April 2006 volume 2 issue 4

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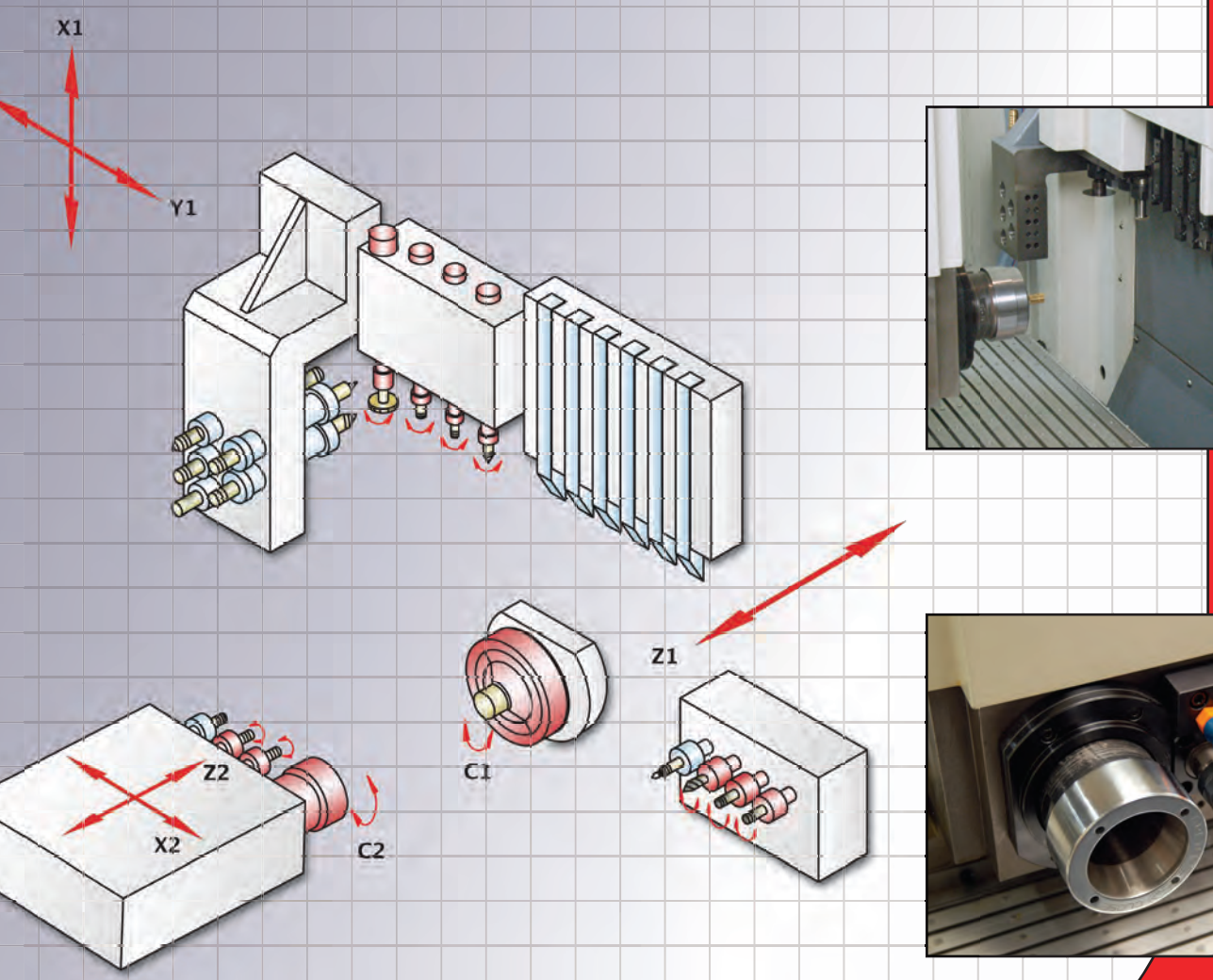

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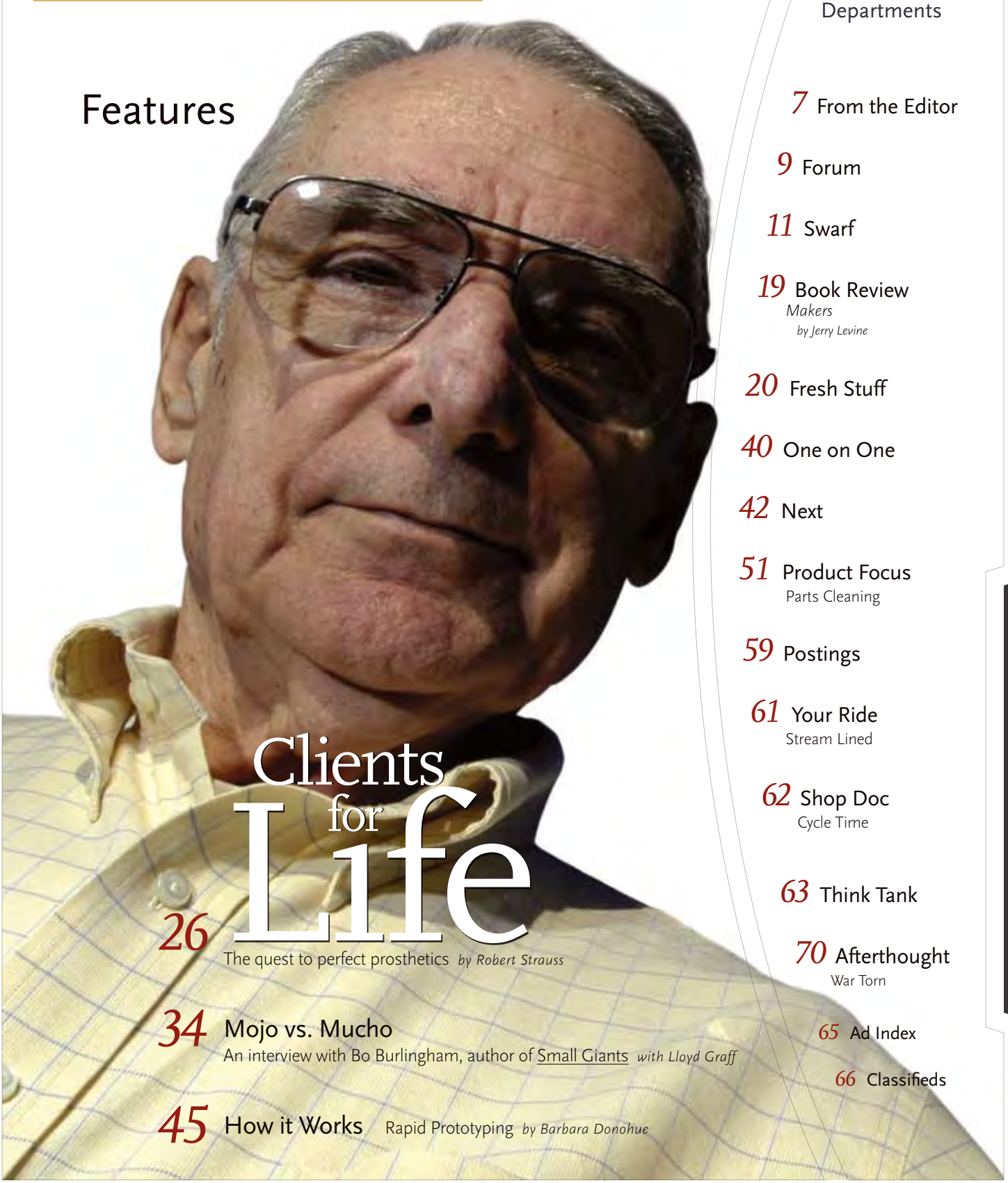

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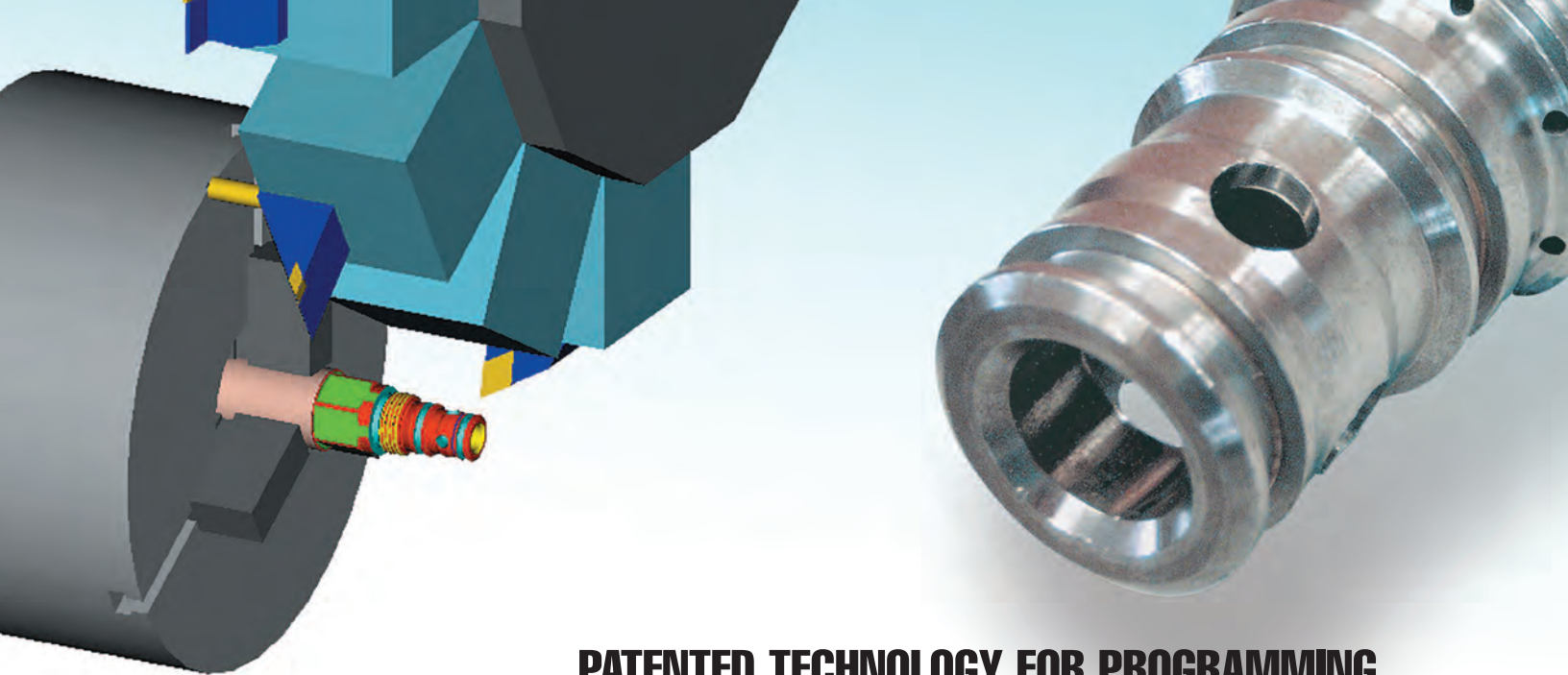

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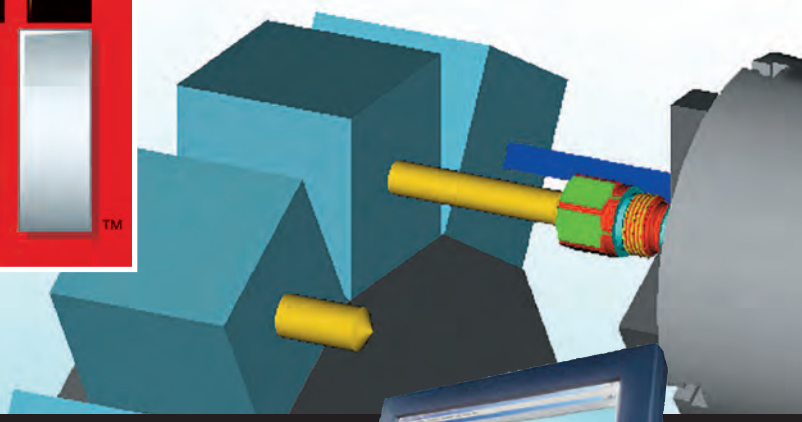

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A Screw Machine World Inc. Publication
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(708) 535-2200

Emojono Intelligence
Lloyd Graff
Lloyd@todaysmachiningworld.com

Publisher
Dan Pels
(708) 922-3493

Managing Editor
Jill Sevelow
jill@todaysmachiningworld.com

Assistant Editor
Noah Graff
noah@todaysmachiningworld.com

Web Forum Editor
John Iwanski & Noah Graff
noah@todaysmachiningworld.com

Art Director
Robert E. Bocok
rob@todaysmachiningworld.com

Circulation Director
Judy Palmer
judy@todaysmachiningworld.com

Contributing Writers
Barbara Donohue, Lloyd Graff,
Noah Graff, Robert Strauss

SUBSCRIPTION/CHANGE OF ADDRESS:
BASIC SUBSCRIPTION RATE: US$40 for domestic/US$55 for international.

Send address changes and/or subscription inquiries to:
Today's Machining World,
P.O. Box 847, Lowell, MA 01853 or email
georgegagnon@computerfulfillment.com

EDITORIAL: Send articles for editorial consideration to Lloyd Graff, Editor.

ADVERTISING: Dan Pels, Adv. Sales.
TMW, Inc., 4235 W. 166th St., Oak Forest, IL 60452.
(708) 535-2200, Fax (708) 535-0103.

CPC Publication Agreement Number 40048288

Canadian Return Address:
World Distribution Services
Station A, P.O. Box 54
Windsor, ON N9A 6J5
email: cpcreturns@wdsmail.com

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The Long-Term View

The owners of the companies featured in Bo Burlingham's *Small Giants* (see page 34) all take a long-term view of their businesses. If it's your life's work, you don't manage for the quarter.

I was reminded of this during a recent visit to Mazak's Florence, Kentucky campus. Mazak set up its American business in 1974. Mazak is a part of Yamazaki Mazak Corp. – a Japanese family-controlled machine tool builder based in Nagoya. According to George Yamane, Mazak's head of marketing, who has lived in the States for 22 years, the company did not make money in the U.S. until 1990. But they kept investing anyway, believing that Mazak would eventually gain a preeminent position in North America.

Today, the company is building and selling 130 Nexus machining centers per month in Kentucky. Mazak is quite profitable and recently completed it's fourteenth expansion in Florence. They also have built regional Technology Centers around the U.S. and Canada.

We have taken the long view at *Today's Machining World* also. A venture capitalist would have built the magazine around an early exit strategy. A large publisher would have pushed to make numbers and likely compromised the editorial integrity and authenticity of *TMW*. We have stuck with a brick-by-brick approach, aiming to improve our product every month.

I believe this is a far better magazine today than a year ago, and a huge improvement over our early *Screw Machine World*.

I look forward to writing about our fourteenth expansion, which might happen if we earn your readership one issue at a time.

Lloyd Graff
Editor/Owner

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Today's Machining World

De-claration

I was delighted when I reviewed your January issue. I think you realized your ambitions for the redesign; it's very clean, contemporary and readable. I especially liked your interview with Gene Haas (January 2006) and the refreshing candor that found its way into print. Also, I have already challenged my staff with the goal setting exercise you suggested in "Afterthought."

One more thing. A single sentence in "Swarf" caught my eye and my interest: "So many B-to-B's have given up journalism for advertorials." Both sad and true. This reminded me of a proposition I once placed in front of Rick Kline (president of Gardner Publications). I asked him why we don't promote best practices – editorially and in marketing communications – by forming collaborations among organizations, which are innovative and willing to take risks to further the long-term good of our industry? Rick "de-Klined" (I couldn't resist the pun). But the idea – indeed the imperative – is still before us: on both the editorial and advertising sides. The term, "For more information...," must ring out with new authority.

