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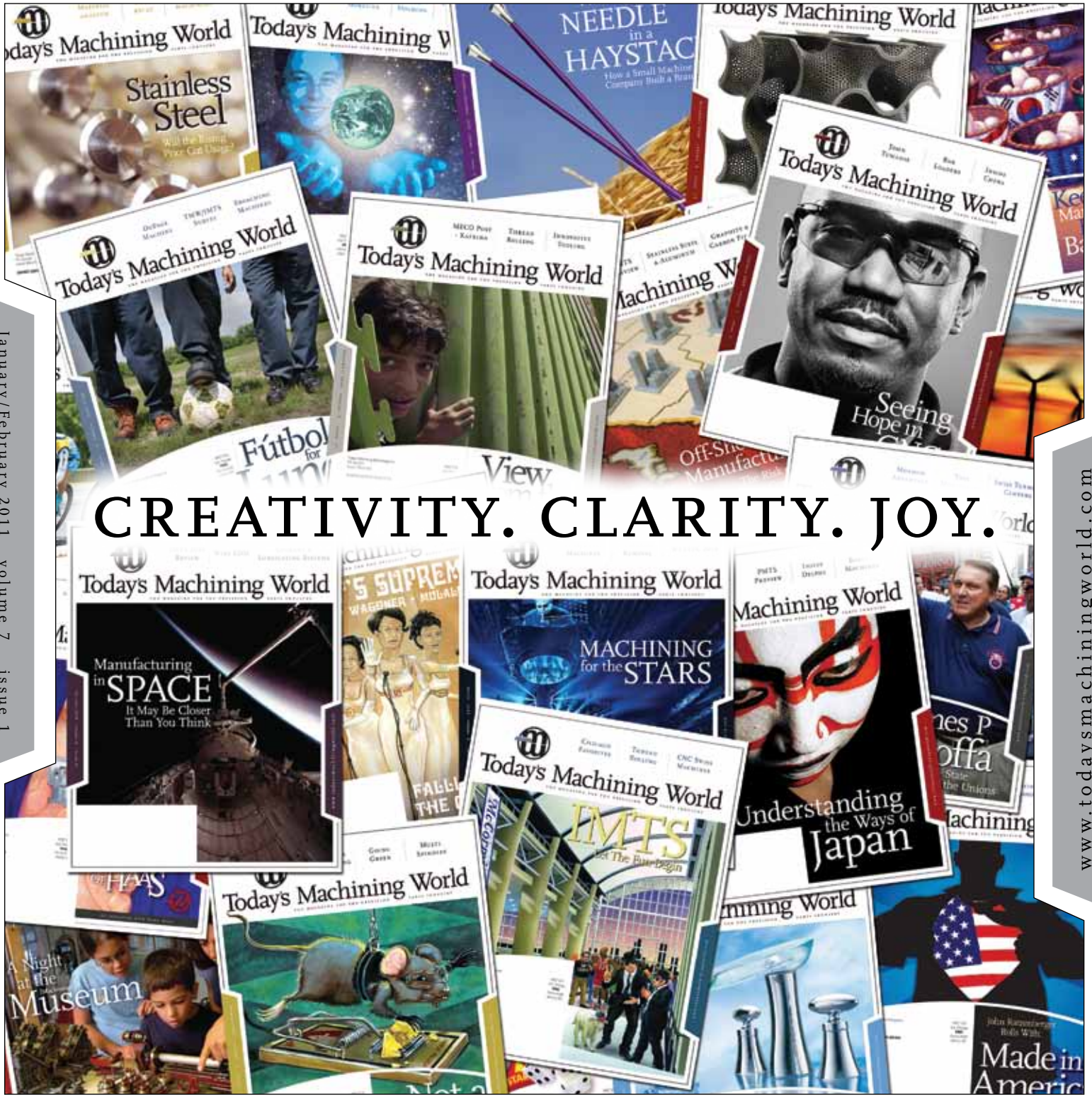

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January/February 2011 volume 7 issue 1

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WHO READS

Driven folks like **Scott Livingston,** president of ***Horst Engineering & Manufacturing Co.*** in East Hartford, CT.

"I live my life at warp speed, but I make time to read Today's Machining World. I look to the magazine for best practices and ideas, and not just about business. I have a mentor who is always pushing me to evaluate my time/energy portfolio. Friends often wonder why I pile so much on an already full plate. I'm a husband, father, CEO of a precision machining company, runner, cyclist, kayaker, hiker, board member, photographer, writer, and environmental advocate. I can't see past the pile of books next to my bed and my Amazon.com "wish list" will break me. I'm a Gen-X'er with eclectic interests. Today's Machining World delivers the mix I like."

Today's Machining World?

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WHO READS

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

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

Today's Machining World?

Today's Machining World

www.todaysmachiningworld.com

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SUBSCRIPTION/CHANGE OF ADDRESS: Basic subscription rate: US$40 for domestic/US$55 for international.

Send address changes and/or subscription inquiries to: Today's Machining World, P.O. Box 802, Skokie, IL 60076 or email emily@todaysmachiningworld.com

CPC Publication Agreement Number 40048288

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

Today's Machining World (USPS 024-909) (ISSN 1945-4643) is published nine times a year; January/February, March, April, May, June, July/August, September, October and November/December by Screw Machine World, Inc., 4235 w 166th Street, Oak Forest, Ill. 60452.

POSTMASTER:
Send address changes to Today's Machining World,
PO Box 802, Skokie, IL 60076.
Subscribers may also e-mail address changes to
emily@todaysmachiningworld.com
Periodical postage paid at Skokie, IL
and additional mailing offices.
CPC Publication Agreement Number 40048288
Canadian Return Address:
World Distribution Service ,
Station A PO Box 54, Windsor, ON N9A 6J5
or email: cpcreturns@wdsmail.com

BPA WORLDWIDE

The Great Masthead Debate

Orginally printed in the very first issue of *Screw Machine World,* Nov/Dec 2000.

Dan, Pels our publishing guru for *Screw Machine World* magazine, thought he was asking a simple question yesterday, "What title should we put on the masthead under your name, Lloyd?"

He set off a day of heavy wrestling with the issue because, for me, it was crucial to the magazine and how I define myself.

"Would you call yourself an editor, a publisher or a writer?" he asked innocently. I stared blankly at the whiteboard on the wall looking for a clue. None of those titles felt right. They were too generic. They were too white bread, too Chevrolet. I thought for a while, and then announced a proposed title for myself. "Call me 'Chief Space Filler,'" I said.

Dan looked at me with anguish and annoyance. He sees his role as shepherding an idea for a trade publication from the initial musing stages and turning it into a professional, moneymaking, ink-and-paper entity in weeks.

"Lloyd, if you do this, they'd use it against you. Your competitors will tell advertisers, 'Look at their masthead, they aren't serious people. This is just Lloyd Graff playing around and asking you to support his indulgences.'"

This hurt, because Dan is correct in a way.

"You have a point, but this is a way of expressing to our readers that we want to have fun, and we want them to have fun when they read the magazine," I replied. "It's a way of saying we are risk takers, that we are serious about what we are doing, but we're also a little goofy, too."

"Lloyd, I implore you, don't do this. You can send this message in your choice of content. Don't do it on the masthead, it's a mistake," Dan said.

"Dan, if I'm going to do another typical trade publication, it's not worth doing for me," I went on. "*Screw Machine World* can't be your grandmother's publication. It has to have energy, a point of view, a sense of joy, or I don't even want my name on the masthead."

The meeting was over, but of course the conversation in my head was raging. What is my role? Does anybody really read the masthead? Can I synthesize my unique contribution in a title? No. But we can use a word to approximate, to set the tone.

So, my official title for this issue only is "Chief Space Filler." I reserve the right to change it for the next issue. I'd love to know what you would call yourself on your company's masthead, on your resumé, or even in your obituary.

Lloyd Graff
Editor/Owner

Lloyd's titles over the past 10 years.

Chief Space Filler
Provider of Passion
Pusher of the Envelope
Mr. Conflict of Interest
Story Teller
Chief Schmoozer
Listener
Brother Where Art Thou
Bid Your Brains Out
Drummer
3-Point Shooter
The DJ Lloyd
Swarfaholic
Getting it Right
One-Eyed Jack
One-Eyed Jock
H.V. Kaltenborn
Touching the Lloyd
Offensive Coordinator
Kerry Wood, Chop Water
Nash Rambler
Corny Hybrid
Raconteur
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Get To
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Lemon Squeezer
Changing Tides
Bypassed
Swish
Krusty
And One
Virologist
Drill Sergeant
Neighbor
Captain Video
Center Brain
Knit One Pearl Two
Keeper of the Faith
Salad Dresser
Fat Chance
Unleavened
The Independent
Black and White
Face to Face, Belly to Belly
Rent-an-Editor
Student Editor
Revisionist
Oligarch

contributors

Lloyd Graff. For a used machinery dealer a first deal is supposed to be like a first kiss. Lloyd can't remember the kiss, but the deal was buying a 9/16" RA6 National Acme from Allen Bradley in Milwaukee when he was 17. One week before he was headed to college he dug up the Acme in Wisconsin. He was pulling down $125 a week and felt like he was not earning it if he couldn't land a big fish. He drove up to Allen Bradley's old multi story fortress in downtown Milwaukee and inspected the piece. With limited knowledge he detected six spindles, threading, collets and pushers. It was running with regular oil. The operator said it was good. Lloyd consulted with his father and uncle long-distance (reverse charges), offered $2,500 and hoped A-B would accept. They did. The machine sold for $7500 during the school year.

Barbara Donohue, "The Engineer Who Writes," started her literary career as editor of a small-town weekly newspaper. On occasion there would be a patch of unsightly white space that needed to be filled, so she'd write up a recipe and a story to go with it. Over time, she developed a following. The police chief in town told her, "I don't cook, but I always read your recipe." After stepping down as editor, she continued for 10 years to write her weekly recipe column and also covered food topics for trade magazines. These days, she writes "How It Works" and the new "Is It Good?" features for *TMW*.

Dan Hummell came to *TMW* via Craigslist. A 10 year Army veteran and lifelong manufacturing fan, Dan cut his first metal on a Bridgeport endmill in 1976. By that time, his father, a maintenance mechanic, had already educated him in the use of micrometers, calipers and metric and fraction conversion—a good thing, since CNC and AutoCad were quite a few years away. Employed at various facilities over the years, Dan has worked as a machinist, automotive mechanic, and sales person, before finally using his military intelligence background to apply good intel practices within the business community as a consultant. Hired by *TMW* full-time as their Sales Manager, Dan looks forward to the magazine's next 10 years.

Jerry Levine has been writing book reviews for *TMW* since its inception and always gets great pleasure out of learning something new each time. For the past 20 years he has been an active volunteer in a homeless shelter project in Chicago's south suburbs. Currently, he is very much involved with the shelter's building of a 100 unit permanent housing facility. Groundbreaking is scheduled for May, 2011.

Emily Aniakou joined *Today's Machining World* in June of 2008, just three months after returning from Benin, West Africa as a Peace Corps volunteer. Before that she lived at a meditation center in upstate New York and before that, she spent a year living in Bangladesh and traveling through India and Sri Lanka. Emily lives with her husband, an untrainable beagle and a teenage foster son in Munster, Indiana, where the snow and cold just won't quit and rumors of an Arizona-like immigration law are sweeping through the community.

Noah Graff joined *Screw Machine World/Today's Machining World* way back in 2005. He started with the title of videographer and gradually transitioned into writing, editing and building a Web empire(soon to be). He is presently editing a new documentary about the Chicago locations of his favorite movie, *Ferris Bueller's Day Off* (see photo). A few of his favorite things in life include Italian food, salsa dancing, and creating. Favorite quote this month: *A person who has never made a mistake has never tried anything new.* –Albert Einstein

Alan R. Earls acquired a passion for gizmos from his father, a mechanical engineer. He is particularly fond of the technology back-stories that illuminate how change occurs and what it means. His articles have been published in daily newspapers, consumer periodicals and specialty publications, and he is the author or co-author of several books about technology history including, *Watertown Arsenal, Route 128 and the Birth of the Age of High Tech*, and *Raytheon Company: The First 60 Years*. Prior to beginning his writing career, Alan worked in a number of manufacturing positions in industry, gaining first-hand knowledge of machining processes and other manufacturing activities. He has also worked as a technical writer on missile and radar systems and is a licensed amateur radio operator.

Todd Toborg has been creative director for *Today's Machining World* since August of 2009. With 11 issues under his belt to date, he is looking forward to continuing his relationship with *TMW*. With a life that revolves around design and sports, he feels right at home with his *TMW* co-workers, especially when getting into time consuming conversations about Chicago sports. There is only only debate he stays away from: Red delicious apples most definitely trump honey crisp.

From the American Precision Museum

On behalf of the America Precision Museum I am writing to thank you for the wonderful article Alan Earls wrote about the museum in your November/December 2010 issue. His article not only captured the essence of the museum but also the state of today's machine tool industry. His photographer did a great job with the additional photographs and his research was impeccable. Merritt Roe Smith from MIT is a huge supporter of the museum and did an internship with Ed Battison, our founder, when he was working on his PhD many years ago. We were pleased he was included in the article. It is a great story—in fact, it is one of the very best articles written about the museum in some time.

I sincerely hope that if you are in the area, you will let us know. We would love to give you a personal tour of the museum and share our story with you. Thank you for the important attention you have given to the story of the American machine tool industry and this museum.

Nancy Hoggson
Development and Communications Manager
Windsor, Vermont

Telepathy with the Readers

Last week, I finally got around to reading a book you recommended, *The American Machine Tool Industry Its History, Growth & Decline*, by Albert Albrecht. In the book the author mentions the American Precision Museum. I recall thinking that I'd need to look into the details of the museum. On Monday, your November/December issue arrived and there it was, a cover story devoted to the museum. So, Lloyd you can add "telepathy" to your many skills.

Thomas C. Scanlan
Surplus Record Inc.
Chicago, Ill.

The Way to Go

In response to your "Swarf" in the Nov/Dec issue about older machines coming onto the market, I think that National Acmes are the way to go. We currently are running 40 and doubling our floor space with an expansion in the spring. You can do anything with an Acme now. We've already rebuilt several of our 6 and 8 spindle Acmes and they are like brand new machines when we get them back. Plus, they are adding CNC slides and lots of other technology that we never thought possible on a screw machine.

I believe that the screw machine industry is going to keep expanding, especially with all of the new features that are available on rebuilds now.

Jason Orbin
Submitted on www.todaysmachiningworld.com

A Distaste for Politicians

In response to your "Swarf" in the Nov/Dec issue about the 2010 political advertising season, I want to say that I care about my country, but it is getting harder all the time to find a candidate for any government office to feel good about. Listening to the exaggerations and partial truths/lies I am reminded of professional wrestling. In wrestling, opponents show no respect for each other in the ring and then eat, sleep and travel together to the next venue. Our national politicians are divided by party to the point that there is no real debate on the issues. They seem to spend so much time on party issues and props for themselves that there is no time for the real work anyway. But fill the trough and they will be shoulder to shoulder to eat their share.

Bill
Submitted on www.todaysmachiningworld.com

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

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By Lloyd Graff

Taking the Plunge

The key question facing American manufacturers, especially contract machining shops in the next two years is, how do you expand? Or, the interesting corollary question, is this the time to cash in?

Let's be real, American manufacturing has always been cyclical and still is. We are a little past a year into the current upturn. With low interest rates, the 2012 presidential election run-up beginning, the depletion of domestic players and the competitiveness of North American industry, these should be two excellent years.

There is always a strong tendency to fight the last war, so a lot of folks are going to be reluctant to expand for fear of the next bubble burst, a la 2001 and 2008. The dilemma so many of us are faced with is that we cut back so deeply to weather the recession that it is hard both financially and psychologically to put it all on the line again. But some people will make the big bets and a portion of that group will win big.

This is the moment to ask yourself which camp you are in. Visibility of the future is always iffy, but I think the odds are strong that we have at least two fat years ahead. If you consider yourself a player who is in the game for the long term this is the time to plunge. If you can't take the volatility of the manufacturing game, sell out in 12 to 18 months.

The train from Beijing to Shanghai goes 200 miles per hour. Amtrak's Acela Express train from Washington D.C. to New York goes half that on a good day. But our erstwhile stimulus package of 2009 has a lot of money designated to make us slightly better than mediocre in rail.

They are upgrading the service between Chicago and St. Louis, Los Angeles and San Francisco, Miami to Orlando and Tampa, and that hot rail market between Albuquerque and Santa Fe, New Mexico.

Train travel is fun. Security is not as annoying as at airports and fares are pretty reasonable. My question is whether we can afford the cost of upgrading a third rate passenger rail system to a second rate one. Our interstate highway system is excellent and air transportation is still high caliber, so do we need to spend billions on passenger rail?

Anyone for buses?

Mike Jackson, the CEO of AutoNation, the big publicly held consortium of car dealers, says pickup trucks are flying out of his stores. He sees this activity as a reflection of the confidence of small business around the U.S.

Jackson is predicting a two or three year ramp-up to the 16 million car build rate, which has traditionally been the standard of automotive well-being. With GM and Ford solidly in the black at 11.5 million units they will be coining money at 16. My question is whether the auto infrastructure can quickly accommodate 16 million. From a precision machining standpoint we are beginning to push the comfortable limits of production now in place. A 40 to 50 percent increase in build rate will strain everybody to meet requirements.

I talked to Kevin Meehan of Hydromat recently about the ability of his clients to expand production. He's seeing some activity, but he thinks the big Tier Ones in Europe, particularly those in

Germany, will be in the catbird seat to provide the sophisticated assemblies that will be in short supply. The Germans maintained their automotive infrastructure, while in North America we allowed the market to gut part of the supply chain.

The opportunity to get fat and happy during the impending U.S. car up tick may be more a bonanza for the Germans than for companies in the New World.

There are at least three

cable series currently chronicling the business life of pawn shops. What is the fascination with people borrowing against baubles or selling their junk to professional peddlers for rent money?

I get a kick out of these shows and their genteel predecessor, Antiques Road Show, because the used machine tool racket that I practice is a bastard cousin of the pawn shop. I'm dealing in esoteric machinery which could be fodder for the furnace, or somebody's stake to a fortune in Turkey or Topeka.

But I'm not only a purveyor of oily, wreaking junktiques from the basements of defunct car making mausoleums. I have my own collections of metal skeletons that have no logical home. Who wants a stock reel for a 4-spindle Conomatic? Who covets orphan bearings for random spindles for who-knows-what machine that used to be made in a now demolished factory in Vermont?

Somebody may want my crusty flotsam and Jetsam, but who buys the pawnbrokers' crap? If I'm the supposed authority on machine tool dinosaur bones, who's my pawnbroker?

Once I almost traded an Acme for a yellow Mercedes convertible. Should have done it. Dumb iron is just dumb iron, unless it's got a Fanuc control.

Goldman Sachs is valuing

Facebook at $50 billon and I am still calling my kids on the phone and texting only if I've got a magnifying glass available.

Frankly, I don't care what my third cousin's niece had for breakfast or if a high school acquaintance just had a prostate biopsy. I'm not particularly social, but I do love media. I know Facebook CEO Mark Zuckerberg is Time's Man of the Year and his success is legendary, but for a 60-something guy like me, Facebook seems like an Internet tinker toy.

What am I missing here? Are any of you machining brethren, machinery mavens, media types, etc. actually using Facebook either personally or professionally? Or is it just the province of children, teenagers, and Generation X, Y, Zers?

The growth of Facebook has been stunning, and Zuckerberg vows to connect the world. Every Bolivian lithium miner, vodka stained Finnish reindeer rancher, and Polynesian pearl diver supposedly will be clutching their iPhone waiting to connect with a sopping lobsterman from Maine. Six degrees of separation between Osama Bin Laden and General Stanley McChrystal.

Readers, bloggers, actual friends, please tell me about your Facebook divorces, your Facebook reunions, or better yet, your Facebook sales.

