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february 2007 volume 3 issue 2

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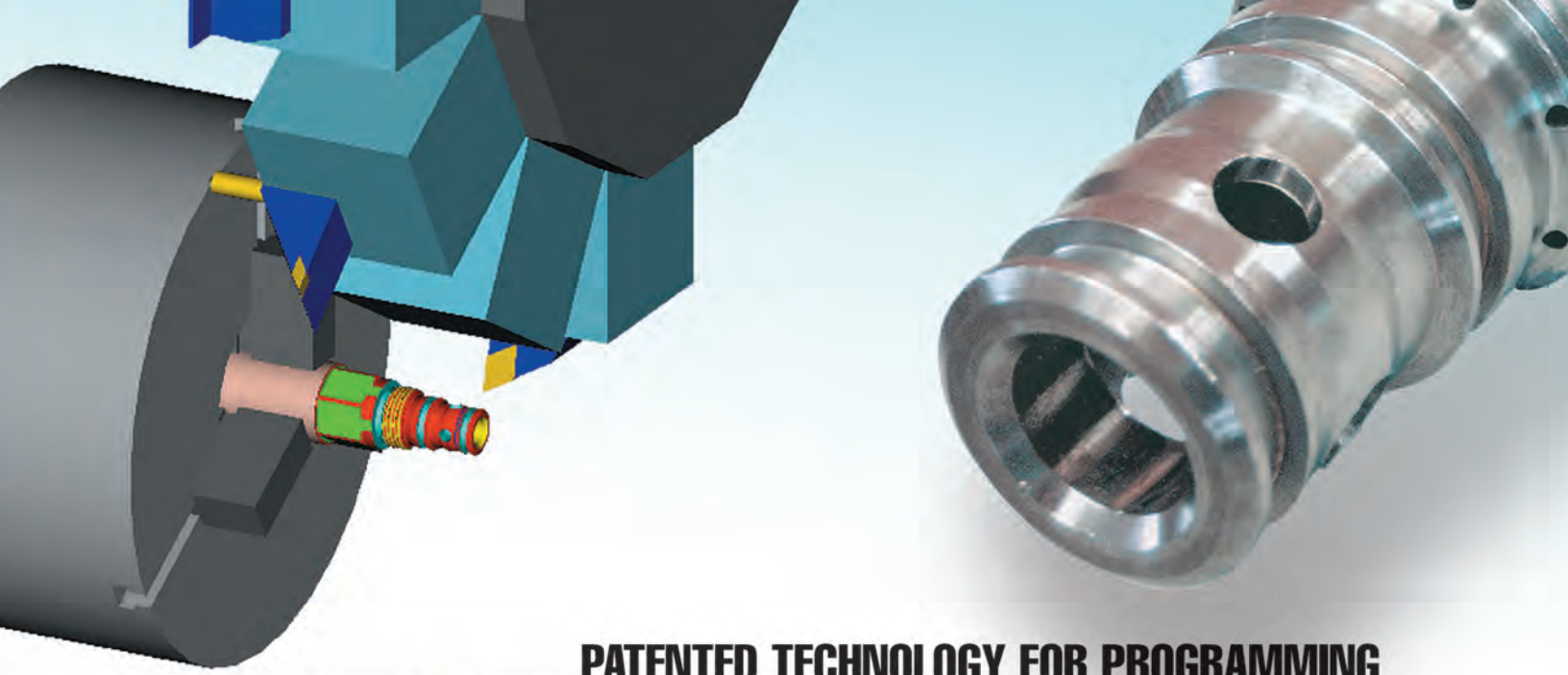

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BPA WORLDWIDE

Forward Thinking

It's fun to reminisce and wax nostalgic about the good old days, when mills were mills and lathes were lathes and never the laser shall meet. Some trade magazines still make rehashed stories and photos staples of their pages. Unfortunately, the Norman Rockwell world is long gone and we will not profit from immersing ourselves in it unless we are art collectors.

I am focused on making *Today's Machining World* part of tomorrow's machining world. Karen Aho's story this month about the present and future of customized manufacturing is emblematic of this thrust, as is Noah Graff's Next feature. There is a lot more money in the next big thing instead of the retro market for carburetors.

The more I read and observe the more I see a huge opportunity in the reduction of the use of fossil fuels. This may very well be the biggest story of the first thirty years of the 21st century. Two gigantic happenings are driving this momentous change. The first is the clash between a modern, capitalistic, progress-centered civilization and authoritarian, backward-facing, recalcitrant, predominantly Muslim civilization. The flashpoint of the conflict is possession and production of oil.

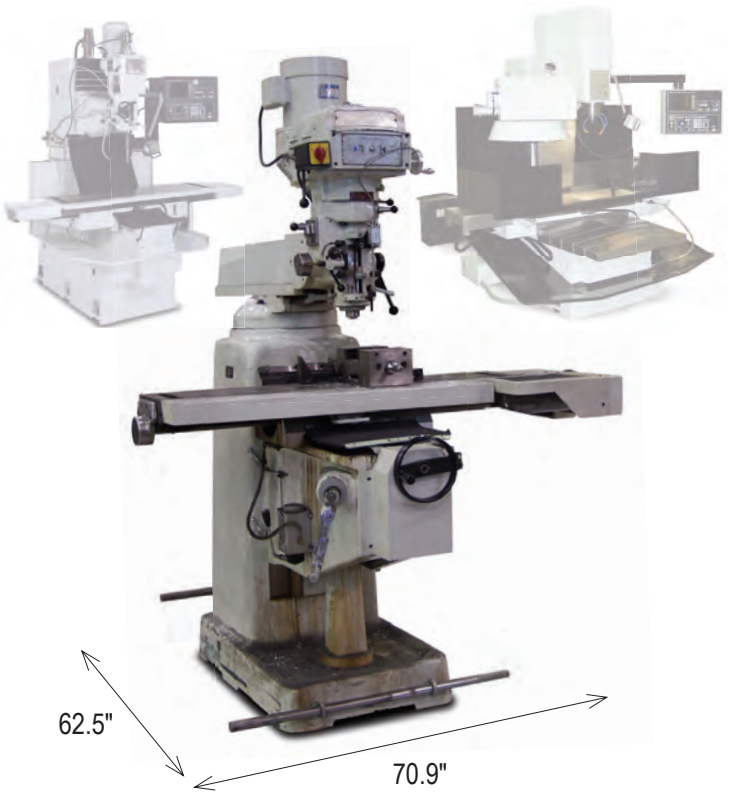
As modern, liberal civilization reduces its oil reliance, the conflict eases and the forces of darkness lose.

The second big story is greenhouse gases and their impact on climate and quality of life. As the evidence mounts that carbon emissions and greenhouse gases are having a bad effect, the politics and economics of fuel usage will produce a consensus on actions to be taken. This will be part of an enormous business story. Forward thinking manufacturing companies should be looking for the opportunities today because the big boys certainly are. When the utilities are figuring carbon emission taxes into their planning projections, Morgan-Stanley is trading carbon emission credits and General Electric is throwing money into wind, you know we are already in the carbon counting world.

Folks, reduction of carbon usage is the "next big thing." You should be there. *TMW* will be.

Lloyd Graff
Editor/Owner

It's hard to make money in the 21st century with 19th century technology.



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contributors

Today's Machining World

February's talent pool.

Mary Ethridge spent 18 years with the former Knight Ridder newspapers. She recently covered business news for the *Akron Beacon Journal* in Ohio where she won several awards, including her enterprise reporting by the United Nations and the Associated Press. Her work has appeared in the *Philadelphia Inquirer, Cleveland* magazine and the *Miami Herald*. She graduated from Princeton with a degree in English literature. Ethridge is known for getting sources to spill all: Cindy Crawford once confessed to her an addiction to blueberry Pop-Tarts.Currently, her biggest challenge is coming to terms with her teenager's nose piercing.

Karen Aho is a former reporter for the *Anchorage Daily News* and the *Fairbanks Daily News-Miner* who made her way to Alaska from Manhattan, where she completed a bachelor's in history from New York University. She has lived in a tent in the foothills of the Brooks Range documenting turn-of-the-century gold camps. She landed in journalism while writing about dog mushing, and went on to produce award-winning coverage of all that is wild in Alaska. She returned to earn a master's degree at Columbia University and currently lives in New England, where she writes about science and culture.

Paul A. Eisenstein is a veteran automotive journalist based in the Motor City – that is, if you can ever find him there. His coverage of the products and people, business and trends keeps him on the road much of the year. Mr. Eisenstein has won numerous awards for his writing, including several Golden Wheel Awards. He's a board member with the Automotive Press Association and a juror for the prestigious North American Car and Truck of the Year balloting.

Barbara Donohue received her mechanical engineering degree from MIT. She worked in design, heat transfer and manufacturing for several years before changing careers to become a journalist. Now she writes about technology and business from her home office in Acton, Massachusetts. When not writing, she sings in a choir, volunteers as a literacy tutor, and is weekend "foster mom" to a yellow Lab puppy named Tikva that is training to become a wheelchair assistance dog.

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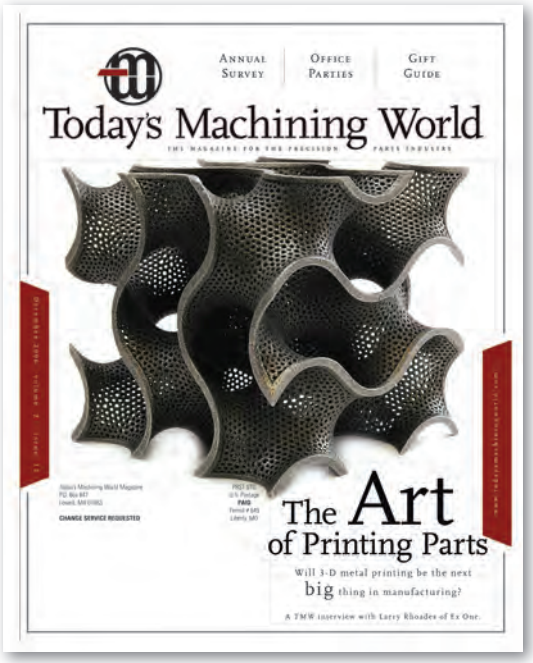

Collet Wisdom

I read with great interest the article on ER Collets (Shop Doc, December 2006). I think that it should be mentioned that users should check the TIR on the collets that they buy and be sure they are receiving what is advertised. I have found that you get what you pay for and oftentimes cheaper is not even close to what you expect, and in fact, does not even meet the DIN Standard.

John S. Reeder Jr.
Meggan Sales Associates LLC
Southbury, CT

Drilled Deep

I do have the tendency to agree with Mr. Cox regarding spot and drilling on multiple spindle machines (Shop Doc October 2006, Bill Cox's reply December 2006). Keep in mind, we are dealing with five, six and eight spindles, not one. What happens when you have one spindle on the lower end and another spindle on the high end? You learn how to compensate. On a multi-spindle you have a million and one problems that you will never see on a single spindle machine. Your drill needs to touch the outer ends of the cone on a pre-hole in order to maintain alignment. That has been my experience. Give me a CNC or a multi-spindle, the principle is basically the same. When you operate a machine for 8 - 10 hours a day and it is no longer a new machine there will be a lot of variables. What is written in a book dated 1945, or even as early as two years ago, doesn't apply. Only experience applies. Anything on paper is always a starting point and a guide. I do not agree with Mr. Rowe.

Bill Colon
Bare Metals
Broadview, Il

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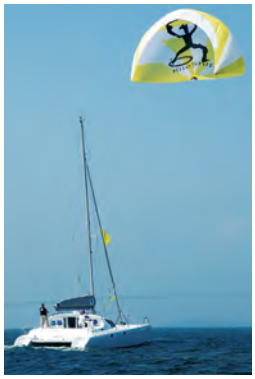
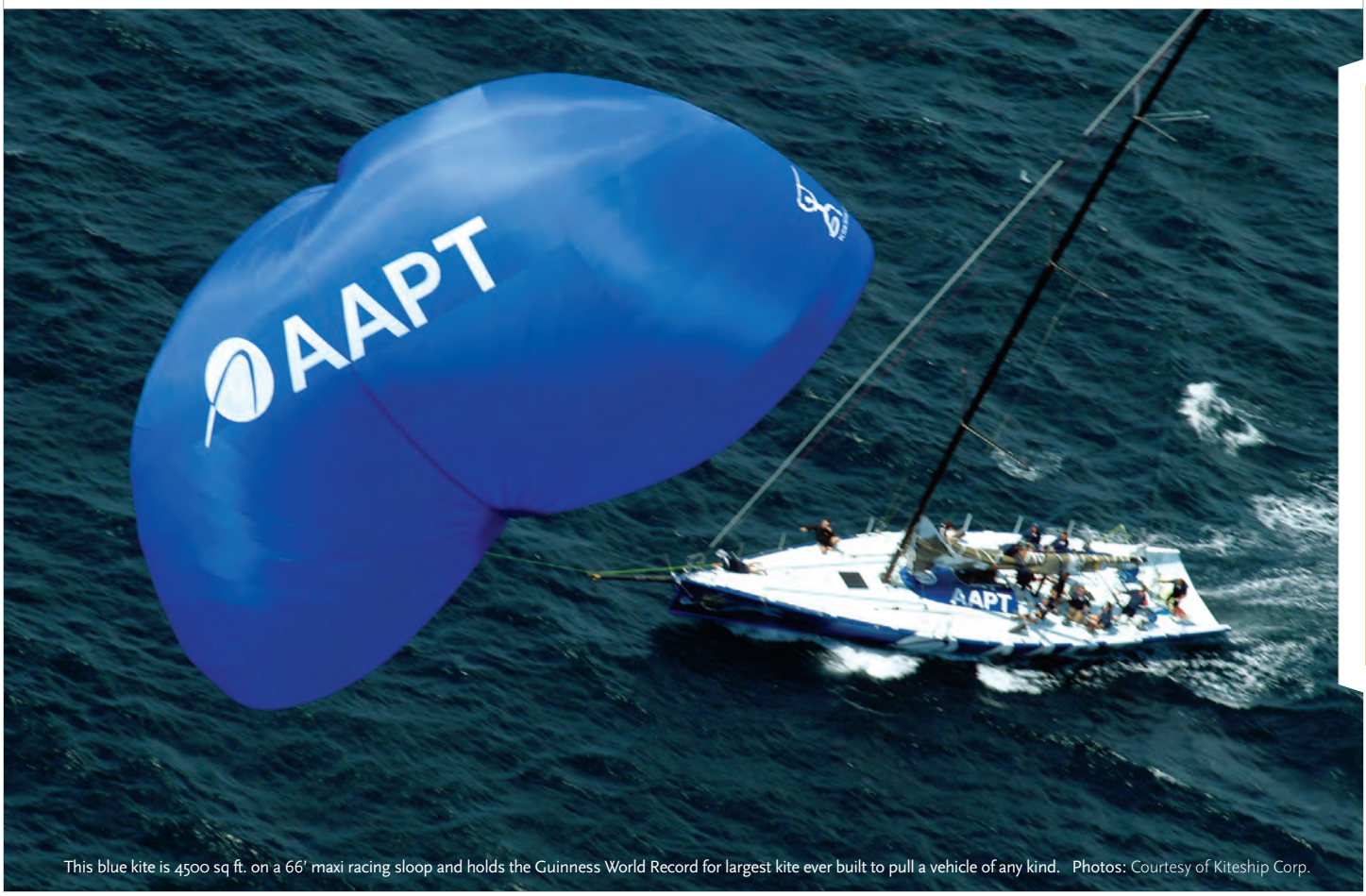
By Lloyd Graff



I used to make kites out of newspaper and tie a ribbon for a tail. I almost got killed by a huge out-of-control kite on the shores of Lake Tahoe, which missed my head by inches while I sat reading on the sand. My favorite fiction book in years is *The Kite Runner*, about a boy's life in Afghanistan. And now I see that kites could save the world a lot of oil.

Some creative guys in the San Francisco Bay Area think that some really big kites, strategically lofted above oil tankers, can save up to a third of the fuel it takes to motor one of those monsters from Bahrain to Bayonne. The idea is akin to the hybrid car approach of using the wind power as an assist, and the fossil-fueled powered engines for the heavy lifting on calm days. With a good global positioning system and deft kite management, the kite masters claim huge fuel savings. The advantage over sails is minimal capital expense and simplicity.