Lloyd Dunlap
Dunlap Group
Naperville, IL

Girl's Eye View

I truly enjoyed the article about women and machining. As a female in the manufacturing industry, I often feel alienated. I am one of the few female owners of a manufacturing shop. Most of the time, when I go to machine classes or CNC showrooms, I get comments like, " Oh, your husband let you come out to see the machines?" As I am sure you know, it's hard to be a woman in this industry. It's so hard that I don't even recognize myself as an owner, for fear of losing creditability. Are you aware of any other female owners of manufacturing shops?

Gina Radke
GSI Inc.
Sherwood, AR

A Good Read

Congrats on a terrific issue (February 2006)! I really enjoyed reading this issue. Although I'm not a machinist, I've been in the industry for 17 years. Thank you for the fine publication.

Pam Rubenstein
Allied Specialty Precision, Inc.
Mishawaka, Indiana

Oil Can

Regarding February's Shop Doc: Overcoming threading and tapping problems requires attention to many details, well outlined in Mr. Knight's response. However, one possible critical issue was not addressed, namely the fact that often the cutting oil can make or break the part, literally. Higher quality cutting oils with proper selection of viscosity and extra pressure additives for a given application can do wonders when it comes to difficult machining operations like threading and tapping. In addition, proper oil filtration may well be the difference between failure and success.

Uli Kuster
Blaser Swisslube Inc.
Goshen, NY

Robot Nation?

Regarding February's NEXT feature: The quote from the third person, Marshall Brain, is quite something. He says that robots will replace 50 million jobs in 20 years (including most of the three million teachers, all sixteen million manufacturing jobs, most of the one million truck drivers, etc.). I think you would be hard pressed to find an informed person on the planet who shares this opinion (although I hope people reading this don't get misled into believing it!).

Jeff Burnstein
Robotic Industries Association
Ann Arbor, MI

Send your comments to:
TMW Magazine 4235 W. 166th Street, Oak Forest, IL 60452
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Something on your mind? We'd love to hear it.

Mea Culpa: The cover photo of the March 2006 issue of *TMW* was a stock photo, not an actual photo of Extreme Industrial Knife's fire. We regret the omission.

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industry news & whispers

By Lloyd Graff

Open Game

The *Wall Street Journal* ran a wonderful front page feature on the chess team of Miami-Dade College. The team is in the Final Four of collegiate classes, surpassing Harvard, Yale and Princeton. Team members are all part-time students at the gritty city college. A couple of players work as bouncers at local night clubs. All are Cuban-Americans.

This would never happen in France or Japan or England. Can you imagine some Jamaican blokes from Blackpool beating Oxford or even playing them? Ain't never going to happen in class-conscious England.

The energy in America still comes from the newcomers. And they still pour in under the fences, through the cracks, and out of the pores. And the country still struggles with immigration. Every year or so a know-nothing Congressman will gain attention by making an outrageous statement about the absolute necessity of tightening our borders to keep out the evil "furriners." Lou Dobbs will interview the statesman, and the Border Patrol will yelp.

But back in the real world of manufacturing, medicine and making a living, the Mexicans, Cubans, Cambodians, Palestinians and Pakistanis are providing the muscle, building the homes, and winning the chess tournaments.

Unemployment keeps going down, wages keep rising, and the immigration paranoids keep fanning fears about the latest "yellow peril."

Immigration reform is an interesting issue for the academics to chirp about, but the bottom line is that America has a perpetual "energy" deficit that young gutsy people from around the world rush in to balance.

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The mood at the PMPA Management

Update in Phoenix was strongly upbeat. I'm a little reluctant to read too much into an imperfect sample of self-selecting people, but the pulse was kicking.

It was not a Detroit crowd, and for most of the people I talked to, diversification is a business commandment. Everybody had a story about losing work to China, yet nobody was really upset about it. Chinese competition was an issue of discussion, but there was more talk about the future opportunities for business in China than panic about the Asian plague. This is a seismic shift from just three years ago, when China was the preoccupation.

One reason for the de-emphasis of China is the quick hands of Mexican women. The dexterity of these abundant ladies in Reynosa and Monterrey is enabling North American components to be assembled at competitive world prices, keeping lots of shops busy.

A lot of metals suppliers were meeting their customers in Arizona. Business is good, but the easy inventory profits are now gone, so they are living on thinner margins. But the same percentage on much higher prices means a nice bottom line.

Metals sales people are not big picture people. Tell them the price and they sell it, so there was not much speculation about the movement of prices. As one of them told me, "If I knew, I wouldn't be doing this."

An observation about the PMPA:

The membership is smaller, but the current generation of leadership, second and third-generation shop owners, who are in their prime, are leading a group which is secure in who they are and where they are going. In my opinion, the organization does not really care if it gets much bigger, as long as it does not shrink into irrelevancy. If it can hold its constituency it will keep its technical members and be economically viable. The danger is if another shakeout would take the group under the sustainable threshold and push the tech members to abandon ship.

The wholesale financial restructuring

of the North American automobile industry is happening before our eyes. Recently Dana filed for Chapter 11. A restructuring of GM and Ford is happening as I write this, whether they are forced into bankruptcy or not. The UAW is also undergoing the process of transformation whether they admit it or not.

It is unclear whether we will see a gigantic explosion where everything blows apart, probably precipitated by a strike by UAW dead-enders, or more of a meat grinder where Wagoner, Ford and Gettelfinger end up as sausage, and a Kirk Kerkorian or a Wilbur Ross provide the bun and mustard.

It looks like 2006 will be a decent year for a lot of folks doing auto work. And a very good time for getting a foot in the door at Toyota, Honda and Nissan.

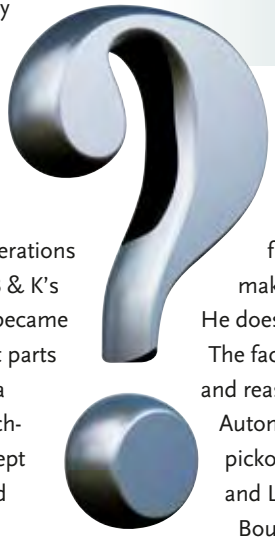
The Delphi negotiations may be the vehicle for either scenario. If GM, the UAW, Delphi and the creditors can forge a viable compromise, there could be a path through the mess. The State of Michigan and the Feds might also play a role in a settlement. A big GM worker buyout, possibly government-backed, could be the temporary savior.

The outlook for firms doing automotive work in North America looks favorable at the moment. Because the big Tier One and GM and Ford are in such a pickle, they desperately need a healthy supplier base. A disintegrating supplier network would be as bad as a strike. Bankruptcy actually allows the Tier One to pay their bills more easily and tends to lubricate the system, at least in the short-run.

It looks like 2006 will be a decent year for a lot of folks doing auto work. And a very good time for getting a foot in the door at Toyota, Honda and Nissan.

swarf

Have you been wondering like me about the disappearing act of Bourn & Koch since they bought National Acme, New Britain and Conomatic in the DeVlieg-Bullard deal? No ads, no postcards, no salesmen. Are they running a stealth business?



I called Loyd Koch and Tim Helle, who run the Rockford, Illinois company, to find out what's happening. Loyd is the technical guy. He deferred to Tim, who told me they were consolidating the Rockford operations in one building, a non-answer to my question about B & K's commitment to the multi-spindle business. He then became quite defensive, even belligerent, to my probing about parts deliveries and stocking policies. I told him that I was a customer who was trying to buy some expensive attachments for several 8-spindle National Acmes, but he kept going off about competitors who "sand old parts" and try to pass them off as new.

I told him that the market did not expect him to stock every part for every machine ever made, but potential customers would not tolerate long deliveries. It was clear to me that the conversation was now essentially over, so I called a supplier in Detroit to get his spin on the spare parts situation for National Acmes.

He told me that Bourn and Koch has made their statement to the Acme and New Britain world by going silent. He says B & K calls him frequently looking for parts, which is rational but makes one wonder who is the secondary market. He does not call B & K for parts.

The fact is that the basic Acme parts are readily available and reasonably priced by AMSCO, Champion, Detroit Automatic, and others in Detroit. Attachments like pickoffs and threading are available for many machines and Logan continues to improve upon the standard.

Bourn and Koch had an opening when they bought DeVlieg, but they squandered it. Either they believed the market had no legs, or that they would get the business by just putting out a shingle. At this point it appears to me that neither the buyers or Bourn & Koch really care about "OEM" parts.

One of the oldest clichés in sports is "he came to play." When I hear that old saw I wonder if it would be more meaningful to say "he came to win." In the daily game of business that I play, the distinction between "coming to play" and "coming to win" is powerful. The person who comes with a plan and a commitment to winning in sports or business has an enormous advantage over the person who just shows up. The intention to win is necessary for the belief that you will win. And the belief in your ability to win is critical to winning.

There are many days when I just show up to work. I have no plan, no commitment to a goal. I am just there to react to the situations that arise during the day.

It is the day in which I arrive with a focus – I call it being in "war mode," that I make things happen. The prevailing inertia in any business or team is a headwind which usually thwarts good intention, but the commitment to win can occasionally overwhelm the entropy.

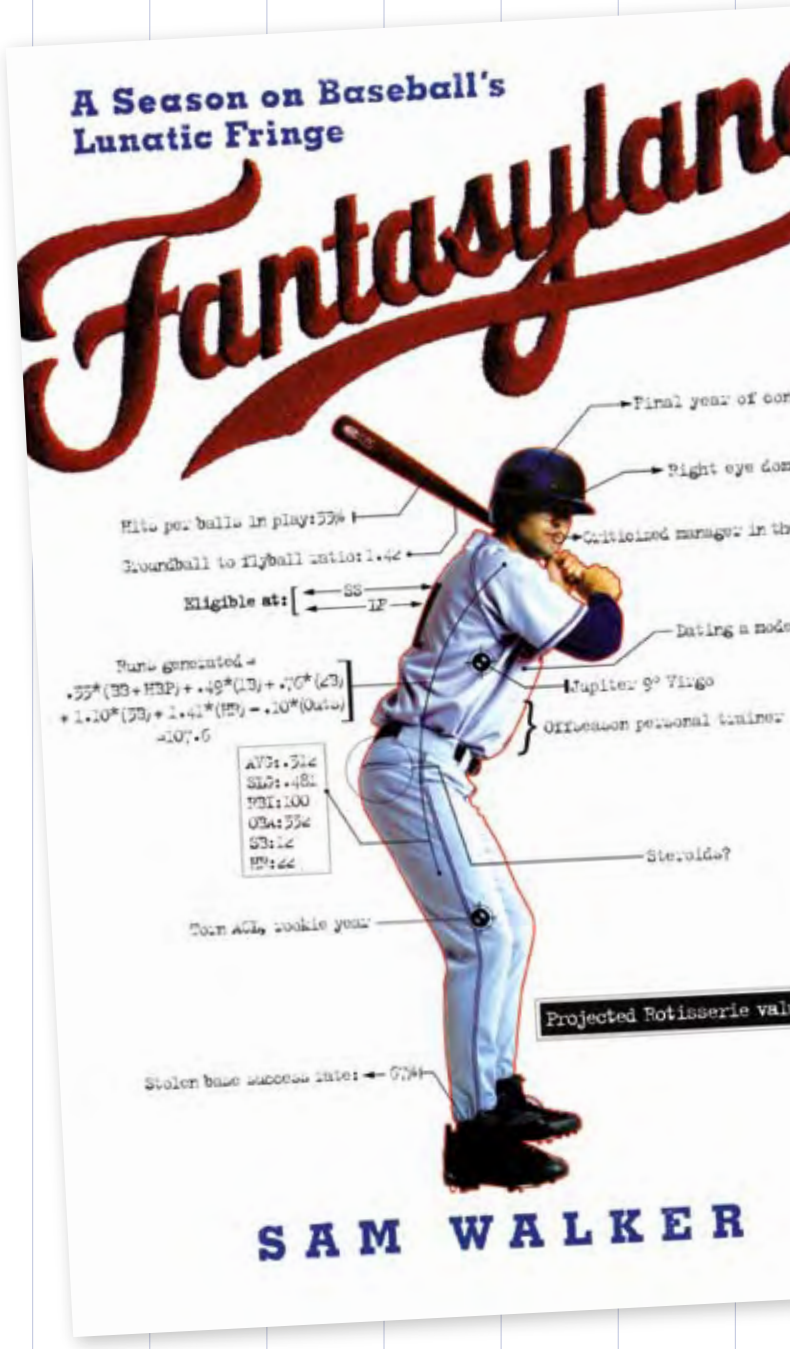
I am reminded of a story about the great Boston Celtics center Bill Russell. Russell would often throw up before going on the basketball court because he was so keyed up for the game. When asked why, he said that he had spent many years developing his skills, preparing his body, and sharpening his game intelligence. "If you are going to do all the work, then you might as well go out and win," he said.

I think it is the job of the manager or coach or CEO to come to win and to make it clear to everybody that at least one person is committed to winning. You almost owe it to the people who work with you to provide the clarity of purpose that a team or business requires.

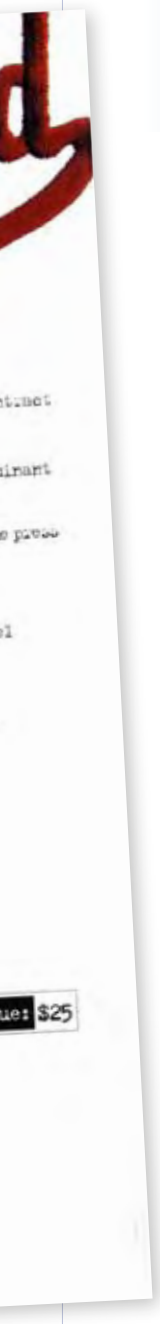
Sometimes the leader has to fake it, and learning to fake it convincingly is essential for a boss. I have found that a purposeful bluff can also be useful in helping me find my confidence to win. You see the great card players consistently show this steely belief in winning, and it makes their bluffing gambits stand up.

When you watch the great coaches like Tony LaRussa, Bill Parcells, and Phil Jackson do their work you see the core confidence infuse their teams. They don't always win but they always fight tough, because the coach won't accept anything else.

Front: Paul, John **Back:** Bill, Ed



I'm writing this piece in mid-March, one of my favorite times of the year. The NCAA Basketball Tournament is in full swing and the baseball season will start in two weeks. I have spent the last few days immersed in the Baseball Prospectus 2006, a vast compilation of stats and comment about Major League Baseball.



swarf

I have become a Fantasy Baseball aficionado to go with the disease of being a lifelong Chicago Cubs fan. My son-in-law Scott Roy and I won our Yahoo league last year, so we have graduated to winner's league this season. We'll have to step up our game.

I just read Sam Walker's new book called Fantasyland, which I strongly recommend as a fun read. Walker is a *Wall Street Journal* sports columnist who had always rejected the lure of fantasy sports, but he took the challenge of getting into a major league Rotisserie baseball group called the Tout League, and wrote about his experience of living in the world of human baseball guys and the statistical empiricists who never revel in numbers.

Scott is a math whiz and software maven in Pal Alto, while I just like to watch a Travis Hafner swing. We are the Yin and Yang that Walker writes about in his book.

I regard Fantasy Baseball as a microcosm of business. You have numbers guys and people guys, and they are both right some of the time. The key to success is getting the two approaches to work in sync.

It is nice to know that Jeremy Burnitz, who played right field for the Cubs last year, hit 24 home runs, but also hit 8 warning-track fly balls, which would have been homers had he been hitting them at Pittsburgh's PNC Park, where he will be playing his home games this year with the Pirates. This is the kind of statistical swarf the stat mavens gorge on.

My observer's opinion of Burnitz is that he's almost a has-been who can't get around on the high hard one. He'll be out of baseball by next year.

I love this stuff. Hope is in the breeze, and the computer is the new Field of Dreams.