With the New Year

beginning I wanted to see what the Sunday New York Times, the reflection of the Eastern liberal elites, would be writing about. The front section was a montage of pessimism and orneriness about public workers' pensions under attack, New York state's financial woes as Andrew Cuomo takes over in Albany, and the inability of young workers to find livable wage work in southern Europe.

The pieces were well done, but the editorial judgment of The Times was indicative of what I see as the disconnect of the public and business environment at this moment.

The politicians and elites (journalistic, academic and financial) are fixated on a problematic world economy while the people who have weathered the past three years are rearing to make money. You see this in the stock market, where the Gotham hedge funds and mutual funds have generally fought the tape expecting a double dip recession, deflation and more recently stagflation with commodities rising rapidly in price.

Meanwhile the Dow is up 80 percent from the 2009 low and Christmas sales were up twice as much as the consensus predicted.

The recent Purchasing Managers' Chicago survey showed a stunning burst of industrial activity and almost everybody I talk to in manufacturing is bullish.

A few straws in the wind—I recently heard of two companies that flew heavy machine tools to the U.S. from Europe to get them on the floor in 2010. Also, with demand strong in China, machine tool firms in Japan are rationing supply because they do not want to shut out customers from around the world.

As I look at my Graff-Pinkert used machinery business I am wondering where we are going to find the skills we may well be needing in 2011.

The N.Y. Times is still looking at a 2009 world. Fortunately, we are living in 2011.

As Charles

Barkley so eloquently stated in his first memoir, "I may be wrong, but I doubt it."

Today I'll put on my Carnac turban and peer into 2011.

I predict—the economy will grow much faster than most economists are forecasting. My number is 5.2 percent for the year. The manufacturing economy is taking off. Auto sales could reach the 14 million rate. Employment will improve with the tax issue settled for the moment and Congress writing the rules on Obamacare. Housing will still be tough, but the big problem children of housing—Florida and California—have both stabilized. Deflation will be off the table as will the dreaded double dip recession. Congress will actually start to seriously discuss the deficit because the Tea Party folk will balk at raising the debt ceiling in April.

I predict—Hilary Clinton will discuss running against Barack in 2012 but decide against it. Sarah Palin will travel to Iowa and decide to run. Mike Bloomberg of New York will look at the field on both sides and decide whether to run for President. I predict—he will decide to run as a Republican and will win the nomination and the Presidency in 2012. Bloomberg never loses. If he wants it bad enough and opts to run, he will become the first Jewish President.

I predict—The Boston Celtics will win the NBA Championship and Philadelphia will win the World Series. The surprise team in baseball will be Washington, but they are two years away from a pennant. The Cubs will finish a close second behind Cincinnati in their division.

Here's hoping you don't agree entirely and contribute your own fearless forecasts.

Maybe if you are

living under a rock you haven't heard of GROUPON™. But this two-year-old company allegedly had the chutzpa to reject Google's $6 billion offer to acquire it.

So what do they do?

They sell coupons for goods and services on the Internet with good writing, a sense of humor, and a cool concept—the deals

swarf

have a limited time frame and a minimum number of people need to take them before they kick in.

Noah Graff and I heard Andrew Mason, the 29-year-old founder of GROUPON™, at a *Wall Street Journal* forum on growing your business. We were fascinated by his story and self-effacing demeanor. As he told it, the GROUPON™ idea was not his brainstorm. He was interested in social media and had developed a Web site to attract young people to political meetings. A venture capitalist liked what he was doing and invited him to use the concept of attracting a minimum threshold group for a commercial purpose—i.e. selling discounted goods and services. As Mason recounted it, "he didn't have anything better to do," and "somebody was dangling a lot of cash in front of him." So he went to work on the site with gusto. It caught on like wildfire, and he and his founders realized they had a monster by the tail. Mason started hiring salesmen and building infrastructure immediately, because as great an idea as GROUPON™ was, it was eminently copyable.

Since Noah and I heard Mason speak we have been working on our own version of GROUPON™ for the industrial world, which we call "The Real Deal." The folks at Trusty-Cook Inc., a manufacturer of wonderful and unique non-marring hammers that replace the primitive lead and bronze hammers, immediately loved the idea and did their first Real Deal email blast in December. They have been very happy with the results and are signed up to do two more in the coming months.

If you think you don't do discounts, think again. The possibilities are tremendous. If you want to do one give our Sales Manager, Dan Hummell, a call at (630) 715-4318, send him an email at dan@todaysmachiningworld.com, or email Noah Graff at noah@todaysmachiningworld.com.

See how the Real Deal can grow your business.

I've been asked many times over the last 2.5 years since I almost died of congestive heart failure, if I am a changed man because of the experience.

The answer is yes and no.

I got back into my magazine work within days of getting home from the hospital. I was more passionate than ever to write my stories. The machinery business was harder to get into because in 2008 and 2009 business was so awful it seemed like anything I tried failed. I probably would have given it up if I could have financially, but after fighting so hard to live, I didn't want to give in to financial duress.

Recently, I read a piece in *Spirit Magazine*, the publication of Southwest Airlines,

about happiness. The thrust of the article was that we are programmed for happiness by our upbringing and biology, but on the margins we can decide to be happier if we commit to it.

This has been the case with me.

Since my heart surgery and a laundry list of ailments I actually feel happier and more content that at any other time in my life. At least partially, being happy is an exercise. I have made it a habit to make a mental note of things I'm grateful for every day. This is a regimen and I do it more regularly than walking on the treadmill. I believe it has made a difference in my personal happiness quotient.

I can honestly say I feel happier and more content today, 2.5 years after my Armageddon. Not that I would recommend it.

By Jerry Levine

book review

WAR

For 15 months, reporter Sebastian Junger followed a platoon based in a remote mountain outpost in eastern Afghanistan. His objective was to convey war as soldiers really live it. *WAR* illuminates the lives of men and women who fight for us, how they feel, how they live and learn, and how they survive and die all too randomly.

Junger asked to be assigned to the point platoon based in the toughest position in Afghanistan. This was the second platoon at Camp Restrepo in the Korengal Valley. Junger commented that even though he had been imbedded with fighting groups previously, he was totally unprepared for the level of violence he was about to experience.

Firefights were an almost daily occurrence. Enemy fighters might be 300 or 400 yards away shooting bullets that cover the distance in about half of a second. The first warning might be the light from the tracers, the next is the distinctive snapping sound as the bullet breaks the sound barrier just inches from one's head. Finally, a second later, the soldier hears the initial gunshot. Hopefully, by then he has long since dove for cover.

There is no time for fear. In combat, a soldier's fear actually recedes and a rapid response action takes over. Pulse, blood pressure and adrenaline levels go through the roof. But at the same time the soldier's training takes over and concentration and control reach a peak. Unfortunately, the adrenaline rush can become addictive, which can lead to psychiatric problems later. Junger points out that by the time the tour was over, half the platoon was on psychiatric meds.

Junger covered an ill-fated mission to recover weapons caches hidden in one village. As the soldiers moved in, there was considerable fighting and five young civilians were killed. The senior U.S. commander, Col. Ostlund (who Junger thought was excellent) met with village elders to discuss the deaths. Ostland condemned the enemy who had paid young Afghan kids five dollars to go out and shoot at the U.S. soldiers. The soldiers ended up killing the young kids. After the Americans left, the elders met to consider Ostlund's plea. They decided to reject it and declared a jihad against every American in the valley. One final upshot of this attack was that even civilian deaths committed by the Taliban (which far outstripped those by the Americans) were then blamed on the Americans.

Later that night a column of U.S. soldiers was ambushed along a mountain trail. The enemy's objective was to cut off the first few lead men (officers) from the rest of the column and capture them, probably for propaganda purposes. The point man, Sgt. Josh Brennan, was hit eight times from a distance of 20 to 30 feet, while the rest of the column was taking heavy fire. Specialist Sal Giunta, a fire team leader, quickly assessed the situation, "Everything kind of slowed down, and I did everything I thought I could do," he said. He saw enemy fighters dragging Brennan down the hillside. He emptied his M4, killing one and scaring off the others. He recovered Brennan and while wounded in two places, carried his friend back to the remains of the column which was still desperately fighting for its life. For his bravery Giunta was awarded the Medal of Honor last November—about six months after this book was published.

On a deeper level, Junger asks, Why? What makes otherwise normal men fight and kill? Junger concludes that it's frequently love that makes men fight and gives them uncommon courage. Courage is a love that won't let a comrade down. In Sal Giunta's case he raced through heavy enemy fire to kill an enemy soldier who was carrying away a wounded buddy and brought him back to safety.

At the Medal of Honor ceremony Giunta said, "It was nothing, *anyone* would have done it." What he meant was *anyone in the unit* would have done it. It's the desire to never let their buddies down that sustains these soldiers under such tremendous pressure and makes them fight. That is the ultimate of love. There is no greater love.

(Junger and photojournalist Tim Hetherington also directed the documentary film Restrepo based on this same experience. The film won the Grand Jury Prize at Sundance in 2010.)

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

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William Shaffer, vice president of Conicity Technologies

is it good

is it good

With Barbara Donohue

Today's Machining World's new feature "Is it Good" investigates how new or unique products work by interviewing the people who developed them. In this interview, William Shaffer describes how his edge preparation machine addresses tool failure issues with an automated brush honing process.

William Shaffer, vice president of Conicity Technologies, Latrobe, Pa., worked as a machine designer for many years. In the 1990s he became curious about tool failure modes and developed an edge preparation machine for precisely forming a cutting edge to maximize tool life and efficiency. He called it Engineered Micro Geometry (EMG). His company, Conicity, was formed in 1999 in association with Weiler Corporation, Cresco, Pa., a manufacturer of the abrasive brushes used in the precision Conicity honing process.

What does EMG technology do?

Cutting tools live and die based on corner strength. EMG profiles the cutting edge so the edge-prepped area is thinner where the chip is thinner, strengthening the corner and reducing the rubbing that generates heat. Controlling the micro-geometry of the cutting edge not only has significant effects on overall tool life and metal cutting efficiency, but also surface finish and the formation of burrs.

How did you develop the technology for EMG?

The idea of varying the edge preparation started out with my curiosity about why certain tools fail specifically due to heat. I made an extensive study of tool failures, starting in 1999.

The study began with a tool that has a trademark failure pattern: the plunge-style grooving tool. This tool fails more than 90 percent of the time due to heat, with the corners of the tool being "burned." Typically, the center region of the cutting edge of the tool would still be intact after both corners had failed.

Once I identified the tool failure mode as edge prep rubbing, the next step was to control the distribution of the edge prep—keeping the edge prep in ratio with the chip being cut. The edge preparation process parameters were developed in late 1999 and the metal cutting testing began.

Our first edge preparation machine was introduced at IMTS in 2006. We now offer insert, round tool and drill preparation systems suitable for use on the shop floor. They use a precision, automated brush honing process to produce the correct edge profile.

What can your edge preparation machine do?

In one application, the PCD tools used for high-speed milling automotive heads lasted 80,000 heads. The failure mode was burr generation. We had the engineer take 18 tools out of the batch and edge prepped them. The shop then got 280,000 heads on a tool.

There isn't a tool you can name that we haven't improved: broaches, reamers, high speed steel tools, and other materials. We edge-prepped 2" broaches for a washing machine manufacturer. They ran eight times longer.

Can edge preparation help make dry machining more practical?

EMG allows the efficiency of the metal cutting process to remain at a high level. When metal cutting efficiency is up, forces are lower and heat generation is reduced. Once the source of heat is essentially controlled, then the advantage of the Micro-Geometry edge prep can be combined with correct substrates, different tool geometries, and high performance tool coatings, to allow dry cutting to become a more economical proposition for the industry.

What's in store for the future of EMG?

The manufacturing sector and the environment's demand for effective dry machining to help reduce pollutants will grow. EMG is already a key factor in that process.

Efficient machining of both new and existing aerospace materials will soon need to be at a much higher rate, too. In a few short years, the number of machines required to support global aerospace production will exceed the number of machines that exist. High speed machining of composites, reinforced plastics, and carbon fiber will become more and more important. EMG is already effectively functioning in these areas.

How can a machine shop use EMG technology?

Shops can lease or buy our machines. Models are available for forward-cutting tools (reamers, drills, gun drills) and side-cutting tools (end mills, taps, steps on step drills). There is a model specifically for inserts. The machines will do any material including carbide, cermet, PCD and CBN. To operate, you simply load the tool and consult a chart that tells which program to run, based on tool and process parameters.

On the drill edge prep machine, for example, you can run 100 tools per hour. The machine makes both cutting edges the same, which helps the drill track straight.

Is it good?

You bet. Game-on.

◀ Doosan Infracore

Doosan Infracore introduces the DNM 400A vertical machining center, designed for high productivity with precision tolerances, and built to fit the most crowded shop floors. The DNM 400A's rugged, one-piece casting is strategically ribbed to prevent distortion during heavy or interrupted cuts. Fine grain Meehanite is selected for its superior dampening characteristics and ability to dissipate heat. Widely spaced linear guideways give excellent support to the saddle in all locations, regardless of the table's load distribution. Each guideway is induction hardened and precision ground. Rapid traverses are 1181 ipm along all three axes.

For more information, please contact Doosan Infracore at 973-618-2500 or visit www.usa.doosaninfracore.co.kr/.

▶ EXAIR

EXAIR's new High Temperature Air Amplifier offers a simple, low cost way to move high volumes of hot air to surfaces requiring uniform heating while in a furnace or oven. There are no impellers or moving parts to wear out. The High Temperature Air Amplifier amplifies airflow up to 18:1 at outlet. Its design is rated for environments up to 700 degrees Farenheit and its surface is protected from heat stress by a mil-spec coating process (developed for the aircraft industry), allowing easy disassembly for changing shims or cleaning. Efficiency is high and the sound level is low at only 72 dBA. Prices start at $359.

For more information, please contact Exair Corporation at 800-903-9247 or visit www.exair.com.

◀ Hardinge

It may have a small footprint, but the Hardinge GD5C2 rotary indexer packs a big punch. It weighs only 55 pounds so that you can place it without a hoist. The Hardinge-engineered mechanical components have proven to be all that you would expect from a company known for their precision and reliability. For Hardinge it began in 1901 when they manufactured their first 5C collet. The Hardinge 5C threaded-nose spindle followed along in 1940. The Hardinge collet closer designed for their manual indexer back in the 1960's was so sturdy, efficient and on-target for industry needs, that it is still an option for this CNC indexer design today.

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

fresh stuff

◂ INDEX TRAUB

INDEX TRAUB announced the new TNL18 sliding headstock automatic lathe and its variant, the TNL18P production machine. The TNL18 can be changed over in minutes to produce precision parts with or without a guide bush for long or short parts from bar up to 20 mm diameter. Up to three tools can be on the part at once. The machines are ideal for medical component machining, delivering precision and qualified surface finish in a single operation. The tool capacity of the TNL18 can be increased to as many as 54 tool places through dual- and multi-holders, extending productive times.

For more information, please contact INDEX TRAUB at 317-770-6300 or visit www.index-usa.com.

◂ Methods Machine Tools

Methods Machine Tools, Inc., a leading supplier of innovative machine tools, automation, and machine tool accessories now offers the VisionGauge® Digital Optical Comparator (Patent Pending) in a vertical configuration. Parts are mounted flat on the system's XY stage and the optical axis is vertical (the lens is looking down on the parts). The most appropriate VisionGauge® configuration for a given application (either horizontal or vertical) is typically dictated by fixturing and mounting considerations. Another application appropriate for the vertical VisionGauge® is the inspection of craniomaxillofacial implants in the orthopedics industry—also difficult to fixture in a horizontal system.

For more information please contact Methods Machine Tools, Inc. at 978-443-5388 or visit www.methodsmachine.com.

▸ ZPS America

ZPS America announces the new 8-spindle ZPS 867 CNC multi-spindle production center. The 867 can accommodate stock to 72 mm diameter. Provided with a double Siemens 840 D CNC control, the European-built machine offers up to 72 CNC axes and can perform nearly any metal cutting operation on precision parts from drilling and tapping to milling, spline gears, broaching and hobbing. With a cast iron base and total weight of more than 20 tons, the 867 is extremely rigid. Combined with the highest spindle torque in the industry (191 NM), the stable 867 can handle difficult materials with great precision.

For more information, please contact ZPS America LLC at 317-452-4030 or visit www.zpsamerica.com.

With Alan Earls

Today's Machining World's new feature "Orgins" tells us the stories of how successful technologies, companies and people got their start. This month we interview a pioneer of rapid prototyping technology, Scott Crump, the founder and CEO of Stratasys Inc.

A 3D Vision Spawns Stratasys, Inc.

Back in the mid-1980s PCs were just starting to take over the workplace and CAD/CAM was a bleeding edge technology that only large companies could afford. The idea of a machine that could create 3D parts automatically was pure science fiction.

That changed between 1987 and 1988 when Scott Crump had a vision of an easier way to create prototype components, which resulted in the invention of a technique called Fused Deposition Modeling (FDM). (Generically, FDM can also be referred to as "additive" technology.) As it turns out, others were thinking along the same lines, notably 3D Systems, which actually brought its own prototyping system to market in 1987, two years before Stratasys.

Although the development of 3D prototyping technology generated considerable excitement, initially it was too expensive for any but the largest companies. But there were enough customers looking for a competitive edge, particularly those in aerospace, medicine and automotive, to make Stratasys viable.

It wasn't long before these early adopters discovered that they could use Stratasys products not only for prototyping but for making production items, too. In fact, the ability to produce in small quantities began to seem like a competitive advantage. Since the first machines, dimensional tolerances and surface finish have improved. Costs for the machines have also dropped dramatically from the six figure range to the low five figures.

Additive technology has proven so successful that it is often used for small and medium-size production runs and, for manufacturing concerns, has proven to be a cost-effective method of producing custom tools and fixtures.

Above: CEO of Stratasys Inc., Scott Crump.

What inspired you to develop this technology?

CRUMP: While running another company I experienced firsthand the need to get prototypes quicker and less expensively than the traditional manufacturing processes allowed. I realized that every manufacturer faced the same problem I did. I imagined there being a better way.

Did you have a specific vision for what the technology might do?

CRUMP: I dreamed of a machine that could help the design engineer get prototypes quickly and without the huge expense. I thought that if this were possible it could make product development departments much more efficient and enable designers to improve products, because they wouldn't be so limited in the number of prototypes available to them. With additive manufacturing equipment, in-house engineers can make a dozen iterations of a design if they choose, and the design gets better each time. The second part of that vision was the windfall—the savings in tooling costs that naturally follow.

Have you been surprised at the growth and development of this technology and the way it has been applied?

CRUMP: The vision I had was to provide a small machine that would fit on the desktop of the design engineer and be affordable by any design or manufacturing organization. This has really become a reality in the last few years, which has driven the growth in unit sales. Something that never ceases to amaze me are the unique applications manufacturers continue to find for additive manufacturing. I never imagined that fashion designers would make purses and clothing with this technology. And I didn't imagine the business of Shapeways.com, which builds customized items for consumers, or that cities would build models of their entire downtown to promote tourism.

What have been the biggest challenges in developing and improving the technology?

CRUMP: It's a continuing challenge to drive the cost down while bringing the machine quality up and reducing the footprint of the machine. We've come a long way improving machine accuracy and repeatability, and have greatly reduced machine size. But these are ongoing challenges that will never end. Another major challenge was to create a better user experience by making the machines very simple to operate. We have come a long way in this area. Several of our machines can be run by beginners with no training. They just follow prompts on an LCD menu.

Where do you see the technology evolving and fitting within manufacturing enterprises?

CRUMP: The various additive manufacturing processes available are already being used frequently for producing manufacturing tools like jigs, fixtures, assembly aids, guides and gauges. They are also being used for low volume manufacturing of parts. Additive manufacturing is so much more efficient and cost effective than traditional processes, it's just a matter of time before it becomes mainstream. In the not too distant future additive manufacturing equipment will reside in every shop next to the machining equipment.