The Kite Runners



This blue kite is 4500 sq ft. on a 66' maxi racing sloop and holds the Guinness World Record for largest kite ever built to pull a vehicle of any kind. Photos: Courtesy of Kiteship Corp.

The ownership and management

of the domestic automotive industry is swiftly moving from Detroit to Wall Street. Two hedge funds control Delphi, Wilbur Ross has a big position in Lear, and Ford's future now is in the hands of its bankers because its finances are so precarious.

A lot of smaller automotive suppliers like Jernberg are falling into the hands of dealmakers like KPS Special Situations, which flubbed up DeVlieg-Bullard a few years ago.

The deal guys are not in for the long term. They usually look at three-year exit plans, although a lot of deals do not go smoothly enough to make that strategy work. The exit strategy only works if they can turn the floundering companies around enough to make them attractive to another buyer or to the public in an Initial Public Offering. These kinds of deals are hugely leveraged, so they depend on compliant lenders and a lot of liquidity in the system. A tepid interest rate climate is also built into the figuring.

The good thing about the deal guys is that they are in a big hurry to clean up the messes that they walk into. They also have money to invest in projects with a fast payback. There will be quite a few winners and certainly plenty of losers as the deal guys pick through the wreckage and make their bets.

Most public companies will not buy bankrupt entities. But they will be looking closely at the true turnarounds. If the interest rates do not overheat, there will be a lot of money made in the big auto suppliers in the next five years.

As we move into 2007,

the 2008 Presidential election will come into focus. The good news is that there will be some really interesting possibilities in both parties.

For the Democrats, I'm making the assumption that Barack Obama, the senator from Illinois, will run. America now looks at Obama as a "black candidate," but Obama is more like Tiger Woods than Jesse Jackson. He is a person of color who has made it in the "white" world of Harvard Law School and Illinois politics without playing the "black" card, like Woods has made it on the once lily-white PGA Tour. Obama has a Kenyan father, a white mother from Kansas and an Indonesian stepfather. He grew up in Indonesia and Hawaii with his Kansan grandparents playing a big role in his upbringing.

Obama is almost a clean whiteboard in national politics. This is a strength and a weakness. Obama is naïve and untested on the big stage. Hillary Clinton (assuming she runs) is going to dirty him up quickly with innuendo and leaks. This is not necessarily a bad thing, because the American public needs to see whether the new "golden boy" has some Rocky in him. We need to see if Barack

swarf

Obama can take a punch. The American presidency is no place for wimps with glass jaws.

Americans are starving for a smart, optimistic, authentic new face with a message that shuns partisanship and division. Obama is perfect for the role. He looks like the cocoa-colored Jimmy Stewart of 2008, but he needs to get scuffed and kicked and knocked down before I'll really believe in him.

The Republicans have their answer to Obama in Mitt Romney, the Mormon from Massachusetts. He's clean, seemingly, without much of a national paper trail to haunt him. The GOP also has John McCain, senator from Arizona, who spent five years in a North Vietnamese prisoner of war camp. McCain is old and battle scarred. The Bush wing of the Party – what is left of it – distrusts him. He's reported to be very "emotional," which may be innuendo, but it gives one pause about putting him into the life and death situations the president deals with every day.

And then there are Rudy Giuliani and Newt Gingrich. Giuliani is the tough guy who cleaned up the Mafia in New York City, then civilized a city which was out of control. He is the symbol of toughness in the face of terrorism. His resumé is appealing, but his personal life has been Clinton-esque. When Rudy's wife threw him out because of his long-time affair, he moved in with his best friends, who happened to be two gay men. How will that play in South Carolina?

Newt Gingrich is probably the smartest person running. If by some fluke he gets the Republican nomination and runs against Obama, we would have the best policy debates since Lincoln-Douglas. Personally, I don't think Newt lusts to be president, but he wants his ideas to win. I think Newt is a brilliant guy, a powerful advocate, and by some accounts, a lousy person. Should we care if he's a jerk – but a capable one? I think so.

Maybe the most interesting of all the likelies is Hillary

Clinton. She's experienced, shrewd and loaded with campaign money. A lot of people loathe her. The polls say that her gender may hurt her the most. I see her as quite different from her husband. Bill wanted to be liked by everybody. Popularity was everything. I think Hillary has more of a policy agenda, which worries me. Bill was a uniter, a mollifier, who could feel our pain. Hillary won't worry about inflicting pain. Maybe we need that kind of toughness in the West Wing.

If I were to predict the horserace today, I would go with Clinton vs. McCain. Obama is too naïve, and Romney is too Mormon; but wouldn't it be cool to have at least one fresh face to consider?

I had a fascinating conversation with Ken Myers, who spent a career developing efficient manufacturing of plumbing goods for Delta Faucet and now is helping a Chinese firm develop world-class manufacturing capability in the same field.

Ken had many reservations about going to work for "the enemy" after retiring from Delta. But both Delta (which was looking for offshore capability) and the Asian firm convinced him that this was the way the world was changing, and he could either flow with it or ignore it at his own loss. So now Ken spends about four weeks per quarter at the plants in Southern China, listening and advising. The Chinese are soon going to order their first multi-spindle screw machines (remanufactured 8-spindle Schüttes) to augment their simpler single-spindle lathe and vertical machining center finishing approach.

Ken also surprised me by saying that his Asian client was shopping for American companies which were successful in manufacturing brass products. They have already bought two. The cost advantages of manufacturing in China are not huge vis-à-vis the U.S. They want to learn from sharp North American manufacturers and hedge their bets against big cost increases in China, changes in the currency, or protectionism. He says his Asian client is planning a big expansion in its manufacturing – and it will not be in China. They see the next big opportunity in another growing third-world market.

Another takeover in the news to report. Harris Steel of Canada is being bought by Nucor for a billion U.S. dollars. Harris has 22 plants, including Laurel Steel, a prominent supplier of cold finished bars for the North American turned parts industry. The steel business is in a

swarf

consolidation phase in which the big players like Nucor are taking control of both production and distribution to try to reduce the profit cyclicality of the business. I think the big fear in the steel industry is that Chinese production will over-expand; and if there is a hiccup in Chinese domestic growth, the Chinese firms will flood the world with cheap material. The big producers like Mittal and Nucor want to be able to control enough market share in a lot of niches to be able to weather the certain storms of the future.

We are also seeing mergers in the metals distribution players. The acquirers, whose stocks have been buoyed recently, believe that size insulates them from the pricing power of the huge producers. If they can manage the distribution of material to enough smaller customers, they can get concessions from the mills on volume buys.

The Nucor purchase of Harris Steel also gives Nucor a strategic link to the Canadian market, which may be useful if Congress swings more protectionist under the Democrats. NAFTA is not going away, but higher tariffs on steel with other parts of the world are always a possibility.

UGITECH USA

(formerly Ugine Stainless) has announced plans to build a bar processing and distribution facility in Batavia, Illinois. The recent acquisition of UGITECH as part of a global expansion made this year by Schmolz + Bickenbach AG, a company with a tradition that dates back over a century, has paved the way for this state of the art facility. Expected to start delivering product by the third quarter of 2007, this facility will produce two existing proprietary tecnologies, UGIMA XLTM family of stainless machining grades, and SMQTM (screw machine quality) bar.

Walter Schiff died recently.

He wrote the original copy for one of my favorite television commercials – the Ginsu Knives infomercials. A couple of years ago I wrote an "afterthought" ode to Ron Popeil, who immortalized the phrase "just set it and forget it" to sell his

Art by "Starman"

swarf

Popeil and Schiff were brethren in the hard sell TV business.

Schiff's magnificent contribution to American sales lexicon is the phrase "but wait – there's more." Are there four more powerful words in the English language?

"But wait – there's more" spawned QVC, the Home Shopping Network, the Jewelry Channel and Carlton sheets and the no-money-down real estate guys. Schiff's memorable four words gave us 3 a.m. programming. We insomniacs of the world are forever grateful.

We can laugh at the blatant hucksterism of Schiff's artful pushiness for Ginsu Knives (the company was bought by Warren Buffet in 1985, and the knives were originally made in Ohio), but we can learn from his success. The customer, whether we're selling machinery or fittings or detergent, is always secretly waiting for your "but wait – there's more" pitch. If your answer to his latent desire for more is Peggy Lee's refrain, "that's all there is?" you probably won't get the business.

Walter Schiff's brilliance was recognizing the universal hunger for "more," and marketing to it. I think that every person in business needs to keep "but wait – there's more" in his or her back pocket for the perfect Ginsu moment.

Copper prices are down almost 30 percent from the speculative hedge fund bubble. Brass rod is just beginning to follow with scrap prices down about 10 percent from the peak.

We are in the midst of the unraveling of the commodity price squeeze which was more about avarice than scarcity. Oil is hovering around $52 a barrel for crude, which is attributed to a mild winter in the United States, but really, how many people are still burning heating oil. The reality is that the speculators who went long on petrol are on the run. If we don't get a Shia A-bomb soon, the oil bulls will be deader than the A-Team.

For Ben Bernanke, the commodity route gives him time to plan his next move. Gasoline at $1.75 a gallon is like a tax cut or a half point rate cut for the economy. It may be enough to stabilize the housing market which is already showing a heartbeat. The stock market analysts say they look forward, but they usually are obsessed with the current quarter's comparisons with last year. They will probably miss the likely bounce in construction. Global warming also allows builders to work virtually year-round now, all the way to Manitoba, which skews old comps.

Weak steel prices are likely to give the auto companies and their traumatized suppliers a little boost. When the metal supply gets sloshy, the dynamic shifts power to the buyers even with the reduction in primary producers.

The acceleration of stock prices in recent weeks despite the Democrats grabbing Congress, Iraq dragging on, and a lousy Wal-Mart Christmas indicates that the financial mavens believe the U.S. will get the prayed-for soft landing.

My two sons Ari and Noah have been taking classes in improvisational comedy at Second City in Chicago. Second City is the comedy club where many of the Saturday Night Live cast prepped. Hundreds of John Belushi wannabees take courses. It serves as almost a comedy community center for Chicago young people.

The guys invited Risa and I to see their culminating group performance in December. I loved it, and I could also see the value of Improv for anybody who has contact with the public. To be a good comedic actor you must be an active listener. You must also always set up your partner for the next line. You must give them a "gift." A good salesperson needs to give the buyer the opening in the conversation to feel appreciated and heard.

For my son Ari, who is a psychotherapist, the skills for successful improv can easily spill over to skillful listening to patients. For Noah, the journalist and filmmaker, the gift is listening intensely to the subjects and the actors.

Anybody in a business who needs to connect creatively with other people could benefit from an Improv class, even if they can't remember a good joke.

www.PerfectionInMotion.com

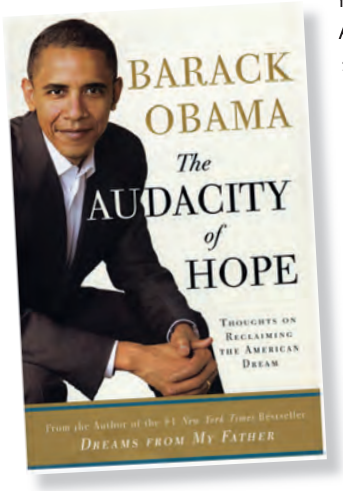
By Jerry Levine

The Audacity of Hope

There is so much inspiration in Barak Obama's #1 bestseller *The Audacity of Hope* that, regardless of his role in the next Presidential election, one hopes that his values, his civility, and his level of thoughtfulness will reinvigorate American politics. What is truly refreshing is his granting permission to the world to watch as he tries to resolve his internal conflicts.

Obama anchors his positions in American values. These values start with the words of the Declaration of Independence, "We hold these truths to be self evident..." The value of individual freedom may be so deeply engrained in us that we take it for granted. But Obama's life experience of growing up in Indonesia and having family in Kenya has taught him that, in much of the world, individual rights can be subject to the whims of an army general or corrupt politician.

In the book's prologue, Obama sets down some core positions: He believes in evolution, scientific inquiry, and global warming. He believes in free speech, and is suspicious of using the government to impose religious beliefs. He views the American experience through the lens of a black man of mixed heritage.



He also believes in free markets, capitalism, and entrepreneurship. He wishes we had more engineers and fewer lawyers. He thinks America has more often been a force for good than for ill in the world, and carries few illusions about our enemies. He reveres the courage and competence of our military. He rejects politics based on race or gender or sexual orientation, and believes our values and spiritual life matter as much as our GDP. It is a politically ecumenical approach.

While Obama has a 100 percent vote rating with the liberal Americans for Democratic Action, he decries the bitter partisanship of our current political discourse. He ties the intensified partisanship to generational change. The older political generation served in World War II. They may have come from different backgrounds and different political philosophies, but in the war they came together for the common good. However, today's political discourse is driven by the tumult of the 1960s, and its long political backlash. This was clearly evident in the last Presidential election with the Swift Boat controversy.

Obama advocates spending more on education at all levels, especially in science and technology, in order to make America more competitive in the world. He believes in large scale alternative energy investments. He believes his job is to set policy while the engineers do the science.

He provides a wonderful perspective on race in America,and has a great concern about the inner city poor. He is also greatly concerned about the political firestorm surrounding immigration, and helped write parts of the McCain-Kennedy compromise bill.

Obama has a feel for foreign relations. This is probably a result of parenting from a Kansas mother, an African father, an Indonesian step-father, and several grandparents of all races. He jokes that family reunions look like U.N. meetings.

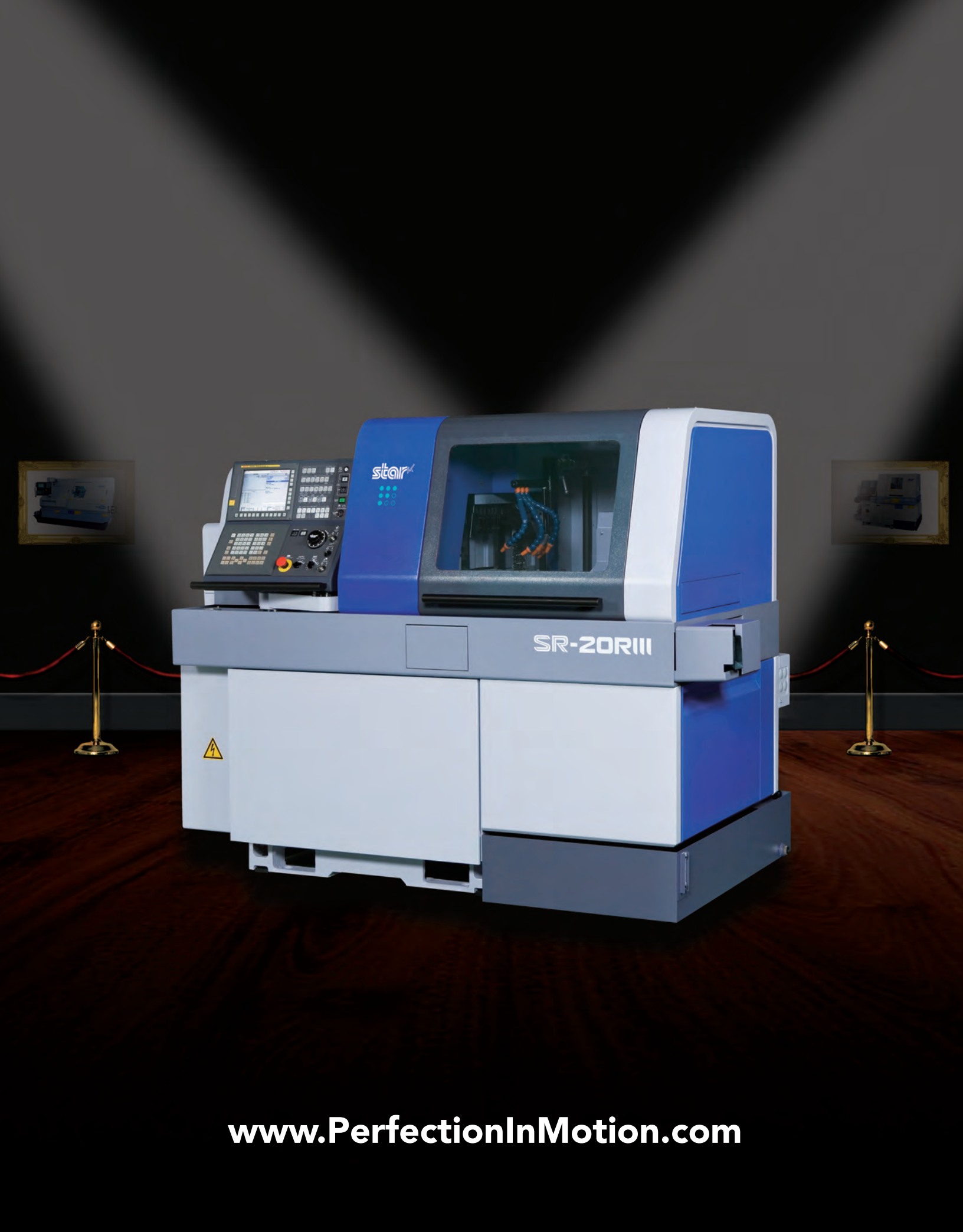
Obama points out that 15 years after the end of the Cold War and five years after September 11th, the U.S. has no coherent national security plan. He recognizes that threats facing the U.S. are real, multiple and potentially devastating. Globalization makes our economy and security captive to events around the globe. If we want to make America more secure, we must make the world more secure, and we are assigned the unpleasant task of being the world's policeman Obama recognizes the ineptitude of the U.N. in many areas. He advocates multi-lateral approaches outside the U.N. to world problems.