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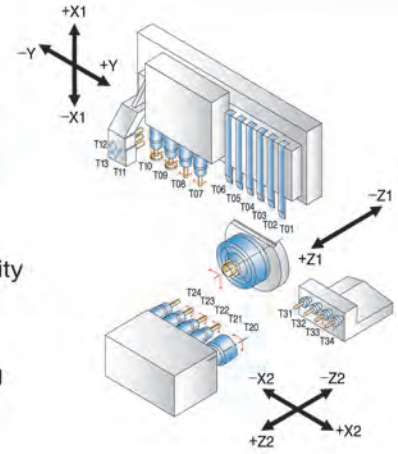

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book review

By Jerry Levine

The Wonderful World of Invention

If there ever was a book written for readers of *Today's Machining World*, it would be *Makers: All Kinds of People Making Amazing Things in Garages, Basements, and Backyards*. *Makers* celebrates the eternal human desire to tinker, tweak and hack.

Man is a tool-using animal, and this ability helps elevate him above other animals. Although the tool-using process is not uniformly spread among mankind, we all still rely on it for our progress. How many of our auto, airplane and computer companies owe their start to guys tinkering around in their barn or garage?

The book's author, Bob Parks, set out to find 100 inventors who made interesting, off-beat stuff. The book profiles the inventors, using short vignettes to tell their personal stories and the stories behind their inventions. There are accounts of the usual suspects: machinists, engineers and computer geeks, but there are also stories of a musician, several writers, and a few high school and college students. The book tells about a doctor in India who created infant warmers using wood and light bulbs, which save dozens of babies every year. There is a story about a Serbian banker/amateur pilot, who missed being able to fly after being transferred to Kazakhstan, so built his own full-scale flight simulator.

Some of the inventions contain sophisticated computer circuitry, while others are cobbled together from junkyard parts. I loved reading about the improved mousetrap, built from random junk that cost a total of 8 cents. It features an infrared LED and photo transistor from scrapped computers, mounted on the end of a cardboard toilet paper tube. Its other scavenged parts come from a junked clothes dryer, a vending machine and a cookie tin.

My father, who in his wilder youth was an accomplished safe cracker and locksmith, would have loved the book's description of a hand-held, electronic lock-picking machine made at no cost from castoff computer parts. Its inventors are three part-time computer hackers who remove computer viruses in their day jobs.

The book also describes several unique vehicle innovations, such as a jet powered go-cart, a mono-wheel motorcycle and a semi-practical hybrid car. The hybrid car is a custom-designed electric Porsche, supplemented by a gasoline powered trailer, built from a VW Rabbit. The Porsche, like most electric cars, can only travel about 30 miles on a charge, so the gasoline-powered trailer is responsible for getting the Porsche to out-of-town car shows. Built in California (where else?), it ran amok of regulations. The DMV gave the inventor a hard time because they couldn't figure out if it was a car or a trailer.

Makers is not a "how-to" book; it's really a coffee table book because of its beautiful photos. My favorite photos are taken by Frans Vandermaele, a bug photographer from Belgium. Because insects flit and fly too fast to be easily captured in the center of the frame, Vandermaele built a precise optical sensor from three common laser pointers and coordinated it with his camera. As soon as a bug crosses the light path, it trips his camera's shutter.

Today, as technology advances so rapidly, many people are becoming befuddled by how everyday machines work. Many people lack the confidence to fix things – let alone come up with new ideas for inventions. That's why I find this book so fun and fascinating. It's a must have for every self-respecting geek's coffee table.

"Some of the inventions contain sophisticated computer circuitry, while others are cobbled together from junkyard parts."

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

Away Rego

REGO-FIX is now offering a variety of products ideal for small part machining and the medical industry. REGO-FIX's powRgrip collet system uses a toolholder and collet that generate very high clamping forces. This system features a dynamic dampening effect to increase surface finishes and tool life when cutting complex materials used in the medical industry with a run-out of 0.0001" or better.

UP collets are part of REGO-FIX's ER collet series and are offered in a broad selection of both standard and metric sizes, ranging from the ER 8 series to the ER 50 series. They can accurately clamp tool shanks ranging from 0.2mm (0.0079") up to 34.0mm (1.3386") and ensure the tightest possible tolerances of 0.0002" or better. UP collets are primarily used in high-speed machining applications where low TIR is desired.

REGO-FIX cylindrical holders are compatible with the company's ER collets and various automatic machines, including Swiss type turning centers. These holders offer a broad range of sizes (ER 8M – ER 40), types and tight tolerances, 0.0002" or better.

For more information on REGO-FIX please call 1-800-REGO-FIX or visit the company's website at www.rego-fix.com.

Nexus In Line

Horizontal machining is now available in an untended manufacturing configuration with the new Horizontal Center Nexus 6000 from Mazak with a FANUC Robotics robot.

This machine features a high-speed, 50-taper, 50-HP, 10,000-rpm spindle with 388 ft-lbs torque as standard equipment. The 500-mm pallet is the foundation for a work size of 39.3 inches high and 35.4 inches diameter. At 111 inches wide, the HCN 6000 is space-efficient.

Rapid-traverse rates in X, Y, and Z are 2362 ipm, and acceleration is 0.7G. A 43-tool magazine with automatic tool changer is standard, as is the 2-pallet changer, driven by a roller-gear cam with no hydraulics or sensors. The pallet will index 90 degrees in 1.9 seconds and change pallets in nine seconds.

The HCN 6000 is designed for ease of maintenance and environmental consideration. Standby power requirements are cut by 20%, and air consumption is reduced 36%. Sealed grease lubrication in all axes instead of way lube reduces oil consumption and extends coolant life due to no tramp oils in the system.

For more information, visit the Mazak website at www.mazakusa.com.

All Locked Up

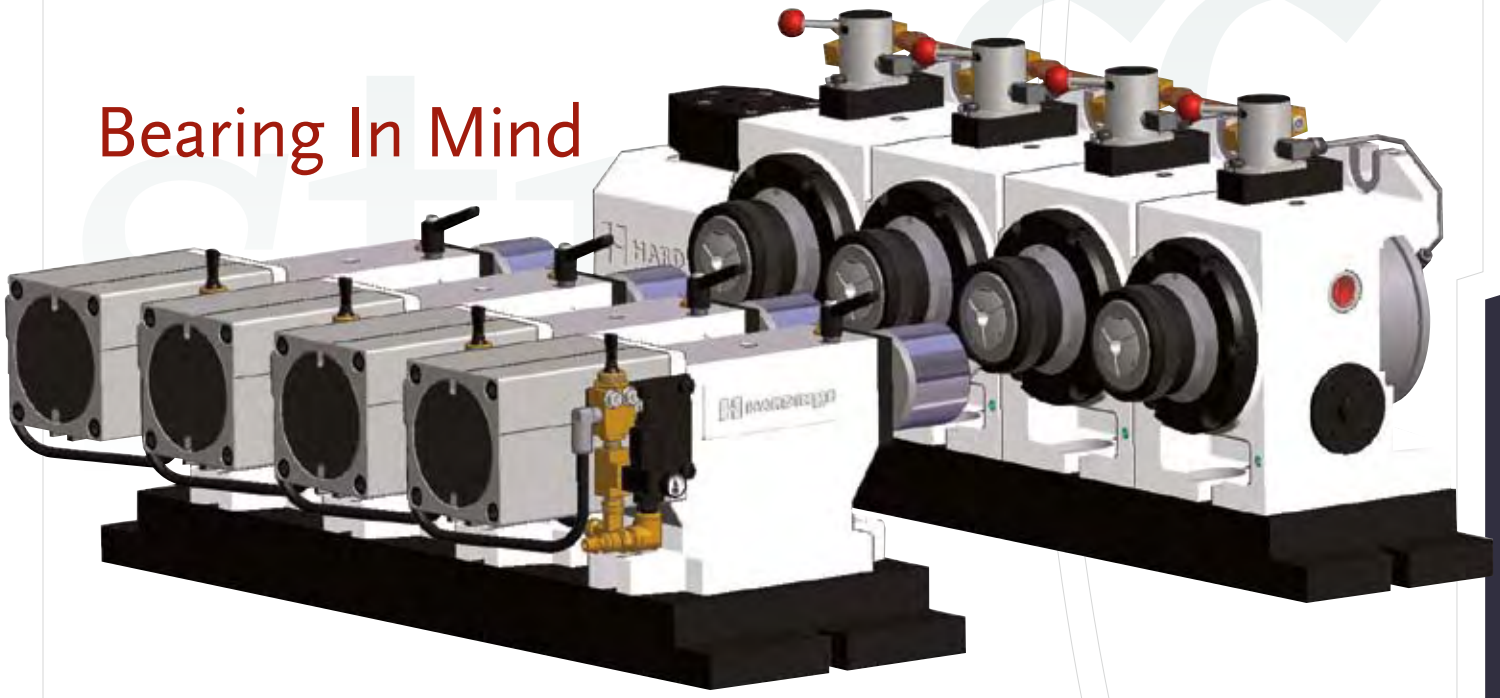
Manchester Tool Company has introduced the new MTC SLS (Serrated Locking System) Cartridge System.

The MTC SLS Cartridge System consists of a toolholder and a cartridge, simplifying the standard multi-component design into one piece. Both the toolholder and the cartridge have serrations or interlocking ridges on the inner sides. These serrations create a tight fit between the cartridge and the toolholder. Once the toolholder and cartridge are locked together, the MTC SLS provides stability comparable to that of an integral shank tool.

For optimal savings, the MTC Cartridge accommodates any of the MTC double-ended, double V design inserts. The insert locks into position with a single screw. Double-ended for extended life, MTC inserts perform cutoff, plunge-and-turn, plunge-and-contour, and face grooving operations efficiently and economically.

For more information on the new MTC Cartridge System, call Manchester Tool Company at 330-644-8853 or visit the company web site at www.manchestertools.com.

Bearing In Mind



Hardinge has introduced a bearing spindle indexer designed for machining applications requiring large radial and axial loads. Dual bearing units are located at the front and the middle of the spindle to support a part weight of up to 500 pounds and axial tailstock thrust of up to 1000 pounds. This 5C indexer has a low-profile spindle nose and a removable handle for increased tool clearance.

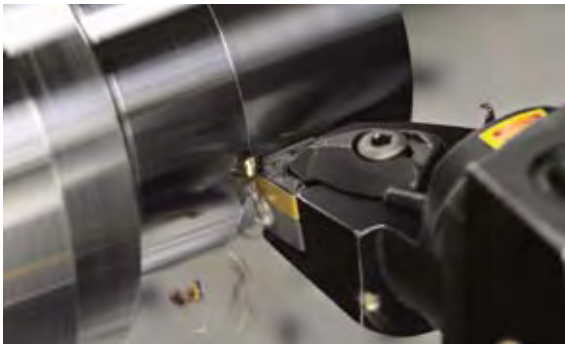
One can mount up to four indexers with tailstocks for multi-part processing. Bearing spindle indexers are available in single, dual, triple and quad units. Options include manual or pneumatic tailstocks and a choice of collet closers, including the new thru-hole model, which incorporates a 1.080-inch thru-hole to accommodate bar feed use, thru-coolant and long parts. The air-open, spring-close design means that the part will remain clamped if loss of air occurs. A .0625-inch drawbar travel allows .015-inch loading clearance without adjustment.

The Hardinge bearing spindle indexer can be integrated into a CNC application as a fourth axis by using a Hardinge all-digital servo control and a CNC interface cable; connecting via the RS-232 port and interface cable; or using the capabilities of the machine's CNC control and motor amplifier.

For more information call Hardinge Workholding Division at 800-510-3161 or visit the company website at www.hardingetooling.com.

fresh stuff

San-Viktory



Sandvik Coromant has introduced GC4225, the newest addition to its series of ISO P turning grades. The new GC4225 is an ISO class P25 grade, designed to optimize both roughing and finishing, and enhance machining performance in the steel turning area.

The GC4225 is Sandvik Coromant's next generation first choice insert for universal steel turning. The GC4225's application areas extends beyond those of its predecessor, the GC4025, allowing for more flexibility in manufacturing operations. Furthermore, its capability to be used with a variety of materials showcases the grade's versatility.

The new insert's geometry and combination of features enhance reliability and productivity through better surface finishes, higher feed rates and cutting speeds, and improved plastic deformation and crater wear resistance.

The GC4225 is composed of Al_2O_3 coating for chemical wear resistance, MTCVD TiCN coating for mechanical wear resistance, and gradient substrate, including cobalt, for optimized hardness and toughness.

For more information contact Sandvik Coromant Company at 201.794.5223 or visit www.coromant.sandvik.com/us.

Royal Subject

Royal Products has introduced a new line of Precision ER Collet Chucks with runout guaranteed to be less than 0.0001" TIR between

the O.D. taper and I.D. socket. When used in conjunction with Royal Ultra-Precision ER Collets, overall system accuracy is guaranteed to be 0.0003" TIR or better. This high accuracy helps to ensure an evenly distributed chip load and results in a significant increase in cutting tool life.

All Royal ER Collet Chucks incorporate a tapered shank ground to AT-3 specifications and a specially ground clamping nut. These features result in reduced vibration, near-perfect roundness, increased rigidity and higher clamping force on the cutting tool. Each Royal ER Collet Chuck is dynamically balanced to G2.5 at 18,000 RPM and includes a serialized balance certificate. A central thru-coolant feature is standard on all models.

Royal Precision ER Collet Chucks are available in a wide variety of lengths to suit ER-11, ER-16, ER-20, ER-25. ER-32 and ER-40 collets. Royal Products maintains large inventories in five regional warehouses for immediate shipment.

For more information, please contact Royal Products at 800-645-4174 or visit the company website at www.royalprod.com.

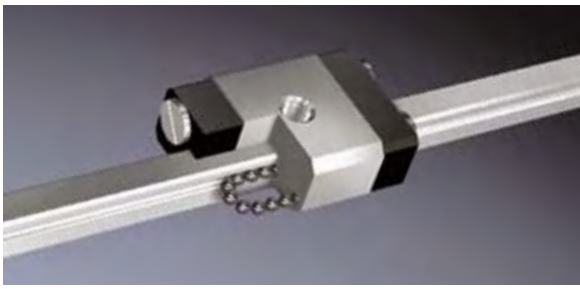
"C" Somma

Somma Tool Company, Waterbury, CT, re-introduces the "C" series Flexi-Grip Collets previously supplied by Sandvik and Balas. The following series are in stock at Somma: C3, C4, C6, C8 drill collets along with STC4 tap collets. Because the C6 and C8 series have been redesigned, they are priced much lower than in the past. Although they are redesigned, these collets are completely interchangeable with the old design. Somma Tool Company can also supply the chucks for these collets.

For more information, please contact Somma Tool Company at 203-753-2114 or visit the company website at www.sommatool.com.

fresh stuff

Pint-Sized



THK has introduced the Type RSR1M, the world's smallest linear motion guide, featuring a rail width of 1mm.

The Type RSR1M and the Type RSR2M (2 - 4mm rail width) were developed by THK engineers in response to demand for decreased design sizes. The Ultra-Compact RSR Series features minimal rolling resistance and 4-way equal load ratings. Type RSR heights range from 2.5 - 4 mm; block widths are from 4 - 10mm; and block lengths range from 6.2 - 17mm. Basic dynamic and static load ratings are 37 - 307N and 58 - 435N respectively.

THK's Type RSR is ideal for a variety of applications requiring precise movement, including medical, semiconductor equipment and measuring instruments.

For more information, log on to www.thk.com or contact THK America, Inc. at 847- 310-1111.

Medically Proven

Mori Seiki's NL Series of CNC lathes are experiencing increasing popularity among medical manufacturers, particularly those specializing in the production of joint replacement components. The extremely rigid design of the NL Series allows the machines to easily meet the extreme accuracy and surface finish needed for components made from titanium or stainless steel.

Joint replacement parts are sold in kits that are highly customized to fit specific body types.

The flexibility of the NL Series milling capability allows manufacturers the agility needed to meet this demand. The milling motor of the NL Series is located inside the turret, directly coupled to the milling tool. The direct-coupled milling motor reduces tool spindle acceleration time by 2/3 and diminishes vibration and noise by 1/2. This design improves accuracy by reducing heat dissipated into the turret to 1/10 of that found in a conventional lathe's milling function.