How could precision machine shops and others in similar manufacturing fields use additive technology in their shops today?

CRUMP: They can use this technology to help win bids. Overnight, you can produce a physical model of the customer's job to give them immediate feedback. You will pleasantly surprise the customer because they are used to waiting for weeks to see a part.

It is also a great way to make manufacturing aids, like jigs and fixtures. One of the biggest benefits to any size of manufacturer is to quickly and inexpensively produce custom manufacturing and assembly tools. Every manufacturer needs a variety of custom tools. With additive manufacturing, you can have that tool in under a day and you can save from 50 – 95 percent of the costs. It can also help make short run production parts. Although it's not for mass production, if you make only 10's, 100's, or a few thousand of any given product model per year, there's a good chance additive manufacturing could save you an enormous amount of money. You can eliminate the high costs of individual part machining or of making injection mold tooling and let the additive manufacturing system build the components using nothing but the CAD file. The machine can even produce complex assemblies, already assembled, requiring no humans to do it.

Getting started is easy. You can initially use a service bureau—we have our own but there are many others—or you can invest in the technology yourself. Our products start at around $15,000 and range up to around $450,000. The main difference is the maximum build size. Our largest machines can create parts up to 36" by 24" by 36". There are also some differences in the range of materials and ease of use.

Left to rt.: Steve Weiss and Jens Bogehegn, co-founders and owners of Zacuto USA

Photo courtesy of Zacuto USA

Milling Dollars Baby

Manufacturing Filmmaking Accessories

By Noah Graff

Ten minutes into my interview with Jens Bogehegn and Steve Weiss, the co-founders and owners of Zacuto USA, a filmmaking accessories manufacturer in downtown Chicago, they break off on a tangent, excitedly brainstorming and debating production decisions for the upcoming season of their Emmy Award winning Web video series, *The Great Camera Shootout*. On the show, Jens and Steve, veterans of the film and video production industry, scientifically review every current HDDSLR camera, pitting the quality of the video footage from those cameras against the images of traditional film cameras. Both individuals are intense, driven businessmen, who take great pride in the filmmaking accessory products they build. They like being in the manufacturing business, but they will be the first to tell you that their first love is filmmaking. "If you had talked to us seven years ago and said, 'one day you guys will be manufacturers,' we would have laughed at you," Steve says.

Before the Machining Business

Jens met Steve in the mid-'80s while looking for a place to do video editing. Soon after, Jens worked as a freelance cameraman almost exclusively with Steve through two former businesses. In 2000, they started a production house together called Zacuto Films and in 2001 formed Zacuto Rentals, a camera rental division of the company. In 2005, they created Zacuto USA, the manufacturing branch of their company.

Left: Z-cage kit with DSLR camera
Photo by Zacuto Inc.

The High-def Revolution

Around 2001, High-Definition video cameras struck the professional video production world when Panasonic introduced the VariCam line. The VariCam revolutionized the filmmaking world because it could shoot in 24p ("p" stands for "frames per second"), the same frame rate as film cameras, rather than

being limited to 30p, the speed which video has traditionally been shot on in the U.S. The VariCam's images, when shot on the 24p setting, produced an image similar to that of film. This was a dream come true for filmmakers everywhere because the camera still had the ease of use and economic advantages of video cameras. Shooting film has always been extremely expensive, time consuming and labor intensive. The light sensitivity of film allows less leeway for shooting in natural light compared to some of the latest HD video cameras, so shooting it requires more extensive lighting equipment and often a crew. Also, a bargain on 35 mm film stock could be $30 for a minute of footage, while videotapes cost a tiny fraction of that. After shooting, the film has to be sent to a lab for processing, which creates more time and expense. Then, converting film footage to a digital format to edit it on a computer is a much more involved process than transferring digital footage into a computer.

If you can't picture the difference between film and video footage, think about images from a Hollywood movie or TV show shot on film and compare them to the images from a newscast or sporting event shot on video. It's not that 30p video looks bad, but the look of film is what many people consciously or unconsciously believe a beautiful, professional image should look like.

High-def for the Masses

Soon after the VariCams came out, Jens and Steve bought two or three of them for their rental business for about $100,000 each. The cameras were always checked out, because according to them, at the time there were only about 100 VariCams in existence worldwide. But in 2004, the video production world again was turned on its head when Panasonic came out with its prosumer High-definition camera,

the HVX 200. Suddenly almost anyone could buy a video camera that shot 24p HD video for $5000, and its images looked pretty good. Although the quality of the images was not quite as good as that of the $100,000 cameras, it was good enough that footage shot on both cameras could be seamlessly intercut.

Steve and Jens were blindsided by this game-changing technology. They knew that the video camera rental business would never be the same. Until then, normal people didn't buy professional video cameras, they rented them because quality cameras were far too expensive. Now, most professional and avid amateur video/filmmakers were going to buy their own relatively high quality video cameras.

A New Opportunity

"We were quite upset, but that was the greatest thing that could have happened to us as a company," Steve says. Steve and Jens knew that the only way they could stay in business was to find a way to serve the needs of video makers who

Above: Jens Bogehegn testing a 35 mm film camera for ***The*** *Great Camera Shootout*
Photo by Zacuto Inc.

Left: Panasonic HPX 170 Zacuto Handheld DOF Filmmaker Kit
Photo by Zacuto Inc.

would be using these new prosumer cameras. After trying out the new technology for themselves they realized that although the video from these cameras looked pretty good, the physical design of the cameras was poor for shooting in a professional manner. The cameras were small, and often not ergonomic, so they were awkward to hold steadily while a cameraman walked with them. The expensive old school cameras were much larger and heavier, but they had been well designed in many respects—they balanced naturally on the shoulder of the camera person and had an electronic viewfinder designed to fit conveniently against the camera person's eye.

On walls throughout Zacuto's headquarters, large ancient video cameras are mounted like animal trophies. During my visit, Steve pointed to one of the trophy cameras and with both conviction and sentimentality exclaimed, "That was a great design, ENG—Electronic News Gathering style."

Inventing the Rigs

As much as Jens and Steve loved the old cameras, they knew what they had to do for their business to survive. They had to make the new prosumer cameras practical for shooting video in a professional manner. So they dove into the manufacturing business, building kits of parts primarily made from aluminum and plastic, which connect with one another to form camera rigs. Steve refers to this concept as the "tinker toy" system. The majority of parts are secured to one another with rods that fit into holes. They are held in place with clamp mechanisms, as opposed to threaded screws. This system gives the pieces flexibility to slide and turn at different angles, so the camera person can customize the rig to their preference.

How It Works

The foundation of Zacuto's rig system is the Universal Baseplate. They call it universal because it is designed so that any camera can be secured to it. When the camera is secured to the baseplate it has the ability to slide vertically, horizontally and be raised in height. The Universal Baseplate is used to secure the camera to a shoulder mount, tripod or other Zacuto designed devices to hold up the camera. The baseplate is mounted on 15 mm aluminum rods. The rods are made to connect to other components which clamp on as arms. The arms hold features such as handles, microphones, mat boxes, monitors and mechanisms that enable a camera person to smoothly focus or zoom.

The DSLR Revolution

Today, Zacuto's rigs are more valuable to filmmakers than ever because of the proliferation of DSLRs (digital single-lense reflex cameras) which can shoot extremely high quality 24p 1080i High-definition video. Since HD video capability was introduced to DSLRs in 2008, millions of filmmakers worldwide have fallen in love with them for they same reason they loved the VariCam and its prosumer offspring, these cameras have the ability to deliver high quality images

Above: Z-Finder jr., One of Zacuto's optical viewfinders
Photo by Zacuto Inc.

Left: Components for the Z-Finder
Photo by Noah Graff

Below: BEM CNC, Schaumburg, Ill.
Photo by Noah Graff

Above: Peacemaker DSLR tripod kit.
Right: Part of the DSLR Z-Cage kit.
Opposite: Looking through Zacuto's electronic viewfinder prototype.
All photos by Zacuto Inc.

resembling those of film for a relatively cheap price. For readers unfamiliar with the terminology, DSLR cameras are the modern digital version of the large still photography cameras traditionally used by professional photographers (SLR cameras are the original analogue version). Photographers and filmmakers like these cameras because they have interchangeable lenses and large image sensors which allow similar depths of field and picture angles to film formats.

Prices of today's DSLRs without lenses can range from as low as $500 up to $3000, which can sound wonderful to an indy filmmaker on a tight budget. However, despite the potential of these cameras to produce beautiful images, the reality is that they have not been engineered for shooting professional video.

DSLRs are awkward to hold steady for long periods of time, their viewfinders do not work when shooting video, their built-in microphones are lousy, and it is difficult to adjust the cameras' focus or zoom smoothly on the fly while shooting. Zacuto makes products to solve these problems, costing as low as under $100 for small accessories to several thousand dollars for rig-building kits.

The Production Process

Steve and Jens decided from the start that they wanted to manufacture the parts for their Zacuto kits locally as opposed to overseas. One reason for this decision was their concern for quality control, but mainly they needed to have easy and fast communication with their engineers and contract manufacturers because almost every week they are coming up with new ideas for products. With their current workflow routine they can think up a new product and have it on the market in six weeks.

When Steve and Jens come up with a new product idea they first talk to their engineer Bob Zajeski of ZETA Engineering Company, Homer Glen, Ill. He creates an e-drawing and on the same day they analyze it, tweak it and send it back to him. A prototype is then made which gets sent back and fourth for further adjustments. When they come up with a prototype they are satisfied with they test it by using it to shoot a video. Zajeski, who has designed 280 products for Zacuto over the last five years, explained that with the introduction of the lightweight DSLRs, they have had to adapt the kits. Recently they have reduced the weight of the parts by using carbon fiber and thinning out the walls.

A huge advantage for Steve and Jens in developing new products is that they have over 50 years of filmmaking experience between them and they are constantly producing new videos. They use the video equipment they need to build accessories for, while their competitors just observe the technology from the sidelines. For example, one recent trend in video production that Zacuto has addressed is the growing popularity of shooting video with the iPhone. Jens and Steve have designed rigs specifically for the different models of iPhones, consisting of a handgrip attached to a cradle which the phone locks into. They also sell a viewfinder, their patented Z-Finder, that attaches to the iPhone's screen to give the shooter more stability and a better view of the image.

Manufacturing the Kits

The bulk of Zacuto's parts are machined at BEM CNC, Schaumburg, Ill., a job shop that makes parts for an array of different industries.

The parts are machined primarily on milling centers. Fast changeover is a priority rather than fast cycle times because new products are constantly introduced. Volumes range anywhere from 10 to 500 parts. BEM CNC uses several Mori Seiki horizontal machining centers and Brother pallet machines because the pallets enable quick changeover.

Bogdan Falat, one of BEM CNC's owners, said that the tolerances for Zacuto's parts range in tightness. The parts aren't going into airplanes, but Falat said that some of them are relatively intricate. He also said that Zacuto puts a high priority on the aesthetics of the parts. BEM CNC constantly watches over the parts to make sure their red color is consistent when they come back after being anodized.

Zacuto's Next Challenge

Steve and Jens have recently embarked on their first foray into electronics by engineering the very first electronic viewfinder (EVF) specifically designed for DSLR cameras (see photo below). In essence, it is a 3.2" monitor that one will put in front of the viewfinder Zacuto currently makes.

One of the current drawbacks of shooting video with DSLRs is that although the cameras have viewfinders for taking still photos, a camera person can only see their video images on an LCD screen on the back of the camera. This is the trend for most consumer and prosumer video cameras today—to see an image the camera person has to look at a flip-out LCD screen. LCD screens can be difficult to see when you're around a lot of sunlight, they are not as accurate for focusing on an image, and they take away an important method for holding a camera steady—pushing it firmly against the eye.

Presently, Zacuto manufactures its Z-Finder, which is a viewfinder that attaches directly onto the LCD panel on the back of the DSLR camera. It helps to steady the camera, block out light, and focus, but a camera person must have their face pushed right up against the camera at all times, which limits the ways it can be rigged and positioned.

The new electronic viewfinder will enable a camera person to look through a viewfinder that isn't pressed up against the back of the body of the camera. The camera body connects to the viewfinder with a standard HDMI cable, the same cable one would use to connect a computer or HD camcorder to an HD TV. All the parts for the monitor will be assembled and manufactured in the United States apart from the panel for the screen. Jens and Steve say there is no other company they know of today that manufactures an electronic monitor of that type in the United States.

Their First Love

When Steve and Jens went into the manufacturing business in 2004, they made a vow to themselves that the only way they were going to do it was if they could fulfill their personal passions to make films too. Jens and Steve produce three ongoing Web series, *Critics*, *Film Fellas*, and *The Great Camera Shootout*.

On *Critics* Steve and co-host Philip Bloom review films created specifically for the Web. On *The Great Camera Shootout* Steve and Jens Compare the latest DSLRs with traditional film cameras. On *Film Fellas* they record veterans of the film industry discussing the world of filmmaking over dinner. In addition to those series, Steve and Jens are constantly making videos demonstrating and educating current and potential customers about their products. All of the videos have a great energy, and Steve and Jens glow as they have fun with their products and discuss filmmaking. The videos speak to the heart and soul of the two manufacturing filmmakers, who approach their lives' work with a refreshing zeal.

"If you were to ask me ... first and foremost, I'm a filmmaker. And that's what I want to do. I'm a manufacturer and I love doing it, but I started as a filmmaker and I'm going to end as a filmmaker," says Steve.

Jens follows, "It's still weird to think that we're manufacturing. It's another creative outlet, just ... I'd rather make films than make the products. But at the core, it all comes from probably the same part of your brain—the creative part. You've got to be creative with anything you do."

For more information or to watch the videos mentioned in the article visit Zacuto at www.zacuto.com.

Left to Right: Cory Harrison, Rick Harrison, and "The Old Man"

Interviewed by Noah Graff

Rick Harrison, started the Gold and Silver Pawn Shop on the outskirts of Las Vegas with his father, Richard, in 1988. The shop is one of the most successful pawn shops in the country, dealing in items as diverse and valuable as Super Bowl rings, Picasso paintings, gold bars, even Bridgeport mills. Today, he stars with his father, "Old Man" and son, Corey, on the History Channel's hit reality show *Pawn Stars*.

How did your pawn shop begin?

RH: First [my dad] had a little coin shop. We graduated from the coin shop to an old secondhand shop and then to the pawn shop. It's impossible basically to get a new pawn license in Las Vegas. It took us years to figure out a way to get one. In 1955, the good old boys got together and they decided that they wanted to have a little monopoly on the pawn shops. So they had the city council pass a law saying that when the city population got to 250,000, they would issue one more pawn license. The city population at the time was right around 25,000, so they obviously assumed it was never going to happen. In '87, I went down to the city and checked out the law. I started calling the city statistician once a week. In April of '88, lo and behold, the city population reached 250,000. Five minutes later I was down at the business license place saying, "Give me my license."

Why did you want to have a pawn shop? What about it in particular appealed to you?

RH: They made a lot more money than secondhand shops because no one wants to sell their stuff. A lot of people want to get loans on it, and it's just a lot easier with a pawn license than it is a secondhand license. A lot of people don't realize this, but 20 percent of the adult population in this country does not have a bank account and cannot get one. A credit card is never going to happen for them, so they come to pawn shops. They borrow money from me and they shop here. It's sort of like a subculture a lot of people don't know about.

But on the show everybody sells their stuff.

RH: That's because people borrowing money don't want the world to know they're broke. It's not necessarily that they're desperate; sometimes they're just a little embarrassed that they've run short on money for rent that month. A lot of times I get extremely well-off, successful people who have lost too much money gambling.

What kind of interest do you change on items?

RH: I charge 10 percent a month, which sounds really expensive, but my average loan is right around 100 bucks. I have a $5 ticket charge, so if you borrow 100 bucks from me and you want to get your items back a month later, it comes to $15. Actually, of the maybe 9,000 loans I have out right now, the average is, I think, 120 bucks. But I have loans as high as $30-$40-$50,000.

How do you find customers?

RH: Most people come to me nowadays. I literally have billionaires that shop in my store. I'm probably one of the most successful pawn shops out there, and I think it's because I just do business differently than other people. I will tell them right to their face what I'm going to sell it for. I think [honesty] is the most important thing in business, because the day you start ripping people off, you have that six degrees of separation and everybody in the world's going to know that you rip people off. The opposite applies if you're honest with people.

What was one of your biggest deals that went wrong? And what's one of the weirdest items you've ever dealt with?

RH: A guy came in and I bought a pair of earrings off him for $40,000. The very next day police came in and took them from me. [As far as weird]—I had some 200-year-old Japanese porn called Shunga. It's on scrolls and all the parts are exaggerated.

How do you deal with security in the store?

RH: If you look closely on television at every one of the employees that works for me, there's a little bulge underneath their shirt. Almost everyone working at the pawn counter is carrying a gun. Criminals know that the other pawn shops don't carry guns, so they rob them, not me ... hold on one second, I hate to cut it short, but a lady's got a 10 carat diamond she wants to pawn off.

For more information you can visit the Pawn Stars website at www.history.com/shows/pawn-stars.

With Noah Graff

shop doc

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

Dear Shop Doc,

On our CNC lathes we occasionally have trouble with push back when using collets on bar jobs. Our collets have smooth bores and I am wondering if a serrated collet would help or if it will just create more problems.

Chuck Force

Dear Chuck Force,

Serrated collets will probably help, but first let's consider all of the variables.

1) **Bar whip**—Bar whip can cause the bar to act as a lever against the collet, prying it open. You should always use a spindle liner and/or a properly sized liner set in your bar feeder to minimize bar whip.

2) **Collet bore**—Most collet systems have some gripping range, but the bore of the collet can only be machined to one given nominal diameter, and that diameter fits the bar the best. Avoid using a collet that's "close enough."

3) **Chucking pressure**—The hydraulic pressure to the rotary actuator can be adjusted. Follow the manufacturer's recommendation for the operating range and adjust accordingly. In general, you need higher pressure for larger diameter bar and less pressure for small diameters.

4) **Maintenance**—Make sure that the sliding components of your collet chuck are clean, lubricated and slide easily. Make sure your hydraulic oil is in good condition, the level is adequate, and the system is operating in the proper temperature range.

Serrated collets work by reducing the surface area of the collet bore, thereby increasing the pressure that the contact area of the collet exerts against the work. You can calculate the surface area of the collet bore using the formula: $2\pi r^2 + 2\pi r h$. Ignoring the area removed by the slots in the collet, a 1.0" diameter collet with a 1-1/4" land has 5.5 in² of gripping surface.

If the collet closes with 1,000 pounds of force, that force is distributed over the 5.5 in² surface area of the bore, resulting in a contact pressure of 181.8 psi. If you decrease the surface area of the collet bore by machining in serrations, you increase the contact pressure by a corresponding amount. This doesn't multiply the holding force in any way; you are still applying the same 1,000 pounds of force to the task of holding the work. By applying the force to a smaller area with greater pressure, the collet can dig into (deform) the work. Whether or not the collet permanently marks the work (plastic deformation), or the work bounces back (elastic deformation) depends on the force applied.

Another option is to have the collet coated with a textured carbide alloy coating like Carbinite (go to www.carbinite.com for more info). The principle is the same as serrations, but instead of grooves cut into the collet bore, the bore is coated with a crystalline like carbide alloy. The coating has a texture similar to sandpaper, which provides tremendous grip.

Dan Murphy
REM Sales LLC

Dan Murphy is a regional sales manager for REM Sales LLC., a U.S. Tsugami distributor. He can be reached at dmurphy@remsales.com.

Have a technical issue you'd like addressed? Please email noah@todaysmachiningworld.com.
We'll help solve your problem, then publish both the problem and solution in the next issue of the magazine.