He supports free markets, liberal democracy and a rule of law for developing countries, but he says we cannot "liberate" others to democracy. The U.S. is responsible for providing leadership by setting the example. Others will follow.

Obama may become our next President, but I worry that he may be too young, still learning and not tough enough. On the other hand he has a good sense of self, has good values, is thoughtful, intelligent, and learns quickly. His heart is filled with love for this country, and it shows.

I won't say whether he deserves your vote, but I do know you should read his book.

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



www.PerfectionInMotion.com

On the QT

Mazak has introduced the Quick Turn Nexus-250MSY. With advanced integral spindle/motor technology, spindle output on the new Quick Turn Nexus 250MSY is 18% higher (35 Hp, 4,000 rpm) on the main turning spindle (10-inch chuck) for heavy-duty metal removal and high-speed cutting of aluminum and other non-ferrous materials. The second spindle has a 6-inch chuck size, 10-Hp output, and 6,000-rpm maximum spindle speed. The additional rotary tool spindle for milling has 7.5 Hp output and 4,500-rpm maximum speed (with 6,000 rpm optional). Rotary tools and turning tools alike can be mounted at any position of the 12-station drum turret, and quick-change toolholders can be loaded or unloaded with a single turn of a wrench. Grease lubrication cuts lubrication use more than 50%, from 30 liters annually to 14.2.

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

Feeling Fuji

Fuji's new FS4-3500 compact automated gang tooled turning center allows loading and unloading of the workpiece during spindle rotation. The FS4- incorporates a 30 degree bed design. A hardened and ground combination square and dovetail way system support the gang slide. The saddle and cross slides are coated with TURCITE type material to reduce stick slip. The FS4-Series can be applied to most applications that require both OD and ID turning. The machine can be connected with a part flip station for complete OP-10 / OP-20 turning. Maximum part diameter is 6.0 inches. A 4-station indexable turret is also available.

For more information, please contact FUJI Machine America at 847-821-7137 or visit the company website at www.fujimachine.com.

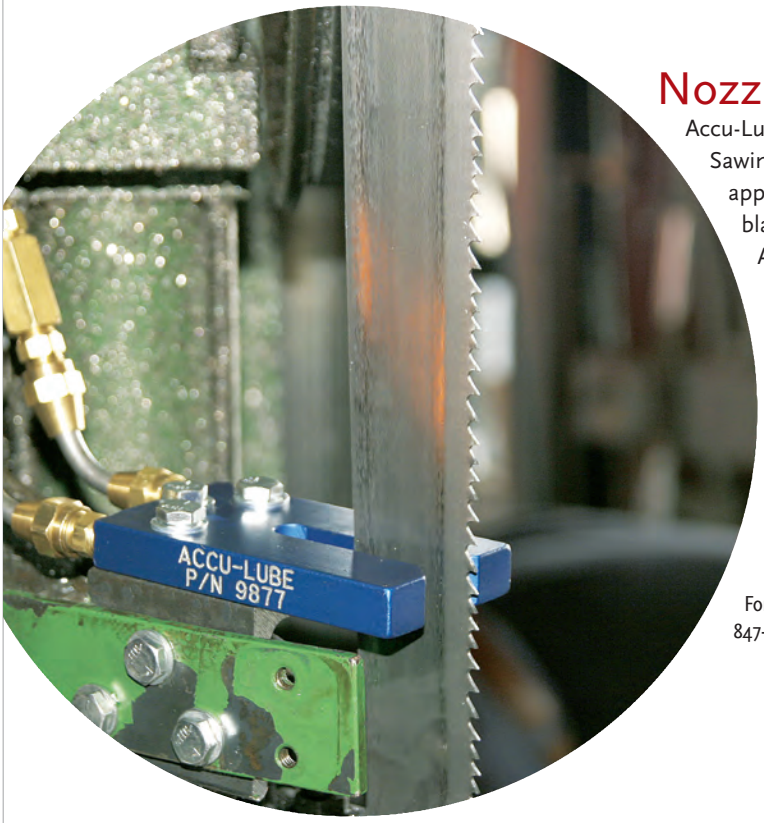
fresh stuff

STAMA-NA

STAMA America has introduced System 8-Milling-Turning Centers with one (MT) or two (MT-TWIN) milling spindles and one or two turning spindle(s) for the complete machining of semi-finished and saw sections on one machining center. STAMA has merged its TWIN-Technology with its Milling-Turning Technology. A multi-functional swiveling and rotating unit with 2 turning spindles has been integrated in the column system machining center with two heavy-duty milling spindles.

System 8 Milling-Turning Centers feature vertical milling spindles with speeds up to 12,000 rpm (80 hp). The two turning spindles with speeds up to 4500 rpm (60 hp) may be used as NC axes and the STAMA rotating/swiveling trunnion unit has a continuously variable A-axis pivoting angle of 120 degrees (-30 to +90 degrees).

For more information, please contact STAMA America at 630-871-3310 or visit the company website at www.stama-america.com.



Nozzle-Tov

Accu-Lube® has introduced a new nozzle design for Near Dry Sawing Applications. The U Nozzles allow the lubricant to be applied from behind the blade on the three sides of the blade. The Accu-Lube® U Nozzles attach to a two pump Accu-Lube® applicator system to split the lubricant, and applies a smooth coat directly to the cutting edge. Accu-Lube® Nozzles mixes lubricant and air right at the nozzle, not back at the applicator, so there is no lag time and no dry cutting. The flow of lubricant is directed out three ports. Accu-Lube® U Nozzles should be used with Accu-Lube®'s positive displacement pump applicators. Accu-Lube® U Nozzles are available in two sizes:
Part # 9877: U Nozzle with throat size of 2.1/8" and
Part# 9857: U Nozzle for smaller throat size.

For more information, please contact ITW ROCOL North America at 847-657-6185 or email cfuhr@rocolnorthamerica.com.

fresh stuff

Auto Cell

Acro-Feed Industries, Inc. has designed and built a special automated manufacturing cell for automotive strut rods. The cell design includes: (1) new standard Acro-Feed Model 125N620DR 8-spindle, 20-ft long bar feeder; (1) rebuilt and remanufactured Acme 1-1/4 RB-8 screw machine; (1) rebuilt and remanufactured Acme 1-1/4 RA-6 screw machine and a milling machine that was provided by the customer.

All of the required automation was designed, built and provided by Acro-Feed for the escapement assemblies, diverter assemblies, elevator conveyors, magazines, conveyors and loader/unloader mechanisms. The system has PLC controls and touch screen monitors.

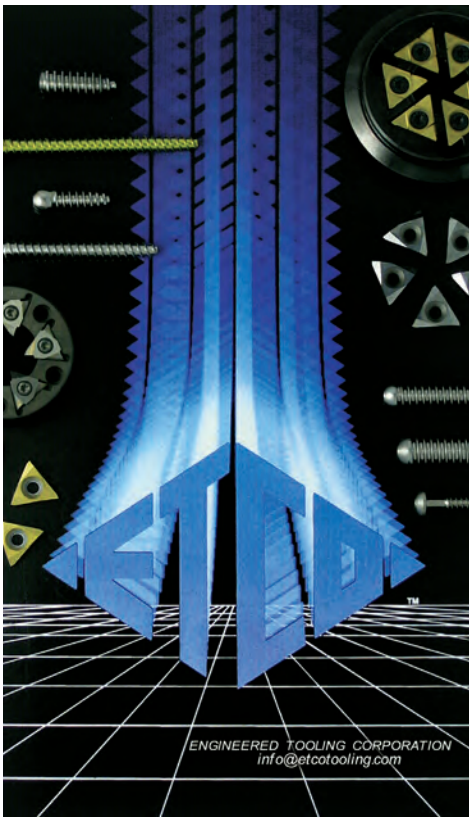
For more information please contact Acro-Feed Industries, Inc. at 313-821-0809 or visit the company website at www.acrofeed.com

Cool Collets

Techniks now offers new ER coolant collets, which do not have any plugs or seals to fail, and do not require coolant discs. ER16, ER20, ER25, ER32 and ER40 Steel Sealed collets are available in all popular inch and metric shank sizes. For the best T.I.R. (accuracy) and extended cutting tool life, Techniks recommends their "Power Coat" nuts that hold up to 75% tighter than standard nuts. Rated to 2,000 P.S.I. T.I.R. 0.0004", and works with standard ER holders and nuts.

For more information, please contact Techniks at 800-597-3921 or visit the company online at www.techniksusa.com.

fresh stuff

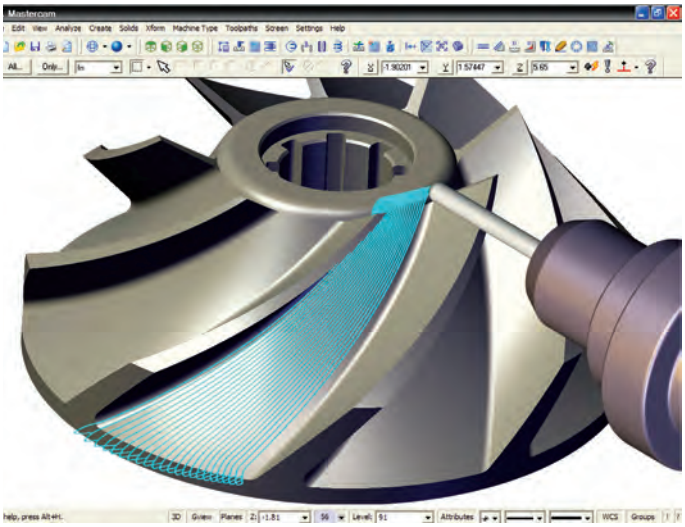


What a Whirl

ETCO/Engineered Tooling Corporation has introduced its new thread whirling line of indexable inserts and cutter bodies. These are made to be used with Swiss-style CNC machines such as Tsugami, Star, Citizen, Tornos, Maier and more. ETCO can manufacture any size IC indexable insert in both screw down style or wedge style inserts. All products are manufactured in ETCO/ Engineered Tooling's New England facility, which uses the latest CNC grinding equipment.

For more information, please contact ETCO at 781-788-8888 or visit the company website at www.etcotooling.com.

fresh stuff



X-2 the Max

Mastercam has released Mastercam X2, which incorporates new advanced multiaxis toolpaths that enhance machining strategy control and provides tools for programming complex multiaxis parts. These advanced toolpaths use a "smart" interface that customizes itself to the selected machining strategy.

Mastercam's File Tracking function helps manage files by identifying files that have changed, while Change Recognition identifies specific changes in files. It can detect modifications to Mastercam, SolidWorks®, Solid Edge, AutoCAD, and other CAD files, and can mark affected operations if their source geometry has changed in any way. Once the affected geometry is updated, the user can automatically update any additional toolpaths that use that geometry.

For more information, please contact CNC Software at 860-875-5006 or visit the company website at www.mastercam.com.

fresh stuff

Live Wire

Lyndex-Nikken now offers an expanded variety of live tools for CNC lathes. Lyndex-Nikken stocks a range of standardized live tools for CNC turning centers from Okuma, Mazak, Mori Seiki, Nakamura, Sauter and all other major builders. Lyndex-Nikken's live tool offering includes high-speed tooling, coolant feed thru tools, axial tools, radial tools, dual output radial tools and universal tools. Straight and offset units, modular quick-change systems and tapping quick-change holders are also available. Many models are lightweight and compact. Extensive parts inventory, maintenance and repair, and rebuild services are available through Lyndex-Nikken.

For more information, visit or contact Lyndex-Nikken Inc. at 800-543-6237 or visit the company website at www.lyndexnikken.com.

Illustration by a friend.

By Mary Ethridge

The Future of Michigan

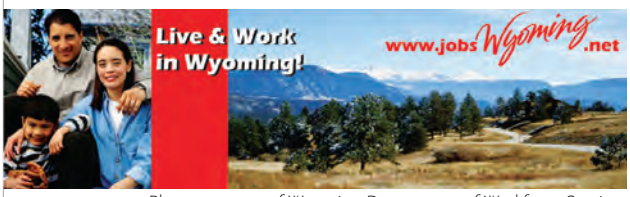


Photo courtesy of Wyoming Department of Workforce Services

In September, along I-75 just outside of Flint, Michigan, a billboard went up featuring the images of a fresh-faced family and lush landscape. The plea emblazoned across it was straightforward enough: "Live & Work in Wyoming." The underlying message was just as clear: Wyoming has jobs; Michigan doesn't. What are you waiting for?

In many ways, the story of the billboard, picked up by the *New York Times*, illustrates the dual nature of Michigan's current economy. Much of the state is going through some "tough sledding," thanks to the ongoing loss of manufacturing jobs, said Michael Shore, spokesman for the Michigan Economic Development Corporation (MEDC). On the other hand, it has a legacy of research and development, top-rated universities and an experienced workforce – good enough for Wyoming to raid – to create a new economy.


Photo Courtesy of Wayne State University and the All Saints Teen Club.

Downtown Ann Arbor
Photo Courtesy of Ann Arbor Chamber of Commerce

"Take a minute to consider the strong base we already have for our efforts," said Shore, whose state organization is at the forefront of the state's transformation.

Those efforts are numerous but have one mission – to diversify Michigan's economic base well beyond its traditional auto manufacturing by including a myriad of high-technology, knowledge-based companies. This diversification, if successful, could mean changes in the centers of power in the state, shifts in population and a reallocation of government funding and services.

Geographic Shifts

Some say it can already be seen in the clustering of high-tech companies in regions outside of Detroit; including Kalamazoo, Lansing, Ann Arbor and Oakland County.

"Detroit has lost much of its economic vitality," said Charles Ballard, a professor of economics at Michigan State University. "The economic center is shifting to Ann Arbor and west."

In 2001, when Bill Ford, then Ford Motor Co.'s chief executive, moved to Ann Arbor from his family's long-time home in Grosse Pointe – the traditional enclave of wealthy Detroit executives – some saw it as a symbolic shift of sorts.

Yet Ballard and many other of the state's leading economists believe Detroit and its suburbs are still crucial to Michigan's well being.

"It's hard to imagine a state could be great if its major city is a disaster," he said.

Scott Goemmel, chief executive of PMV Technologies; an information technology company in Troy, Michigan, agreed.

"Detroit is a vital part of the region. ... We're all in this together," Goemmel said. "We have to get over the idea of geographical and political boundaries."

Ballard points out that it's important to realize that Michigan's economy is not a "monochromatic painting." Although the unemployment rate in the Detroit metropolitan region is 6.7 percent and Flint reached 10 percent in July, Ann Arbor's stands at only 4.9 percent. Google Inc., the Internet giant, recently opened an advertising center there with 1,000 employees.

"There are parts of the state that are doing quite well," he said. "There isn't anything simple about this."

Indeed not.

Manufacturing Decline

Although the decline in U.S. manufacturing jobs has hit much of the nation, Michigan's heavy reliance on a single industry put it at particularly high risk for economic devastation.