The NL Series packs all of its features into a relatively small footprint. Models from the series range from just 8'10" x 6'9" to 14'10" x 7'6".

For more about Mori Seiki please contact the company at 972-929-8321, or visit the company website at www.moriseiki.com.

In An Emergency

Pilz Automation Safety presents PITestop, a new range of emergency stop pushbuttons. A safety contact block prevents contact elements from being released without detection.

A black ring at the actuator base makes it easy to detect when operated. The PITestop is available with illumination and with a black actuator to issue a STOP for an area shutdown.

The safety contact block in the PITestop range ensures that the E-STOP is triggered immediately if individual contact elements are lost or attached incorrectly. High-quality contact elements mean that even very low currents in the safety circuit (1mA) can be controlled. Safety contact blocks have either one or two N/C contacts plus an additional N/O contact.

The new PITestop emergency stop pushbuttons are suitable for applications up to Category 4 in accordance with EN 954-1. They also meet the new requirements of IEC/EN 60947-5-5 and ISO/IEC 13850 (EN 418).

For more information, contact Pilz at 1-734-354-0272 or visit www.pilz.com.

Clients for life

The quest to perfect prosthetics

For nearly two decades, Ron Farquharson was just plain frustrated with his body-powered prosthetic arm. Sure, it seemed like state-of-the-art to some, since he was able to hold jobs and get around like a "normal" person. "But what Ron really liked to do was cook," said Farquharson's friend, Johnnie Rouse, somewhat laughing at the thought. "There was no real safe way for someone with a hook or a battery-powered arm to hold knives, or at least no really easy and effective way of doing it."

Farquharson had lost his right lower arm in an industrial accident in June 1971. Fifteen hundred pounds of hydraulic press fell on his hand and crushed it. Doctors fitted him with a prosthesis with a number five hook on it. Farquharson learned how to use it well, but as time went on, he figured there had to be something better. His friend, Rouse, had a machine shop, and by the mid-1980s, encouraged Farquharson to come up with something that was better, since no one else seemed to be moving that way.

"Ron came to the shop with some drawings and I thought, "I can do that," he said. "So we worked on it and soon we had the N-Abler. I would guess that is the story of all successful inventions."

Though exact national figures are hard to come by, it is clear that amputation, and thus the need for prosthetics for arms and legs, is increasing. A New York Times story earlier this year said that by February of 2006, 387 soldiers had come back from Iraq as amputees.

by Robert Strauss

Opposite photo by Laura Pedrick; page 28 photo courtesy of Texas Assistive Devices; page 30 photo courtesy of Otto Bock.

Quadruple amputee Mike Sciullo displaying his WWII photos in his studio, where he currently restores photographs for clients.

"Whether it is because of the Iraq War or just the aging of the baby boomers and the propensity for older people to lose limbs from diabetes and other diseases, there is just more of a need for these products," said Joanne Kanas, a certified prosthetist/orthotist, the professional who fits amputees for their prosthetics and sometimes constructs them. She works in the Linwood, New Jersey, office of Hanger Prosthetics and Orthotics and, as such, sees many new and old products.

The machined parts of the prosthetics, she said, can be quite simple or as complex as a small computer, depending on the device. In recent years, some prosthetics have become electronic, which requires processors and wires and equipment equivalent to that used in EKG machines. Yet even with that amount of sophistication, many of her clients opt for old-fashioned – sometimes jury-rigged – mechanical devices.

Take, for instance, Mike Sciullo, who lives in the quite beach town of Brigantine, only a couple of miles north of the cacophony of the casino Mecca of Atlantic City. Twelve years ago, soon after coming home from a hard day at his photography business, Sciullo, then 67, fell asleep and went into septic shock. By the time he woke up from a coma in the hospital eight weeks later, his extremities had lost too much circulation, had developed gangrene, and had to be amputated. His right hand has a wrist, but no fingers, while his left arm is incomplete below the elbow. His legs are lost below the knee.

Thus, he has three different types of prosthetics. His left arm has a hook and his legs are plastic-covered with interior mechanical parts. His right arm has a clapper-like device with a stainless steel hinge and copper rivets and burrs to hold the device together, with a simple Velcro to attach it to a support around the wrist. The flap acts like a thumb, but has several settings depending on how tightly Sciullo wants to grasp something.

"The copper sometimes oxidizes because I use it so much, so maybe that wasn't the greatest idea," he said. "But I got used to it and you do not want to change what works."

Kanas said she replaces the rivets with simple ones she buys at Home Depot.

"Sometimes it is like that," she said. "If you are an amputee, you are a client for life. If you are a normal person and turn a knee and it gets rehabbed, you may never go to the doctor again. Once you have a mechanical item, though, it wears or gets broken and you have to come back. That doesn't mean it is complicated machinery. Sometimes it is just rivets from Home Depot."

Johnnie Rouse (left) and Ron Farquharson of Texas Assistive Devices (right) examining a part from the N-Abler V.

Or sometimes it is workmanship from a lone machine shop – Johnnie Rouse's, for instance.

Rouse makes the Texas Assistive Devices – that's the name of the company Farquharson now owns – N-Ablers primarily on three CNC mills and two CNC lathes. The N-Abler V, which is the successor to the first four versions of the artificial hand device, is somewhat like a wrench set. A metal wrist-like device hooks onto whatever stump of the arm is available. Then there are different kinds of inserts that go into the "hand" end of the device, depending on what the wearer wants to do. Farquharson's favorite is his cooking knives.

"I've always like to cook and I couldn't do it. I just couldn't feel I was safe," he said. "Now my hand can become like a knife."

Depending on what the amputee needs, Rouse will mill it. It could be a hook or a thumb-finger or even something for recreation.

"We have made fishing rods to go in the N-Abler. It can be anything, so long as it has the proper tolerance and strength," said Rouse.

In the last decade, much of the prosthetic market has gone to using high-strength aluminum and titanium, since they are lighter than stainless steel – the more traditional metal in mechanical prosthetics – and are strong as well.

"We tend to use an aircraft grade of aluminum, perhaps 70-75, which is low weight and high tensile strength, sometimes stronger than commercial grade titanium with one-third the weight," said Rouse.

Even in myoelectric arms, like the Utah Arm created by Motion Control, Inc., of Salt Lake City, the aircraft grade aluminum is the standard for most mechanically-machined parts.

"We have made attempts to do machined parts in plastic, but it has not been successful," said Harold Sears, the president of Motion Control. "The strength to weight ratio is not good enough, and the plastic is too brittle when it comes to something people use a lot, like a prosthetic arm."

Machinists make molds at an in-house factory for most of Motion Control's products, said Sears. The Utah arm, because it is controlled by electronic sensors, has 916 parts, but much of that, he said, is circuitry and not machined parts.

"On the other hand, it is a bit of an urban myth that electronic parts are replacing everything in prosthetics," said Sears, even though he manufactures those sophisticated electronic parts. "It is difficult to make an arm that is right for all occasions, and sometimes it is the older styles that are just right."

In some cases, the prosthetics in use today are still a vestige of what was state-of-the-art in the middle of the 20th Century. There was a lot of research done on prosthetics during and right after World War II and the Korean War. Soldiers were coming home limbless and there was a social and practical need to find the best way to make them whole again.

Plastics and some carbon compounds were gaining in manufacturing of all sorts, but the primary material for prosthetics was stainless steel. The military, which was doing much of the research, was not into style. Most artificial arms and legs of the post-World War II era were strictly poles and pincers. They had easily-machined parts and it was mostly a one-size-fits-all scene. Stainless steel was durable if sometimes cumbersome, but it worked, and subcontracting parts was simple, since there weren't many of them on each arm or leg. If a prosthetic allowed someone to walk or at least open a door, and it didn't come apart too often, it was deemed good enough for use.

"Sometimes it wasn't as sophisticated as that," said Sarah McConvill, a development engineer for Otto Bock Health Care, one of the largest prosthetic manufacturers in the world, based in Germany but with facilities in Utah and Minnesota. "You often went to the prosthetist and he or she would take some big pieces of wood. The art was carving it down for a custom wooden prosthesis and using belts or straps to keep it on the stump. It was just an external wooden element that mainly acted for support. It was not very functional, but it filled the pant leg and allowed the person to walk."

After the Vietnam War, though, according to Texas Assistive Devices, Rouse, research on artificial limbs went dormant.

"Universities had other things to do and, frankly, there wasn't all that much of a market or a constituency to have better products," said Rouse. "It certainly wasn't sexy to be looking for a better artificial leg at the time."

Yet like much else in the economy, the baby boom started to have an effect on the market. Diabetes and accidents and other traumas started happening to them, plus the Vietnam veterans, who were much more vocal than their World War II and Korean War counterparts about veterans' benefits, wanted better choices for artificial limbs.

"The next big jump came in the late 1980s, when there were a couple of people deciding that these cool space-age carbon-fiber reinforced composites could be applied to a prosthetic foot," said McConvill of Otto Bock. "They had these neat properties. They were light but strong. That was a huge jump. That is when you saw more amputees running or playing basketball or at least doing a normal level of activity."

Sciullo, for instance, has carbon-fiber springs in his artificial feet. When he walks, the spring along the front part of his foot allows him to push down on what would be the ball of his foot, and as he steps forward, another

Otto Bock's version of the carbon fiber reinforced artificial foot.

spring in his "ankle" bounces the foot back. Once again, said Kanas, Sciullo's prosthetist, these are simple machined parts.

"I order them from Otto Bock and each one is custom-made, depending on someone's height or weight or activity level," she said. "On the other hand, though, they are standard type parts.

"I don't think you could just go to your local machine shop and pick up one, though," she said, noting that this is a person, not a model car, who is using the part. "If this part wears out, I would want someone standing behind me who would fix it right away and correctly, so it's good to have manufacturers like Otto Bock or some other long-term business there. Still, I guess, there are a lot of people out there who could do this kind of work if they find a market."

Liberating Technologies found its own niche market in electronically powered upper arms. The Massachusetts company was spun off in 2001 from insurance giant Liberty Mutual, which decided it wanted to have control over some of the products they were insuring.

"There are not really all that many amputees each year, and of them, only 15 percent are upper limb, and only a portion of them need products like ours, elbows and shoulders," said Bill Hanson, Liberating Technologies president. Unlike hands and feet, though, elbows and shoulders have few, if any, upper arm muscles to work with, so the advance into electronics is a boon to those who need that kind of prosthetic.

Hanson's company does buy circuit boards and the electrodes that hook to the stump like EKG monitors, but they do the soldering in-house, either by hand or by machine. The Boston Arm, the flagship Liberating Technologies product, uses a standard three-phase brushless motor in the elbow, connected to the circuit board and the electrodes.

"We are forever battling the problem of weight. You can imagine what it was like to have a wooden or even a stainless steel arm. You really had no place to anchor it, so it was almost just a cosmetic thing," Hanson said. He said that research is now going on to figure out how to get cheaper and more malleable titanium and have it essentially screw into a stump. "It's done a lot in the dental field and more and more overseas. But people here are worried about infection, so it needs a bit more work."

Back in Texas, Rouse said he mostly loves just refining his machine-shop products. Rouse said he is now using Mazak 5-10C machines for precision turning and is also using a Haas TL-1 for slightly less high tolerance work.

"The average tolerance in the industry is five-thousandths and a normal tolerance for parts for good prosthetics is one or two thousandths, but I like to hold plus or minus a couple of tenths of a thousandth," he said with pride. "Each wrist we do has about 30 parts, and each N-Abler insert has another 10 or so, but you don't want these wearing out all the time. It's a person you are talking about here."

Sciullo, who uses his left-hand hook and right-hand flapper device made by Kanas with great dexterity, said he isn't interested in moving into electronic devices. He has a myoelectric arm, but keeps it in storage, rarely ever even trying to use it.

"If something wears on my mechanical limbs, I can see it coming beforehand or, even if it breaks, I can go to Joanne and someone can easily machine something for me," he said. "If I were dependent on electronics, who knows? They would have to send it out and I would be without for maybe weeks, or at least days. Sometimes progress is not what it seems."

The machinists like the feeling of custom work done immediately toward a greater end as well.

"Johnny and I had the opportunity to go to Walter Reed Hospital and talk to amputees who came from Iraq," said Farquhhrson. "They just wanted to get their limbs and either go back to be with their platoons or get on with their lives. Some got sophisticated stuff, but others worked with machined limbs like ours."

"It is a wonderful thing though, to make what is otherwise a simple item. I have a veterinarian, for instance, for whom we put in a scalpel part in the N-Abler, and now he can work like anyone else," said his partner, Rouse. "What other machinist can make things like this that put lives back together?"

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1-3/4″ 6-spindle, factory rebuild
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

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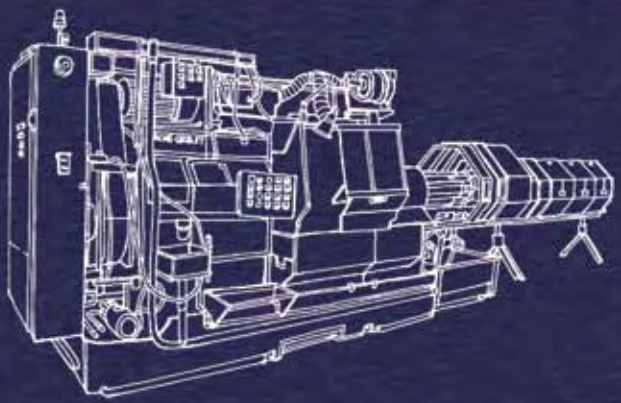
1″ RAN6, 1975
1-1/4″ RA6, 1973-1958-1982 (6)
1-1/4″RA6 collet chucker, 1982, superb
1-1/4″ RB8, 1956-1979 (5)
1-5/8″ RB8, 1980, pickup (2)
1-5/8″ RBN8, 2000-1975
2″ RB6, 1979-1985-1956
2-5/8″ RB8, 1975 (5)



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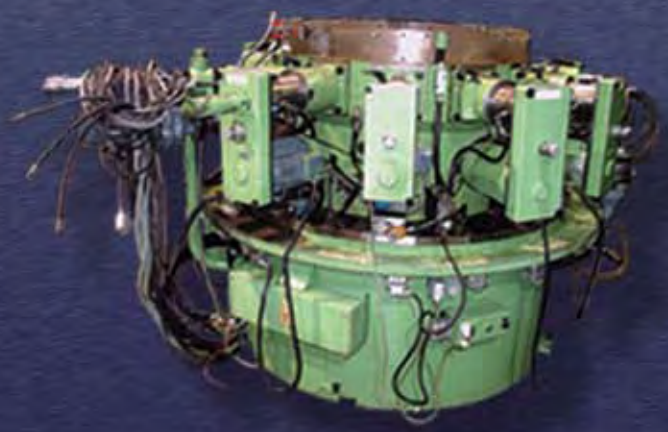

Hydromat HW 25-12, 1984
Hydromat HB3245-16 2002 CNC
Hydromat HW 25-12, 1984
Hydromat HW2 25-12, 1985
Hydromat HW 25-12, 1985
Hydromat V-12, 1986 Trunnion
Hydromat 30-60, 36-100, 20-80 units for drilling, threading, recess

Swiss-CNC
Sliding Headstock
Citizen L-32, 1998
Citizen L-20, 1996, Type VII
Star SA-12, 2000
Tornos Deco 26mm 2002