By Noah Graff
Printed in the October 2006 issue
of Today's Machining World

In five years, will there be a fence between Mexico and the United States that effectively halts illegal immigration?

As long as wages in the United States are significantly higher than those in developing nations and illegal aliens can readily obtain employment in the United States, no fence or other enforcement strategy that primarily focuses on the border will deter millions of people from violating our immigration laws annually. Impoverished, desperate people will find a way to go over, under, around or through any types of physical barriers that are built. Without enormous concurrent increases in the size of the Border Patrol and detention capacity, as well as the political will to incarcerate everyone who is caught crossing the border illegally, this strategy is doomed to fail. A far more effective and sensible solution to the illegal immigration crisis would be to implement a system that enables employers to easily determine who is authorized to work here, and, at the same time, swiftly impose harsh and sure penalties against those employers who ignore or disobey the law.

T.J. Bonner, President
National Border Patrol Council, Campo, Cal.

There will be a wall between the United States and Mexico in five years—the lone question remaining in 2006 regarding it is: how long will it be? As seen most recently in Israel, fortified borders can and do serve vital security interests. However, such a wall on the border with Mexico is only one of several needed remedies for addressing our current illegal immigration crisis in the U.S. The magnet for illegal immigration into the U.S. is the widespread availability of jobs; so, [fencing/barriers] must be joined by a consistent and robust interior enforcement regime at the workplace. There must be mandatory employee verification and significant sanctions for employers who fail to comply with the law.

John Keeley, Director of Communications
Center for Immigration Studies, Washington, D.C.

No. Putting up fences has only pushed clandestine border crossing to other parts of the border. This will continue since the cost of fencing the entire U.S.-Mexico border is prohibitive—somewhere between $3 and $10 billion dollars—more than the entire education budgets of Arizona and New Mexico. As it is, 20-40 percent of undocumented migrants in the United States entered the country legally and overstay visas. The best long term solution is to work with Mexico to raise Mexicans' standard of living. This is why we no longer have large-scale Irish or Italian migration to the United States.

Irene Bloemraad, Assistant Professor, Sociology
University of California, Berkeley, Berkeley, Cal.

the facts:

December 15, 2005, **The House of Representatives passed bill 4437, calling for mandatory fencing along 698 miles of the Mexican border.**

The border between the U.S. and Mexico spans 1,951 miles. **The urban areas of San Diego, California and El Paso, Texas (which contain barriers) have been the location of the greatest number of illegal crossings.**

www.wikipedia.org

Since 1993, **the U.S. Government has spent more than $20 billion to reduce the flow of unauthorized immigration from Mexico, and it continues to commit more than $6 billion annually to that cause.**

Last year, **only 3,200 employment-based visas were issued to Mexicans**, in a year when **more than 400,000 Mexicans were added to the U.S. work force through illegal immigration.**

Illegal immigrants [in the U.S.] are the most fully employed, with **94% of the men in the work force – significantly higher than native-born Americans**.

Wayne A. Cornelius
Director, Center for Comparative Immigration Studies
University of California-San Diego
Testimony prepared for the House Judiciary Committee
Field Hearing on Immigration
San Diego, Calif., August 2, 2006

By Lloyd Graff

best of swarf

April, 2005

I have written quite a lot about eBay over the last three years, because I see the eBay phenomenon—the transparent connection between buyer and seller, unlocking the value for both parties—as one of the most important developments I have ever seen in business. eBay sent a large contingent of people to National Manufacturing Week, a recent show in Chicago. It was an excellent opportunity to observe the company as it tries to weather a period of significant challenge. eBay is being attacked on one front by the scam artists who try to victimize unsuspecting bidders. A common ruse currently employed is an e-mail to a person who was the second bidder on an item, offering that item again, by stating that the high bidder reneged. An unwitting bidder who sends money to the scammer may lose his funds in the ether. eBay has a phalanx of investigators in Hungary, where a band of hackers are trying this ploy. Many of the bad guys have been jailed, buy trying to beat the crooks is like cooking up the next flu vaccine—it's hard to anticipate the latest strain of the bug. Another threat to eBay is Wall Street expectation. The incredible success of the company has given investors reason to push the price of the stock higher and higher. To keep the stock price up, the company must meet the Wall Street analysts' "expectations." One little slip could send the stock price tumbling. My fear, as both an investor in the company and a user of the platform, is that eBay management will make decisions to meet the short-term desires of "the Street," which will harm the firm in the longer term. The recent price increases have brought a folding of stores and a reduction of items being offered. Graff-Pinkert has cut its listings in half, because the $20 minimum fee makes many potential listings uneconomic. eBay, in trying to copy the success of its eBay motors category, is stumbling in Business and Industrial. But to eBay's credit, they are determined to get it right. Patrick Jabal has just been brought back to run the entire category. I think we will know by May if the company is still nimble, and if the platform is still customer-driven, or whether the short-term targets will dictate. It is also a bit unnerving to see that President Meg Whitman considered leaving the company for Disney. This was a bad signal. A lot of "hot" money has left eBay's stock. We'll soon know if they were correct, at least in the short run.

August/September, 2004

This has been a great baseball summer for me, though my beloved Chicago Cubs have been inconsistent, and my softball playing has been limited by my eye woes. Why? Because I am loving Fantasy Baseball.

Fantasy Baseball is statistical combat with dueling box scores. You draft a team of Major League ballplayers and then match them, statistically, with another person's selection of players. In my league we compete in 10 different categories such as home runs, stolen bases and relief pitching saves. Stats are kept in real time on Yahoo!. I am co-managing a team with my son-in-law Scott, who is a computer scientist in Palo Alto. We have spent untold hours on the phone plotting lineups and personnel changes, to the glazed eyes of my wife and daughter.

I am indifferent about computers and technology, but I am addicted to the goofy Fantasy Baseball stuff—as are millions of others. Online sports is a huge business, well into the billions of dollars as an industry, with fifteen million players.

As I look at the Fantasy Sports business as I head into Fantasy Football season, I see a suggestive snapshot of an important slice of business that will affect us all, whether we publish magazines or machine fuel injectors. Data, information; meaningful, interpreted, timely, tailored, predictive information, is valuable in the marketplace. People will gladly pay for it.

For me the joy of Fantasy Baseball is finding an undervalued hitter who punishes left-handed pitchers on Saturday afternoon games, televised by Fox, when Tim McCarver is doing color commentary. In other words, finding the obscure intersection of data points that seem to give me an edge. (Is this how men joust today?) Then I have to judge whether Jason Bay's (Pittsburgh outfielder) slugging is more valuable to me than Ichiro's (Seattle outfielder) singles and stolen bases.

In the world of Fantasy Baseball, winners are decided in statistical categories. Not all that different from bidding by machining jobs who then document the manufacturing process under SPC dictates. Winning the machining game today means winning the data game.

In the magazine business, advertisers are focused on data, which is defined as a representation of facts when real facts are obscure. Advertisers are interested in circulation and readership of a publication to glean insights into the publication's usefulness in persuading an audience to buy something. In both the machining and publishing analogies, statistics are critical in a purchase decision. In fantasy sports, reams of data are available. I recently combed through some of the Fantasy Football magazines, which hit the market in July. They all interpret the same data, but they focus on different issues to make their draft recommendations. Daunte Culpepper of Minnesota is on the cover of more than a couple of guides, but others see Peyton Manning of Indianapolis as "the man" at quarterback. I liken this to some folks who are focused on cycle time for a part on a particular machine, while others are obsessed with tool life, and others are anal about downtime. Judgments are made on past experience, states, and

hunches, like fantasy sports. The old LaSalle Steel Machining Handbook is akin to the Sporting News guide to Fantasy Football. The Sporting News guide offers judgments and pictures, while the old handbook just throws a lot of numbers at us that are supposed to be facts.

I am sure that people in the manufacturing community would pay readily for interpretive and predictive data on a myriad of topics. Independent evaluation of metals from different mills would make useful statistical material. Comparisons of cutting tools and coatings, lubricants and attachments would have value. Walter Mossberg of the *Wall Street Journal* makes a half-million bucks a year because he make thumbs-up and thumbs-down judgments on electronic gizmos that a lot of readers care about. Peter Gammons of ESPN is one of the network's most valued commentators because he doesn't just read the baseball news; he evaluates it and makes accurate judgments.

Increasingly in today's marketplace it is the data, the stats, but even more, the interpretation of the info that is valued. Study fantasy sports to understand which way our business world is headed and how you can beat the game.

If you look at the trade press in manufacturing, you rarely see independent analysis of data because publishers are afraid that an advertiser might not like the interpretation. What you get are mostly puff pieces, like you would get if the P.R. man for the Chicago Bears wrote analysis of his team for a fantasy guide. The readers would scoff at it, because it would be inherently suspect.

In my opinion, we are headed more towards a Fantasy World in manufacturing, because it will bring us closer to reality.

February, 2005

The outlook for General Motors looks grim.

GM is forecasting production of 1.188 million vehicles in the first quarter, down from 1.315 million in the 2004 comparable period. The company has the overhang of 1.1 million insured former employees' health care to cover. GM has no viable hybrid car plan to compete with Toyota, Honda, and even Ford. Their big public relations push at the recent Detroit auto show was about the Sequel car, a hydrogen fuel-cell-powered vehicle.

The hydrogen car is a phony ploy. GM says they will have a viable production car by 2010. The environmentalists at the Sierra Club laugh at this. They see hydrogen as a smokescreen because they understand the hurdles of this project.

First of all, developing the hardware is daunting. But even if GM developed an elegant solution for all of the engineering difficulties, they still have to convince the Exxons and the Shells to spend billions on hydrogen distribution infrastructure. This is a real longshot when hybrid technology will be improving with greater volume.

And then there is the question of how we are going to produce all this hydrogen we will need for the cars. Hydrogen would be extracted from seawater. The process would require vast investments in electricity. The only financially viable approach for producing such electricity would be to build nuclear power plants near the ocean shore. We are talking about a lot of nuclear plants. Since we have not built one of these in the United States since 1976 because of the politics of nuclear waste and current fear of terrorism, I have a bit of doubt we will witness a radical shift toward nuclear.

So General Motors tries to fool the public by advertising its supposed push into cutting-edge hydrogen to mask its slide behind Toyota as the world's biggest car company, which will happen very soon.

Rick Waggoner, the head of GM, inherited a lousy situation, but he shows few signs of improving the company's competitive position, compared with Carlos Ghosn, who transformed an ailing Nissan almost overnight.

Meanwhile Toyota, which leads the world in hybrid, will be bringing out a Lexus SUV hybrid, will be bringing a Prius plant to China to ramp-up volume and become the first auto manufacturer with a hybrid in that market. This is a bold gambit because of the Chinese disregard of intellectual property. Either Toyota believes the Chinese are incapable of successfully copying their hybrid technology or, what some in the industry speculate, that Toyota is betting the Chinese copycats will show them how to lower their hybrid costs. This investment will help them widen their world lead in this technology.

This is the time to sell GM stock short. This company is headed down.

An Interview with an Acme machine, May/June, 2002

Lloyd: Mr. 22414, it's an honor to interview you on your 60th birthday.

A real milestone for an Acme of any size. May I call you by your last 3 digits?

22414: Sure, just call me 414. All my friends do, at least those that haven't been cannibalized or crushed and melted. Tragic, humiliation endings for those poor multis.

Lloyd: Tell me a little about your youth. What is your earliest memory?

22414: Ah, yes. I remember Cleveland in April. Snow on the ground. The National Acme plant in 1942 was crazy. They were

cranking out 15 to 20 screw machines a day. Most of my fellow 9/16" RA6's were destined for ammunition work. That was my first job—bullet cores. Twenty-four hours a day. Bullet cores and more bullet cores. I was proud to be part of the war effort, but let me tell you, that was work. No vacations. Just all bullets, all day, every day.

Lloyd: 'Til 1945?

22414: A good year. They shut me off one day, put me on a skid, and told me to take the day off. It ended up as a very long holiday. They sent me to the caves, near Atchison, Kansas, sprayed me with cosmoline, and told me to relax. Spent five years there, underground. Borrrrrring. Fortunately, there were 125 other Acmes and a few New Britains and Cones in my cave. Made some nice friendships. Started a singing group, The Acme Brothers. I was a tenor. Great climate. Dry, 57 degrees all the time. Wonderful if you were a wheel of Roquefort cheese, but I longed for the action of wartime.

Lloyd: Then came Korea.

22414: Yeah. I'm Rip Van Acme and then suddenly, it's that 24-hour grind again. They sent me to the Joliet Arsenal along with 82 of the other Acmes at Atchison. Three more years of go, go, go, making those bullet cores. It's sad to think of the bloodshed that those millions of bullet cores I made probably caused.

Lloyd: After the war, they sent you back to caves?

22414: Yeah, feast or famine in those days.

Lloyd: What were your operators like in those days, 414?

22414: Mostly white guys. Scandinavian ancestry. A fellow named Carlson, another named Olson. Olson really treated me well. Made sure the oil was pure. Cleaned out the chips and sludge every two weeks. He respected me. I heard he started a screw machine shop in Chicago in the 1950's. His son came into the business in the late 60's. Lost track of him since then. He used to send me a Christmas card every year.

Lloyd: How long were you in hibernation the second time around?

22414: Would you believe the Government kept me underground until 1968?

Lloyd: There were lots of changes in the country those 15 years.

22414: In 1968 the Government sold me at an auction. A dealer in Chicago bought me for $6000 and sold me a couple of months later for $9250 to a shop in Los Angeles.

Lloyd: How was it different than being at a U.S. Government arsenal?

22414: Variety. I ran some bullet jobs, then they put me on aircraft fasteners. I got my first threading attachment and diehead—a NAMCO 9/16 DR head. The operators were a mixed bag. Had a nice one, Jackson, then he left for a quarter per hour more in Long Beach. The next guy smoked pot on his break—a laid-back dude, but he couldn't have cared less about my lubrication and soon I was choking on chips. The boss canned him, but his replacement was not only a slob, he was abusive. Oh, did he hit me with that damn steel hammer. Punished my cross slides. Mauled my end-tool slide. I cringed when I saw him every morning. He drank a lot. Many mornings he had a hangover. I heard he ended up at Alcoholics Anonymous, but that was long after the boss fired him for falling asleep on the job.

Lloyd: How long were you in Los Angeles, 414?

22414: I was there until 1974. Remember the oil embargo? Bad times on the Coast. A dealer in L.A. picked me up for $4500. He sold me for $7500 six months later to a small shop in Arkansas. Owner was a good old boy. Did mostly plumbing work, brass fittings. Whew, did he run me fast. I ran so hot I thought I was going to catch fire. The shop was filthy, like a skating rink. If I wasn't bolted to the floor I would have slid around the joint. And the oil mist was as thick as soup. I saw the boss slip a bottle of booze to the local fire inspector. That turned out to be a mistake because we had a major fire two weeks later. Burned my paint off and scared me to death, but somehow, I survived it. After the fire I ended up being sold to a dealer in St. Louis. He cleaned me up and gave me a new paint job, a crummy paint job. The painter didn't strip and prime me. Just sprayed everything. Gummed up the slides, infiltrated the gear case. Yuck.

Lloyd: We've all had hard times, 414. Did life get any better for you? Marriage, children, passions?

22414: I met a gorgeous 52 New Britain back in L.A., but the peer pressure on me was awful. Acmes and New Britains were like rival gangs then, Romeo and Juliet, Crips and Bloods. We kept our relationship hidden. Then I got shipped out. We wrote, but, you know. Finally, in the early 1980's I went to upstate New York. Shop was all Davenports and me. I was a novelty, sort of like a duck in the hen house. Those Davenports could fly, but they were always self-destructing. They put a steel automotive job on me and just ran me every two months for two weeks at a time. That was a great gig. I was the odd man out, but I did my work and they respected me for my sturdiness. I was proud to be an Acme. Davenports are nice. But for steel, day-in, day-out, an Acme is the gold standard.

Lloyd: How long were you in New York?

22414: I stayed for 15 years. Then the boss had a heart attack. He sold the shop to an accountant. The bean counter thought he could run the business without ever venturing into the factory. Everybody started getting sloppy. Quality suffered. Orders lagged. The owner tried to suck the cash out of the business, cut every corner. The bank shut him down after 16 months. Then you bought me, Lloyd.

Lloyd: Welcome to Chicago, old-timer.
22414: I feel like I'm a living piece of Post-War American Industrial history.
Lloyd: 414, to what can you attribute your longevity?
22414: If there is one thing I have learned it is that preventative maintenance is the key to my longevity. Change my oil every two months and I will sing like a tenor. Use good quality cutting oil. Absolutely do not use soluble oil—it triggers my asthma every time, eats my seals, rusts my bearings. Clean out my oil lines frequently, put good grease in the grease fittings. Throw some automatic transmission fluid in my tank every two months—50/50 concentration. It's like Lipitor for me. And clean me up. A clean machine runs better. That sludge in my bottom is like extra fat. Get rid of it. Another thing. My collets and pushers must be cleaned frequently. Compacted chips drive me nuts. It's like slivers in your fingers. Those chips under the tool holders are a killer, too.
Lloyd: You've had numerous repairs and spindle bearing jobs over 60 years, 414. What is your opinion of repairs and spare parts?
22414: They talk about the good old days. They weren't so good. The rawhide seals we used to have were crude compared to what we use today. The old spindle bearings were inferior to those of today. Today's commercial grade bearings are probably as good as Class 3's of yesteryear. The spare parts from National Acme are still good but the gray market spares generally work as well. Today's cutting tools are far superior to the old days. The sound enclosures for the stock reel and tooling area are a major improvement. You think we machines enjoy that incessant clatter? I personally do not have Cyclo-Index and Logan clutches, but my buddies tell me that they feel like bionic Acmes with them. Today's motors are extremely efficient and weigh 1/3 as much as my original. Lighting on the machines is easy on the eyes today, and those mist collectors have saved my lungs.
Lloyd: How many years do you realistically think you have left, 414?
22414: I really believe I can make a comeback as a collet chucker. There is still a lot of high volume second-op work that has not migrated to those beasts, the Hydromats. And there is always the possibility of Mexico—ah, yes, Puerto Vallarta, maybe even the Far East. I'm not ready to retire. Cannibalizing is a last resort, but frankly, I know I can still cut it. Give me a good operator, a bundle of sweet-leaded steel, and some well designed tooling, and I can run 10 to 20 more years right here in America.
Lloyd: I'll see what I can find, 414. Meanwhile, I've planned a surprise birthday party for you. Happy 60th birthday 414—and many, many more.

By Noah Graff

Printed in the Ocotber 2010 issue
of Today's Machining World

best of shop doc

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

Dear Shop Doc,

I've been struggling with part length issues on one of my Brown & Sharpe #2 Ultramatics. The variance does not appear to be related to tool movement or collet tension as the length varies, sometimes it's long and sometimes it's short. The tolerance is reasonable (+/- .005). I've checked the regular stuff; rolls, pins, feed finger tension. Do I need to design every job to feed long and face off?

Coming up short (and long)

Dear Short and Long,

The Brown & Sharpe Ultramatic should be able to hold +/- .0025 when working properly. So no, you should not need to face every part to hold .010 total. Length variance can be particularly difficult to troubleshoot. Check one item at a time. Let's start with the most obvious but common problems.

The feed stroke should be set to over travel by .250 maximum. If not set correctly, it cannot only exacerbate other problems, it can cause variance as the bar weight changes from a full bar to two feet of bar.

Check your trip dogs next. Make sure the feed is finished before the stop is moving. This sounds basic, but if the stop indexes away just as the collet is closing there can be variation, and it can look like the feed operation is done when it's not.