Michigan has lost 250,000 manufacturing jobs and 325,000 jobs overall since 2001. Much of that has been in automobile and related industries. The state is expected to lose 30,0000 more jobs in the next 18 months, according to Shore. Fewer people were employed in Michigan in December 2006 than in December 1996. George Fulton, a University of Michigan research professor in the Institute of Labor and Industrial Relations, has predicted the economy won't recover from the losses until at least 2013.

> Michigan is the world's center for automotive research and development, with $10.3 billion in spending annually.

None of this is news to the people of Michigan. They've lived it. What they may not realize is auto manufacturing has left Michigan with a tool for economic transformation. The state is the world's center for automotive research and development, with $10.3 billion in spending annually. Its more than 220 auto-related research and development facilities employ more than 65,000 professionals statewide.

Comerica Park and the Detroit Skyline. Photo Courtesy of michigan.org

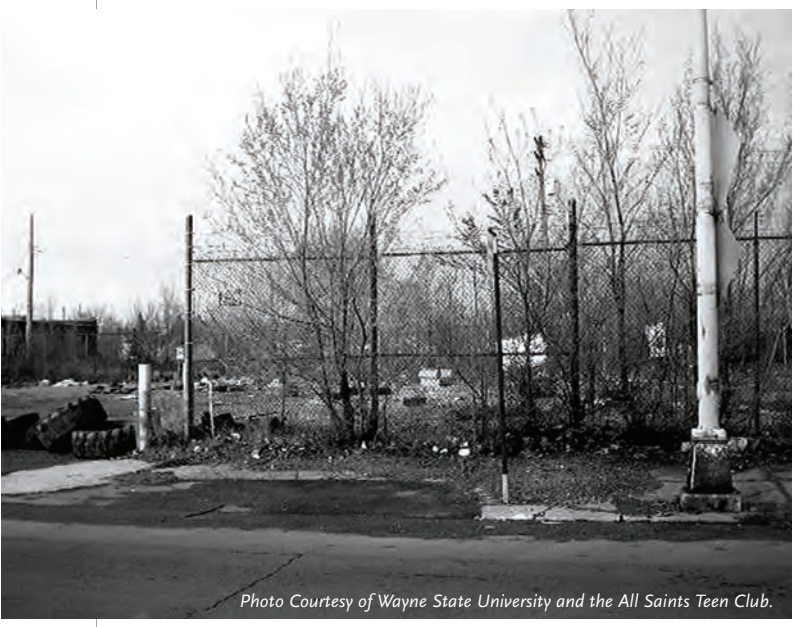


Photo Courtesy of Wayne State University and the All Saints Teen Club.

Michigan is also the second state in the country for overall research and development spending and has the third largest research and development university in the University of Michigan. It also has the fourth largest high-tech workforce in the nation. It's home to nearly 60 percent of the North American automotive supplier base.

Michigan has a greater proportion of workers in high–technology occupations than the national average, and these high–tech occupations are growing faster in the state than in the nation as a whole, Fulton pointed out in a recent study about the state's economy. Michigan's involvement in automotive manufacturing extends far beyond the Big Three manufacturers, because many of the foreign–based manufacturers also have research facilities in Michigan.

But relying solely on the auto business – albeit the high-tech variety – would put the state in the same position as its has been in for the last 80 years. Competition today requires a community to use its particular advantages, such a large labor pool, hip cities and extraordinary places for recreation.

"No one wants to repeat history here," Ballard said.

Best Shots

To that end, state and local leaders have winnowed the state's industries into a handful of areas they believe offer its best shot at economic transformation. In addition to auto research, the state is promoting itself as a home for life sciences, including pharmaceuticals. Other primary areas of concentration are alternative energy, microsystems, tourism and homeland security (Michigan borders Canada). Tourism is included in the mix to a lesser extent

The majority of these industries require not only patience for their long to-market lead times but a workforce that is well educated and technologically savvy.

"Really, there's only one way to prosperity for many states these days and that's to concentrate on knowledge-based industries and to give them what they need to succeed, including smart people," said Lou Glazer, president of Michigan Future Inc., a non-profit think tank.

Michigan's fledgling relationship with United Solar Ovonics, an alternative energy company, underlines Glazer's point and provides a glimpse into the state's potential future – for good and bad.

In March of 2006, Swedish appliance manufacturer Electrolux closed the doors of its refrigerator plant in Greenville, a town of 8,000 people 30 miles from Grand Rapids. In 2005, it announced it was moving its operation to low-cost Mexico after spending nearly 130 years in Greenville. The move eliminated 2,700 jobs that paid an average of $16 an hour plus benefits. Electrolux also provided 20 percent of the city's tax revenues.

When Electrolux announced the plant closing, it told supplier Greenville Wire Products that its contract with Electrolux was being terminated. Wire Products shut down its refrigeration shelving plant and put another 160 out of work. Other companies followed. Doctors and lawyers left town. Stores were shuttered. In all, locals estimated, the Electrolux shutdown cost the Greenville area close to 8,000 jobs.

Breathing Life

But there is some relief for the people of Greenville. United Solar is building a factory there that it expects to open at the end of 2007. It recently announced plans to open another plant in mid-2008 in Greenville's new industrial park. United Solar's parent, Auburn Hills-based ECD Ovonics, said it plans to build four more plants on its Greenville site, creating at least another 1,000 jobs. Of course, that's a fraction of the jobs

Greenville lost when Electrolux left, but Shore of the MEDC says that's one of the hallmarks of a high-tech economy.

"By its nature, high-technology doesn't need a lot of bodies," he said. "You need a concentration of many companies to make it work."

The deal with United Solar almost didn't happen for Michigan. The largest manufacturer of film solar products nearly sent its project to South Carolina.

As the competition heated up, Michigan officials increased their offer's incentives to nearly $40 million. The MEDC added a $5.7 million, 20-year Single Business Tax (SBT) credit at the last minute, making Michigan's offer a bit sweeter than South Carolina's. United Solar President Subhendu Guha said the company did a line-by-line comparison of the offers and then picked Greenville.

Michigan Gov. Jennifer Granholm, who worked long and hard to find a replacement for Electrolux, called United Solar's commitment to Greenville a symbol of hope for the state.

Michigan officials said they weren't just throwing money at a trophy project – a mistake many Rust Belt states have made over the past quarter century. United Solar is worth the investment because it fits with the state's plans to become a hub for the alternative energy business, they said.

But the jobs at United Solar, for which Electrolux veterans get first dibs, aren't simple assembly line positions. They require technical knowledge, said Shore of the MEDC. Shore's group linked with Montcalm Community College to provide United Solar employees with training they need to do the work. Employees without an appropriate college degree must take four semesters of specialized classes, heavy on math and science.

"The response has been lukewarm," among former Electrolux employees, said Ryan Jeltema, a reporter for the *Greenville Daily News*. "Even the names of some of the courses – like 'Concepts of Deficit Vacuums' – would scare me off."

United Solar said starting wages at the plant will be $12.50 an hour, a third less than Electrolux paid.

"Some people in Greenville said, 'You want me to go to work for less money, but first I have to go back to school?' They didn't want to hear it," Shore said.

Changing Views

Changing the minds of a handful of companies is one thing, but changing the world views of an entire generation is another entirely.

"Look, those jobs (at Electrolux) disappeared two years ago, and they're not coming back," said Shore. "It's a hard realization."

It has proven tough for officials to convince a group of people who've lived off juicy assembly line jobs for decades that continuing education is vital.

According to the 2000 U.S. Census, Greenville's population is half as likely to hold a college degree as the rest of the nation.

Ann Arbor Street Art Fair. Photo courtesy of michigan.org

"For 80 years it was absolutely true in Michigan that if you could get out of high school and you were physically able to do the work at a factory, you could make a very comfortable living," Shore said

Jeltema said the old attitudes are firmly entrenched in Greenville.

"It's a really difficult transition to make, especially for middle aged people – 45 or 50 years old – who only know life in high paying factory jobs," he said.

Thomas Clay, director of state affairs for the Citizens

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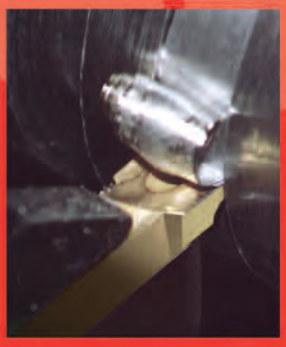

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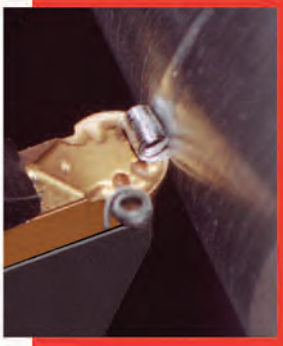

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Research Council of Michigan, said the problem isn't just in Greenville.

"What sets Michigan apart from almost every other state in the country is that for years you could live the American dream without having to go to college," said Clay. "Of course, that's not the case now. We're really behind the eight ball on this one."

Michigan currently has a skills gap of sorts as it seeks to build a high-tech economy. Fewer than 25 percent of Michigan adults hold college degrees of any kind. That puts Michigan at two percent below the national average.

Those 75 percent of people without a college degree are the parents and grandparents of today's school age children – the manpower for the state's economic future. Those who still hold to the notion that high school is enough are, of course, far less likely to encourage their children to pursue higher education, said MSU's Ballard.

Gemmel of PMV Technologies said the problem takes root much earlier than high school graduation. The importance of higher education, particularly in high technology subjects and approaches, needs to be stressed beginning in elementary school if Michigan has a real hope of turning things around.

"We need a re-engineering of our education system," said Goemmel. "We have to incorporate what's important to us in the curriculum."

Budget Struggles

But Michigan is facing a $1 billion-plus budget deficit combined over the next two years, Gov. Granholm announced just before Christmas. To trim that deficit, Granholm has said she may have to make cuts in school funding.

Michigan currently spends about $13 billion a year on schools, more than $9 billion of which is paid through the state's general fund. About 22 percent of that fund is made up of the Single Business Tax, a highly unpopular and complicated tax to be eliminated at the end of 2007. Michigan lawmakers have yet to determine a replacement for the SBT and its revenue.

"Cutting 22 percent out of the general fund has a significant affect on some of the most vital programs in the state," said Clay. "You either have to cut some or find the money someplace else."

Justin King, executive director of the Michigan Association of School Boards, told the *Detroit News* recently that further cuts in K-12 funding could push some districts into bankruptcy. In particular, rising costs for employee health insurance and retirement have stressed school budgets. King told the newspaper the number of Michigan districts on the brink of financial calamity soared in 2006, from 50 to at least 80 and perhaps as many as 100 districts.

A lack of replacement for the SBT has left not only school officials but business leaders scratching their heads as well.

"No one really knows how to plan for what's coming," said Ballard. "What will replace the SBT? At this point, no one knows."

Future State

Despite a state budget in crisis, a high unemployment rate and a reluctance of residents to let go of the past, Ballard and others have profound hope for the state's economic future.

"I'm cautiously optimistic. The potential is there to get it right," said Ballard. "The next several years will be crucial. We're facing some really big issues, and we can't afford stupid decisions."

Michigan made plenty of stupid decisions in the past. It often looked like the class loser desperately seeking a prom date. It begged companies to stay or relocate to the state, enticing chief executives with money it didn't have and incentives that weren't in its best interest. If the state had continued on that path, Michigan would have had more in common with Mississippi than its first initial.

Fortunately for Michigan, its leaders appear to have learned some vital lessons in the last two decades. The most important of those is that any lasting transformation of a state's economy must be built on an existing foundation. For Michigan, that means taking advantage of its strengths, notably in automotive engineering, life sciences and higher education. It must also convincingly bill itself as a hip place to work and live to draw the workforce it needs.

This shift to a white collar, high-tech economy means the brains, power and money in Michigan will continue to migrate to those areas already poised to embrace them. Ann Arbor gets it. So does Oakland County. Lansing's on its way.

Let's hope the rest of the state, including the laid off Electrolux workers in Greenville, finally gets it too.

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By Karen Aho

A Lot Size of One

Photo courtesy of Align Technology

Geomagic 3-D automotive part. Photo courtesy of Geomagic.

Today, in a factory in Juarez, Mexico, a machine will manufacture a lot size of one. In the time it takes a robot to lift the product off the conveyor belt, the machine will manufacture another lot size of one.

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Align's product:

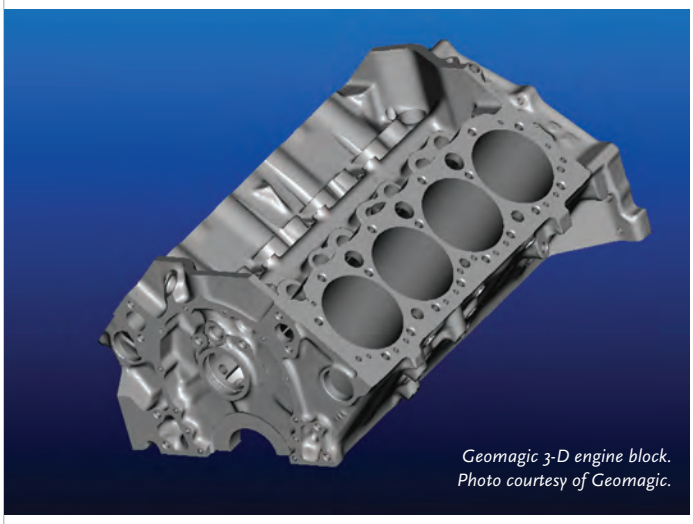
Invisalign Braces, mass produced just for your mouth.

"We're making a bunch of unique things over and over again," said Len Hedge, Align Technology's vice president of operations. "The process is not that much different. The technology that supports it is not that different. It's, 'How do you accommodate the unique individual features of each product?'"

Align is at the forefront of a new age in manufacturing, one that blends the individual specifications of traditional cottage industry with the mass-production capabilities of the post-industrial age. It exists thanks to advances in three-dimensional computer technology, technology that may upend contemporary models of manufacturing just as advances in two-dimensional technology did in entertainment.

In entertainment, companies such as Amazon.com saw in emerging two-dimensional technology the potential to market to individual niche tastes. Few need a reminder how well Amazon.com fared with this idea. As author Chris Anderson points out in *The Long Tail*, the book coining the niche-marketing phenomenon, the strategy worked because it tapped into the consumer's innate desire to find a product to his own liking. As a result, consumers became what he calls "active producers," driving what companies would make available, instead of the other way around. These consumers are, he writes, "a force to be reckoned with."

The founders of Align observed that the same phenomenon could apply in the material world; emerging three-dimensional technology would allow products to be designed to fit the individual's unique physical shape. The two Stanford Business School students – one of whom was wearing a retainer and



Geomagic 3-D engine block. Photo courtesy of Geomagic.

noticed his teeth shifting – recognized that graphics software could be used to design the multiple stages of plastic liners.

Only in the last decade have software companies tackled the problem of how to program a computer to perceive depth. What comes easily to people is overwhelmingly complex for machines. Engineers have used Computer Aided Design software since the 1960s, but, as its name suggests, it merely aids the human drafter.

Companies such as Geomagic, in Research Triangle Park, N.C., have now made it possible for a computer to render a 3-D image directly from a laser scan. The software triangulates thousands of points, mapping the locations between and among shapes and spaces. The digital image can evaluate a surface for defects; input to a machine to directly build a 3-D object; or simply store an image for posterity. Digital imaging is used, for example, to preserve the exact shapes of ancient artifacts.

Plastic-braces liners have been around since the 1940s, but a craftsman had to saw each tooth from a mold, then adjust and re-wax the teeth in position for all 20 sets of liners. The technique was laborious and rarely used. With 3-D software, the changes are made digitally and still allow for an intricate range of movement.

Align has created a largely digital production system. It e-mails the orthodontist's dental images to a facility in Costa Rica staffed by 500 English-speaking dental technicians. They use an automated program to digitally realign the teeth in stages and confer with the orthodontist, who is e-mailed a 3-D image of the process. Align uses stereo-lithography to build the molds directly from the computer, but originally cut liners the old way – by hand-laying a sheet of heated plastic on the mold to cut. The company developed its automated "one-lot" system.

"The back end of the manufacturing process was almost an afterthought," Hedge said. "That's probably an overstatement. But it was a secondary problem to be solved."

Align's technology sidesteps the pitfalls of sequencing through a system of identification. The conveyor-belt tool reads the label on each mold as it slides into place. The tool's computer then locates the corresponding file, then carries out the prescribed cut. The company does not release cycle times, but says there is no perceptible lag.