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

Bargain Corner

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Davenport spindle stopping clutches $35 each
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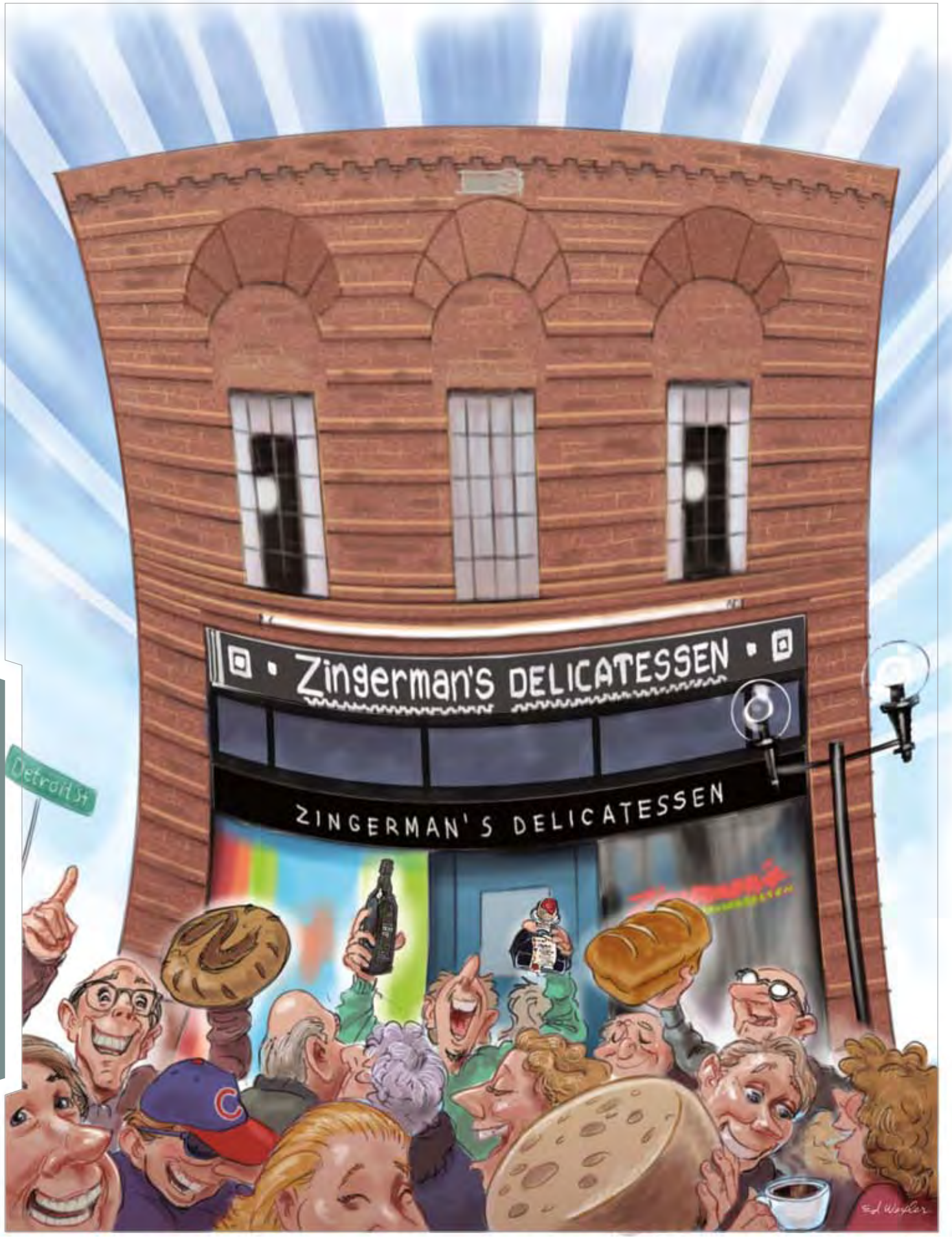

Bo Burlingham

MOJO vs. MUCHO

Intimate, intoxicating and magnetic; words not often associated with corporate culture. Companies embracing brilliance and forgoing growth beyond their reach. An interview with Bo Burlingham, author of Small Giants.

Bo, where did your new book Small Giants begin?
It started with an article I did on Zingerman's Community of Businesses in Ann Arbor, MI, which had started as Zingerman's Delicatessen in 1982. It was founded by two young guys, Ari Weinzweig, who had been a Russian history major at the University of Michigan, and Paul Saginaw, who had knocked around the restaurant business for awhile and decided that what Ann Arbor needed was a world-class delicatessen. The amazing thing is that over the course of the next ten years, they actually succeeded. By 1992 they had been written up in *Esquire, The New York Times* and all the food magazines. Whenever anyone mentioned the great delicatessens of the world, Zingerman's was right there among them. They came to a crossroads on deciding what to do next. A lot of people wanted to start up a Zingerman's in other college towns. They could have franchised. Saginaw and Weinzweig could have raised capital to start their own stores, but they decided not to. They had bought into the business originally to create something great and unique. When you start replicating something, it's no longer unique by definition, and often it's not even very good. They decided that instead, they would create other businesses in the Ann Arbor area that would be great and unique in their own right. They would do a bakery, a coffee roaster, a creamery that would make gelato and cheese. Today they have eight different businesses, all food-related businesses, operating independently and yet together as one business, which is great and unique in its own right. What struck me most when I went to visit the company was the incredible people who they have been able to attract. They were people who had left good jobs at large companies to go work at Zingerman's and were now making cheese. There was something electric about the atmosphere at Zingerman's that attracted all of these people.

Illustrations by Ed Wexler

MOJO vs. MUCHO

An interview with author Bo Burlingham of Small Giants.

It certainly has attracted me. I go to Zingerman's both for the coffee, the danish and the corned beef, but primarily, to study the place and feel the magic.
It is the magic of Zingerman's and the unconventional decision they made when they could have gotten much bigger and grown much faster. They decided they had other goals more important to them than getting as big as possible, as fast as possible. I wrote that story, and a publisher, Adrian Zackheim, contacted me and said, "You know, I think there is a book here." And at first I didn't get it, to tell you the truth; I thought there might be a book for Ari and Paul. I wound up agreeing to talk to him and realized he wasn't really talking about a book about Zingerman's. He felt Zingerman's appealed to an aspiration people had. He wondered if there were other similar companies that had also appealed to that aspiration.

Zingerman's has the "mojo" you talk about in the book. Can you define having a mojo in business?

To me, it is the corporate equivalent of charisma. When a leader has charisma, you want to follow him or her. When a business has charisma, you want to be associated with that business. You want to buy from it. You want to sell to it. You want to work in it. You want to wear its t-shirts or its hats. You just want to be associated in some way with the company. Charisma is hard to define. The way I approached it was to ask this question: "All these companies have this mojo; what do they do in common that creates it?" These are companies that are the best at what they do and have established very intimate relationships with everybody they come in contact with, including customers, employees, suppliers and the communities in which they do business.

Can you talk a little more about that intimacy as it relates to Zingerman's?
Let's take the intimacy with their community. Zingerman's was celebrating its 20th Anniversary when you and I were there. There was a big sign next to Zingerman's, put up by about a dozen local non-profit groups, including a group called Food Gatherers, founded by Zingerman's. They were thanking Zingerman's for all it had done to support them over the years and for having done so much to make the Ann Arbor region a better place to live. Zingerman's and all the other companies in the book also reflect the personality of or the culture of the places where they're located, to the point where it's difficult to imagine them being someplace else. Zingerman's in particular is very much a reflection of the kind of community Ann Arbor is. It is very focused on learning, on knowing where the food comes from. Ari is a fanatic about it. It's one of the things that you find everywhere you go in the company, this passion about foods. There's a casualness mixed with great ability. As Ari said, "You're liable to find a Nobel scientist along side a high school student all waiting to sample the cheese." The intimacy is a two-way street with the community. It has to do with the companies giving to the community but also being molded by the community. These companies have a personal, not just business, relationship with their customers and their suppliers. Zingerman's brings its suppliers to life. It tries to bring them directly into contact with the people who buy their stuff by telling their stories.

Ari writes in his newsletter about his coffee supplier in Brazil, or his cheese supplier in Spain, where he buys his salt. It's just so human and so personal.
Yes, and with all these companies in the book, it's like the customers and the suppliers and the company itself are part of the same community, trying to accomplish something together.

The intimacy with employees goes back to a quote from Herb Kelleher of Southwest Airlines, who was once asked by *The Wall Street Journal* about the secret to Southwest's success, and he said, "It's very simple, it's our culture." This was at a time when business magazines were trying to dissect Southwest's success, and they would focus on its selection of airports, or its fast turnaround time. The interviewer asked, "Well, what's the secret to your culture?" And he said, "Caring for people in the totality of their lives." In other words, not

just caring for them as employees who are there to do a job, but caring about the whole human being. That is what you find in all of these companies. The effect is that the people who work there understand that they're part of a company that cares about them and treats them with respect and generosity and honesty – the culture of intimacy.

One of the questions that gets raised is: Is that the one thing you tend to lose as the company gets larger? Companies that get larger tend to get more impersonal. I tried to come up with some measure of where you cross the line. What I eventually decided was that it happens more or less at the point at which the people at the top of the organization no longer know everybody in the organization. Fritz Maytag of Anchor Brewing said that his limit was about 50 people. People said Albert Tanner, who was the founder of O.C. Tanner, could walk around a plant with a thousand people in it and know everybody by name. He would sit down regularly and talk to them about their families. Obviously that's an extraordinary thing. Most people aren't capable of doing it, but it carries a powerful message when it happens.

Speaking of mojo, I interviewed somebody who I saw on the dust jacket of your book, Rosabeth Moss Kanter. She has written a book about winning and losing streaks, and I think she struggled with this idea of even having mojo.

Can you have mojo? And if you lose it, can you get mojo back? The answer is yes. As to why people lose it – I have a certain perspective shaped by my personal experience. I was on the board of the U.S. part of The Body Shop for five years and saw this company lose its mojo around the same time Ben & Jerry's was losing its mojo. I think that this is why Rosabeth struggles with it, because she has only looked at publicly-traded companies. I think it is extremely difficult for a publicly-traded company to keep its mojo. The kind of people who are capable of being mavericks and, at the same time, deliver the kind of returns on investment they need to deliver in order to keep their shareholders happy, requires enormous management skill.

In the book there are no Silicon Valley companies.

When you take outside money you don't have any choice about making those decisions because you're responsible to the people you brought in.

The venture capitalists are looking for an exit strategy.

They have to. Venture capitalists are not free agents. They're responsible to the people who put money in their funds, and they have to deliver certain returns. The only way they're going to be able to deliver those returns is by cashing out, and if they don't do it and don't deliver the returns, they'll be out of business. I hear so many people complaining – They talk about vulture capitalists and things like that. There are good venture capitalists, who actually deliver, really do provide the help you need to be successful, and there are other venture capitalists, who aren't so good at it. But to me, the idea of calling them as a group, vulture capitalists, shows a certain naiveté. One of the things I respect about the "Small Giants" is that they're so realistic about what they're obligations would be if they took in venture capital or went public.

Go back to your history with *Inc.* magazine.

One of the things that struck me about the companies in my book was that they had figured out how to keep the mojo or how to get it back after losing it. When I first came to *Inc.* it was a start-up. The Goldhirsch Group,

MOJO vs. MUCHO

An interview with author Bo Burlingham of Small Giants.

which owned *Inc.* magazine, would have made the Inc. 500 easily, except that Bernie Goldhirsch didn't want to put in an application for it. *Inc.* had plenty of mojo at that point. It was a great environment. We had this incredible relationship with our readers. We had never been in a journalistic environment where you had that kind of a close relationship with readers who were so responsive. The same was true of our relationships with our suppliers. Bernie was a sailor, and it was a part of our personality. But I think that we began to lose it before the sale to media giant Gruner & Jahr. We had gotten a little stale, and there was more competition. We ran into a lot of the problems that companies run into when they begin to lose their mojo. That began to happen in the 1990s, and once Gruner & Jahr bought the magazine the damage was incalculable. They totally devastated it. Whatever mojo remained at *Inc.* was wrung out of it during the Gruner & Jahr years.

Can you talk a little more specifically about how the mojo was wrung out?

There was a complete turnover in the staff, which wasn't bad in itself because the people who they hired were good people, but when you have that much of a turnover that quick... They moved the magazine from Boston to New York, and New York is one of the worst places in the world to have an entrepreneurial magazine. Entrepreneurs don't get respect in New York.

Why do you say that?

It doesn't have the caché that it does in a Boston or Silicon Valley or practically any place else in the country. When journalists go to parties and hang out with their friends and say, "I work at *Inc.* magazine," nobody says, "Oh wow, that's great." It's like they don't even know what *Inc.* Magazine is. Half the time they say I-N-K. I actually think that it was time for a lot of new blood to come into the magazine, but because it was done so suddenly and so haphazardly and so completely you wound up losing a lot of institutional memory.

Bo Burlingham

Bo, I want to bring up another fellow you identify as a Small Giant, Norm Brodsky. He has a column in *Inc.* I love his column because of its nuts and bolts practical stuff, very human, personal, and it appears that this is the way he runs his business too.

Norm Brodsky was absolutely the quintessential fast growth, get-big entrepreneur in the 1980s. He took his company from zero to $120 million in eight years, and then from $120 million almost all the way back down to zero in eight months. It was a traumatic experience for him. He took it into Chapter 11, got it through Chapter 11, then took it out of Chapter 11. It just had a searing effect on him and totally changed the way he looked at business. Then he started CitiStorage, which is a record storage business. They go to hospitals or accounting firms and store their records, then put the boxes on shelves. It doesn't get much more mundane than that, and Norm loves the business. He says when he goes into the warehouse he loves nothing better than to smell the cardboard, which I can attest is overwhelming. But the thing he loves is that he looks at this business, and what he sees is a great business. It's a great business in terms of its culture, in terms of its relationship with customers, its relationship with suppliers, its relationship with the community and its profitability. He's figured out how to do all of that.

And it appears that he has fun too.

He does have fun. He has two really great partners, one of whom is his wife, Elaine, who plays a very active role in the business and is probably responsible for the great culture that's in the business now. The other person is his friend of many years, Sam Kaplan, who is a very smart, talented, organizational person, who compliments Norm. Norm is still a guy who loves the thrill of growing things. The thing I respect most about Norm is his ability to learn from his mistakes and change. He changes when he realizes what he really did wrong, he's very honest with himself in terms of figuring it out. He then comes up with mechanisms to keep reminding him not to do that again, and that's a gift to be able to do that.

That's somewhat the situation we're in with *Today's Machining World*. We're focusing on the drama of business and the humanity of manufacturing. It's a whole different paradigm, and it's really fun to do. And I think that is why people love to go to Zingerman's and why people want to do business with Norm Brodsky. I love what Zingerman's has done with trying to change Zingerman's from being just a food business to being an idea business, particularly with their training business ZingTrain.

Yes, I agree. ZingTrain has got a critical function as a catalyst for all that other stuff happening because the mere existence of ZingTrain means they've gone through a process of thinking about what they do. The thing they teach there is about the different stages of competence. The first is unconscious and incompetent. Second is consciously incompetent. The third is consciously competent, and the highest level is unconsciously competent. In other words, you're doing it well, and you don't even think about what you're doing any more. In order to teach something, you have to go from being unconsciously competent to being consciously competent.

Anything else you would like to talk about?

I hope that Small Giants prompts people to think about what it is that makes a business great. Our culture is designed to get people in business to focus on getting big and never really reflecting on – Is that going to make us great? I think different people will come up with different answers to that question, and that is fine. I also hope that it prompts people to think about where they want to go. A lot of times you start out in business wanting financial independence, and you get so caught up in whatever it takes to keep the business going that you really don't think about the long-term future. I'm hoping the book will begin to put a spotlight on the private company, particularly the closely-held private company sector, which I think is critical. This stuff really does matter. We spend the greater part of lives working in businesses, and it's really where the fabric of the society is woven, and what happens in those businesses, and how they run them that have consequences that go way, way beyond the economic factor.

Thank you, Bo.

Interviewed by Noah Graff

Young baseball agent Matt Sosnik

is best recognized as the agent of Florida Marlins, 22-game winner Dontrelle Willis. He is known for having close relationships with his players. He once even shared an apartment with Willis for several months. This coming season he will have five players on the Marlin opening day roster. Recently, ESPN's Jerry Crasnik featured Sosnik in his book *License to Deal: A Season on the Run with a Maverick Baseball Agent*.

What made you want to be an agent?
I realized that I was never going to be able to play pro sports. I was Jewish and 5-10, and I figured that this was the closest I could come to actually being [part of that world].