Next, check the items involved in the lead cam actuating mechanism for the turret. First, check the lead cam shaft. If there's any perceptible movement when you take the weight off the lead cam shaft you may have worn bearings or a bad shaft. This can cause variation because the weight of the bar changes over time as the bar gets shorter. Next, check the linkage in the lead lever mechanism. There are several fulcrum points to this lever and wear here can cause variation. Finally, check the turret rack and lever. These teeth can become worn and cause length variation. This area can also become full of chips (brass and aluminum are especially pervasive), and the chip movement can cause variation. The abrasive nature of the chips can wear the teeth away and cause huge variations. Keeping this area clear of chips should be a regular maintenance item. I have seen machines where the rack teeth look like needle points.

The withdrawal cam on the adjustment plate in the back of the machine must be kept adjusted. The proper adjustment is .002 max clearance. Brown & Sharpe recommends .001. I've seen machines at .015 and have often wondered how they made any good parts on them.

The last thing to check is the spindle. The only thing you need to look at here are the thrust bearings. There should be little or no endplay on the spindle. Check this with an indicator on the spindle end and then manipulate the clutches back and forth (you might as well check and adjust the clutch tension while you're at it). There should be little or no movement in the spindle. The thrust bearings can be adjusted with the nut near the back end of the spindle.

There are several models of upgrades for Brownies available commercially, all of which eliminate any variance issues resulting from the lead cam shaft, the lever and rack, or the withdrawal cam. The withdrawal cam adjustment should be a maintenance item checked regularly along with keeping chips from the rack area.

Greg Knight and George Morris
AMT Machine Systems

Greg Knight is the Vice President of Machine Tool Automation and George Morris is an Application Engineering Manager with AMT Machine Systems in Columbus, Ohio.

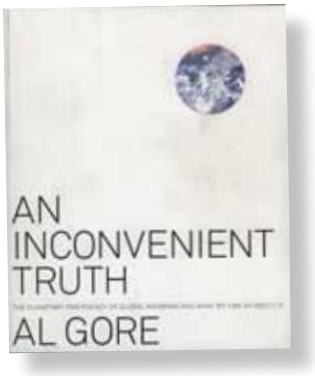
By Jerry Levine

printed in the may 2007 issue
of Today's Machining World

The Real Inconvenient Truth

If you want the cold facts on science's hottest topic, you might warm to Al Gore's *Inconvenient Truth* and Fred Singer and Dennis Avery's *Unstoppable Global Warming*. These two volumes provide the bookends for an ever expanding library on climate change.

While the style and target audience of each book is different, surprisingly much of the basic data is the same – it's just the conclusions that vary. Global warming science has been obscured by highly politicized partisans, making it difficult to trust much of what is printed in the press. One needs to read both of these books to gain a reasonable understanding.



Both Gore and Singer agree the earth is warming and CO_2 levels are increasing. Gore claims Earth's current temperature increase is caused by man's use of fossil fuels. Singer says the warming is caused mainly by solar activity in a roughly 1500 year cycle and CO_2 has little to do with it.

Earth's temperature has been both higher and lower than today several times in the past 650,000 years. The temperature varies by about 20 degrees F from low to high in cycles of approximately 100,000 years. The lows are ice ages; the highs are called climate optima (because we like it as it is today).

Earth's current temperature is near the top of the cycle, but it has been exceeded several times in the past. Singer writes that data shows CO_2 changes lag temperature changes by 200 to 1000 years, because higher temperatures cause the ocean to give off dissolved CO_2. The present warming began at about 1650 C.E. at the end of the "Little Ice Age." CO_2 began rising 250 years later, around 1900. Gore counters that due to man's impact, CO_2 levels are higher now than they have been at any time in the past 650,000 years, but they were appreciably higher a few million years ago.

There is a tremendous amount of peer-reviewed science on the subject of global warming. The best compendium is the United Nations' Intergovernmental Panel on Climate Change (IPCC), which publishes a scientific summary roughly every five years. It's compiled by several hundred scientists from many countries. There is so much information with conflicting conclusions, one can cherry-pick to fit one's bias.

The IPCC also develops a shorter Executive Summary, written by a smaller group of scientists/politicians from around the world. A fair amount of negotiation goes into the wording to get one's political position advanced. The Executive Summary is attacked for being too alarmist, while the main scientific text is attacked for being too conservative.

Singer's book draws heavily on peer-reviewed science with hundreds of footnotes and citations. Gore's references include several non-technical websites. He frequently says the scientific consensus agrees with whatever point he is making, so there's no need for further evidence. Singer counters that most of the recent IPCC scientific report agrees more closely with him, so he calls out Gore as the one out of step with the scientific consensus.

The real inconvenient truth is there are very few significant practical solutions. Singer says the sun's activity is the problem and money spent on mitigation of CO_2 is a waste. Gore says the U.S. needs to reduce CO_2 emissions by 60 to 80 percent by the year 2050.

But the costs are exorbitant. I was a member of a global warming commission convened by then Vice-President Gore in the late 1990s to study ways for the US to meet the Kyoto treaty. The estimates ran into the hundreds of billions of dollars yearly. Fareed Zakaria of Newsweek writes "slashing CO_2 emissions by 60 percent would require cutting back on industrial activity across the globe on a scale that would make the Great Depression look very small."

Mr. Gore is to be praised for bringing forward a discussion of global warming. If the effort leads to meaningful fossil fuel conservation in the U.S. and elsewhere, that would be great. The United States needs to provide world leadership in order to press China, India, Brazil and Russia (no Kyoto requirements) and Canada (Kyoto's greatest scofflaw) into action.

Adapting to global warming sounds defeatist. But humans have successfully adapted to rapid temperature swings in the past, all without the sophisticated technology now available.

Many environmental advocates avoid talking about coping, for fear it will hamper efforts at mitigation. The answer is to do both – mitigate what we can and adapt to the rest.

By Lloyd Graff

Printed in the January 2005 issue
of Today's Machining World

twenty four hours in the life of Curtis Screw

Gary Pletscher hopped out of his Ford pickup at 5:55 a.m. on November 10, 2005 and marched across the Thielman Drive asphalt, anticipating a 13-hour siege of problem-solving amidst the whispering of new CNC Schüttes, stalling steel swarf, and the twang of dimes and quarters being won and lost every second on gear blanks and fittings soon to be trucked to Detroit.

Welcome to a day in the life of Curtis Screw Co. of Buffalo, N.Y., now in its hundredth year of cutting metal. Pletscher is one of 300 guys and 29 women in Buffalo who make Curtis make money in the relentlessly demanding world of zero-defect, give back the gains, just-in-time automotive sub-contracting. Curtis' hourly struggle for perfection of product extracted from sometimes balky machines and overstretched people is both heroic and mundane — the boring daily grind of grinding tools, checking prints and fighting the tides of surging material costs in battered Buffalo, a factory town annealed by the competition for profit in the ruthless world car market.

Through the tenure of only four owners since 1905, and 50 years of co-existence with the United Auto Workers Union, Curtis survives, even thrives — family owned — because of the flat-out commitment of employees such as Pletscher, 32 years with the company and planning to make it to 42 in Buffalo, his home since birth.

Pletscher, like many of Curtis' people, has deep roots in the company. His father-in-law started with the firm in 1954. He became a Davenport lead man and set-up man. His brother-in-law works on Acmes and Schüttes. His nephew started in the plant a year ago. Pletscher was in the union for 26 years setting up multis, rising to lead-man and trainer. In 1998 Ed LeClair, Curtis Screw's vice president of operations, approached him to join management as an estimator. "Our estimator at the time was retiring, so I went there for six months, and because it was crazy on the floor, they asked me to go into project engineering. After that, our maintenance foreman was retiring, so they asked me to head up that department. I did that for a few years. Almost three years ago they asked me to go to production supervisor on multis," Pletcher recounts.

Line of Fire

Now at 5:55 a.m. on a bitter, slate morning, Pletscher walks into Curtis Screw's $9 million dollar gamble, the 150,000-sq.-ft. plant on Thielman Dr. The old Niagara Street and Roberts Avenue factories are systematically disgorging their machines to Thielman daily. Pletscher's task is to ensure that production will never be interrupted long enough to cause a product shortfall to a customer. The job requires limitless energy, an encompassing knowledge of the big picture at Curtis, and a microscopic eye for the details that make jobs run and, sometimes, not run.

Moments after entering the new plant, Robin Johnson, the night supervisor, briefs Pletscher on issues he encountered during the last 12 hours. Pletscher checks the paperwork that documents the evening production. He looks for shortfalls and problems to report at the 8:00 a.m. production meeting. He walks down the line of multi-spindles already installed at Thielman, talking to operators, listening for the alien growl of a National Acme with indigestion. An old 8-spindle is suffering a high-low clutch malfunction that has slowed production on part #3394 from 9.5 seconds to 11 seconds. Have to get that fixed today. A part from Jelenic Machinery is due in later via UPS to fix another flagging Acme, running component #4167.

Pletscher walks over to the two brand new Schütte CNC multis that were installed in September. They are a big part of the $9 million bet that the owning Hoskins family, president Paul Hojnacki, Ed LeClair, their banker, HSBC, and the whole Curtis clan have placed on their future in the metal-cutting business in North America. The Schüttes cost $1 million each, and they are dedicated to making transmission gear blanks that are not terribly sophisticated but are one of the core products that Curtis makes for automotive. They run some of those jobs that go on and on and on, year after year, with big volume. The management team decided that the gear blanks were parts that they absolutely could not afford to lose, and they were going to buy the best machines in the world to produce the parts fast and flawlessly.

Both Hojnaki and LeClair told me privately that they preferred to buy Euroturns, the Czech machine sold by Maxim of Dayton, Ohio, but the key engineers at Curtis preferred Schüttes, which were considerably more expensive than Euroturns. In the end, they yielded to the engineers because they were going to make the machines succeed, if they staked their reputation on the decision.

Pletscher checked the numbers on the new Schüttes. He has some of his best operators on these machines. The CPK numbers were extraordinary in Germany, over 5. Jeff Kiepp, an engineer, went over to Cologne, Germany, for training. Schütte

had service people on hand for weeks to qualify the machines. Ron Greco, a 27-year veteran, is running the machines on days, and Tim Kuta, who knows his stuff, is on nights, but they are machines, and they fail occasionally. Curtis can afford no failures on the $1 million Schüttes, so the company built its own dedicated part-checking machines to inspect each gear blank coming off of the CNC multis. The blanks roll down conveyors into the inspection machines. The inspection machines were designed and built by Curtis engineers P.J. Allen and Kenny Carmichael. They cost Curtis $46,000 each to make, but would have been $75,000 each to buy from a supplier.

More Than a Meeting

Pletscher needs the data on every machine at Thielman for the 8:00 a.m. production meeting led by Marty Nuara, the Niagara Street plant manager, who will run the combined operation at the new plant.

Pletscher wants to know what jobs are hot, what machines are ailing, what operators are available, everything he can to match the right talent to the appropriate machines to get out the product. Curtis is able to juggle its customer requirements because it has depth of talent and equipment. They have built up extra inventory to cushion the move to Thielman. They haven't missed a delivery schedule, despite the inevitable missteps inherent in moving machinery to a new location. But the moving process is hugely expensive. The original working number was $3,000 per machine to move from Niagara Street and Roberts Avenue to the new factory. That figure was way too ambitious. With 200 major pieces, the move will probably cost $1.5 million at a minimum. Pletscher and Nuara have to keep an eye on every part number to make sure that no screw up is disastrous. That's why the 8:00 a.m. meeting is crucial.

At 8:00 a.m. Marty Nuara convenes the meeting at Niagara Street, the 100-year old headquarters plant on the Niagara River, overlooking the Peace Bridge and Ontario, Canada. It is seven miles from Thielman, but a century separates the multistory downtown plant that has absorbed countless gallons of oil in its cement pores and the epoxy-floored, almost immaculate new plant. Thielman somehow smells like Oreo cookies. Niagara emits the aroma of cutting oil, but after three seconds, who notices.

Gary Pletscher is on a speakerphone. Nuara runs the meeting at the big conference table near the kitchen. The supervisors plus Marty Schwarz, a 40-year veteran of Curtis who retired but came back to help with the move, sit at a table listening to Pletscher's job and machine status report on speaker phone, then give their own update on their areas of supervision. They go over which machines are being moved and tell each other about every job in play at Thielman and Niagara Street. There is a problem with an operator with a bad

absentee record. Nuara makes a note to bring the operator in for a disciplinary procedure. There are contract guidelines for such sessions. Curtis does not mess around with problems. They do not fester. This particular operator met with Marty Nuara that same day for a review.

Setting a Tone

Nuara is a young but seasoned 37-year old engineer who has moved up quickly at Curtis. He seems to live for this job. He grabs hold of problems like they are Lindt chocolates. My impression is that if Nuara ever had a couple of hours with no problems, he would invent one to tackle. Fortunately, for him, at Curtis, especially during a move, there are always plenty of issues to deal with.

Nuara is moving his office from Niagara St. to Thielman on this day. A few cardboard boxes prove adequate for his stuff; the wall photo of a pristine golf green will find its way to his office in the new building, as will his collection of favorite screw machine parts that he has collaborated on. I think every guy in the turned parts business has a treasured assortment of steel, brass and aluminum objects in a dish or drawer that symbolizes his life's labor. To his wife or secretary they are shiny, hexagon flotsam, but to a real screw machine guy they are his jewelry, worthy of being frequently touched, even caressed.

Underneath the second-floor conference room at Niagara St., the riggers are loading a 42-millimeter 6-spindle Schütte on to a flatbed for the trek to Thielman. A few hours earlier, it had been disconnected from its electricity and plumbing. Frank Augugliaro handled the job. Frank is also the UAW union chair at Curtis, a position he has held for six years.

Augugliaro is a pragmatic guy. He has worked at Curtis for 32 years. Curtis has 11 pay grades for union workers. He is in the top grade. Though Curtis is union, it has very few of the rigidities you see at a Ford or GM plant or, worst of all, McCormick Place in Chicago.

Augugliaro has a good working relationship with LeClair, but you do see clear boundaries between union and salaried workers. Management wears oxford shirts and ties, though engineers do not wear ties, generally.

Both Hojnacki and LeClair had fathers who were union men. They are Upstate New York guys, not Harvard MBA's. The Hoskins family lives in Buffalo, and John Hoskins, Jr. is working daily in the company. For a guy like Augugliaro, this is comforting.

By Lloyd Graff

Printed in the November/December 2009 issue
of Today's Machining World

Finding a BRAND in your MACHINE SHOP

Cathy Bothe was knitting a sweater for her grandson Jack in her Kenosha, Wisconsin, home on a Sunday night in 2006, and in her words, "bitching about these crappy Chinese needles," she was using. Her husband, Kent, who had been cutting metal chips in the family machine shop for 40 years retorted, "So why don't you do something about it?"

At that time, there was no high-end knitting needle, only the generic Wal-Mart needle. Cathy and Kent often talked about folks who restored cars. Did they go to the dollar store to buy their sockets? No, they would invest in a Craftsman or Snap-on because they understood they were buying a tool to last a lifetime.

That night, Cathy and Kent drove over to their machining facility to make the needles Cathy always wanted but could never find in yarn shops.

After running some aluminum barstock through a Mori Seiki AL-2 lathe, they suspected that they had the unique product every job shop owner dreams of, but most never find.

Cathy, the president of Bothe and Associates, a 59-year-old shop started by Kent's father in a humble garage, enlisted her daughter Laura and son Paul to work in the needle company they named, Signature Needle Arts. Bothe and Associates was already busy serving a broad range of industrial and medical customers, but the Bothes thought that a product that offered a superior tactile experience even at 10 times the price of generic needles from China would find buyers among knitting enthusiasts.

A business consultant could have given Cathy a dozen reasons why making a utilitarian commodity product into a piece of useful jewelry was a stretch for the machinists from Kenosha. But probably because she didn't know what she didn't know, she threw herself into the project with the naïveté of a zealot.

It turned out that even without a detailed business plan, possessing a plant full of CNC lathes and a million man-hours of manufacturing know-how gave the Bothes an advantage in bringing their unique idea to life.

Think of the hypothetical "housewife in Duluth," who thinks about, and maybe even pencils out, what a spectacular needle would look like. She'd likely have no clue about machining a point on a stringy piece of aluminum barstock. She probably never would have heard of anodizing or CAD/CAM. She might consider sending a product sketch to a Chinese company (that would honor the intellectual property, of course) and wait for a prototype to be mailed back to her in a week.

The Bothes were able to compress the learning curve on production but were novices at bringing a top of the line consumer product to buyers who didn't know they had always wanted it.

Meanwhile, business in the machining world was evaporating, and the pie in the sky knitting needle effort was starved for marketing money.

Cathy and Laura Bothe decided to bring 75 pairs of their machined needles to a needle arts trade show in Chicago in August 2007, hoping to elicit a little buzz, and if lucky, sell some product.

To their amazement, customers lined up 10 deep to see the needles of their dreams. Kent had stayed home, but was on pins and needles waiting for a phone call from Cathy to report customer reaction. The call seemed to never come because Cathy and Laura were just trying to cope with the throng of buyers. This was the moment they knew they had a business, not just a sideline to the machining company.

They also discovered that a key to developing the brand was reaching the online knitting community. Most knitters are women and many of them read blogs on the Web related to their hobby. The Bothes gained tremendous exposure on a

massive Web site devoted to the knitting and crocheting community called, Ravelry.com. The site now has over 513,800 registered users from all over the world. Through Internet buzz, blog mentions and displaying at shows, the Bothes quickly gained sales and credibility in the fiber arts world.

They realized that their biggest challenge is convincing people that using Signature Needles makes the knitting experience significantly more pleasurable and efficient. Stitched to that hurdle is the guilt factor. Women are often reluctant to spend money on elegant tools for themselves, though they are less likely to skimp on yarn.

Cathy said, "If you're going to make a gourmet meal, you must [have the best] ingredients, so we buy very high grade aluminum, all American-made aluminum. That's made a big difference for us." Signature Needles uses high quality grinders that get the diameters to within a thousandth of an inch total, which is important so knitters can make an accurate stitch size. They anodize in the United States, which enables them to create five lush colors—emerald green, ruby red, gold, amethyst purple and sapphire blue. The high-grade aluminum also allows their needles to be polished to a beautiful finish.

Chinese needles are made from hollow tubes of aluminum. But Cathy says you can never get quality points with hollow tubes. She says you can keep forming it and forming it, trying whatever you can think of to make the needles pointy, but you just can't get the accuracy or the radius on the tip that Signature can achieve with their quality materials and processes.

Kent Bothe uses the comparison of buying a fancy golf putter for $200 or a Calloway driver for $300. He rhetorically asks if anybody who cares about their golf game would whack the ball off the tee with a 40-year-old Sam Snead persimmon driver.

I observed a reluctance to splurge on this type of product in my friend Janet Herbstman, who first exposed me to the knitting world. Janet is a fanatical sock knitter who could easily afford the Signature Needles, yet she told me she could not pull the trigger on a set of four beautiful double-tipped stainless steel Signature Needles because of the $45 retail price point.

Signature's single point needles have three different point profiles; Stiletto, Middy and Blunt, which no one else has ever done. They also have three lengths available; 7", 10" and 14", and you can pick a decorative cap.

Single point needles sell for $28 a pair for the smaller sizes (US 1-US 5) and $32 a pair for large diameter sizes (US 6-US 10).

After our interview with the Bothes I brought back a set of double points for my friend, Janet. She woke up at 6 a.m. the next morning to try them out and immediately loved them. She says she will be buying a lot more in the future.

Cathy says that people love to have choices, yet a typical big company has a different attitude. They say, "This is what we're making. Here, buy it." Signature says, "Tell us what you want." This is why they now have a 7" needle, which no one else makes.

The Bothe family's Signature Needle Arts story is one for all seasons, but has particular meaning now as machining companies search for a way out of a disastrous downturn.

The Bothes had a good idea—the superior needle. They had the energy, guts and smarts to pursue it in a big way. They have capitalized on their machining knowledge to make a consumer product with the precision and finish required of a medical implant. They have also utilized social media like Twitter and knitting blogs to gain a following.