"Their assembly line is 300 times more efficient than Nike's," said Ping Fu, CEO and founder of Geomagic, which provides imaging software for Align. "I told them you will make history: the first company that makes mass customized products. It's as important as the Ford assembly line."

> "You [are] the first company to make mass customized products. It's as important as the Ford assembly line."

Mass customization can mean different things. Anyone who has bought a Dell laptop or ordered at Starbucks has enjoyed the have-it-your-way marketing strategy that lets people customize a product from a palette of options. (If you've ever been frustrated in line at Starbucks, take heart: It's said there are 19,000 possible combinations.)

But Fu's definition is a custom build of one, as Align has done. Its liners are not assembled from a pre-selected pool. There really is only one of each. Align's number of variations is limited only by the size of the population. Since launching in 1998, Align has essentially manufactured more than 21 million different products.

"This really is the future, and are we there? Probably not yet," said Frank Piller, a research fellow at MIT's Sloan School of Management who specializes in mass customization. "The driving force will be consumers, who find out that this is cheap, flexible technology."

The technology is not cheap, yet. Fu talks about a day when people will order clothes and shoes based on their own body scans, but even she, a designer of such

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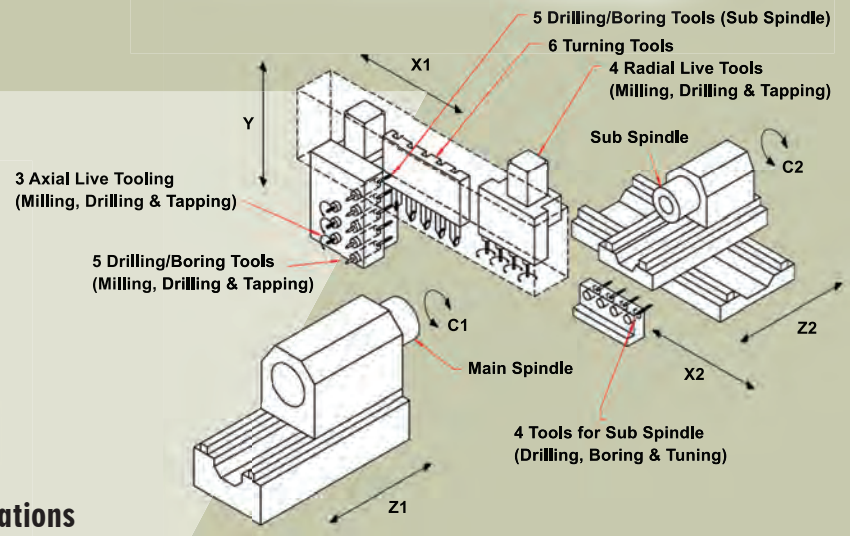

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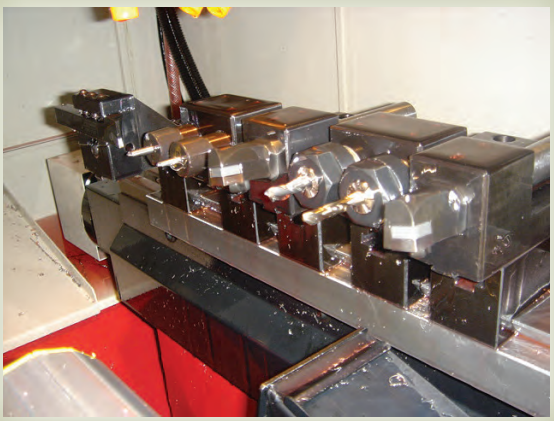

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software, won't stake out a date. 3-D technology is taking its first steps in high-value, high-volume industries, primarily the aerospace and medical fields. If we want to see what the technology holds for the individual consumer, we can get a glimpse now through the medical industry.

In the mid 1990s, Emanuel Sachs, a mechanical engineer at MIT, developed the 3-D printer. It is a deceptively simple idea. It uses the same principles as an ink-jet printer, but instead of ink on paper, it sprays a soluble binder onto a sheet of ceramic powder. After 250 layers, the soluble portion is an inch high. Machines can now print objects nearly a foot high.

Unlike other additive processes, MIT's printer allows for a great freedom in materials. Today's commercial 3-D printers typically use ceramic to build marketing and machining prototypes, but can also print with metal powders, or be infiltrated with a flexible or hard epoxy afterward. They make incredibly complex shapes, are porous and have a rough surface.

James Serdy, a researcher at MIT's 3-D lab, thought these qualities would make them perfect for medical implants. Working with bioengineers, Serdy patented a process to print bone polymer scaffolds already being put inside people.

Instead of a ceramic powder, the machine lays down a powder of polycaprolactone, a biodegradable thermoplastic; tricalcium phosphate; and ground sugars. Instead of an epoxy, the printer sprays tiny droplets of water, electrostatically steered in fine streams down to 40 microns (a cell is one or two microns). Where the water strikes, the sugar particles melt and fuse together.

"It's a pretty simple concept," Serdy said, "just using water to cement these sugars together."

The remaining powder is blown away and the water is leeched out. The crystallized sugar remains bound. The object is bathed in a chloroform vapor, which melts the PCL to create a plastic film over the shape. A water bath then dissolves the sugar. The result is a complex, porous polymer shape, whose outside and internal geometry can be designed on a computer alongside x-ray images.

Once inside the body, the scaffold is injected with the patient's stem cells to stimulate new bone growth. In time, the scaffold dissolves. MIT originally convinced just one of its six 3-D printer licensees, Therics, to pursue medical applications, but has recently spurred Ex One and Z Corporation into the field.

Ping Fu

CEO and co-founder of Geomagic

Ping Fu has long been fascinated by shapes. But her childhood memories aren't filled with Legos and Play-Doh; as a victim of the Chinese revolution, Fu was laying bricks at age 8.

Fu, 48, now a successful pioneer in 3-D software design in the U.S., has a talent for shaping her own experiences. As part of her family's "re-education," Fu and her sister were sent to a cooperative, where Fu was beaten, raped, starved, and forced to denounce herself ("I'm a bug. My life is worthless."). "Working in factories grounded me, because I had to do something with my hands," Fu said. "Computer design is not an abstract concept in my head. I can always see it through."

Fu earned a college degree in literature at 18, then spent two years investigating rural infanticide from China's one-child policy. Her report brought international condemnation upon China, and authorities threw Fu in prison. For three days she crouched in a cell with no heat, food, light or toilet, then was exiled to America.

At Bell Labs in Illinois and the National Center for Supercomputing Applications, Fu tackled how to build practical applications using 3-D digital theory. Using a supercomputer, she modeled both galaxies and molecules, analyzing the shapes within and between objects. She helped design the animation software for *Terminator 2*, and supervised a student who created the Mosaic browser Netscape, all while earning her doctorate.

"I think very visually, and shapes are just very appealing to me," Fu said. Training a computer to perceive a shape is another matter. "It is very difficult to represent what human eyes see, to digitally capture the perception of limitless shapes," Fu said. The challenge intrigued her.

In 1996, she and her husband, Herbert Edelsbrunner, founded Geomagic, and developed a software that renders shapes without a human operator. Unlike CAD, digital shape sampling and processing software reproduces the shape from a laser scan. The process requires thousands of tiny lines and triangles be coordinated between the "point clouds" of a surface, mapping the highly complex relationship among every shape and every space.

NASA has used Geomagic software to inspect tiles on the space shuttle while in orbit. The aerospace and automotive industries use it to inspect aging parts.

Fu's emphasis now is on the broader shape of the future. With 3-D technology, companies can customize consumer products, from medical devices to shoes fitted from an individual laser scan. This labor model provides for a local, skilled workforce, and is critical to improving the domestic and international economy, Fu says.

"I have a strong desire to make a better life, and a strong desire to share that better life with others, because I know how bad life can be."

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Photo courtesy of Medical Modeling LLC

A translucent stereolithography model of the bone structure of a patient missing the right side of their cheekbone and orbit.

"I regret that the biological field got so little attention until very late in the game because in many ways it is the natural use for this process," Serdy said.

Therics concentrated on craniofacial applications, filling small, intricate voids, but its product wasn't fully launched into the marketplace, and the struggling company was bought by Theken in 2005.

The opportunity for consumer-driven manufacturing is already clear. Sunil Saini, director of research and development at Therics, said a spine surgeon contacted the company last year seeking a half-cylinder cap that could protect his bone grafts from displacement by soft tissue.

Like two builders hunched over a bar napkin, the surgeon and the software technician sketched a design on paper. Therics translated it into a digital design and printed the surgeon a few dozen caps. A pediatric spine surgeon is now working with Therics on his own, small design for his own small patients.

"We're scratching the surface of this now," Saini said. "They're not just relying on what the manufacturers give them. Even if it's not an economic blockbuster, there are definitely more ideas out there that haven't been developed."

Andrew Christensen, president of Medical Modeling LLC, uses Mimic 3-D software from Materialize to design models of missing bone fragments from CT and MRI scans, allowing surgeons to sculpt a replacement before surgery. He recently invested $1 million in an electron beam melting machine, capable of building titanium and cobalt chrome, thus propelling him to build the actual implants.

Prosthetics and other large implants will remain in the realm of standard manufacturing for now, experts say. Not only are they cost effective, but additive manufacturing processes, such as the 3-D printer, have yet to conquer the materials problem. One of the next hurdles is to print scaffolding that can hold weight.

"Within 20 years, everyone will have a piece of equipment to print teeth," said Thomas Cole, president and co-founder of Atlantis Components, which uses 3-D software to make low-cost abutments for dental implants.

If that's not futuristic enough, consider another great 3-D materials challenge: to print organs.

Vladimir Mironov generates a media buzz with his obsession to raise money. The director of the Bioprinting Research Center at Medical University of South Carolina, Mironov says that with $1 billion and five years he can complete the processes to print a kidney. And he is hardly alone. Mironov has convened three international symposiums on the topic. The Chinese have already found that 90 percent of cells can survive the printing process.

"You could have a patient in an operating room, opened up. You could put him through the MRI or CT scanner, get the data you need, then almost be printing that body part," said Terry Wohlers, a leading consultant on rapid prototyping technology. "That's the goal."

It's quite a few years away. But given such technology, who knows what the consumer of the future, the "active producer," might design himself, or request?

Computer programmer John Braun has a 3-D printer in his kitchen. Although he has no architectural experience, he bought a Z Corp 410 for $75,000 and launched a successful business printing architectural models. He upgraded to an improved, color Z Corp Spectrum Z510 for $50,000. He can digitally design and print in two weeks what takes two to four months to build by hand.

He is fascinated by the technology. He attends conferences on the machinery, spoke at Euromold last year and likes to invite friends over to watch things print.

"I've got this vision of having this machine in your kitchen, where you would have an animal protein substance, a plant substance, and maybe five base flavor substances, kind of like RGB colors in your printer," Braun said. "You could call up on your way home, say, 'I would like fried chicken for dinner.' When you drive up, the house smells like fried chicken and you pull it out of the machine."

"I think that's within the realm of possibility. You just have to convince the FDA."

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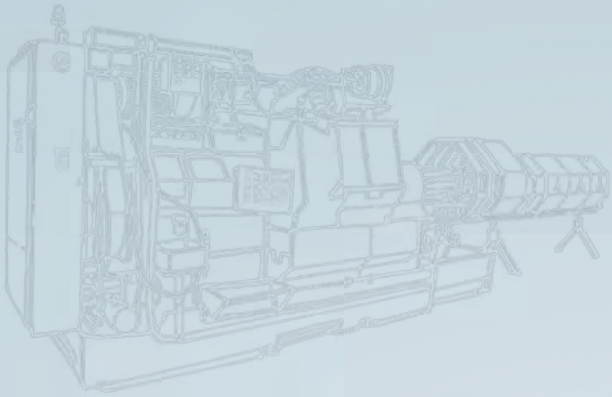

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3-1/4" 6-spindle, 1982
5-5/8" 6-spindle, 1979
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ACMES
1" RAN6, 1979
1-1/4" RA6, 1975 (3)
1-1/4" RB8, 1975
1-5/8" RB8, 1980, rebuilt 1996. pickoff
1-5/8" RBN8, 1975, rebuilt 2002
2" RB6, 1979, Direct Drive Rebuild
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Citizen L20, Type VII, 1996-98 (2)
Citizen L25, Type VII, 1998
Citizen L-16, Type V, 1996
Tsugami S25, 1993 w/ lemca loader

NEW BRITAIN
Model 52, 1-1/4" 6sp., 1979 (3) pickoff
Model 62 2-1/4" 6sp., 1975
Model 62 2-1/4" 1960, $5750

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next

BY NOAH GRAFF

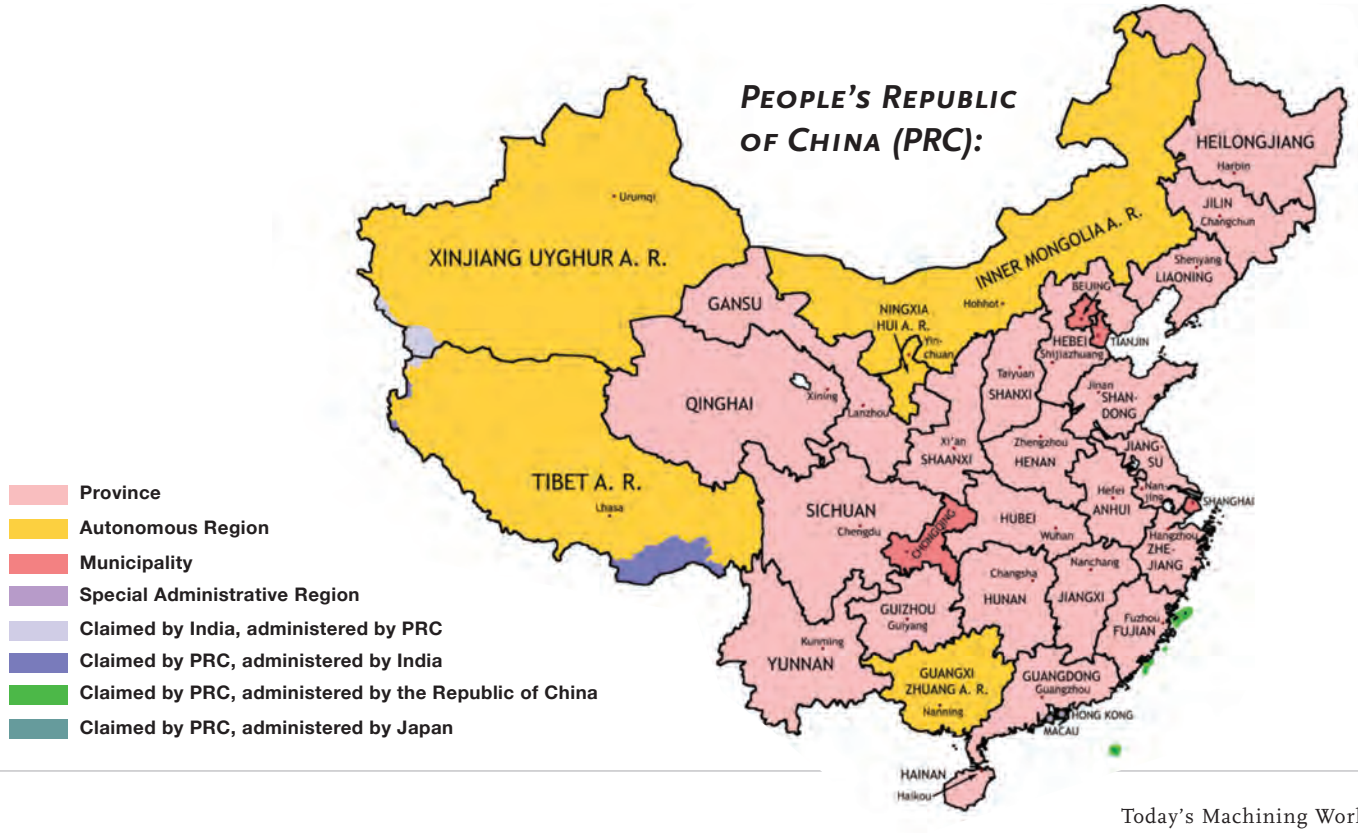
In 10 years, will China have a demorcratic government?