How did you get your start?
I found one guy who would let me represent him. His name was Lou Luca. He was in AAA, and I told him that this was something I had always wanted to do. But it was total trial and error. I had no idea what I was doing. None. I didn't have a mentor. I had no clue.

What do you think your job entails as an agent?
Number one is being emotionally supportive towards guys, and being able to really just be a stabilizer when they're sort of emotionally all over the place.

Do you see yourself as a father figure to your clients?
For some. There are some where I feel like I'm an older brother, and there are some where I feel like I'm a contemporary. And I definitely have some guys who are as mature as I am, if not more mature.

Do you ever see yourself as a "Jerry Maguire?"
If you correlate that I actually have a heart and care about guys and not just the money, that's true. But by the same token, it's business, and I make it clear when I go into a house that I'm not there because I think the guy is a great guy. I'm there because it's something that could make me some money. I don't want to pretend it's something that it's not.

Why are you different from other agents?
I think that other agents are good guys. I think the problem is that the young players and their families are so uneducated about the process that the people who become agents tend to be guys who are looking to make a quick buck. And each time that someone comes in with less and less integrity, it just lowers the bar and people feel like to succeed they've got to lower the bar themselves.

What's one thing you really love about being an agent?
I love the closeness with the players.

What's one thing you really hate about being an agent?
I would say that the thing I hate the most is, that most people, men in particular, abuse their relationships. And it made me understand why people in relationships are unfaithful to each other. For the most part, the guys who have slipped away from us are guys who are unfaithful to their wives, and I just chalk it up to the fact that if somebody can't be faithful to their wife or their children, what chance do I have that they're going to be faithful to me.

How much do agents make?
This is the first year the business was profitable. All agents, including us, charge 3-5 percent.

If you were a general manager, and you could have any pitcher to start your team around, who would you take?
I'd take Dontrelle Willis first and Johan Santana second. I think if you ask that to most GMs they'll answer the same way.

If you could have coffee with anyone, living or dead, Who would it be?
I think it would be a tie between Albert Einstein and Dave Matthews.

What car do you drive?
I drive a 2006 Jaguar convertible. It's my eighth Jaguar in a row.

If you could be any machine, what would you be?
Honestly, any of them would be fine, because it would allow me to emotionally distance myself from the disappointments of the business.

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

With political instability in many oil producing countries, and the world's rapidly increasing energy demand, the price of oil has skyrocketed recently. Some experts believe that the price of oil could still rise significantly.

If oil were selling for $120 per barrel, would it have a positive or negative effect on U.S. contract machining companies?

It depends on whether the contract manufacturers can pass the additional cost to their customers, and whether high oil prices lead to a recession. The impact will be minimal if they can pass the cost.

High oil prices will not affect the economy if the government and the Fed use a proper combination of fiscal and monetary policies. Oil prices increased substantially in the last four years, yet they have not affected the economy yet. There could be some impact on some industries that depend heavily on energy products. If China, for example, imposes price control at $50, while the U.S. does not, some U.S. industries might outsource some of their operations to China.

A.F. Alhajji,
PhD Associate Professor, College of Business Administration
Ohio Northern University

the facts:

The Internet and private intranets are becoming a significant energy consumer. **It's estimated that to move 2 megabytes of data over the Internet requires the energy equivalent of 1 pound of coal.**

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Goldman Sachs recently reconfirmed their forecast for **oil prices to spike above $100.00.** With speculation that Iran may be building nuclear arms, if tensions exacerbate, the oil market could suffer. **Iran is the world's second largest producer in OPEC, sitting on 10% of the world's proven reserves of oil and fully 25% of the world's reserves of natural gas**.

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For every dollar that the price of oil increases, the price of gasoline increases 2.4 cents.

A.F. Alhajji,
PhD Associate Professor, Ohio Northern University

I clearly believe that U.S. and global manufacturers alike would be adversely impacted by $120 oil. Upon further thought, a case could possibly be made that relatively efficient, higher-tech U.S. manufacturers are less adversely affected than foreign manufacturers. This might actually work to reduce the current cost advantage I believe foreign manufacturers hold over U.S. companies. However, I believe the downturn in economic activity would be detrimental to all and thus adversely affect U.S. manufacturers.

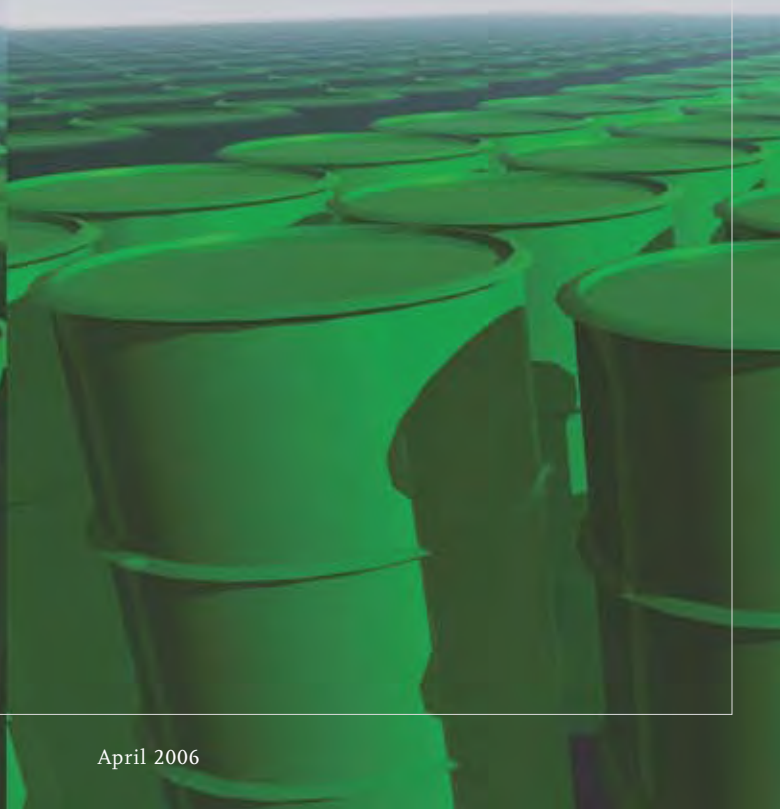
Kyle M. Cooper
Vice President and Energy Analyst, Citigroup Global Markets

A significant increase in oil prices to $120/barrel will slow economic growth primarily through its effects on spending or aggregate demand.

The increase in cost for imported energy will reduce disposable income for households and firms, thus, reducing available consumer spending for non-energy goods, and in the short-term at least, the willingness of firms to purchase new capital goods.

In the medium to long run, higher oil prices are also likely to reduce the productive capacity of the U.S. economy and manufacturing. High energy costs will make businesses less willing to invest in new capital development projects.

Athanasios D. Bournakis, Ph.D.
Principal Research Economist, University of Illinois at Chicago



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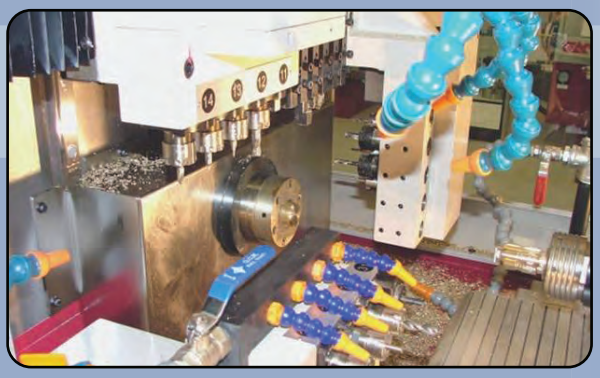

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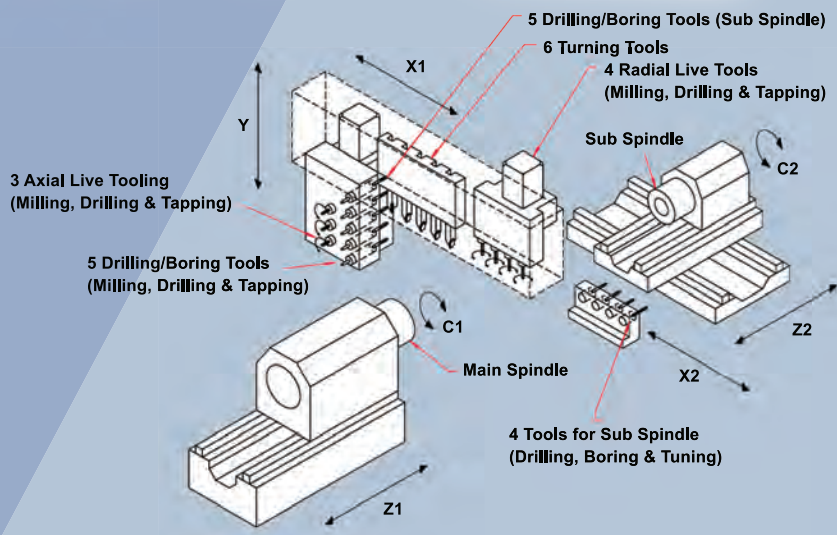

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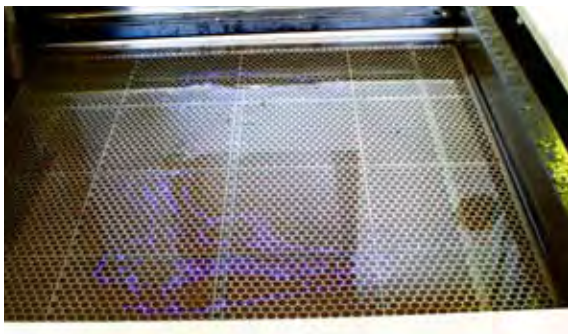
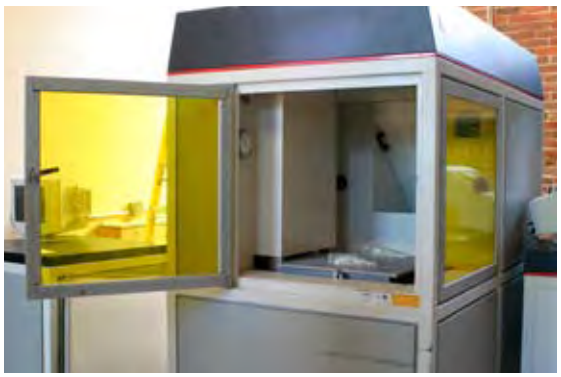
By Barbara Donohue

Rapid Prototyping

Stereolithography turns computer files into parts.





A small spot of purple light scampers over the surface of the clear fluid in the tank of the machine. In about 15 seconds, the spot of light outlines a pistol shape.

The perforated metal platform just below the surface dips a little deeper into the liquid resin. The platform rises again. A bar sweeps across the surface. Then the purple spot dances again. This process repeats again and again. Finally, the platform rises above the surface and the liquid drains away, revealing the two halves of a toy gun formed in translucent plastic.

The magic happens every day here at San-Tech in Peabody, MA. It's called stereolithography (SLA). It uses a special liquid resin that solidifies when exposed to ultraviolet (UV) light, similar to the dental filling material that is applied as a paste and then hardened with intense UV light.

Top: A collection of SLA-fabricated parts.

Middle: In this 15-second exposure, the laser beam has had time to inscribe the outline of the prototype piece in the liquid photopolymer. The platform will lower into the vat and rise again with a new polymer layer 0.006 inches thick, to be re-inscribed with the next slice of the design. This repeats until the form is complete.

Bottom: process chamber of the SLA machine.

Photos by Jean Butler

Developed in the 1980s, SLA is one of several processes used to build mechanical parts directly from 3-dimensional computer drawings. Building parts by these methods is called rapid prototyping, a process used by more and more companies to help evaluate designs, especially for items that would be difficult or impossible to machine, such as molded plastic or cast metal parts. The technology is also finding additional uses in other areas. In medicine, for example, SLA helps doctors visualize surgical plans and makes it possible to create a customized implant for patching up a hole in a patient's skull.

Some large companies have their own SLA machines, but many businesses find it more cost-effective to send out rapid prototyping work to a company that specializes in it. One such company is San-Tech, a Peabody, MA, division of Res-Tech, Inc., a Clinton, MA, plastics molding company. San-Tech's four employees provide SLA prototyping and other product development technologies to a wide range of industries, including medical devices, transportation, electronics, sporting goods, appliances and toys.

From computer file to reality

To build a part with SLA, the process begins with a special computer file, an .STL file, which can be created by any 3-D drafting program, explains San-Tech operations manager Carrie Denley. When a customer sends San-Tech the file, usually by e-mail, Denley quotes the job based on the dimensions of the part and the volume of material to be used. She says a typical prototype made by SLA might cost a few hundred dollars. Normal turnaround time is three to five days, but San-Tech can turn parts around as quickly as two days if needed, Denley says.

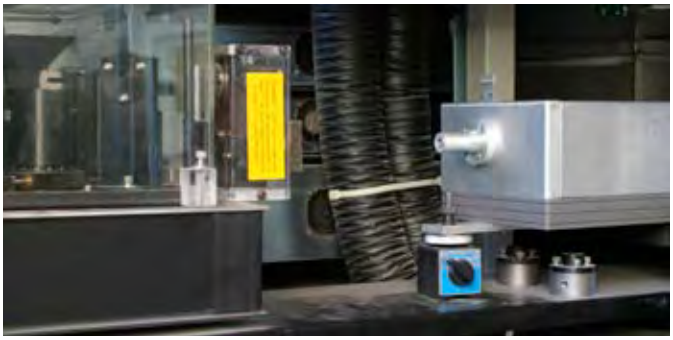
SLA manager, David Caron, loads the customer's .STL file into a specialized SLA program, which adds the support structures that will attach the part to the perforated metal platform and support any thin-walled sections while the part is being built. The San-Tech SLA machine builds parts in layers 0.006" thick, so the program needs to "slice" the part and its supports into 0.006" layers. Other SLA machines can lay down layers as thin as 0.002". Caron checks the part/support scheme for problem areas, such as sharp edges on the bottom of the part that might need extra support. Then he sends the sliced file to the SLA machine.

Above: SLA manager, Dave Caron, operates the computer controls of the stereolithography machine.

Layers and laser light

The heart of the SLA process, a solid-state UV laser, is mounted in the base of the SLA machine. The laser light first passes through optic elements that focus it into a consistent, round beam 0.012" in diameter.

The beam then reflects from the surfaces of two small mirrors that are attached to small servomotors. The SLA machine's computer controls the servomotors, which tilt the mirrors this way and that. This moves the beam so it can trace the shape of each slice. After the small mirrors, the beam reflects off a fixed mirror at the top of the SLA machine, which directs it at the surface of the liquid resin. There, the beam, moving at about 200"/second, "draws" a slice of the part being made. Wherever the laser shines on the surface, the liquid resin solidifies into plastic.



Above: The solid-state laser (silver box, right) produces a beam of UV light. The optics on the left focus the beam into a spot 0.012 inches in diameter.

Some Rapid Prototyping Processes

LOM – Laminated Object Manufacturing
A laser cuts cross sections of thin layers of material that are bonded together to make the 3-dimensional form. Relatively low material cost; may be suitable for prototyping large parts.

SLA – Stereolithography
An ultraviolet laser solidifies liquid resin in layers. Resins are available with the characteristics of many different plastic materials used in production.

SLS – Selective Laser Sintering
An infrared laser softens layers of powdered material so it bonds together. A wide variety of materials is available.

3DP – 3-dimensional Printing
For each layer, powder is deposited, and an adhesive joins the particles and the layers. The powder material is typically a type of starch. Low cost. A part that cost $600 – 700 for an SLA prototype might cost $200 – 300 for a 3-D printed prototype. Good for initial concepts. Models tend to be delicate and do not withstand heat or moisture very well.

how it works

Left: Mirrors controlled by servomotors direct the laser beam to follow the path described by the CAD drawing.