"We do email surveys and have a large email list of customers," said Cathy. They gather feedback from those and exhibit at consumer trade shows. "People come to our booth all day long," said Cathy. "We also have people emailing us from our Web site to tell us exactly what they'd like to see—new caps, lengths, everything."

The Bothes are worried about knockoffs, so they are running as fast as they can to build their brand, knowing that the copycats will eventually strike.

They bought a new Tsugami CNC Swiss-type lathe to machine their needles and it is now the busiest machine in the shop. In 30 months they have built a business within a business. In the cluttered world of precision machining, they have found a needle in a haystack.

Printed in the April 2005 issue
of Today's Machining World

Happy Hunting

by Troy Schultz, Dynamic Tool, El Paso, Texas

I have been elk hunting in Colorado with my horse, Rader, and mule, Elle, for seven years. In Colorado, when you go to the national forest and even when hunting on private lands, all motorized vehicles are restricted from going off-road. Even snowmobiles and quads are outlawed. That's where Rader and Elle come in.

When hunting, it is possible to go on foot to the campsite. But if you are lucky enough to shoot an elk, you cannot get it out without the help of a horse — or better yet a mule. My mule, Elle is larger than an average mule. To breed a large mule you need to mate a large donkey called a mammoth jack with a large mare. It looks kind of goofy riding a small, "standard-sized" mule so I got a large one that basically looks like a horse with floppy ears.

Mules are actually more intelligent than horses. When I only had horses I used to shut my gates with a latch mechanism that you fold down onto a post. In two weeks Elle figured out how to open them; now I chain all my gates with pad locks.

The best thing about having a mule when hunting in the mountains is that they are more sure-footed and they have much better endurance than a horse. A mule can also carry a lot more weight, perhaps twice as much as a horse, which is a premium when you're going long distances carrying heavy objects.

Once I was on my cousin's horse and wandered into quick-sand. The mud was up to the horse's neck and up to my waist. My cousin threw a rope around the horse and our two mules pulled us out.

Two other guys and I attempted to carry one elk leg a half a mile, but that was too much for even the three of us. Elle and Rader make elk hunting possible. I couldn't take back anything I shot without them.

"When hunting, it is possible to go on foot to the campsite. But if you are lucky enough to shoot an elk, you cannot get it out without the help of a horse—or better yet a mule"

By Noah Graff

Printed in the April 2007 issue
of Today's Machining World

Mike Rowe hosts the Discovery Channel's hit program *Dirty Jobs*.

He's leapt into a multitude of blue-collar occupations including some off-the-beaten-path jobs: Shark Suit Tester, Copper Foundry worker, and Road Kill Removal Specialist. No matter how disgusting, dangerous or strenuous the job, Rowe continues to approach it with enthusiasm.

NG: What jobs did you aspire to do when you were a kid?

MR: I honestly had no aspirations, at least none that I can recall. I mainly remember feeling panicked by the idea of doing any one particular thing for the rest of my life.

NG: What is the "dirtiest" job you've ever had to do?

MR: Removing a broken lift pump from a wastewater treatment facility has to be near the top of the list. Someone must enter the shaft from the bottom, swim through tons of human waste, climb to the top of the pump, and tie off a cable. Unforgettably bad.

NG: What's the strangest job you've done – on or off the show?

MR: I worked the midnight shift at the QVC Cable Shopping Network for three years. I also sang in the opera for a few years. A great place to meet girls while dressed like a Viking.

NG: In what job have you felt most endangered for your life?

MR: Shark suit tester, lumberjack, coal miner, alligator farmer, golf ball recycler – in no particular order.

NG: What's the most physically difficult job you've had to do?

MR: In terms of physical abuse, it's hard to separate the agonies of railroad work from hot-tar roofing, or indoor deconstruction from blacksmithing. Anything that involves swinging a sledgehammer for 12 hours in a row is going to leave an impression.

NG: How do the people you are working with feel about their jobs?

MR: The people I meet, by and large, appear happier, more balanced, and better adjusted than most of my friends with white-collar jobs. They genuinely seem to love what they do. Most of them seem to be in on some sort of joke that your typical professional doesn't get.

NG: What's the most important thing you've learned from all of the jobs you've had?

MR: One of my favorite lessons is the importance of having visual cues in our daily work lives, and the forgotten benefits of working on a job that allows you the satisfaction of having actually done something. Bricklaying, road-kill removal, whatever. Seeing a finished product or the fruits of your labor is something a lot of the white-collar workforce no longer experiences, and it's important.

NG: If forced to choose one job from the show as your lifelong occupation, which would you choose?

MR: I think I'd like to run the machines at a scrap metal yard. The magnet, the claw, the shredder; they are all very satisfying. Farming taro in Hawaii was also gratifying. I wouldn't eat the poi, but farming the taro is good fun.

NG: How do you stay so upbeat and positive?

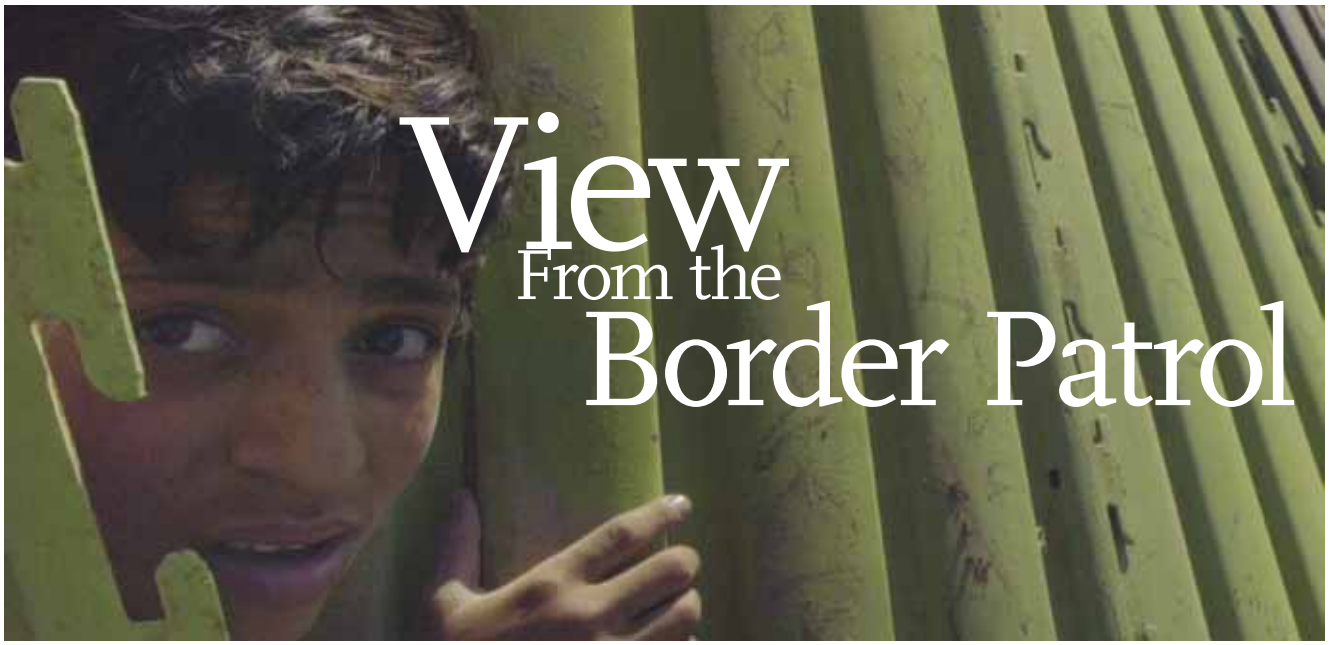
MR: I get to leave at the end of the day.

NG: If you could work alongside anybody living or dead for one day, who would that be?

MR: That's a tough one. I'd like to navigate a riverboat with Mark Twain, or maybe drive some spikes with John Henry. I'd like to see if he really died with a hammer in his hand. Mostly, I believe I'd like to split some logs with my grandfather.

By Noah Graff

Printed in the November 2006 issue
of Today's Machining World



View From the Border Patrol

Noah Graff talked with **T.J. Bonner**, president of the National Border Patrol Council, about his dual role in thwarting illegal immigration while advocating as a labor leader.

NG: T.J. Can you begin by talking about what your job entails as a border patroller and as the president of the National Border Patrol Council?

TB: As a Border Patrol agent I'm responsible for securing the border, stopping everything that comes across the border. Obviously we're not successful in that. We have millions of people in the country illegally, although it's estimated that at least a third of the people or perhaps 40 percent of the illegal alien population in the United States are overstays. They come to this country legally but overstay their welcome.

NG: How many officers do you have on the Mexican border?

TB: We have about 10,600 to 10,700 patrolling 2,000 miles of border.

NG: What is the daily routine for Border Patrollers?

TB: It depends on where you're stationed. In some areas the daily routine is about as boring as boring can be, because they sit you in one spot and tell you to watch that piece of the border. In other areas you have the freedom to patrol around and engage in what's called sign cutting, which is looking for footprints or others signs of disturbances that indicate people have crossed the border. It's not always something as simple as a footprint. In many cases people will get very clever when they cross the border. They'll put boots on their feet so that it's just a scuff mark, or they'll lay a board across and have people walk across like on a balance beam.

NG: What are the ups and downs of a job like yours?

TB: I love the challenge of tracking down someone who knows they're being followed and they're trying to throw you off the trail. It's a very satisfying aspect when you outwit and capture them. The most difficult part is working in some of the extreme temperatures. I work out in the mountains of San Diego, and in the wintertime we will get snow out there. In the summertime we will get triple-digit heat. Working in the extreme temperatures exposes the agents to as much danger as it does the people who are out walking.

NG: How has the job of Border Patrol agents changed since you started?

TB: The big change was the adoption of the strategy of deterrence, which came about in the mid 1990s. The theory of the strategy of deterrence is to have agents in high visibility, high profile positions right along the border. The people who are making $5 a day will come up to the border and see all of these agents and turn around and go home. But they figure out ways to get by the Border Patrol. One of the results of this new strategy has been an increased reliance on professional smugglers. It's now estimated that perhaps as much as 90 percent of the traffic that crosses that border illegally is aided by professional smugglers. And the cost of being smuggled across has grown commensurately, about tenfold in the last 15 years. So what used to be $150-$300 crossing is now in the range of $1,500 to $3,000, and that's for someone from Mexico. The farther you get from Mexico, like from Canada and China, the more it costs, because there are more palms to be greased.

NG: What is the most important group of people you are focusing on?

TB: Obviously the terrorists. In February 2005, James Loy, Deputy Secretary of the Department of Homeland Security, testified in front of the Senate Intelligence Committee that al-Qaeda had a keen interest in exploiting the weakness of our southwest border for sneaking across. The reason is very obvious; when you come across through legal means, albeit fraudulent legal means, you leave a trail. There is then a danger that someone is going to connect those dots and track you down before you can carry out your terrorist attack. If you slip across the border unknowingly, no one knows you're in the country.

NG: What group of people do you target next?

TB: It would be the large grouping of people I call criminals, whether they be drug dealers, drug smugglers or just coming in for the express purpose of preying upon people in our communities. About eight percent of the people the border patrol catches have some type of criminal record.

NG: What is the best solution to prevent foreigners from entering the country illegally?

TB: The best solution is to address the problem at its root, which is the workplace. We know why most people are coming across the border illegally; they're seeking to better their lives economically. If they can't find work in the United States they simply won't come, which will leave you with a smaller group of criminals and a handful of terrorists. It would be much easier to spot and apprehend that smaller group if your weren't consumed with dealing with the millions of people who are coming across every year looking for work. The Border Patrol catches an average of 1.2 million yearly, mostly people simply looking for work. Our agents on the ground estimate we are only about 25 to 33 percent successful, which means that several million people get by us every year. Now some of them go back home, so some of the people you're catching are repeat offenders. I've caught the same group of people four times in one eight hour shift.

NG: If you were a poor Mexican, wouldn't you try to cross the border?

TB: I think that any person who is looking out for themselves and their family's best interest would make that journey. You can't blame them for coming across and breaking our immigration laws. You have to blame our system which encourages people to come across, because on one hand we say, "Don't cross the border," and we have Border Patrol agents there and fences in some areas, but once they get by the immediate border area, no one is looking for them. So the word gets out that, "Hey, once you make it, once you run the gauntlet you're home free. No one's going to be looking for you."

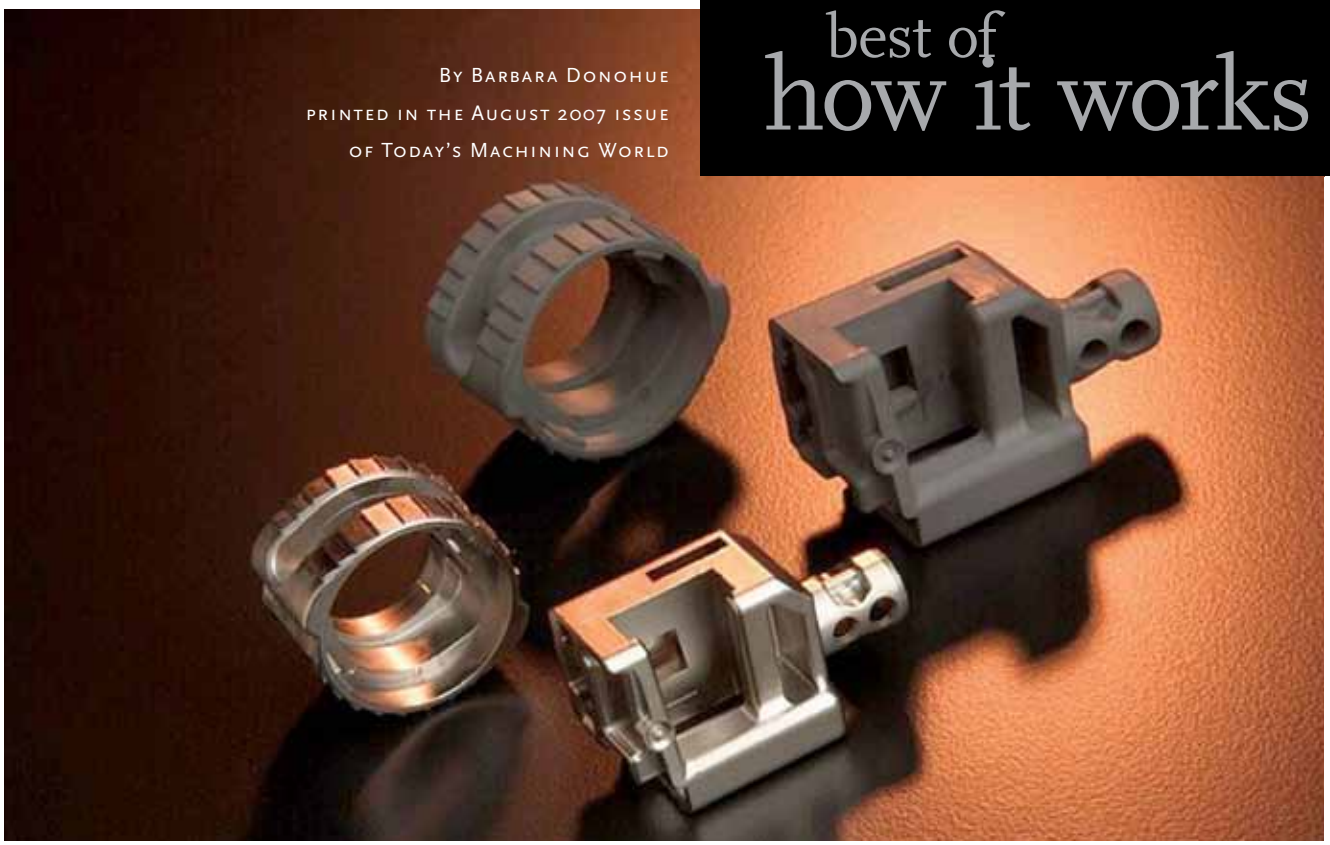
NG: If you were the supreme leader of the U.S. Government for one day and you could make one change or new policy, what would it be?

TB: Employers need to be given a simple, foolproof mechanism to verify that an individual has a right to work in this country, and that requirement has to apply to everyone. The logical document to establish is a smart Social Security card that contains no more information than what the current card contains, like a name and a number, but it would also have a digital photograph encoded. It would also be biometrics encoded in a very sophisticated algorithm, so when the employer swipes the card through a reader they would get an answer back in at matter of minutes saying, "Yes, this is a genuine card, feel free to hire this person." That information would also bounce into a master database so that enforcement agents could compare the records.

NG: Aren't immigrants doing jobs that American citizens don't want to do?

TB: To the extent that you have jobs that Americans do not want to do or that you don't have enough of a labor pool, then by all means immigrants are important. Immigrants have been used historically in United States to fill jobs where there was a need. The problem comes when you have a surplus of people coming in and when you are not selecting people who have skills that you need. We're getting the poorest of the poor and the most unskilled workers coming in rather than soliciting people who have the job skills that we need.

NG: Thanks, T.J.



By Barbara Donohue

printed in the August 2007 issue of Today's Machining World

Metal injection molding

Can manufacturing complex metal parts in high volume really be as easy as filling a mold? Read on.

To make a complex part in metal, you can cast it, or machine it — or injection mold it. The process is called metal injection molding (MIM), or sometimes powder injection molding (PIM). It can produce intricate parts in a wide range of metals, including steel, stainless steel, and even high-temperature alloys. MIM has been around for decades, but only in the last twenty years has it found widespread commercial application. Aerospace, medical, electronics, firearms and consumer products industries now use MIM.

You may be familiar with powdered metal (PM) parts, especially as bearings, bushings or small gears. PM parts are formed of metal powder compressed in a die and then sintered. MIM uses much finer powder than PM, and a completely different manufacturing process.

The worldwide market for custom MIM parts is more than $500 million, according to James Dale, vice president of member and industry relations, Metal Powder Industries Federation (MPIF), Princeton, N.J. This does not include parts that companies manufacture for their own use in house.

MIM can make complex parts economically in structural metals. MIM can also allow you to replace an assembly of two or more parts with a single MIM part, further reducing costs.

From Powder to Part

MIM metal powder is very fine, with particles 20 microns (about 0.0008) in size or smaller. "It feels like talcum powder," said David Smith, senior sales manager at PCC Advanced Forming Technology (AFT), Longmont, Colo. These very fine powders are made by a number of processes, including atomizing molten metal with a high-velocity stream of gas.

The MIM process starts with mixing the feedstock, a combination of metal powder and binder. The binder is a mixture of materials such as plastic and wax materials that melt and hold the metal particles in suspension while the stock flows into the mold cavities. A typical feedstock might be 60 percent metal powder and 40 percent binder by volume.

The feedstock is heated and forced into the mold cavities. The parts are removed from the mold. The newly molded parts

are the shape of the final part, but larger. At this stage they are called "green" parts.

The next step is called first stage debinding. This removes most, but not all, of the binder from the part. Debinding can be done with heat (thermally) or by a chemical process, either with solvents or with chemicals that react with the binder.

After first stage debinding, a small amount of binder remains to help the part hold its shape. The part is now a "brown" part and is about 40 percent porous.

Finally, the parts are set on ceramic trays and placed in a furnace to remove the last of the binder and sinter the parts.

In the sintering furnace, the temperature rises until the remaining binder is gone and the metal particles approach 90 percent of their melting temperature, at which point they join together. After sintering, most MIM parts end up at 95 to 98 percent of full density.

MIM parts are often used as-sintered, but you can machine, heat treat or plate them as needed. In applications where 100 percent density is required, a hot isostatic pressing (HIP) process is used.

Economical for Small, Complex Parts in High Volumes

A MIM mold will likely cost about 20 percent more than an equivalent plastic mold, according to Tim McCabe, technology development manager, Kinetics Inc., Wilsonville, Ore. The MIM molds need to fit together more tightly because of the properties of the binder compounds. Also, in general, part tolerances tend to be tighter for MIM parts, McCabe said. The cost of making injection molds varies tremendously, but tens of thousands of dollars would not be unusual for a multiple-cavity mold for small precision parts.