As Chinese citizens become more empowered by new wealth in their booming free market economy, some wonder if this will be a catalyst for the emergence of a democratic government in China.

By 2017, China will be a democracy to beat all democracies. The Chinese Communist Party will lead the transition after 2008, having realized in the aftermath of the Olympics that confident states have fully accountable leaders, an open press and a vibrant civil society. China's democracy will begin as an overwhelmingly one-party state with only weak opposition, but over time will develop into a raucous, free-wheeling democracy like that of Taiwan. Special interest groups will abound, and lobbyists and lawyers will proliferate as the Chinese people increasingly seek to use the political system to maximize their economic gains. Even more than a democracy, China will be American capitalism on hyper-drive.

Elizabeth Economy
The Council on Foreign Relations

Predictions about China's future have been notoriously off the mark. Scholars seem no better equipped to forecast the future than intelligence analysts. If China is democratic ten years from now, we will trace back the origins to current trends. If not, we will point to the weakness of those trends: an expanding private sector, but closely ied to the state; a growing civil society, but limits on what interests can organize; easier access to information, but censorship of the official media and the Internet; an increasingly effective legal system, but subject to political interference; experiments



not by its leaders, who have passed up numerous opportunities to engage in meaningful democratization. They are hoping that more effective governance will dampen popular demands for democracy.

Professor Bruce J. Dickson
George Washington University

There will not be a democratic government in China in 10 years. As today, Chinese authorities will continue to label their government "democratic" – without implying (or accepting) the liberal democratic institutions designed to constrain leaders and promote accountable governance. However, the political, legal, and social institutions through which ordinary Chinese have been newly encouraged to voice complaints about officials and official policy actions will continue to be nurtured and grow. This is likely to strengthen, not weaken, communist party-state rule. In outward-looking coastal cities, private entrepreneurs and other newly prosperous Chinese will embed themselves comfortably in this party-state. By contrast, Chinese from the rural hinterland, who have lost the most (and will lose more yet) from economic reform, will continue to air their demands in more unruly ways – eliciting a continuous search for policy solutions in Beijing and often brutal repression in the localities.

Professor Melanie Frances Manion
University of Wisconsin-Madison

the facts:

Democracy (translated into Chinese as "minzhu," or "people-as-masters") is not a concept inherent in Chinese culture or political philosophy. In fact, it is in complete opposition to Confucian ideology, which stresses harmony and obedience.

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Chineses journalits, editors and publishers are expected to make the information they disseminate conform to Chinese Communist Party (CCP) propaganda. For example, news coverage is required to be "80% positive and 20% negative."

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The constitution of the People's Republic of China provides for three de jure levels of government. Currently, however, there are five practical(de facto) levels of local government in mainland China: the province, prefecture, county, township, and village.

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one on one

Interviewed by Noah Graff

Thomas Clouse is a 31-year-old freelance journalist living and working in China since 2002. He has written for *Global Finance, Accounting and Business Magazine,* and *Automotive News China*. We asked him to give us an insider's perspective on an American living in China.

What made you go to China to be a freelance reporter?

I majored in philosophy and economics, and both attracted me to China. I went there in 1997 and traveled, then went back in 2002 to teach English for a year. Shortly after that, I applied to a Chinese magazine in Beijing that was searching for an English editor.

Are you fluent in Chinese?

Spoken Mandarin, yes. I'm still working on the written Chinese.

What strikes you as the major difference between Chinese and American people?

I think Americans are very individual-oriented. They're conscious of themselves, of expressing themselves and being different. In China, there is a group mentality. I think the strongest example is their emphasis on family.

What's the make-up of the friends you've made in China?

About half my friends are Chinese and half are foreign. The ex-patriot community in Beijing is also a very interesting group of people. There are diplomats and investment bankers and filmmakers and artists – it's a really diverse collection of people.

How do the foreign business people blend in?

Many don't necessarily have a particular interest in China outside of business. A lot of them bring families, and there are areas of Beijing where they all live and all the signs are in English, and there are strip malls and single-family housing. There are Chinese people who live there as well, but it's kind of like suburbia.

What type of place do you live in?

I currently live in what would be considered Chinese middle-class or upper middle-class housing, which is a giant apartment complex that has a shower, a bathroom and a bedroom, with air conditioning and heating. In the past, I lived in what is called a hutong, which is like the buildings in Chinese movies such as *Crouching Tiger Hidden Dragon* – where people are jumping around on the roofs. A lot of them have been knocked down, but many are still there. They have a lot more personality than the newer housing, but they also have shared bathrooms and generally no showers.

What is the social scene like in China?

China tends to be a place where the elderly in particular are very social. Especially in the evenings, the older members of the community will generally be out in the neighborhood park talking, and in the morning doing Tai Chi. Foreigners are a new subject material. I think just about anywhere you go in China there will be someone who will come up to you, maybe a student or a businessman, who will say in English, "Would you like to have a chat?" or they'll ask where you're from or what you do.

Do you go to Starbucks?

Sometimes. When I was working at a Chinese magazine, occasionally when we were meeting foreign business people or foreign diplomats we would meet in a Starbucks, and every once in awhile there would be a famous Chinese movie star in there. It's really expensive – for those prices you can feed a family at a pretty nice Chinese restaurant.

So it's a status symbol.

I think China has a pretty status-oriented culture, similar to that of the U.S. Chinese people like to be in a place that's considered to be cool and are willing to pay for it, and they're willing to pay for brand names. They like to have the best stuff, the best cars. It's the second largest car market, just over Japan.

What's the thing you miss the most from the United States?

Mint chocolate chip ice cream. You can't get it at the store. Though there is a Baskin Robbins, and sometimes mint chocolate chip will revolve through.

By Barbara Donohue

Guhring drill tip, after deep-drilling tests.

For well over a century, machine shops everywhere have used generously flowing liquids, either oils or oil/water emulsions, to cool cutting tools, lubricate the tool/work interface and flush away the chips. These days, most metal is still cut with flooded coolant. But with the new tools developed over the past few years, and other available technologies, that could change.

Dry and near-dry machining

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Emuge tap for dry and minimum lubricant tapping.

Everybody in the business has used flooded coolant practically forever and knows that it works. They are probably also aware that it has its drawbacks, including:

- The cost of buying, maintaining and disposing of cutting fluid, which is estimated to account for 7 to 17 percent of the cost of machining parts.
- The need to clean parts after machining and to remove as much fluid as possible from chips before recycling
- Health problems from handling or working around conventional coolants include skin irritation or allergic reactions, asthma, bronchitis and other respiratory difficulties. It's possible that long-term exposure to some coolant additives could lead to cancer.

Emuge tap for dry and minimum lubricant tapping.

Competitive cost pressures and increasingly stringent environmental and occupational health standards are inspiring some shops to seek ways to minimize or eliminate their use of cutting fluids. They are finding that dry machining, "minimum quantity lubrication" (MQL) and other techniques offer benefits far beyond simply reducing their cutting fluid costs.

Advanced cutting tool materials, coatings and designs, along with a variety of strategies for lubrication, cooling and chip removal, make it possible to achieve the same or better results with dry or MQL machining: shorter cycle times, better surface finish, longer tool life, and higher recycling value for clean chips.

Dry machining then and now

Some materials have always been machined dry – magnesium, for example. It reacts with water, so common coolants are incompatible with it. PGM-New England, a Manchester, NH, contract manufacturing and assembly company, machines many materials with flood coolant, but it dry machines magnesium for small-aircraft oil pans and other parts. "We've had very good success with [magnesium]. It machines very nicely," said PGM general manager Nick Baldassara.

Dry cutting has also long been used with materials, such as cast iron where "what you create is a dust, not a chip," said Jim Van Buskirk, applications manager at Methods Machine Tools Inc., Sudbury, MA. "You add coolant and it makes a sludge. [Graphite,] glass-filled materials, phenolics. . . you definitely want to cut dry."

Graphite, OK. But dry-machining hardened steel? Yes, with the right tool, said Ron Field, vice president for applications at Cole Tooling Systems, Warren, MI. "Greater than 42 Rockwell, you can run it dry. Mold steels you can run dry." Softer, gummier materials like stainless steel in the soft state won't work dry, he said.

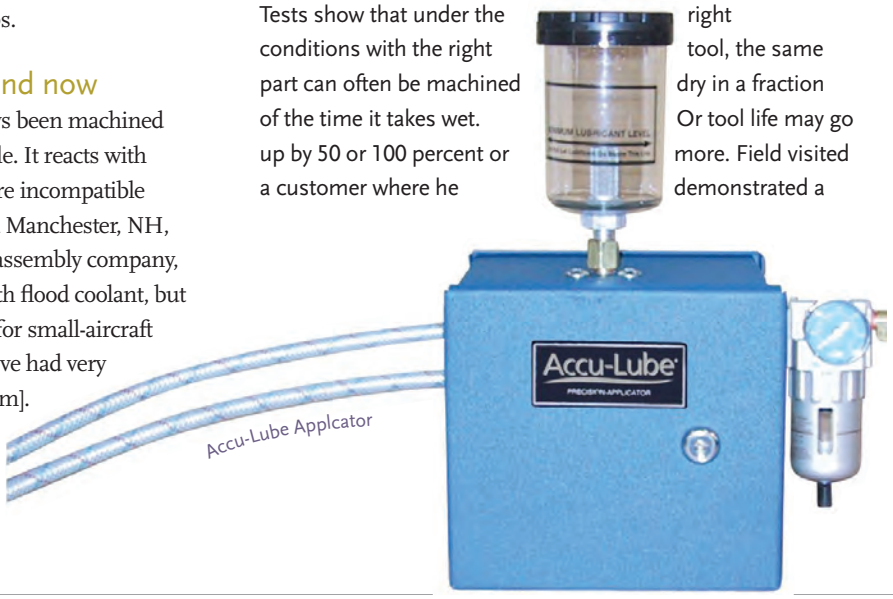
"After you figure out what kind of material you're cutting, then it comes down to the cutting tool geometry and coating," Field said. "[For example, for dry machining of] stainless steel at 50 Rockwell, what we would use is a flat-top insert, with no chipbreaker, and an aluminum titanium nitride coating." That type of coating works hot, he said, "which helps melt the material before the cutter, so it slides up the cutting flute. If you put on coolant, that doesn't happen."

With the right combination of work material and tool, Field said, you can "turn the coolant off, crank up the rpm, crank up the feed rate, reduce the depth of cut, and run like crazy."

Strange to say, some materials can be cut faster dry than with coolant. Companies and universities are conducting research to understand dry machining, including the behavior of materials at the tool/work interface, performance of the coatings, and the heat generated and how it affects surface finish and tool life.

It's all about the tool

Tests show that under the right conditions with the right tool, the same part can often be machined dry in a fraction of the time it takes wet. Or tool life may go up by 50 or 100 percent or more. Field visited a customer where he demonstrated a

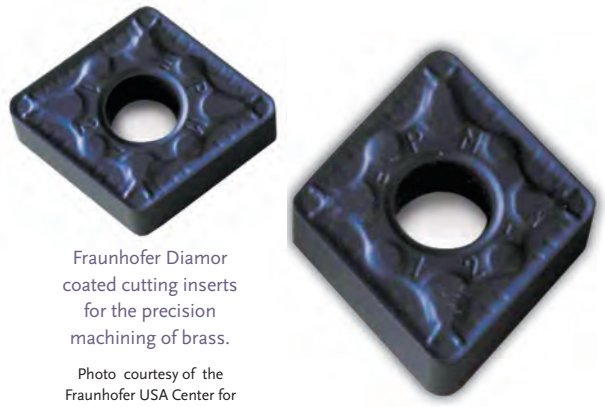


new tool used dry, which allowed a particular part to be machined much faster, reducing machining time from six hours to 45 minutes.

Why can you cut so much faster dry? Tooling makes the difference. Tool materials, including improved grades of tungsten carbide, and new high-performance coatings contribute to the robustness of the tools. These tools like to be run fast, they tolerate the heat, and they don't like the thermal shock of going from hot in the cut to cool in the cutting fluid. They prefer to be run dry.

"Cutting tools have come a long way in the last five years," said Carl Pasciuto, president of Custom Machine Inc., Woburn MA, where they cut many different hard materials without coolant. "The coatings they have now are far beyond what was before. You can't use conventional tooling to do what these new tools can do."

One impressive new coating comes from the Fraunhofer Center for Coatings and Laser Applications (in partnership with Michigan State University), East Lansing, MI. "Diamor" is a super-hard, yet low-friction, amorphous carbon coating. MSU mechanical engineering associate professor Patrick Kwon explained that such a coating would be ideal for hard machining of non-ferrous metals. However, he cautioned, a carbon coating like that should not be used with ferrous metals, as the carbon has a strong affinity for iron and would "dissolve" in the chips and workpiece material.



Fraunhofer Diamor coated cutting inserts for the precision machining of brass.

Photo courtesy of the Fraunhofer USA Center for Coatings and Laser Applications.

So many different tools and coatings are out there that the tricky part of doing the job can be to figure out which combination of tool, coating and machining parameters will work best. The wrong tool under the wrong conditions will fail.

Your tooling suppliers know what's available and what will work best with your job. Based on what material you are cutting and the job's requirements for surface finish, etc., a supplier can recommend a tool and specify speed, feed and whether you should run it dry or wet.

how it works

Just enough lubricant

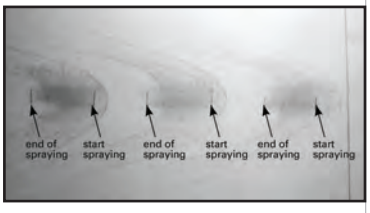
If you can't run completely dry, you may still be able to run without resorting to flood coolant. Minimum quantity lubrication (MQL) systems apply a very light spray of an oil/air mixture to the cutting area. This lubricates the tool as it cuts. The heat of machining burns off or evaporates much of the oil, leaving a nearly dry part and nearly dry chips.

In MQL, also called "near-dry," a nozzle or aerosol generator disperses the oil into fine droplets in air, producing an aerosol or mist. This oil/air mixture is delivered to the work either externally, or internally through the spindle and via coolant holes in the tool. -Program codes control coolant delivery.

The amount of oil varies, depending on the MQL system used and the machining process it is lubricating. A machining center might use 20 to 50 ml (0.67 to 1.67 ounces) per hour.

Accu_Lube MQL on gantry milling machine.

Photo courtesy of Accu-Lube



MQL SPRAY TEST.
Photo courtesy of Guhring, Inc.

Accu-Lube Applcator
Photo courtesy of Accu-Lube

The oil used for MQL is often vegetable based. "A good vegetable oil does the job," said Wally Boelkins, president, Unist, Inc., Grand Rapids, MI, a longtime MQL supplier. Unist uses a refined version of rape seed (canola) oil. It has a high flash point, around 400 to 450 degrees F, Boelkins said, while a petroleum oil might burn at 250 degrees F. "Reduction of friction is the primary thing," he said, and the vegetable oil reduces the coefficient of friction about twice as well as a petroleum oil does.

A number of different companies, including Unist, ITW

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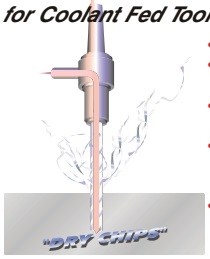

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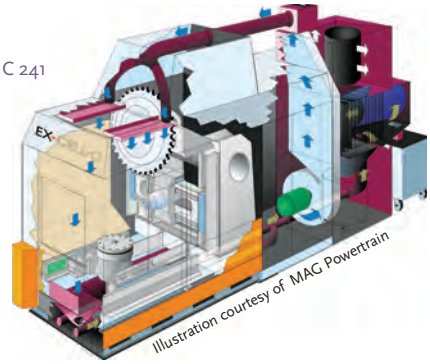
how it works

Accu-Lube and Vogel Lubrication, Inc., offer MQL systems to retrofit onto existing machines. Some machine tool manufacturers, such as Horkos Corp. and Ex-Cell-O (MAG Powertrain), offer integrated MQL built into their machining centers. "Ex-Cell-O seems to have the most experience and the most machines in the field for MQL," observed Mike Hafke, national sales manager - automotive/OEM at Guhring Inc., Brookfield, WI, a supplier of tools and toolholders for MQL.

