundhenke** of Intra-Cut Tool LLC in Holland, Mich.; **Randy Grezenski** of Pointe Precision, Inc.; **Bruce Chastain** in Titusville, Flor.; **Arlin** from Weaver Machine and Hardware; **Dana Kalohoff** of Comturn Mfg.; **Brent Cain** of Honda of America MFG in Marysville, Ohio; **Sheldon Wheaton** of Garmin International in Olathe, Kan.; **Robert Richmond** in Mequon, Wis.; **James Mustaikis** of Dry Lake Machine; **Tom Taska** of Karma Metal Products.

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If you're only reading "Swarf" in the magazine you're missing out! Every week, thousands of people log on to our Web site to read and comment on new articles on current thought-provoking topics. Below are some recent comments from our "Swarfblog" readers at www.todaysmachiningworld.com.

Can a Mom and Pop Shop Survive?

Lloyd Graff blogged about a neighborhood clothing shop he used to frequent but has now abandoned because the shop changed locations, and he now prefers the selection and prices of Jos. A. Bank. In the blog, he wrote that at the store's new location there were "no joggers and African Americans around" unlike at its previous location. Many readers were surprised and puzzled by Lloyd's mention of African Americans in the article.

Don Rozino February 17, 2011 at 1:01 p.m.

I have to question the pertinence of "also no African Americans." I can understand if they moved because it was a tough neighborhood. But, the way it is written can have racial undertones that don't really fit the argument of the piece. It kind of hangs out there like a wing partially hanging off an airplane.

Trashcup February 17, 2011 at 1:31 p.m.

Stupid remark to reference African Americans in this article. Your reasoning to shop at Bank versus the local guy is exactly the same reason why Wal-Mart has taken over the retail market. Everyone's looking for a deal, but the deals that the Wal-Marts and Banks of the world offer are driving the local guy out of business.

Robert Sussna February 22, 2011 at 1:30 p.m.

What Jos. Banks are you talking about? The one in the mall near me has low prices, but the shirts and trousers I purchased actually fell apart after just a couple of wearings! Tore apart at the placket when I stressed them! Go back to someone with decent quality.

As for "no African Americans," that's just racist!

Lloyd Graff February 17, 2011 at 6:33 p.m.

About the reference to moving to an area with no African Americans or joggers. The area in which I live in the South Suburbs of Chicago has become somewhat amazingly integrated, which is a minor miracle in Chicagoland. But many individuals and businesses fled as this transition has taken place. Raymond Levine left a lovely neighborhood shopping plaza where they had the premier location, which I often frequented on morning jogs. I cannot say for sure that the store moved as part of the "white flight," happening in the south suburbs but it appeared that way at the time. I would argue that they abandoned their longtime clientele and moved to an inferior location where they had to build a new identity. I think this played a part in their demise. The African American reference may seem odd in the blog. Hopefully this explanation of the situation will give it a richer context.

Does Winning Breed Good Team Chemistry?

Noah Graff wrote a blog about his interview with Chicago Bulls psychologist Dr. Steven Julius. He asked readers, "If you were starting a business, would you rather have a team that got an "A" in chemistry and a "B" in talent, or a "B" in chemistry and an "A" in talent?"

Dave Bradley February 10, 2011 at 7:56 p.m.

We have a team that is stumbling terribly at the moment. Your story has a lot to say about chemistry that made me ponder. It seems that most of our team members tend to believe their chemistry is superb and in the same breath have a total disregard for accountability. One manager said the organization didn't need good soldiers. It needed warriors that were willing to fight to accomplish whatever. Sooooo, we have all these warriors that are fighting with each other. There is no winning or good chemistry; just breeding of contempt.



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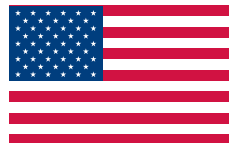
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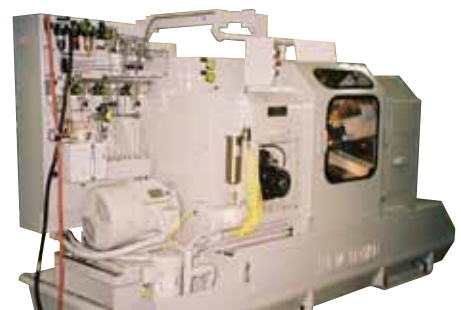
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afterthought

Cyclical Times

We live in strange times. The glass half full, glass half empty dichotomy is more dramatic today than at any other time in my memory.

If you are in the machining world in the U.S. today you are probably feeling rather optimistic about your situation, but if you build houses, install carpet, or do carpentry, plumbing or cut drywall, you are swimming in a sewer.

If you are an unemployed guy in your 50s or 60s you are looking at a gruesome job market that disrespects your skills. If you are a young college grad with student loans to pay off and no marketable skills, it's a barista kind of world.

The economic sands have flipped like an hourglass since 2006.

People I meet socially who are not in manufacturing-related businesses see a world of hurt even if they are not feeling the pain themselves. They do not understand a world of prosperity when their house has lost 50 percent of its theoretical value in 2006, when their kids have moved back in the house, when their cousin who works for the County is on furlough, and it costs \$10 more to fill up the gas tank.

The cyclicity of life is a bitch.

My Uncle, Aaron Pinkert, used to tell me what his father Simon told him. "The silver dollar is round, sometimes you're up and sometimes you're down, but it keeps on rolling." The Bible refers to "seven fat years and seven lean years." When the "chicken littles" bemoan global warming they usually neglect to mention the 11-year sunspot cycle.

When I'm in touch with life's cyclicity I sing along with the old Pete Seeger recording of "To Everything There is a Season."

“If you embrace the seasonality, each change is a beautiful event to take advantage of.”

The beauty of living in Chicago is that we have our seasons to remind us of how life gets icky but ultimately flips over to spring and rebirth. I think that folks who live in L.A. and San Diego can lose the sense of life's cycles because of the boring repetition of sunny days they endure.

I think a person who grows up in a family with a business or on a farm understands cyclicity from childhood. A time to reap, a time to sow, a time to laugh, a time to cry. It's in our bones.

To prosper in America it is extremely helpful to understand that fortunes go up and down. Fortunes are always made by playing the cycles. Wilbur Ross has made one huge financial score after another. He bought steel mills when they were giving them away in the '90s and now he's investing in Ireland after their housing bubble. To him every bust is an opportunity.

Now it is time to embrace Spring 2011. Baseball, Easter, Passover, tulips, \$5 gas (or is it \$2), the calendar flips relentlessly. If you embrace seasonality, each change is a beautiful event to take advantage of. If you lament what just past and wish you could go back to the safety of what you think you know, you'll miss the wonderful anticipation of summer.

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