To make MIM economical, you need to amortize the tooling cost over all the parts made. So MIM is usually used only for higher volumes. At his company, "'low volume' is less than 10,000," said McCabe, and typical quantities can run to hundreds of thousands or even millions.

Small, complicated, high volume parts are ideal candidates for MIM. Various MIM shops can handle parts up to 100 to 200 grams (3.5 to 7 ounces), but recommend 50 grams (1.8 ounces) or less. One MIM manufacturer gives a "rule of thumb": you can make MIM parts about the size of your thumb.

The mold is designed over-sized to allow for the expected shrinkage of the part. Tolerances on completed parts normally run in the 0.003" range, with closer tolerances possible. On long parts, feature-to-feature tolerances can be challenging. In this case, "you could mold in one hole and drill the other one," said McCabe.

"MIM does not compete with pure manufacturing," said Smith. If a customer needs a part that could be a "straight screw machine part, a stamping, or a powdered metal part, we're not going to compete." But some parts can't be made or may not be economically viable without MIM.

Material Mystery

The mechanical properties of MIM materials such as ultimate tensile strength can be close to those of wrought materials. However, the small amount of porosity remaining in completed MIM parts may impair dynamic properties such as impact and fatigue strength.

"One advantage that MIM material has versus forged material is the lack of texture or directionality of properties," said Maryann Wright, engineering supervisor at the Powder Metal Products Division of Remington Arms Company, Ilion, N.Y., in an e-mail interview. For wrought metals, the mechanical properties in the direction of rolling can be different from the same properties in the transverse direction.

Learning to MIM

Most of the design guidelines for MIM parts are the same as for injection-molded plastic parts. The same recommendations apply for uniform wall thicknesses and ribs for strengthening. For MIM parts, you also need to think about how the part will behave during sintering, and include design features to prevent sagging or other deformation. Ideally, the part will support itself during sintering. If not, special fixturing can support it, or the part can be straightened afterward.

Experienced MIM engineers can help fine tune a design and select the right material. The alloy you end up using for a MIM part may not be the same one you might specify for a cast or machined part.

"The sooner you get the MIM designers involved, [the better]. They may come up with solutions you may not have considered," said Dale. "A MIM engineer sees problems every day that the design engineer has never had to consider."

To help remedy this lack of exposure, Advanced Forming Technology conducts a "hands-on MIM school" four times a year. Interested engineers, and a few purchasing people, come to the plant and spend two days learning about MIM. They experience first-hand how to mold, debind and sinter parts, and come away with a deeper understanding of what MIM can do.

Though metal injection molding is a powerful parts-making technique, it is not the ideal method for making every part in every application. For some high-volume products, however, MIM can solve design problems or save assembly costs in ways not possible with other manufacturing technologies.

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By Noah Graff

Printed in the October 2007 issue
of Today's Machining World

Mad Mike

is the head car customizer on the MTV show *Pimp My Ride*, a reality show where people get to have their ugly, old beaters restored and "tricked out" with ridiculous, incredible features such as a 42 inch plasma TV, a microwave, and a purple paint job. He's been working on cars for over 20 years and has customized cars for several celebrities.

Noah: When did you start working on cars?
Mad Mike: I was 14 or 15 years old. I learned from reading car audio magazines as a kid, and then I had a couple guys in the neighborhood who [taught me]—a guy named Uzi, and Cornball, who was one of the [stereo] installers for basketball players and the high profile people in Compton [L.A.]

NG: Who comes up with most of the ideas for *Pimp My Ride*?
MM: It's a group effort—we all come up with the ideas. I just organize it and make sure it happens correctly.

NG: What kind of cars do you have in your driveway?
MM: My '76 International Scout, my Tahoe, my Honda, my Pacifica, and my motor home. They're conservative but unique. Like the one I'm in right now—I have three cell phones, my laptop with high speed Internet, Direct TV, and the windows smoked out black. It's pretty fast too.

NG: What are you doing in your car right now?
MM: I'm checking my emails. I just got an iPhone. I'm watching Direct TV, and I'm also drinking tea and eating my cookie. I do it every day, and I don't have my seatbelt on. I'm going about 85 miles an hour.

NG: What's the most ridiculous thing you've ever done to a car?
MM: Put a TV in the steering wheel—which we got a $15,000 fine for.

NG: Tell me about an idea that simply went bad.
MM: Every idea goes bad. Everything wonderful goes bad. We put a waterfall in one of the first cars I worked on, and I couldn't get it filled because the car vibrated and the waterfall just fell apart. When you get water in your electronics it's pretty crazy.

NG: One of my favorite episodes on the show was when you put the ping pong table in the bed of a truck.
MM: The ping pong table was one of the worst nightmares ever, because you had to saw it down. You couldn't have it regulation size because the bed of a truck is not square, it's like a trapezoid – but a ping pong table is square.

NG: If you could have coffee with anybody living or dead, who would that be?
MM: Albert Einstein or Thomas Edison. Einstein discovered something that nobody's ever been able to figure out, and Thomas Edison discovered something that we still use today. All that people are doing now is redesigning the things people have already thought of.

NG: Have you done cars for a lot of celebrities?
MM: I've built like 70 cars for Shaquille O'Neal. The seat always has to be moved back about two feet, and then right above his head has to be a set of tweeters in every car—he loves crystal clear music. We also did the "I'm Sorry Car" for Kobe [Bryant] when he had sex with that young lady. It was some weird car like a big '46. She always wanted an old car restored and it had diamonds all in a [crazy] cluster.

NG: Have you been carjacked before?
MM: Kind of, but not really. People have tried to steel this truck I'm driving—I think three times already, but they couldn't get it. I've had one car stolen in my life and it blew up on the freeway. I have the ultimate anti-theft security system in my car, and if you're dumb enough to steal my car, whatever happens to you happens. May God have mercy on your soul.

By Noah Graff

Printed in the January 2009 issue
of Today's Machining World

Dan Ariely is professor of Behavioral Economics at Duke University.

Behavioral economics examines market trends like traditional economics, but distinguishes itself by not assuming that humans always act rationally. The research relies on observing how people behave rather than using traditional economics methods such as cost-benefit analysis.

What is the behavioral economics perspective of the recent stock market crash?

DA: You can think about the recent stock market crash as a good example of the differences between standard and behavioral economics. In standard economics you let people run loose, and because people can optimize and be rational and they do only what's best for themselves, the whole system works very well. In behavioral economics we don't think this is the case. We think that there's a lot of reasons why people make mistakes, and as a consequence they can't be let loose on everything. The free market is not the right approach.

Define "irrational."

DA: When we act in ways that we don't understand or predict. This matters because it gives us an opportunity to get into trouble. If I think that I will have safe sex when the time comes but when I get aroused I don't, it's an opportunity to get into trouble. If I think that I will save for a long time but then I get tempted to buy certain things, that's a problem. If we think that people can compute what is the right amount of mortgage for them to take out that's a problem. If we think like Greenspan said when he testified in front of congress that he thought that people would work in the best interest of their companies, which is clearly not the case, we get into trouble.

Do you believe that because humans are not always rational, there is a need for certain regulations?

DA: It would be correct for some reasonable regulation. We've done a lot of research showing that even good people, fantastic people, with the best intentions in the world tend to see the world from the perspective of what is good for them financially. In sports when the call is on the edge we always have the tendency to view our team as more correct than someone who prefers the other team. If you have an incentive to view the world from a certain perspective it's very hard for you not to do it. What happened was that people got a ton of money to see the world in a certain perspective.

Does the human impulse to obtain revenge have a big impact on economics?

DA: Yes. Imagine you and I lived 4,000 years ago. There was no police and no law, and one day you stole my donkey. If I was just doing cost-benefit analysis I would say that if you took my donkey and ran far away, it would not be worthwhile for me to chase you. It would take a week for me to chase you and find my donkey, but in less time I could make enough money to buy a new donkey. But if I was the vengeful type, I would chase you to the end of the world to get back the donkey. I will not only take back my donkey, but your kid's donkey. Note there is less chance that you would want to take my donkey to start with. It's not a part of the economic structure, but it helps to maintain order. Yet if you bring this revenge model to the modern world it can become less productive.

How so?

DA: For example, the feeling of revenge people have against Wall Street. We had a social trust. We gave them our mortgages or our retirement plans, and in a very deep way they betrayed our social trust. And now, once this trust is lost, not only are we willing to lose money to get these SOBs to lose more, we have lost a deep trust in the stock market, and unless we fix that trust I don't think things will actually get better. Economists will say it's just liquidity —lets inject more liquidity into the market. As we can see, the liquidity is not really helping. Liquidity is not a bad thing to do, but it's not enough. It doesn't help when there's no trust.

By Lloyd & Noah Graff

Printed in the March 2007 issue
of Today's Machining World

An interview with James P. Hoffa,
president of the International Brotherhood of Teamsters Union.

State of the Unions

With Lloyd and Noah Graff

LG: I'm curious about growing up in Detroit in a union family. What memories do you have about dinner table conversations?

JH: I had a wonderful childhood. I had a wonderful father, a wonderful mother, great sister. My sister is a circuit judge in St. Louis. My early memories are talking union over the table, but also I remember in the '50s the whole family getting in the car, going to eat dinner somewhere and then going for a Sunday drive. UAW used to have a radio program, and we'd listen to it in the car. Invariably we'd end up on a picket line where my dad would say, "How's the picket line going?" We'd end up pulling our car up and visiting with the pickets. I remember going to union meetings at an early age, sitting in these smoke filled meetings back in the late '40s, '50s and '60s.

LG: I'm interested in how you see the intersection between the interests of the Teamsters and manufacturing.

JH: I think there's tremendous intersection, because the Teamsters Union is one of the most outspoken unions with regard to the unfair trade practices going on. The fact is that American manufacturing is being eliminated by unfair trade deals where you have exports from China and Japan, South Korea, the Far East, India—driving the American manufacturers out of this market. That's because of the trade policies being pursued by this administration and the Clinton administration.

Both have one thing in common—basically unfair trade. Open the markets to everybody in the world and let them have trade barriers where they can create export economies that basically attack American industry with unfair exports into this country.

NG: We certainly see it.

JH: You see it every day, whether it was NAFTA or whether it was WTO, which Clinton did. To ship auto parts into China you face a 30 percent tariff. You can't ship auto parts into South Korea. They have completely protected economies, but they have complete access to our economy. They ship stuff over by boatloads. Hyundai ships from South Korea, they put ramps down and drive thousands of cars off a ship in Baltimore. Now there's no ship of Ford Focuses going over to Seoul, Korea, because they won't allow it. Because of the trade bills they've been able to sucker us into, and we've been stupid enough to do, these companies have created an atmosphere where American manufacturing is at a disadvantage.

LG: What would you do?

JH: I would completely change the way we trade. It's very simple. The first thing you do is scrap NAFTA. There's a 60-day termination. You write a letter and end it and negotiate it all over again.

LG: What would be fair?

JH: The answer is equal access. Let's take South Korea and equality; you trade with me; I trade with you. If you have access to my economy, I have access to your economy. The trade deficit is crazy, and it's getting worse because we have the wrong trade policy. And the answer is: Anytime we have a trading partner that's getting out of line, we basically cut him off. Right now China's great idea is to flood our markets with a cheap car. It'll probably be a pretty good quality car called the Chery, and they're going to start shipping these in. Thousands of these cars will come

here and they'll sell them for $6,000. Americans will buy them and they'll devastate our already hurting auto industry. There should be a $4,000 tariff on those cars. You've got a $6,000 car; it should go for $10,000 so they don't have an unfair advantage over our products. Number one, they won't let our cars into their country. They're smarter than we are. They go to General Motors and say, "Oh, you want to do business in this country? Build a factory." GM has to build a factory and put all the Chinese people to work and then they're going to have a Buick Century. Oh that's great. Great for them. Who won that battle? Did General Motors win? What are they going to get, a small piece of every car sold? How does that benefit our economy?

NG: A lot of people take the consumer point of view and say, "Oh, we're thrilled to get that $6,000 car."

JH: That's the Wal-Mart theory.

NG: I interviewed a non-Teamster, independent operator truck driver who owns his own truck. We asked him, "If you got a chance to talk to Mr. Hoffa, what would you ask him?" And he said, "What would I gain by being part of the Teamsters?"

JH: Well very simply, he would have an organized life. He wouldn't have to be working 60-70 hours a week with all kinds of unpaid down time. If he owns his own truck and gets in a wreck or the truck breaks down, what happens to him? What if he still has a truck payment? Disaster. What if he gets in a terrible accident and can't work for two years? What happens to his mortgage payments, his car payments, his truck payments, his insurance payments? Does he pay workman's compensation on himself? It's a tremendous burden. I know independent truck drivers, and there's a certain type of people that think that life is romantic. But the reality is they have a tremendous dislike of being dictated to. A driver will be called at 2:00 in the morning, drive all night to pick up a hot load at 6:00 a.m. in Richmond, Virginia. Then he gets there and hears the load's not there and won't be there until 8:00 at night. He's got to wait. He doesn't get paid. He only gets paid by the mile when he's running.

Now there's a cowboy-type of person who says, "That is the life for me." We certainly see them as brothers of the road with our Teamsters. I have the ultimate amount of respect for independent truck drivers. But their life is fraught with peril because if they have one thing go wrong, they are really in trouble. I have a relative who started driving a truck that way who finally said, "It's not for me because it's just too much down time. When I compute the cost of my truck, the amount of hours I spend, I'm not making much money. After I pay for my truck, pay for my fuel, pay for the tires, pay for the oil, pay for workman's comp, I worked 70 hours and I made a relatively small amount of money."

LG: Why do you think the over-the-road trucking business has gone virtually all to the owner/operator?

JH: Well it's just deregulation. But you do see the JB Hunts, the Swifts, the Werners, those really big companies rolling down the highway. You're working on the highway, but the truck is owned by the company. There are variations; you can own your own truck or just lease the truck. Or you're completely independent, where you own the truck, and you do everything. The other variation is you are non-union but working for Swift. They give you the truck, but then you run mileage.

LG: Tell me about getting your first union card.

JH: I worked at a military base in Alaska back in the '60s on a ballistic missile system Ford Philco had just put in. It's still there – they had three giant screens, each one the size of a football field, and we could see the missiles coming over the horizon. The job was in the middle of nowhere, but it was the greatest job I ever had. We had 24 hours of daylight up in Alaska in the summer, so we worked nine hours a day, six days a week, 54 hours a week. They had an airplane there, so on our day off everybody put in $50 and we would fly this airplane to go fishing. We'd catch huge rainbow trout. When I think about it, these guys didn't know how to fly. It was unbelievable. Those are the great memories I have.

By Lloyd & Noah Graff

Printed in the January 2006 issue
of Today's Machining World

The Wizard of Haas

Gene Haas, the 52-year old owner and founder of Haas Automation, does not do interviews, but he made an exception for *Today's Machining World*.

Lloyd and Noah Graff talked shop with him at his Oxnard, California, headquarters on October 21, 2005.

Gene, how did you get into this business?

GH: When I was in high school I worked in a machine shop. I started out sweeping floors. This is before child labor laws I guess; I was only 13 or 14 years old.

Did you take engineering in college?

GH: I went into engineering when I first got to California State University of Northridge. I was in engineering for two years until 1972, around the time Lockheed almost went bankrupt. It seemed like maybe engineering wasn't the degree to be in, so I switched over to business.

Where did you go from there?

GH: They did job placements at college, and after I got my degree they found me a job. It was going to pay something like $720 a month. I was making $300 or $400 a week as a machinist, so I just went back to working at a machine shop.

I actually had a job for six months as a programmer at Seaton Wilson, and I was programming the old fashion way—this is even before computer systems came along. It was at one of those fundamental turning points in the whole industry. When I started learning how to make parts in the machine shop, I ran a Hardinge Chucker and a Logan lathe, which were manual machines, and I was making parts one at a time. You put stock in the collet, and you feed the thing; you turn that diameter and then go to another dimension and put a groove in—that's how parts were made. I was probably in my 20s doing all this and going to college and found it wasn't easy to get a job. Around 1976 I decided to get a job using numerical controls.

That was the tipping point?

GH: I went to Seaton & Wilson as a programmer, and they had a TBI, Tomlinson Brother's chucker with 5T controls and an LED display. I had two or three years making things manually on a Hardinge chucker, and I started working on this TBI chucker, which was an experience and pretty primitive by today's standards, but I caught on real quick. "Let's see, if I put these parts in a collet and do it one at a time, I can sit there at $6.50 an hour, which was the shop rate at that time, and make $20 an hour." I started working on the NC and thought, "Shit, parts that would take me maybe 20 minutes to make, I could make in a minute." It didn't take very long to do the math there. I sold my Porsche and bought a TBI chucker in 1978 for around $50,000. I started making parts and was competing against all these manual-type machines. The shop rate at that time was probably $20 an hour. I got a TBI chucker, and suddenly that $20 an hour shop rate turned into $60, $70 an hour.

So all of sudden you were coining money.

GH: It was very lucrative. I will be honest with you; in 1980 or so I was probably lucky if my whole business, Pro Turn, did $100,000 a year, which doesn't sound like a lot to run a whole business

on, but for a kid who probably would have been making $20,000 a year at a regular job, making $50,000 a year at a machine shop was pretty good.

And then?

GH: Well, I was making parts and this whole new wave of NC machines was coming along. One of the things that I needed was an indexer to index some parts on a mill I had bought. I was using the old Erickson pneumatic indexers, and they were a disaster. I wanted to make something that was a little smaller, a better one, and that's what I made. We went to Westec around 1983 and got a pretty good response. People liked the way it looked. It was small. It was programmable. It was different. We just started making them and I never looked back. We had a lot of competition. The Japanese copied us, and you know how the Japanese are; they're always trying to undermine you.

I heard VF1 stands for Very First One.

GH: That's exactly what it stands for, the Very First One. It was very fast paced. We were always growing, moving forward, really didn't pay a lot of attention to the details. The advantage for us was if we had an order, we had to be able to ship something in 30 days.

When did you feel you had outgrown the Chatsworth Plant?

GH: Back around 1992, the first Flexible Machining Systems really started coming out. There were FMS's before that with the pallet changers. But they were really expensive ones, and around that time the FMS's started to become very popular.

Did you take a big gulp after the bubble burst in 2001?

GH: When our business dropped from selling 300 machines a month down to like 200, we cut prices. We realized that the prices we were getting weren't realistic to what people wanted.

Tell me the concept behind the Haas Factory Outlet.

GH: You can walk into one dealer who has a very nice showroom and another where the guy is working out of the back of a warehouse. I think basic Business 101 tells you that that is just not the way to sell stuff. If McDonalds' were filthy dirty nobody would buy a hamburger there. We made dealers have service technicians. That was a big thing too; most sales organizations only focused on sales.

So your technicians become your sales people and your sales people become your technicians.

GH: I think one of the secrets to machine tools is servicing the stuff. I think a lot of our competitors have just missed that whole service attitude. The machines are so complex today you can't fix them yourself. You need someone to come out and fix them for you. If you can fix a washing machine, you can fix a machine tool.

So much has been said about the "demise" of American manufacturing. Everything that you have done over the last 20 years debunks that myth.

GH: Oh I don't think so. Back in the 1970s, there was something like 25 percent of the population involved in manufacturing.

Today you will find it is less than 15 percent. You can't go to a high school today and say, "How many people want to work in a machine shop?" I don't think you would have anybody put his hand in the air. Nobody wants to work in the old machine shops of the '60s where you have Acme-Gridleys that just deafen your ears. They don't want to do ho-hum work; they want to do something interesting.

Let's say it is October 21, 2008, and you are looking back over the past three years. What would have to happen for you personally and professionally for you to be happy about your progress?