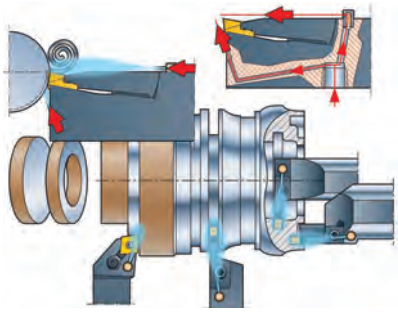


MAG Powertrain/ Ex-Cell-O Model XHC 241 machining center equipped with a "DRY" machining system.

Many of the MQL setups are intended for machining centers. However, options are available specifically for turning. Vogel Lubrication, Inc., Newport News, VA, offers a delivery nozzle that fits on a turning tool holder, which directs the flow of oil mist toward the cutting edge. The Mircona MQL system, primarily sold in Europe (Mircona AB, Gävle, Sweden), but available in the US, provides toolholders with built-in nozzles to deliver the oil/air mixture to the cutting area.

Vogel-Lube tool holder with quick connector for feed tube.

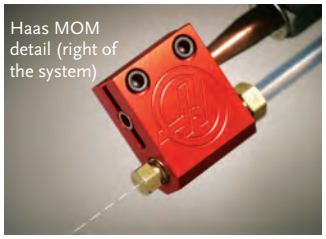
Photo courtesy of Vogel Lubrication.



Mircona truning tool holders for MQL.

Illustration courtesy of Mircona.

Other systems for applying lubricant are available, such as the Minimum Oil Machining (MOM) option from Haas Automation. MOM squirts a small amount of oil toward the tool at programmed intervals, dispensing as little as one drop at a time. The MOM system is standard equipment on one of the Haas gantry routers and is available as an option on machining centers. It is especially effective for tapping, said Dave Hayes, product manager at Haas in Oxnard, CA. Depending on the settings, the MOM system may apply four or five times more oil than a typical MQL mist system, according to Robert Myers, business unit manager, ITW Accu-Lube, Glenview, IL, a supplier of MQL systems and lubricants.



Hass Minimum Oil Machining (MOM) system installed on vertical machining center. Also shown: programmable coolant nozzle (PCOOL) and air blast option (Auto Air Gun).

What can an MQL system do for you? "We do see longer tool life, particularly on deep drilling," said Hafke. The air/oil mist is compressed passing through the coolant channels in the drill. "As it escapes, it expands and blows the chips out with a very high velocity." In one test of deep hole drilling in crankshafts, drills with MQL lasted 90 – 100 meters, while those running wet lasted only about 60.

Guhring drill tip, before and after deep-drilling tests..

Photo courtesy of Guhring, Inc.

Cross-section of drill and tool holder showing Guhring MQL delivery system.

Illustration courtesy of Guhring, Inc.

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Hafke gave these examples of where MQL is being used in the automotive sector:

- Ford Motor Company, 6-speed transmissions, Livonia and VanDyke plants in Michigan
- General Motors, crankshafts, Flint (MI) South plant
- DaimlerChrysler, crankshafts, World Engine Plant in Dundee, MI
- Albon Engineering and Manufacturing, connecting rods, Norman, OK
- American Axle & Manufacturing, differential carriers, MI

Cooling, but without traditional coolant

"It's speculation," said MSU's Kwon, "but it has been estimated that 80 percent of heat [in machining] comes from material deformation and the other 20 percent comes from friction."

Lubrication or low-friction coatings can reduce the friction and frictional heating, but the material is still being cut, so the rest of that heat is still going to be generated. Some goes into the chips and some stays in the workpiece. When you drill a lot of holes close together in a workpiece, either dry or with minimal lubricant, so much heat may build up in the part that it expands enough to impair accuracy. If this turns out to be a problem, you can drill a few holes in one area, then drill in a different area while the first section cools down, Hafke recommends. Workpiece expansion due to heat can also pose a problem with fixturing, he said.

Compressed air may be used directly for cooling. Air is less effective for cooling than liquid coolant, but it also won't thermally shock hot tools the way a liquid coolant does. Also, air can be used to remove chips. To enhance air cooling, consider using a vortex tube, a device that uses compressed air to generate a low-temperature air stream, down to –30 degrees F, for spot cooling. Available from ITW Vortec, Cincinnati, OH, vortex tubes have no moving parts and essentially separate ordinary compressed air into a hot stream and a cold stream.

More exotic and much colder options are also available. The ICEFLY technology from Air Products and Chemicals, Inc., Allentown, PA, directs a stream of liquid nitrogen toward the cutting edge. Liquid nitrogen, at –320 degrees F, keeps the tool and the work very cool indeed, good for faster machining or increased tool life.

Mike Epting, business manager for ICEFLY, related a unique application: liquid nitrogen cooling made it possible to reshape tungsten carbide punches and dies by turning instead of grinding, greatly reducing the amount of time required. For example, turning one die took only 15 minutes; removing the same amount of material by grinding normally would take several hours. ICEFLY cooling technology is available from Air Products as a retrofit, and also is being offered as an option on machining centers from Hardinge, Elmira, NY.

Air Products' ICEFLY liquified-nitrogen cooling system for machining.

Photos courtesy of Air Products and Chemicals

Carbide tube die turned using Air Products" ICEFLY liquid-nitrogen cooling system for machining.

Let the chips fall

Without pressurized flood coolant, the chips don't get washed away. With both dry machining and MQL you need to make sure the chips clear from the cutting area. In most machines, you will use an air blast to do the job.

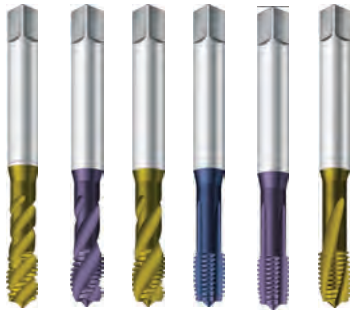
Machines designed specifically for dry machining incorporate chip-handling into their design, providing a free, open path for chips to drop into the collection area. Some machines include a vacuum chip-removal system. Horkos Corp., Canton, MI, takes advantage of gravity for chip removal with its fixture-inverting system. The workpiece is loaded upright on the fixturing table, and then the table is inverted, so the work is machined from below, and the chips simply fall away.

Photo courtesy of MAG Powertrain.

MAG Powertrain/ Ex-Cell-O optimally arranged work area for "DRY" cutting. Inclined sheet metal surfaces without protruding parts or bolt heads allow dry or near-dry chips to flow to the collection area below.

Tapping

"For cutting tools such as end mills, it's not uncommon to run dry," said Alan Shepherd, technical director at Emuge Corp., West Boylston, MA. "In taps, people get heartburn over [it]. Usually when you tap holes, you've already done a lot of machining and have a lot of money into the product. If you spoil a thread you spoil the product," he explained. Emuge of-



Emuge taps for dry and minimum lubricant tapping.

Illustrations courtesy of Emuge Corp.

fers the ÖKO line of taps designed for dry or MQL tapping, as well as tool holders that include a small tube for applying oil mist exactly where it is needed.

When tapping dry or with MQL, it's important to have a means for removing the hot chips, Shepherd pointed out. Often, an air blast is used to remove them, or for through holes, the fixture can be designed to allow chips to exit from the bottom of the holes.

Cranking up your business

Dry machining and MQL open up many opportunities to save money and reduce machining time. Is dry machining in your future? If you're machining hard materials, it could be well worth your time to talk with your tooling suppliers and find out what specialized tools might make it possible to crank up your machines. . . and your profits.

For more information

Air Products and Chemicals, Inc., ICEFLY liquid nitrogen cooling: http://www.air-products.com/Metals/Machining.htm
Cole Tooling Systems, Millstar tools: www.millstar.com
Emuge Corp., taps for dry/MQL tapping: www.emuge.com/taps/oko_machine.html
Ex-Cell-O, machine tools, MQL options: www.ex-cell-o.com, click on "Technology"
Fraunhofer USA Center for Coatings and Laser Applications - superhard amorphous carbon film, Diamor: www.ccl.fraunhofer.org/working_areas/applications/e_diamor.php
Guhring Inc., tools and tool holders for MQL: www.guhring.com,
Haas Automation, Inc., Minimum Oil Machining option: www.haascnc.com/options_VMC.asp
Hardinge, ICEFLY liquid nitrogen cooling option: www.hardingeus.com/index.asp?pageID=23&nid=144
ITW Accu-Lube, MQL systems: www.NearDryMachining.com and www.itwfpg.com/index_acculube.htm
ITW Vortec, vortex tubes: www.vortec.com
Mircona, MQL systems for turning: www.mircona.com, click on "Products" and then "MIRCONA dry lubrication system"
Unist, Inc, MQL systems and lubricants: www.unist.com
Vogel Lubrication, Inc., MQL systems: www.vogel-lube.com, click on "Products" and then "Near Dry Machining"

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Bar Feeding systems simply involve feeding material into the machine, but its impact on a company's total production is enormous. Kevin Meehan, general manager of Edge Technologies, sums it up: "Bar feeders, both short loaders and 12 feet magazine systems, are an affordable and easily deployed tool of automation that effectively increase productivity and unbridle skilled labor for higher value added tasks. By automatically loading and advancing bar stock in a CNC lathe, manufacturers can produce more parts per shift and run their equipment unmanned or semi-unmanned, thus taking precious labor cost out of their products."

Edge Technologies

Edge Technologies,a Division of Hydromat, Inc. presents the newly designed FMB Turbo 3-36, as well as the Turbo 3-26. Both are space saving double-pusher designs featuring GE Fanuc SPS controls and Swiss-type synchronization devices. Hydrodynamic quick-change guide channels allow for quiet operation at high RPM.

The FMB Turbo 3-26 and Turbo 3-36 are automatic Bar Loading Magazine Feeders designed for feeding round, square and hexagonal bar material into CNC lathes. Quick change polyurethane guide channels allow for quiet operation at high RPM. These feeders are compatible with all types of sliding or fixed, CNC or cam operated lathes with spindle bores up to 36mm. Double-pusher space-saving design is 4 feet shorter than single pusher bar feeders.

Edge Technologies also offers The Minuteman, which features a 3-20mm diameter capacity. The Minuteman is equipped with hydrodynamic, quick-change, polyurethane guide channels. The channel is flooded with oil to create a hydrodynamic effect resulting in higher RPM with reduced noise and vibration. Steel ribbing added to the Minuteman's polyurethane guide channels increases strength and stability. Dual anti-vibration devices stabilize the bar stock at two critical points between the guide channel and lathe spindle. The synchronization device for Swiss style lathes employs an electro-magnetic coupling, mechanically linking the lathes headstock's z-axis travel to the bar feeder's pusher.

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.

IEMCA

The TRILOGY 32 from IEMCA is a manual loading bar feeder that feeds 12 foot bar from 3mm to 32mm in diameter. Unlike the old style tube feeders, the TRILOGY 32 is loaded from the top, saving valuable floor space needed for loading a tube feeder and eliminating the puddle of oil found on the floor where the bar is loaded into a tube feeder.

A unique 3 guide channel indexing system permits fast bar diameter changeover through pre-selected ranges. The TRILOGY 32 features a brushless servo motor with "Servo-Sync" to make bar movement integral with the movement of a sliding headstock and fine torque tuning capability which is very important when running small diameter bar.

For more information, please contact IEMCA, a division of BUCCI Industries USA, Inc. at 704-583-8341 or visit the company website at www.bucci-industries.com.

Pietro Cucchi America

Pietro Cucchi, is now introducing the "ONE," a single-spindle line of automatic bar feeders for CNC lathes with fixed and moving headstock. The "ONE" features a hydrodynamic bar guide system with a spring bushing device inside the lathe's spindle. The One allows for control of the feed-out within 0.2 mm of accuracy. It synchronizes the bar pusher with the lathe's moving headstock without mechanical links. The One is now available in a magazine rack configuration for bar stock up to 13' in length and from ¼" to 2" in diameter.

The Multi-Spindle "INTEGRATED" line replaces the machine stock reel and feed-out mechanism with a hydraulic pusher system. It features bar remnant retraction and feed-out in multiple positions. Standard configuration and compact styles are available for bar length up to 20' in length and from 3/16" to 3½" in diameter, and come standard with a magazine rack or a bundle loader system. The Integrated is available for any multi-spindle cam screw machine as well as the latest Index, Schutte, Gildemeister and Euroturn CNC multis. The multi-spindle line has been expanded with the "BASIC," a less sophisticated and economical bar loader system.

For more information, please contact Pietro Cucchi America, Inc. at 847-718-1818 or visit the company website at www.pietrocucchi-us.com.

product focus

Acro Feed

Acro-Feed Industries, Inc. is now providing rebuilding and remanufacturing services for automatic screw machine bar feeders/loaders. Acro-Feed has been a designer and builder of automatic bar and shaped bar feeding systems for screw machines as well as automatic part loaders and unloaders, bar load assists, and automatic bundle feeders for over 50 years.

For more information, please contact Acro Feed at 248-705-8272 or visit the company website at www.acrofeed.com.

Tornos

Tornos' SBF-216 magazine style bar feeder reduces channel guide changeover times down to 15 minutes. With Tornos' quick-change system, operators simply index the guide "block" to the proper size capacity and the changeover is complete. The quick-change system on the Robobar SBF-216 accommodates bar sizes ranging from 2mm to 16mm. This model Robobar is suitable for Tornos' smaller DECO 2000 series of single spindle automatics, specifically the DECO 2000 10a and 13a models.

For more information, contact Tornos U.S. Corporation at 203-775-4319 or visit the company website at www.tornos.ch.

Marubeni Citizen-Cincom

Marubeni Citizen-Cincom, Inc. is pleased to offer the Citizen CAV bar loader (engineered for use exclusively with Cincom Swiss-type turning centers). The CAV is perfectly configured to the speeds, torque, power and axis movements of the Cincom machine. Since the CAV and the Cincom share the same CNC

controller and electrical system, bar feeder movements can be viewed and controlled from the lathe's CNC.

The Cincom bar feeder is equipped to handle round, square and hexagonal stock with diameters from .078" to 1 1/4" and lengths to 13'. Cincom's bar and spindle stabilizing mechanism aligns the bar's center of rotation with the center of the spindle. Even with full-length, 13' bars, the lathe can operate noise-free and vibration-free at speeds to 12,000 rpm.

An auxiliary device pre-positions the bar. Forward and back motion is controlled by a servo that's connected directly to the lathe's CNC. The bar positions to tenths accuracy with no following error. Insertion and braking response times are instantaneous.

For more information about Marubeni Citizen-Cincom please go to www.marucit.com.

product focus

MTA International

MTA International has been serving the Metalworking Machine Tool Industry since 1989 as an import and distribution organization. MTA guarantees your requirements are met with an inventory of appropriate equipment to suite your needs and application whether a 6' or 12' Multi-Tube Type Single Bar Loaders, 4', 5', 6', 12' Automated Magazine Type Loader, or the 20' Multi-Channel Magazine Bar Loader with a 7 second channel changeover. Bar diameters from 2mm to 7" are accommodated.

The Mini-Swiss model of hydrodynamic magazine bar feed is for the 12/16/20mm Swiss Type User. It accepts standard 12' bar stock and is 14'4" in overall length, requires no channel changeover and is equipped with a Siemens controller, synchronization device, anti-vibration device, automatic remnant retract, self adjusting pneumatic gripper and quick change collets.

For more information, visit the company website at www.barfeeder.com.

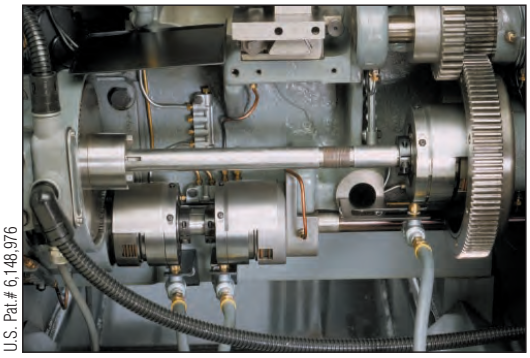
New! Logan Hi-Lo Retrokits - NOW BETTER THAN EVER!