After each slice is drawn and solidified, the "elevator" that holds the platform moves down, submerging the part, to allow the liquid resin to flow on top of the area just solidified. Then the elevator places the platform 0.006" below the previous location. Some of the resin, which is the consistency of molasses, stays heaped up on top of the part. The "doctor bar" moves across the surface of the tank, leveling the resin on the surface of the part to a thickness of 0.006". Then the laser traces another slice. Once the machine is started, it can run unattended, Caron says.

Layer by thin layer, the part is built up. The toy gun parts shown here took about six hours to complete. While the parts are being built, they remain beneath the surface of the liquid, so they are not visible until the process is complete and the elevator raises the platform above the surface.

When the parts are complete, the platform is removed from the machine and the parts cut off by hand. They are washed in alcohol or a chemical bath to remove excess liquid resin. The base support and any internal supports are removed by hand. The parts spend a couple of hours on the turntable in the post-processing apparatus, a sort of super tanning bed that shines intense UV light on the parts to cure any remaining liquid resin. Uncured liquid resin would make the parts sticky.

The parts are then hand sanded to smooth the layer lines and blasted with glass beads to further smooth the surface. The completed parts may be dyed or painted, according to the customer's needs, or may be used to make a mold that can produce dozens of additional parts.

Many parts from one part

To create a mold, the SLA part is placed in a wooden box, rods are placed to create holes in the mold for filling and venting, and the blue silicone material is poured around the part. When the silicone hardens, the mold is opened up. The SLA part is removed, and the mold is ready to produce two dozen or more replicas of the original part. If the part is simple and doesn't have a lot of fine detail, the mold might be good for making 50 parts.

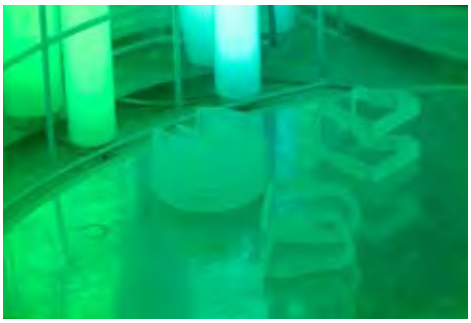
A two-part urethane material is mixed and quickly forced into the mold. Then the mold is placed in a pressure chamber until the new part is set. Clear and colored urethanes are available. The molded parts are tougher and more stable than the original SLA prototype.

Above: Jim Hering sprays primer on an SLA pattern piece.

Any size or shape that fits

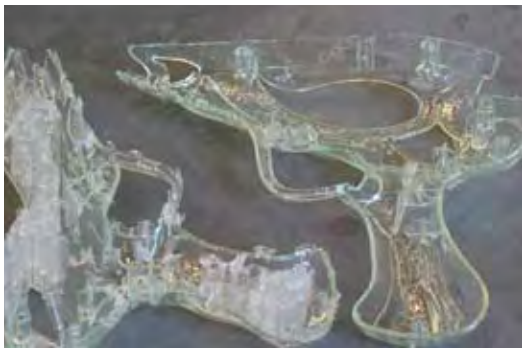
A part can be built as large as the vat of liquid resin in the SLA machine. Denley says that the vat in San-Tech's machine is 18" by 19" in area, and the company usually uses a "half-vat" that is 11" deep. For larger parts, a full vat can be used. She points to a prototype transmission casing for a delivery truck that took up nearly the whole volume of a full vat. That prototype took five days to build in the SLA machine, Denley says, and turnaround for the job was just one week. "[You] couldn't get that built in six weeks at a pattern shop," she comments.

When making smaller parts, it is possible to build multiple parts at the same time, Denley explains. The SLA software can



Above: A view inside the PCA (post-curing apparatus), where the newly-formed polymer pieces undergo exposure to UV light. Next, the interior support structures will be removed by hand and the parts sanded to remove the layer lines.

Above: The interior supports, which were needed to form the shell during processing, are no longer needed and can now be chiseled away.



Above: The prototype half at left is as it came out of the process chamber, with interior supports in place; the half at right has had the supports removed.

Right: A silicone core and cavity mold; the gray piece on the bottom was formed in this mold.

Left: Dana Jackson pours liquid urethane into a large syringe, which he will use to fill the silicone mold. The filled mold will be treated in a pressure chamber.

automatically multiply a single part and locate dozens of parts on the platform.

San-Tech uses one type of liquid resin, DSM Somos 11120. This produces a fairly hard part that is good for making molds. Many other UV-curable SLA resins are available that produce parts with different mechanical properties, such as flexibility or resistance to high-temperatures.

Hold it in your hand

"In today's world, everybody wants it yesterday," says Brian Driscoll, operations manager at Precision Tool & Die, Derry, NH, a company that uses San-Tech's services. Many of his customers start out with just a concept or general idea what they want. Precision's engineering staff turns the idea into drawings. "[Then we] ship the drawings to Carrie [at San-Tech]," Driscoll says. "In three to five days, you can hold it in your hand."

Driscoll says many of Precision's customers are seeking funding to develop and manufacture their product ideas. An SLA prototype, nicely finished, gives potential investors something to look at, handle and envision as a real product. This can be much more persuasive than a set of drawings.

Driscoll tells about one customer, a golf course maintenance superintendent, who had an idea for a new tool to help with greens keeping. He came to Precision just a few days before a big trade show. With an SLA prototype prepared and painted to look like the real product, he received orders for the tool at the show, even though he had yet to manufacture any.

The wide world of SLA

The San-Tech division was created in 2002, but the four staff members worked for the predecessor company and have between nine and twenty-nine years of experience. Denley says she started out in accounting but now knows the whole business, from running the SLA machine to keeping the books. It is clear that she and the others enjoy the work. "We get new stuff all the time. It's never boring," she says, indicating with a sweep of her hand a display of SLA-built prototypes that includes a bottle for antacid tablets, an electronics housing, appliance parts, safety goggles, fasteners and an assortment of parts for toys and games.

Above: Past products for other San-Tech customers include visors for hockey helmets (from left: original polymer prototype, prototype cast in opaque white urethane and the finished product cast in clear urethane,) and goggle inserts (from the front: original SLA prototype, painted prototype and clear urethane finished piece).

Background information was provided by DMS Somos, Elgin, IL, supplier of the UV-curable resin used at San-Tech.

For more information

Rapid prototyping information: http://home.att.net/~castleisland/
Explanation of the SLA process: http://www.howstuffworks.com/stereolith.htm
Videos of the SLA and casting process: http://www.protocam.com/html/video.html

Sources

Carrie Denley, operations manager, San-Tech, Peabody, MA (a division of Res-Tech, Clinton, MA) 888-467-2743, sales@santineng.com, www.santineng.com
Brian Driscoll, operations manager, Precision Tool & Die, Derry, NH, 603-437-6685

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

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product focus

The following are companies that have immersed themselves in the world of parts cleaning.

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.

It's a fact of life; parts are dirty. From their initial trip through the precision part process, through oil and coolant and chips and grime, they need a bath. And how better to clean your beautifully-made new parts then putting through a whirlpool process? From ultrasonic or high-frequency sound wave cleaning, to automated conveyorized cleaning systems, basket immersion and centrifugal spinning, your parts can be treated to their own personal Jacuzzi.

Edge Technologies

The Dürr Ecoclean C-Series agitates parts within the first and second cleaning steps dislodging debris, followed by a vapor degreasing step and ending in a drying stage with all steps working under a vacuum for enhanced performance. A high performance vacuum pump quickly lowers pressure in the Working Chamber for the cleaning and vapor degreasing stages. Final drying is done by reducing the pressure in the working chamber down to the final drying pressure, literally pulling the moisture off all surfaces, as well as the smallest debris, from difficult geometry including blind and threaded holes.

All Ecoclean C-Series units can be configured with high-power injection flood wash and ultrasonic cleaning capabilities for added dimensions to the already powerful cleaning properties of the hydrocarbon system.

Edge Technologies; a Division of Hydromat Inc. is a leading productivity solutions provider to the precision metal working industry. Edge Technologies has extensive experience and a history of success and innovation demonstrated by 20 years providing bar feeder and lathe automation solutions, including over 5300 successful installations of magazine bar feeders in the North American marketplace.

For more information, please contact Edge Technologies - A Division of Hydromat, Inc. at 314.692.8388 or visit the company website at www.edgetechnologies.com.

product focus

Omegasonics

Omegasonics presents the Omegasonics Pro Plus ultrasonic cleaning system to the precision parts industry. Omegasonics technology saves time and money through elimination of hand cleaning; ends the need for toxic solvents and cleaners; gives users superior results in their product quality and delivery schedules through quick, deep cleaning of intricate parts and assemblies onsite.

The Omegasonic Pro Plus offers 2000 watts of ultrasonic cleaning power in a 33 gallon tank. Its specs include: Ultrasonic Power : 2000 Watts; Tank Dimensions : 24" length X 18" width X 14" working depth (20" overall); Overall Machine Size : 51" length X 21" width X 34" height; Electrical : 1 Phase / 120 VAC / 20 Amp; with a List Price of $8,495.

Based in Simi Valley, CA, Omegasonics is the west coast's leading manufacturer of ultrasonic cleaning systems. Omegasonics' ultrasonic technology cleans parts with sound vibrations, hot water and chemically based soaps in place of traditional hand scrubbing and toxic solvents, resulting in time, financial and environmental benefits for end-users.

For more information, please contact Omegasonics at 800-669-8227 or visit www.omegasonics.com.

Parts Cleaning

Miraclean

Miraclean Ultrasonics' SonicCell™ Max is a fully automated, small footprint ultrasonic parts-cleaning line with a small ticket price. SonicCell™ Max is uniquely suited to research and development and cellular applications in such industries as medical, jewelry, electronics, high purity, automotive, and aerospace.

SonicCell™ Max features a tank work area of 12" X 12" X 10" liquid level, and is also available in custom sizes. Standard process stations include an ultrasonic clean, two hot rinses, and a re-circulating hot air dryer, which may be customized.

SonicCell™ Max comes equipped with one automated program or three. Free parts-testing and process development are available from Miraclean, a division of Chautauqua Chemicals Company, Inc. SonicCell™ Max is also available in passivation and penetrant inspection versions.

For more information, please contact Miraclean Ultrasonics at 716-763-4343 or visit the company website at www.miraclean.com.

product focus

JENFAB

JENFAB has introduced a streamlined version of its Lean Clean 360 series of Cellular Rotating Basket Parts Washing systems. These machines thoroughly clean parts in rotating baskets using environmentally safe aqueous cleaning solutions. The combined Spray, Immersion, and Spray-Under-Immersion action removes chips, oils and coolants. Ultrasonics are available for precision cleaning applications. An exclusive feature allows extremely delicate parts, which cannot be rotated, to gently rock back and forth in the cleaning solution. The machines are quiet and energy efficient: Low cost operation is achieved by continually filtering and recirculating the cleaning solutions. The Jenfab Super Dryer rapidly dries parts for more cycles per hour using less energy, because all of the air is constantly recirculated.

The Lean Clean Series was developed for Lean Manufacturing in central and cellular applications. Industries currently using these machines include automotive, aerospace, bearing, bio medical, cold heading, die cast, machined parts, metal forming, screw machine and general manufacturing.

JENFAB designs and builds a wide variety of basket, barrel or continuous in-line parts washers for fasteners. From single-chamber to multi-station, these systems process loads from 50 to 35,000 lbs/hr.

For further information, please contact Jensen Fabricating Engineers, Inc. at 860-828-6516 or visit the company website at www.jenfab.com.

Parts Cleaning

Alliance Manufacturing

Alliance Manufacturing, Inc. has developed a new line of parts cleaning systems, the "Aquamaster CC," designed for cleaning repetitive machined parts.

The Aquamate CC indexing conveyor parts cleaning system can be configured for multi-stage processes including wash, rinse, rust inhibit and drying of machined parts. Typical contaminants removed include coolant, chips, oil and other manufacturing soils.

Pneumatically actuated hinged top-lifting spray chamber lids provide access to part loading and unloading positions. Parts are manually or pick and place loaded onto a fixture or parts tray located on a servo driven conveyor system. Spray and drying manifolds are positioned inside chamber lid and surround part upon closing. For complex parts with blind holes or specific part features, spray nozzles can be positioned for highly accurate cleaning of critical areas. Conveyor systems allows for forward and reverse part oscillation for optimal cleaning and drying.

Systems are designed for single operator interface in manufacturing work cells and are available in single or multi-stage configurations. PLC controls and servo driven indexing conveyor are flexible to accommodate multiple machine functions and cycle times. The part fixtures can be custom engineered to hold specific parts.

For more information please contact Alliance Manufacturing, Inc. at 800-969-7960 or visit the company website at www.alliancemfginc.com.

product focus

Barrett/Kinefac

In today's competitive environment machine parts producers must finds way to reduce costs. Chip processing presents a significant opportunity, especially in the medical device, electronic and aerospace industries where they are machining expensive materials with equally expensive cutting fluids. New small, inexpensive centrifuges like the 75lb capacity Barrett 301 can process a full load in and as little as three minutes. This makes it practical to perform the separation operation in controlled batches near the point of chip penetration.

Using the removable centrifuge pans for chip collection, chip transfer and chip cleaning makes the process adaptable to small shops or individual machining departments. Load and unload time is sufficiently short so the machine operators can be responsible for cleaning the chips they produce and maintaining their separation and material integrity, and the operator can return removed fluid to the machine coolant system.

This Barrett centrifuge produces cleaning force of up to 350 Gs. This is sufficient to remove substantially all typical water-soluble and medium viscosity fluid from the chips. It increases their value to the scrap dealers and salvages the carried off process lubricant. Barrett centrifuge can be used to remove the coolant and lubricants from finished parts as well.

For more information, please contact Barrett Division – Kinefac Corporation at 508-754-6891 or visit the company website at www.barrettinc.com.

Parts Cleaning

Stoelting

Stoelting's VersaForce(i) Conveyorized Parts Washer is designed to clean parts in cellular parts manufacturing applications. The new VSF (i) w/immersion cleans with no operator intervention, and is stainless steel constructed. Multiple cleaning actions are available in a small footprint: Immersion Pre-wash, Spray-under-immersion Wash, Spray-in-air Post Wash, Blowoff chem iso, Spray-in-air rinse, heated dry. The VSF(i) delivers effective parts cleaning capability at an economical price.

For more information, please contact Stoelting at 920-894-2293 or visit the company website at www.stoelting.com.

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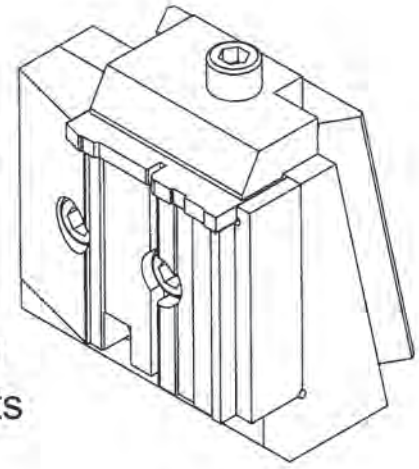

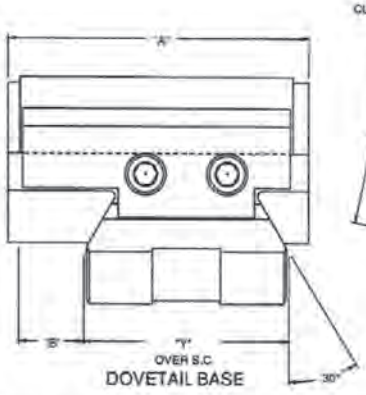

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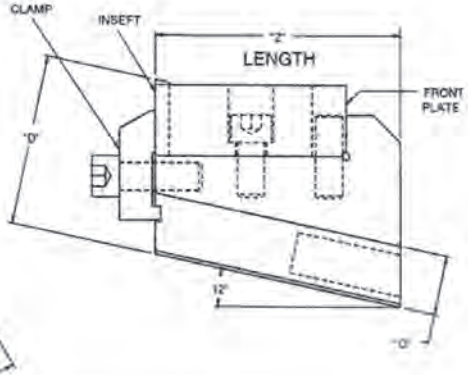

DOVE TAIL	Y	Z	A	B	C	D
5/8	0.9510	2.000	1.5630	0.1250	0.297	1.475 max
5/8	0.9510	2.000	2.0000	0.5625	0.297	1.475 max
1 1/4	1.8820	2.250	2.3130	0.1250	0.547	1.560 max
1 1/4	1.8820	2.250	2.7500	0.5625	0.547	1.560 max

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Noteable and newsworthy information and events for the month of May.