Hi-Lo Retrokit Features:

- Replaces mechanical clutches, roll clutch, band brake and linkages with fast acting air-actuated Logan Clutches
- Positive crisp Logan Clutch engagement - Guarantees cycle time repeatability
- Simplifies clutch maintenance - No disc pack adjustment or slippage
- Quick Stop Power applied brake - Prevents machine coasting
- Ideal for bar loader applications

Savings:

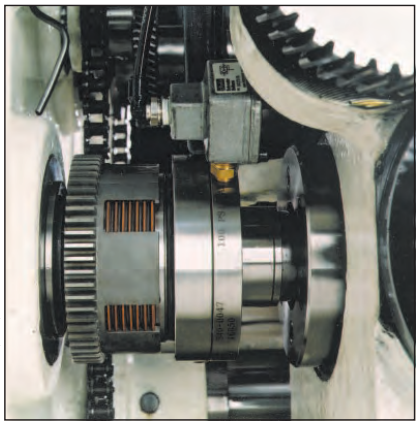
- Increase productivity from 10-20%
- Tools can be positioned closer to the work piece due to repeatable high and low speed clutch engagement
- Better machine utilization - More productivity from existing machines, operators and floor space



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

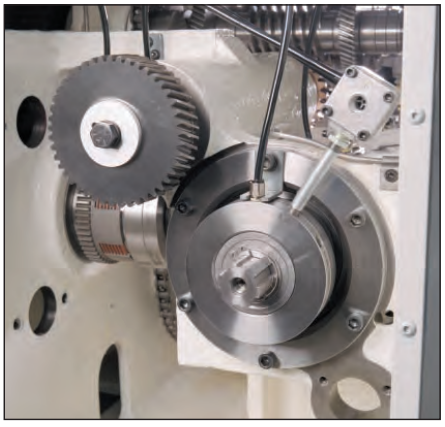
For Model B Davenports

New! Roll Clutch Removal Option



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

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



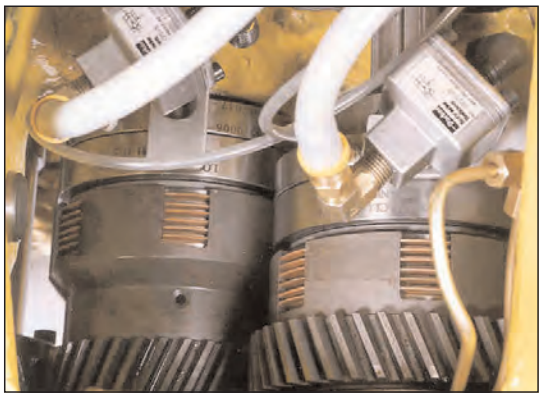
New! Roll Clutch Removal Feature

So you think you need more production capacity?

Logan Hi-Lo Retrokits increase your existing screw machines daily and weekly output from 10-20%, leaving you room for additional capacity and productivity.

Positive, fast acting Logan Clutch engagement allows your screw machine to change speeds much faster than conventional mechanical clutch methods

Reduce cycle time dramatically. Position tools closer to the work piece due to repeatable high and low speed clutch engagement.



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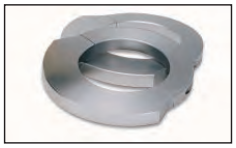

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Come hang with us! **Precision Machined Technology Show** **April 24-26, 2007**

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.

One of the most difficult applications we encounter on the shop floor is machining short parts on our CNC Swiss-type lathes. Usually there isn't much material to grip onto with the sub-spindle. The part in question is about .100" long, but we can only grip onto .040" of it. We use a tapered extended nose collet that has a .400" long extension on it. We use all of the same tools for every set-up, but our production numbers are not very consistent. Even with the same operator on the same machine we've noticed production quantities vary as much as 50 percent. One of the main reasons for the downtime is due to the operator fidgeting with the sub-spindle collet. They have a hard time keeping the part concentric with the backworking tools. We've even started a preventative maintenance schedule to have the operators remove and clean the collet, but we still aren't achieving consistant production.

Concentric Battle

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 Battle,

In the CNC Swiss micro-machining world, detail is king because near perfection is often required. Overlooking even the smallest details can cause significant problems. Never assume your machine tools, work holding tools, cutting tools, bar stock, coolant, machine operators or other production components are flawless. Instituting a PM schedule for maintaining your sub-spindle collets was the proper first step in diagnosing your problem. However, my own past experiences make me think that tooling may actually be your problem.

It's important to recognize that not every extended nose collet is concentric and the collet sleeve is not always accurate.

I suggest trying a left-handed cut-off tool and a standard pick-off collet. A standard collet will have a better chance of being concentric over multiple machines and be easier to consistently install. Also, because the collet is more accurate, the operators will spend less time fighting the correlation between the main side bore and the sub-spindle side finishing bore. When you order the standard length collet, make sure to ask for "extra precision."

Two inherent benefits of a standard length collet is that the part is closer to the bearings, which will reduce vibration. The other benefit is that the part has less of a chance to "wobble" due to the chucking mechanics of an extended nose collet. With this fix you should see a considerable boost in your production numbers and more consistency across multiple machines. Also, your tool life will increase. When we implemented these new practices at our facility we attained repeatable concentricity within .0002" or better.

David Cogswell
Director, Precision Machining Operations
Bal Seal Engineering, Medical Products Group

An ongoing automotive column

By Paul A. Eisenstein

Bang, Bang, it's Dead

It entered the world with the proverbial bang. But when the last Ford Taurus sedans rolled off the Atlanta assembly line in October, it was accompanied by little more than a whimper from thousands of workers losing their jobs.

At a recent meeting, Ford's new CEO, Alan Mulally, projected a sense of calm but clear control, while explaining how his experience at Boeing – where he was credited with leading a critical turnaround – will help him turn the tide at the troubled Dearborn automaker.

At one point, the boyish-looking executive was asked for his thoughts on the failed Ford 2000 project, an earlier attempt to have all of Ford's traditionally autonomous regions work together as a global force. Mulally admitted he needed to get more up-to-speed on that program's problems, adding that "I haven't had a chance to talk to Mr. Trotman yet."

In fact, that conversation with the former Chairman and Ford 2000 architect won't happen. Sir Alex died a year ago. But considering the depth of the learning curve to master the 103-year-old company's history and problems, such a minor slip can be forgiven. The question is whether Mulally is about to repeat history, or rewrite it.

Mulally is restructuring Ford – again – as a global organization with himself as overseer. Meanwhile, Derrick Kuzak becomes global product development czar. The soft-spoken, 55-year-old faces a daunting challenge. In today's hotly competitive and cost-conscious world, automakers can seldom afford the luxury of producing cars for individual regions. Why spend $3 billion on essentially identical sedans for Europe, North America and Asia, instead of $1 billion for a single, shared platform, or "architecture"?

Ford tried to do that at various times, with Ford of Europe, North America and Mazda developing versions of the subcompact Escort. The results were questionable. At one point, virtually identical models were marketed on both sides of the Atlantic, though one was designed in the metric system, the other in inches, with few economies of scale.

When Trotman launched Ford 2000, his team not only tried commonizing parts and platforms, but papered over regional differences, arguing for virtually identical products, processes, even global marketing. The problem: in the States, a car like Escort – or today's Focus – targets young singles on a strict budget, while in Germany, the audience is a more upscale, family buyer.

Kuzak's organization needs shared vehicle architectures that achieve huge savings on development and production costs, while permitting regional buying needs, whether that means tweaks to exterior sheet metal or added – or deleted – content.

The switch to global management is in line with the previous Way Forward turnaround plans. Ford's executive Chairman, Bill Ford, had promised to trim layers of management all the way to the top, and several key executives, including the number two in North America, Ann Stevens, stepped down.

The reaction to Mulally's moves has been mixed. There's a feeling of shock among the troops as Ford slashes jobs, a numbness likely to continue until all the cutting is complete. But those who recognize the depth of Ford's problems acknowledge – if only grudgingly – sharp cuts and massive structural changes are the only way to save a company failing fast.

think tank

Circle Divisions

Using just a compass and a ruler, can you divide this circle into eight regions of equal area?

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

Did you break the code?

I B Q Q Z
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F W F S Z P O F !

Thanks to all the readers who wished us all "Happy Holidays Everyone!"

Miles Free of the PMPA in Brecksville, OH; **Rick Hybben** of Hyco Machining in St. Paul, MN; **Daniel Schlepp** of Wacker Corporation in Menomonee Falls, WI; **Doug Whalen** of Whalen Machine in Freeport, IL; **Steve Gredell** of Empire Machine Works in Raytown, MO; **Jerry Levine** of Chicago, IL; **Jim Brown** of Apogee Machining Services, in Salem, MA; **Al McBride** of Threading 101 in Menomonee Falls, WI; **Eric Rueb** of Northrock Industries in Medford, NY; **Jeff Jovalenko** of KEY MACHINE TOOL in Elkhart, IN; **Bill Todd** of Michigan Rebuild and Automation in Litchfield, MI; **Ron Anderson** of Whitewater Manufacturing in Whitewater, WI; **John M. Weber** of Weber Systems, Inc. in Menomonee Falls, WI; **Jay Street** of Newell & Sons, Inc. in Irwin, PA ; **Cathy Ogle** of Greenville, SC; **Randy Miller** of Vallorbs Jewel Company in Bird-in-Hand, PA; **Kevin Fite** of Methods Machine Tools in Wixom, MI; **Mike Towle; Steve Blackman and Rich Conrad** of Integrated Manufacturing Resources in St. Louis, MO; **Debbie Parrish** of Machine Consulting Services in Durham, NC; **Dave Koepper** of Shur-Lok Company in Irvine, CA; **Jerry Morgan** of K & M Precision Products in Dexter, MI; **Robert Thomas** of A.S. Thomas Inc. in Westwood, MA; **Pat French** of Pro-Form Machine Inc. in Norfolk, NE; **Michael Goldstein** of Cadillac Machinery in Elk Grove Village, IL; **Ron May** of Hunter Engineering Company in Bridgeton, MO; **Gail Kadrich** of Tip-Top Screw Manufacturing in Oscoda, MI; **Jose Medeiros** of Technatron Inc. in Hampton, NJ; **Bob Sullivan** of Herco, Inc. in Fort Walton Beach, FL; **Debbie Whitt** of Halliburton Energy Services in Duncan, OK; **Janet C. Querido** of G. H. Berlin Oil Company in East Hartford, CT; **Tamara Hawn** of Sunnen Products in St. Louis, MO; **Jesse Chanporn** of Harpconn Advance Machining in Glendale, CA; **Mark McCrill** of Langford Manufacturing in Lawrence, MA; **Brian Hurrle** of Alexander Screw Products in Indianapolis, IN; **Uli Kuster** of Blaser Swisslube in Rohnert Park, CA; **Kevin Hardwick** of Northwest Automated in Portland, OR; **Mike Merrill** of Swiss Automation in Barrington, IL; **Chris Morgan** of K & M Precision Products in Dexter, MI; **Lynne Weixel** of GS Design in Tallassee, AL; **Robert Levy** from Hilco Industrial in Farmington Hills, MI; and **Michael C. Kaibus III** of Kaibas Machine Tool in Evant, TX.

postings

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

WESTEC

Los Angeles Convention Center

March 26-29th

Los Angeles, CA

www.sme.org

Houstex

George R Brown Convention Center

Houston Texas

March 6 thru 8

www.sme.org

EXPO Manufactura 2007

Mexico's Largest And Premier Manufacturing Trade Show

Cintermex Monterrey

www.ejkrause.com/expomanufactura

March 13, thru March 15

Auction

M&S Manufacturing Company

CNC Machining Facility

Hudson, MI

March 31 2007

Hilco Industrial, LLC

Online Auction

www.hilcoind.com

Auction

Steelcase, Inc. Stamping, Fabricating

Grand Rapids, MI

March 27th 2007

On-Location (w/ Webcast)

www.hilcoind.com

Auction

FRISBY PMC

Precision Automatic Screw Machine Plant

Elk Grove Village, Il

March 07, 2007 10:00 am

Premier Asset Recovery Group LLC

www.premierarg.com

Trade Show

MicroManufacturing Conference & Exhibits

Hoffman Estates, IL

March 14-15

www.sme.org

Escalator patented

March 15 th 1892

www.butlerwebs.com

March Madness 2007

Men's NCAA Basketball Tournament

March 11- April 2

www.ncaasports.com

KSI

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Minneapolis, MN

March 12-13th

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calendar

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afterthought

Cluttered

The anti anti-clutter movement is pulling itself together as a reaction to the closet organizers of the world. I feel validated and confirmed by the exaltation of mess. Let us all salute the slob.

I have spent a lifetime rationalizing my accumulations of papers. The organized world looks at me like I am crippled and helpless. They see me as imprisoned by my crap, and over time I have descended into shame about my littered nightstand and cluttered desks.

But now the anti anti-clutters have taken the offensive. There are new books by Rabbi Irwin Kula, *Yearnings: Embracing the Sacred Messiness of Life,* and David Freedman and Eric Abrahamson, *A Perfect Mess: The Hidden Benefits of Disorder.* Both extol the upside of disorderly environments and lifestyles.

Did you know that Arnold Schwarzenegger has an open calendar? The Terminator keeps his weights in imperfect order and still governs California pretty well and can eat the impeccable politician Grey Davis for lunch.

My wife Risa is an educational therapist. She helps kids develop strategies to learn better and navigate school more easily. Many of her students, especially boys, are highly disorganized.

She tells me that there is a piece of the brain in the frontal lobes which controls "executive function," including the ability to organize one's things neatly. Her work has helped her to understand my chaotic storage of papers and pens and keys. It still exasperates her when my sunglasses invade the sanctum of the toaster oven, but she rationally accepts my disability as part of the bigger package, which she still seems to love.

In the December 20th *New York Times,* Penelope Green wrote a wonderful article about disorganized guys who manage to thrive amidst clutter. One of her stars is Don Springer, an information technology project manager (uh huh) who won a contest sponsored by Dymo, the label-maker manufacturer, for having the worst "clutter nightmare." His "prize" was $5000 worth of Dymo anti-clutter products, which I doubt he'll ever use. Springer has what he calls his "oh-by-the-way" room, a library/ junk room which his wife would like to turn into a nursery for a new grandchild, but Don "doesn't want to expend the emotional energy it would take to sort through all the stuff."

That is the life story of us, the cluttered. Stuff accumulates. The more it accumulates the more daunting the task to sort through it. So why bother? Until it gets so overwhelming that desperation replaces exhaustion and you ruthlessly throw away everything because if you saved one thing you would have to save another and then you'd need folders and boxes and it would all be worse than when you started.

I live in this messy world, and I bet many of you do to. I remember visiting a good customer, Nick Logarakis, a few years ago. Nick built a very successful machining company in Milwaukee and had significant real estate and banking ventures. His desk was immaculate. No papers. But what impressed me the most was that he kept his telephone in a desk drawer. That was neat. That was neat to the nth degree, almost to the point of bizarre to a person who keeps his car CDs unpacked and unsorted.

My desk is a mess, but I am not. I run two businesses and write columns and articles each month while half blind. There is a difference between the cluttered desk and the cluttered mind.

Yet I wish I knew what was in my briefcase and under my piles. I wish I could organize with a technique more refined than clear cutting. I wish I didn't need six car keys to be able to find one. I wish for one brief shining moment I could put my phone in the drawer – and still be able to find it.

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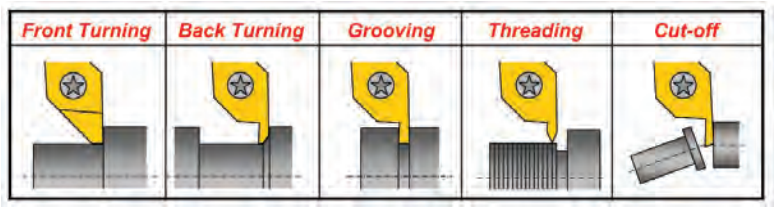

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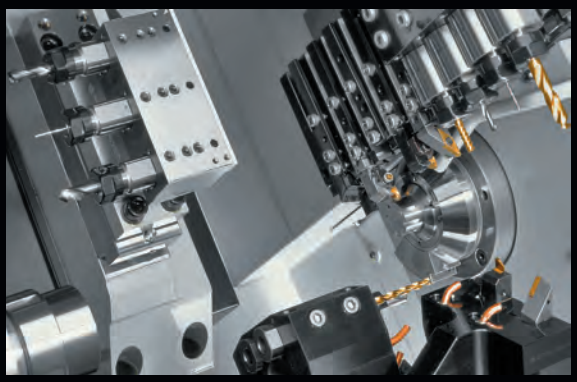

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