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May 6th

www.kentuckyderby.com

EASTEC

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Place Bonaventure,

Montreal Canada

www.reedexpo.ca/montreal

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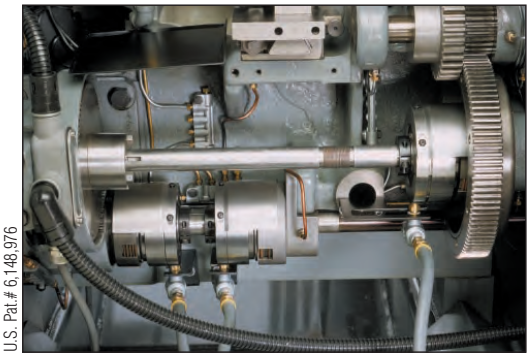
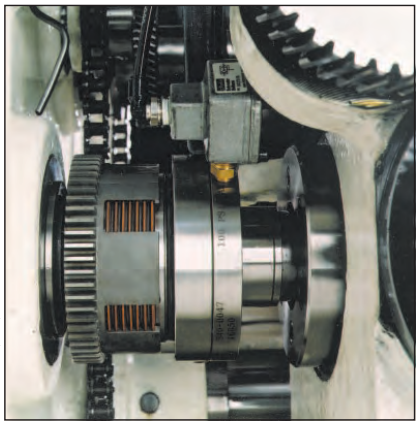


U.S. Pat.# 6,148,976

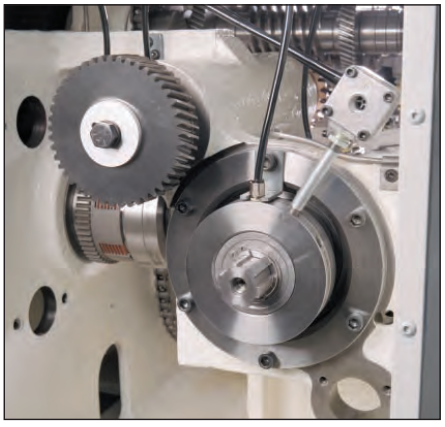
For Model B Davenports

New! Roll Clutch Removal Option



U.S. Pat.# 6,050,162

For New Britains; High speed Conversion Kit - no slippage!



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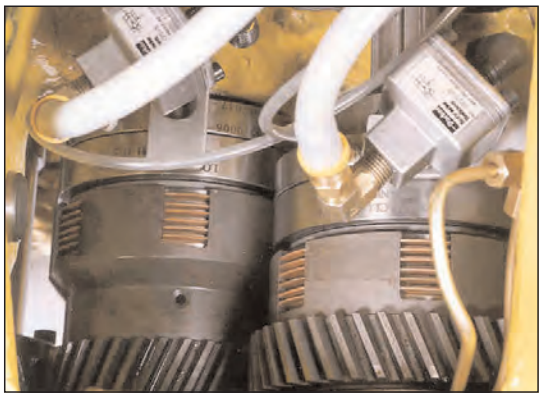

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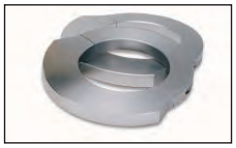

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By Tim Haendle,
Timson Screw Products

Stream Lined

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.

I'm a big fan of the 1930-1940 era cars. Their history and production fascinates me. My interest and dedication to my screw machine business has opened up my world to the past. Most of the machines in my shop are high production and were manufactured in the 1930s to present.

My 1935 8-cylinder Chrysler Airstream is a favorite in my car collection. Years before I owned it, it was in the American Great Race. It has had a complete restoration back to its original condition. There were approximately 2,900 of this model manufactured, with an original price of $980. The motor is 273 cubic inches with 110 horsepower, and the car can easily travel at 65-70 mph. The Airstream has full independent steering, hydraulic breaks and a full oil pressure system in the engine. This vehicle is a pleasure to drive.

Walter P. Chrysler was a railroad man. He learned about cars by tinkering with a $5000 locomobile he bought in 1908. Within a few years, he became plant manager of Buick, and later he was promoted to company president. In 1924, he started his own company, and in 1925, he built his first car. Chrysler was always ten years ahead of his competitors. In the 1920s, his four wheel hydraulic brakes and oil pressure systems were superior to the rest of the automobile the industry. In the 1930s, he lead the field with vacuumed powered brakes and independent front steering. In 1939, he wowed the public with electric windshield wipers.

Chrysler built the Airstream from 1935-1937 to help his company out of a sales slump. However, sometimes his newer designs were so ahead of their time that the consumer couldn't relate to the style. But today, car fanatics search them out, and there are even a few cars today with a similar look to his cars of the 1930s.

I look forward to spending more time on my passion for cars. I read, buy parts on eBay and go to car shows when I have the time.

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,

We are a relatively new screw machine job shop that has just accepted a job in which we need to drill a significantly deep hole (a depth of 2.250). We are trying to estimate how fast we can run the job, but it's difficult because of our inexperience at drilling holes at this depth on a multi-spindle. Any thoughts?

Sincerely, In Deep

Dear In Deep,

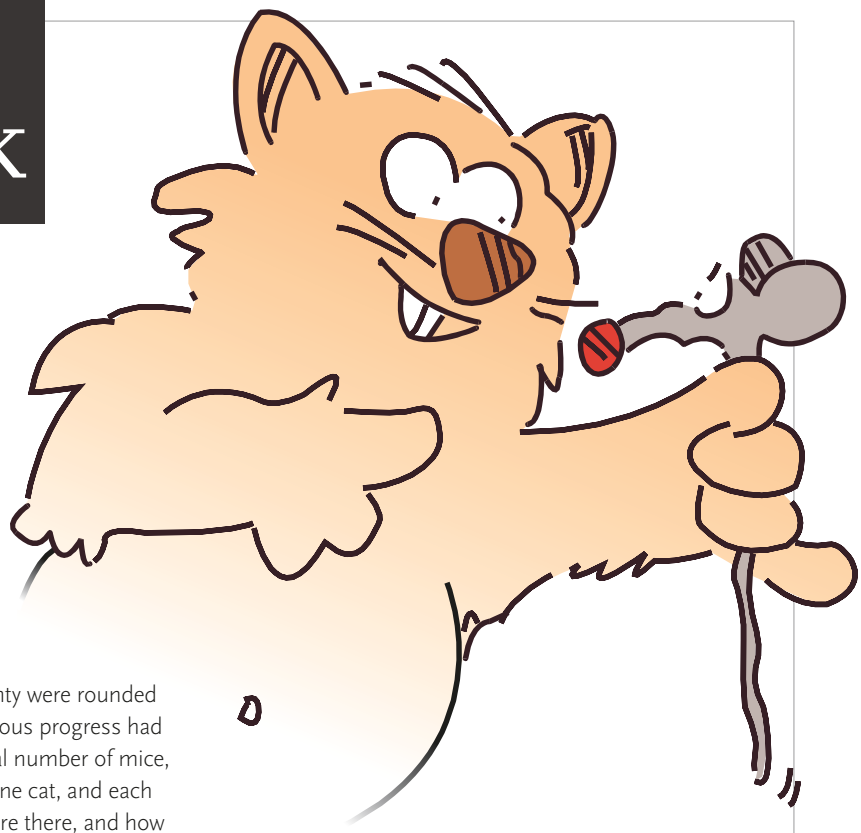
A few years back, we got a new job that was different than the types of parts we normally make here. The part was a steel fitting (12L 14 grade) with a hole that was .160 in diameter and almost 2.250 deep – very similar to yours. It was also a very thin piece, with a .025 wall. With very little experience in extremely deep hole drilling, I had to take an educated guess on how fast we could run the job on our 1-¼" 6-spindle National Acme. Estimating such jobs can be challenging due to the fact that the heat of the steel in many grades can affect the machining by as much as 15%, in my opinion. Upon setting the job, we realized it would run no where near the run time I had previously predicted. The part was packing with chips badly and snapping drills. Also, the process was heat treating the parts, turning them brown.

With the drills set perfectly, the machine was running an hour before all the drills broke. It had been running 50% slower than I had originally quoted the job. After a few days of doing all I could to make it run better, I decided to cut a valley into my main tool slide cam, just large enough for the cam roller to drop into. Then, I used springs to pull the main tool slide back when the roller approached the valley in the cam. It worked, and about half way through drilling, the drills pulled out, and the holes were washed out with oil. Then, the drills plunged back in to finish the cut. This kept the drills from welding up with chips in the holes. I was able to speed up the machine to our original quoted run time as a result. The machine was running with a high pressure system, but I decided to stay away from the coolant fed drills because they were $170 each, a price which would make the job significantly less profitable, considering that there were 5 drills in the machine. The most expensive drills I used were $20 each, and they did a fine job. After a few weeks, I decided to order a special cam that had a triple rise, with each rise being a progressively lighter feed, and the drop off in the cam running after the second rise. I also had the cam made 10 degrees longer than a standard in order to make room for the cut away drop off section, which needed to be wide enough for the roller to drop into. We also added a broken tool detector for drills, which kept the cost of broken tooling and sorting low. The job has run well for us ever since.

Hope this helps a bit.

Wes Szpondowski
Tool Room Leader, Wyandotte Industries. Wyandotte, MI

Cat Attack



A castle was so overrun with mice that all the cats in the county were rounded up to exterminate the vermin. By the end of the year tremendous progress had been made. Records showed that every cat had killed an equal number of mice, and the total killed was 1,111,111 mice! There was more than one cat, and each cat killed more mice than there were cats. How many cats were there, and how is this problem related to the security of the internet?

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

March Puzzle Answer

Possibilities Matrix

Position	a	b	c	d	e	f	g	h	i
1	•								
2	•	•						•	
3	•								
4	•	•							
5	•				•				
6	•	•							
7	•								
8	•	•						•	
9	•								•
Results	3	8	1	6	5	4	7	2	9

Results verification table

Number	Divisor	Division
3	1	3
38	2	19
381	3	127
3816	4	954
38165	5	7633
381654	6	63609
3816547	7	545221
38165472	8	4770684
381654729	9	42406081

Who mastered the nine digits?

Robb Weinstein of Gibbs and Associates; **Brian Rychcik** of S-R Manufacturing Corp in Schenectady, NY; **Deirdre Lang** of Technical Renovations of Union Bridge, MD; **Dan Cibulskis** of Aurora Air Products, Inc. in Aurora, IL; **Tom Mahon** of Honematic Machine in Boylston, MA; **John Whitccraft** of Precise Manufacturing, Inc. in Fort Wayne, IN; **Ryan Zmich** of Guide Line Industries in Scales Mound, IL; **Arny Rusnak** of National Acme (retired) in Northfield, OH and **Kathy Rose** of Specialty Fabrication in Taylor, MI.

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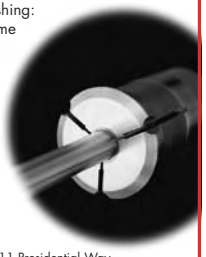

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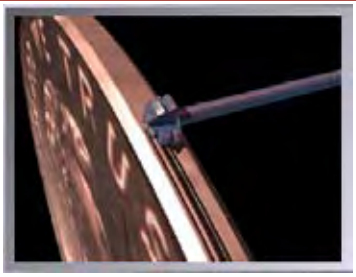

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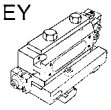

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War Torn

I have never written about my military career, but Robert Strauss's piece is the impetus for me to come to grips with it in print.

My view of military service was shaped by my father's war stories. He riveted our family with his stories of World War II, when he desperately fought to stay out of combat. He became a manufacturer of critical aircraft and munitions components in order to avoid getting drafted. In the process he made a considerable sum of money, but staying alive and out of the service was his primary motive. Same for his brother Jerry and partner Aaron Pinkert. Their war was with the draft board, and they sweated every meeting.

They all stayed out because they were doing critical military work. Strictly above board. When I grew up in the 1960s, Vietnam raged. I was sure I was going to be drafted, sent to Southeast Asia and end up dead or in a wheelchair. It was the daily nightmare I lived, and it affected almost everything I did.

After I graduated from college, I went to Law School just to keep my deferment. But as the war was getting hotter and hotter, it appeared that school wasn't going to hide me forever. I signed up for every Army Reserve and National Guard unit I could find. My dad had some political connections through a Congressman and played that card. Late in 1967, I got the call from the Illinois Guard and reported to Basic Training January 2nd, 1968 at Fort Jackson, outside of Columbia, South Carolina. These were the days of the "Tet Offensive" in Vietnam, the tipping point in the war.

I was the only Guardsman in my training company of 300 men, most of whom would soon face combat. I thought they would hate me because I was probably going home in eighteen weeks, but they didn't.

About half of the guys in my unit were just out of college and none of them relished going to war. Almost every night we discussed the war with some of the guys weighing the odds of fleeing to Canada, and others trying to figure out the best way to break a leg.

The fellow who had the bunk just beneath me did avoid Vietnam. He was a tough kid from Pittsburgh who fell ill to spiral meningitis. He died in the infirmary during the fourth week of Basic. I had a terrible sore throat that fourth week and wondered if I was coming down with it. I hung in there until I got my first pass and immediately headed for the emergency room at the best hospital in Columbia. The doctor said, "Son, you don't have meningitis, but that's one of the worst sore throats I've seen. Take this antibiotic and you'll be fine." I think I felt better in 24 minutes.

I called CBS News in New York to report the meningitis outbreak. I don't know if they ever followed up.

I went home to Chicago in May of '68. Martin Luther King had been murdered in April, and my Guard unit had been mobilized to keep order in Chicago, but I was still at Fort Jackson. I was back on duty for the Democratic Convention in 1968 but the Captain did not put me on the street in Chicago with a bayonet. I stayed back at the Armory writing lesson plans for artillery training, which was never done.

The closest I ever got to Vietnam was the black granite Memorial in Washington. I cried there for the classmates and friends who died in that awful place.

And now we have Iraq, and I'm grateful my boys are not there. And I've supported the war and Bush, and I grieve for the men and women who have fallen in the savagery.

I am a draft dodger, son of a draft dodger, with just a little tinge of guilt, yet so grateful to have had a life without having to kill or be killed. I am a soldier who never had to soldier. I am reconciled to never being reconciled to war.

Lloyd Graff

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Sliding Headstock Type CNC Automatic Lathe

R07

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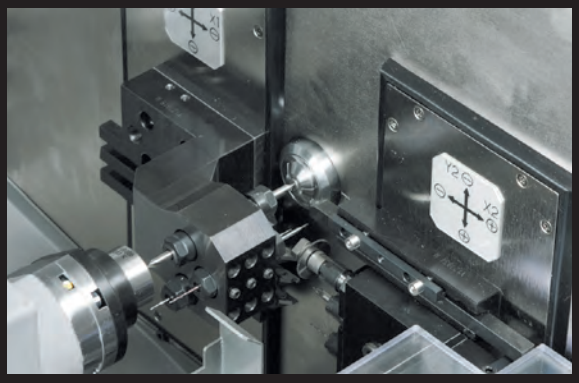

Improved productivity for complex machining

Machine specifications	
Item	R07 VI
Max. machining diameter	Φ7 mm (.28")
Max. machining length	40 mm (1.57")
Main spindle speed	16,000 rpm*
Back spindle speed	10,000 rpm

*With fixed guide bushing

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40 Boroline Road
Allendale, NJ 07401
(201) 818-0100

1801 F Howard Street
Elk Grove Village, IL 60007
(847) 364-9060

17815 Newhope Street, Suite P
Fountain Valley, CA 92708
(714) 434-6224