GH: Nothing, actually. I'm happy now. I think the machining business is doing well. When you look back at things like Sony; remember the Walkman 10 or 15 years ago? Everybody had to have a Sony Walkman to put your little cassette in. Well, that is gone. Remember TVs with tubes? Five years from now, nobody will buy a TV with a tube. But you want to know something? I guarantee you five years from now, people will still be putting a hard tool against a soft material and ripping it apart, and that is what machines tools are; you just rip the stuff off. For 150 years that is what we've been doing in the machine tool business. I don't think it is going to change too much in the next five years.

If you could be any machine what would you be?

GH: I'd be a beer dispenser. Sitting around having a beer with your friends is about the best you can get.

By Noah Graff

Printed in the February 2006 issue
of Today's Machining World

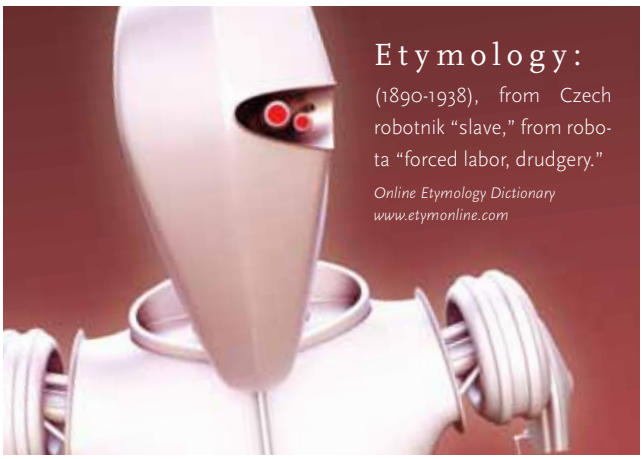
Ten years from now, will robots replace half of today's American workforce, leading to massive unemployment?

My answer: No way. It is estimated that about 250,000 industrial robots (manipulators) are deployed in the U.S. industry manufacturing and service, and even if this number doubles in 10 years, it will still be a relatively small percentage of the domestic workforce. If we add to the consideration "bots," intelligent software agents that automate many knowledge tasks, then we realize that what really happens is a shift in what our workforce is being asked to do. That means retraining the current workforce and educating our future workers to do different tasks. The same happened when computers entered industry, and people said, "Wow, no more need for paper." It turns out with all the virtual information, we need more printers and more paper for printouts, not less. In other words, don't blame a good new technology for economics cycles; enjoy all the new opportunities it offers.

Shimon Y. Nof, Director-PRISM Center, (Production, Robotics, and Integration Software for Manufacturing and Management), Professor, School of Industrial Engineering at Purdue University

The question is fatally flawed and shows a lack of understanding about the real threats to manufacturing employment in the United States today. The top threat is: Will manufacturing companies in the U.S. remain competitive with their global counterparts? If robots and other automated technologies can help companies boost productivity, improve product quality, and get new products to market faster, not only will U.S. jobs be saved, but new manufacturing jobs will be created. If, on the other hand, U.S. companies can no longer compete, the majority of manufacturing jobs will be sent offshore, and we will have massive unemployment in U.S. manufacturing.

Jeff Burnstein, Vice President, Marketing & PR
Robotic Industries Association, www.roboticsonline.com



Today we see more and more robots entering the American economy. Automatic checkout lines are eliminating cashiers. ATMs eliminate tellers. The Web eliminates travel agents. Airport kiosks eliminate ticket agents. These simple robots are the tip of the iceberg. We can say for certain that robots will replace the remaining sixteen million manufacturing jobs, a majority of the fifteen million jobs in retail, most of the six million construction workers, most of the three million people working in fast food, most of the three million teachers, most of the one million truck drivers, and so on. Will it happen in 10 years? That may be a tad aggressive, but we will be seeing impact. Will it happen in twenty? Absolutely. Here is the important question: What new jobs will pop up to replace the fifty million jobs that are lost? America has been creating service-sector jobs, but these jobs are ripe for robotic replacement. You have to hypothesize a whole new category of employment that will absorb tens of millions of displaced workers AND that robots cannot handle. I don't see that new job category arising, so I think massive unemployment is inevitable.

Marshall Brain, Author of Manna and Robotic Nation essays, www.howstuffworks.com

the facts:

The word "robotics" was coined in 1941, in a science fiction context by Isaac Asimov. Later he proposed the "Three Laws of Robotics" in 1968, in his book i Robot.

"Azimov's 3 laws of Robotics"

Law One: A robot may not injure a human being, or, through inaction, allow a human being to come to harm, unless this would violate a higher order law.

Law Two: A robot must obey orders given it by human beings, except where such orders would conflict with a higher order law.

Law Three: A robot must protect its own existence as long as such protection does not conflict with a higher order law.

Typically, **hydraulic or pneumatic pistons** move robot legs back and forth. The pistons attach to different leg segments **just like muscles attach to different bones**.

www.howstuffworks.com

An industrial robot the size of a person can easily **carry a load over one hundred pounds** and move it very quickly with a **repeatability of +/-0.006 inches**. Furthermore these robots can do that **24 hours a day for years on end** with no failures whatsoever.

www.learnaboutrobots.com

By Jerry Levine

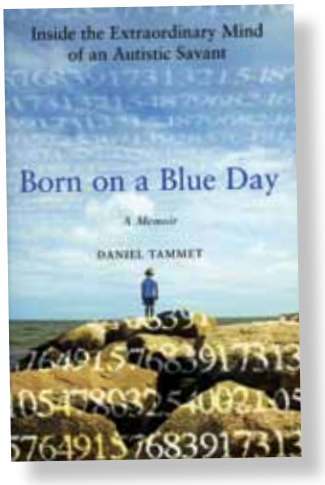
Printed in the August 2007 issue
of Today's Machining World

Born On A Blue Day

Across the world, people are suffering from an autism epidemic. At its worst, victims are non-communicative and may even be violent to themselves and others. At its best are those diagnosed with Aspergers Syndrome, characterized by above average intelligence but limited social skills. The common thread is an inability to relate to others and express feelings. Severely autistic people have limited ability to function independently in the world. Even uniquely skilled "savants" with special gifts are severely socially challenged.

I have an autistic nine-year-old grandson, Sam. My daughter and her husband struggle day to day and wonder what the future holds for them. My grandson was recently invited to his first, and to date, only birthday party this year, even though all 17 of his classmates came to his party earlier this year. Sam was oblivious to the snub, but it pained my daughter greatly.

Born an a Blue Day, by Daniel Tammet, is a beautiful story of a very high functioning savant autistic person with very unique mental abilities. He grew up with warm, caring parents and many siblings but had no relationship with them. At school he was the first one taunted and the last one picked in the schoolyard, and was almost never asked to someone's house to play. He recognized that he was different as a child and wanted to be accepted, but was totally unable to do so. As a substitute numbers were his friends, and they came in various sizes, shapes and colors.



Because of his unique mind, there was hope for Tammet, but his case is very unusual. As he points out near the end of the book, "It was the strangest thing: the very same abilities that set me apart from my peers as a child and adolescent, actually helped me connect with other people in adulthood."

Born an a Blue Day opens, "I was born on January 31, 1979—a Wednesday." So I recently asked my grandson, Sam, if he knew what day of the week January 31, 1979 was, and he quickly responded "Wednesday," the correct answer. This calendarization is one trait Sam shares with Tammet. Tammet does this by somehow relating dates to colors. I asked Sam how he did it, and he had no response, but then he rarely responds anyway.

Tammet, who is British, writes of his coming of age and his difficult transition into independent living. After high school he volunteered to teach English in Lithuania and did the near impossible for an autistic person; he lived for a year on his own in a foreign country. In spite of being a loner, he did make a few friends and learned to speak fluent Lithuanian.

After returning to the U.K., Tammet realized his gift for languages and numbers. He gained notoriety by memorizing the first 22,500 digits of Pi and made a public recitation for a charitable fundraiser.

This led to an offer from a major U.K. TV channel to do a one-hour documentary on his life. He met Kim Peek, the inspiration for the movie Rain Man, and he made an appearance on David Letterman. The TV producers challenged Tammet to learn a new language from scratch in one week in front of their cameras. They chose the extraordinarily complex language, Icelandic. Amazingly, Tammet became fluent in Icelandic and was comfortable enough to appear on several interviews on Icelandic TV.

Tammet eventually fell in love, converted to Christianity, and learned to appreciate his love for his family and their love for him. The book closes with the beautiful passage from 1 Corinthians: "Love is patient, love is kind ... Love believes all things, hopes all things, and endures all things. So faith, hope and love abide ... but the greatest of these is love."

Tammet proved that it is possible for an autistic child to become a feeling human being with the ability to love and be loved. His story gives this grandfather hope.

By Lloyd Graff

Printed in the October 2005 issue
of Today's Machining World

Rock Valley Revisited

The heavy smell of manure envelops the town of Rock Valley, Iowa, a hamlet of 3000 people, more than half of them directly involved in precision machining.

Rock Valley thrives while other farming towns in the corn and soybean belt of the upper Midwest wither. As crop prices stay low, small farms fall uncompetitive, and growing towns like Sioux Falls, South Dakota, pull the young people into the big financial firms and health facilities, while Minneapolis lures others with the Vikings, Twins, 3M and Medtronic.

Rock Valley, Iowa is a little enclave of mostly people of Dutch ancestry, where many of the folks have last names starting with Van. There are thirteen churches in the town, the private Christian schools have more students than the public schools, and cars are left unlocked with keys in the ignition. John Kerry didn't even visit while campaigning in the Iowa primary, because essentially, there are no Democrats in the town. The mayor teaches Government in the public high school, there is one police car in town, no Wal-Mart, McDonalds or Starbucks, and most folks eat dinner with their children at 5:30 in the afternoon.

Rock Valley is unlike other successful Iowa towns nearby: Le Mars, which is dominated by the Wells Dairy, which makes ice cream for Häagen Daz and sells its own Blue Bunny brand; and Ida Grove, which is dominated by one family who makes Gomaco concrete paving equipment for the world. Rock Valley is a town of small companies in metalworking. They probably turn more barstock per capita in Rock Valley than in any other town in the country.

In early September, Rex Magagnotti, Noah Graff and I flew to Omaha on Southwest Airlines, and shlepped three hours in a rented Hyundai to Rock Valley to find out why they buy so many machines there.

We met Jim VanderVelde at the Dollar Store in a new strip mall on the outskirts of town. Jim is the head of Economic Development for Rock Valley. He has a doctorate, knows everybody, and can arrange an interview on a dime. We came to learn that he is one of the people who make Rock Valley so successful.

Jim gave us the background story on the founder of the businesses of Rock Valley, Charles Kooima. Kooima started a job shop in Grand Rapids, then moved back to his hometown of Rock Valley in the late 1940s. His machine shop grew in fits and starts, and he ultimately sold out to the Van Zantens, John and Cornie, who worked with him. The Van Zantens built Kooima into a sizable machining firm before selling out in 1983 to Hayes-Albion Corporation, a Tier One automotive supplier.

The Kooimas and Van Zantens have a connection in one way or another with the many successor businesses in the town. The grandson of Charles Kooima runs a big laser cutting operation. John Van Zanten took an interest in a small local bank, The Peoples Bank, and helped propel its growth from $20 million to $175 million. Through the bank and Jim VanderVelde's government connections, Van Zanten and

associates have provided seed money for many of the machining experts who learned the business at Kooima and its later incarnations.

Building a History

Midwest Pro Engineering is the latest machining company to start up in Rock Valley. It is directly across the street from the old Kooima shop, now known as Total Component Solutions, a company with over $20 million in sales.

Owners Evan Van Ginkel, Paul Van Ginkel and Duane Eppinga are skilled programmers and CNC lathe operators. They felt thwarted at TCS and wanted to try the job shop business on their own terms. A local cement contractor owned a shop and a machining center, but didn't have the inclination to use it right now. The trio rented the building, put up 15 percent equity, borrowed money from The Peoples Bank, 80 percent guaranteed by the SBA, pulled in a development grant from the county through VanderVelde, and bought three brand new Daewoo CNC lathes.

They went to local shops looking for low volume jobs, and Paul Van Ginkel hit the road to build relationships and bring in more work. They now have 20 accounts, which keep them busy 16 hours a day. Their wives all work in the business too, and they are now hiring a new employee. The hire is a former student of Paul's. Paul taught Industrial Arts at the Netherlands Christian High School of Rock Valley for eleven years.

The guys at Midwest Pro have their heat-treating done at Rock Industries, a firm started 12 years ago, much the same way theirs began. Rock started in an old building in downtown Rock Valley with some cheap New Britains and BSA Acmes. They are now in a 60,000 square foot plant, and do the town's heat-treating as well as screw machine jobs. John Van Zanten and Peoples Bank helped them get started, and financed the expansion.

The building that Rock started in is now the home of Quality Machine Products, another small screw machine house. Before Rock and Quality had the building, Valley Machine occupied the premises, running New Britains, Acmes and Wickmans until they built their new facility. Valley Machining, which is 60 feet from Midwest Pro, now employs 100 people. Van Zanten helped them get going too, when the originators left Kooima.

In the Market

Rock Valley is a town of independent Dutchmen who work together. It is almost Rock Valley Incorporated, except for having a lot of different owners. People are constantly borrowing tools and gauges from one another. Their steel often comes in on the same truck, but they say that they seldom compete for the same jobs. What they do compete for are employees. The job market is the toughest part of doing business in Rock Valley. There is virtually no unemployment. Everybody is advertising for help, hoping to coax a salesman or a farmer to try the machining life. Jim VanderVelde is organizing another Job Fair. He figures local firms could hire 40 machinists or welders if they could find them.

Community Ties

In the American economy, when there is a labor shortage, something usually happens to fill the void. Wages rise to a level that overcomes the impediments, or, in Rock Valley's case, Hispanic workers, who were attracted to the area to work in the local meatpacking plants, switch to metalworking. The public school system, which used to have only white, primarily ethnic Dutch kids, is now 9 percent Hispanic. The Hispanic kids are on the school football team and act as interpreters for their parents. The first Mexican grocery store is preparing to open in downtown Rock Valley. The Hispanic newcomers are building a community within the community. It appears that attracting Mexican workers may be the only way that Rock Valley can continue to grow, because the local kids often long for the excitement of the Military or the lure of a new lifestyle. Though coolant is the lifeblood of Rock Valley's economy, cutting metal does not seem to be the career of choice for the brightest kids in the town.

What does hold people in Rock Valley is the sense of community, commitment to family, a feeling of utter safety and familiarity, and church-centered life. On Sundays, extended families get together. It is common to see ten cars with friends and siblings clustered around the family homestead. Big families are the norm in Rock Valley.

The tightness of the town is its strength but also the catalyst for some to leave. The locals call it "being under the microscope," and some can't take it. Tony Rau, one of four owner/managers at employee-owned Valley Machine, grew up in Rock Valley, left for the Marine Corps, spent time in Los Angeles with his divorced father, and then returned to the area. He lives out of town in South Dakota because he needs his space and prefers to be outside the lens of the microscope.

Mel Patel, owner of the Super 8 Motel, the only lodging in town, is selling it and leaving for Kansas City. I inferred that the Rock Valley life for an Indian motel owner from New Jersey wore on his psyche.

Rock Solid

When we left Rock Valley, we decided to take a detour through the cornfields to Le Mars, which bills itself as the "Ice Cream Capital of the World." Rock Valley cuts metal beautifully, but don't go there for the food. Let's hope Rock Valley continues to change, but never changes.

I'll be back to see.

By Lloyd Graff

Printed in the June/July 2004 issue
of Today's Machining World

Tony's Magnificent American Dream

The man who redefined the flashlight sits down with Lloyd Graff for an illuminating chat about his life and business

TM: I was born in 1930. The depression was in 1929 over here. My father had a difficult time; there were no jobs, and they lost everything they had. They had a little savings, but they couldn't get it out of the bank. Everybody lost everything. My mother was forced to go back to the island on the Croatian coast.

LG: What island?

TM: Zlarin, right next to Sibenik in the Adriatic Sea between Italy and Greece. It was a little island, with a population of about 2,500 people; now it is like 250. I was raised there during World War II. We were coming back to the United States in 1936 or 1937; my father got a job, and things had gotten better over here. We were ready to leave and everybody said, "Don't go now. The sea is not safe to travel. With the war there is unrest, and the Germans sank some ships." I don't know how much of that was true, but that was the rumor. So we said, "We'll stay another year." In 1939, the war had started, and we couldn't go, so I was trapped there I lived on the island during World War II. Hunger, people don't know what hunger is. That is why today you don't see me dressed up in a suit. I have never been in a suit. I'm only in a suit if I go to Washington, or if I am going to somebody's wedding.

LG: You came back to the United States in 1950?

TM: I came back in 1950 after the war. I got a job at the Pacific Valve Company down in Long Beach. I worked there a very short time. I knew I had to make more money. From there I went to work for A.O. Smith. They had a lot of overtime, so that was a good company to work for. They gave me an opportunity to learn everything I didn't know, because basically I was a mill and lathe operator. This guy said, "Look, you are going to run this turret lathe, this Warner & Swasey." But I had never run it. He said, "Why don't you try it?" I did a good job, and I became the highest paid guy there.

But then I said, "For what I make, I am never going to really save anything." One of the foremen over there had a little Craftsman Lathe by Sears in the garage, and he was doing little jobs, fittings. I said, "If he can do it, certainly I can do it." And so I went, bought a little lathe, a Logan lathe, belt driven. I think it was $1,200. I bought it from a used dealer. I went home, and my wife said, "You're crazy you are not going to do that." I said, "Look, I have to do something." I bought this lathe and set it up in our garage.

The first job I took I made some Inconel fittings. I bid like $0.30 a piece. You don't put on Inconel threads with a Logan lathe. But I didn't care; I just wanted to make a little extra money.

LG: Tony, when did you decide that you wanted to have a product?

TM: I think the dream of everybody in the screw machine business, or in any business, is to have your own product. I was doing business on all different kinds of component parts. I did business for Kellite Manufacturing. They made a flashlight.

LG: Tell me about Kellite.

TM: My best recollection is, they had this little shop. Don Keller and his father-in-law had some kind of woodworking shop. One of Don's friends lived in San Diego, and he made this plastic flashlight. The cops used it, but with daily handling the flashlight would fall apart. He cut a piece of tubing out of fencing material, fence tubing, and he stuffed a flashlight inside there with rags. It is not legal any more. I told them, "Let me make the parts for you." They were forming parts because they couldn't do the parts all on a lathe. I said, "I will do your parts. ...But Kellite didn't pay their bills, and I struggled to get the money.

Six months went by, and I stopped doing business with them. Then there was Bianchi, a leather company. They made a flashlight similar to Kellite's flashlight, same way, with a slide switch, Somebody told me about one of these spring guys that I made some springs for, he was doing slide business and he said, "Tony, you know, you are in the screw machine business. I got this job going for Bianchi. Why don't you take this job completely and you do it?" I said, "I don't know. Actually, to tell you the truth, I have been designing damn flashlights myself for quite awhile and Bianchi's are not good enough." He said, "Well, you don't have to do anything. All you can make, this guy will have."

They worked together and then they broke up. I said to myself, "I got a product that really will sell." But I knew nothing about marketing. So I quit doing work for him, and in 1979 introduced my own product to the marketplace. I sent the literature out, and it was a winner immediately. I went to a show. I couldn't believe it.

LG: What show was this?

TM: It was one of the hardware shows or sporting good shows in Chicago. I remember a kid walked over to my display, and because I demonstrated that my flashlight was doing what nobody else's spot flood did, people came and looked and said, "What the hell is that?" This kid walked in there and told his mom to look at the flashlight. And the mom said, "Come on, we have one of those." I don't know what the dad's name was; I should really know because I think he is still our distributor in New York. The kid insisted he wanted the flashlight. So the father took the literature, and they left. Later he became our distributor.

LG: How did today's smaller Maglite come about?

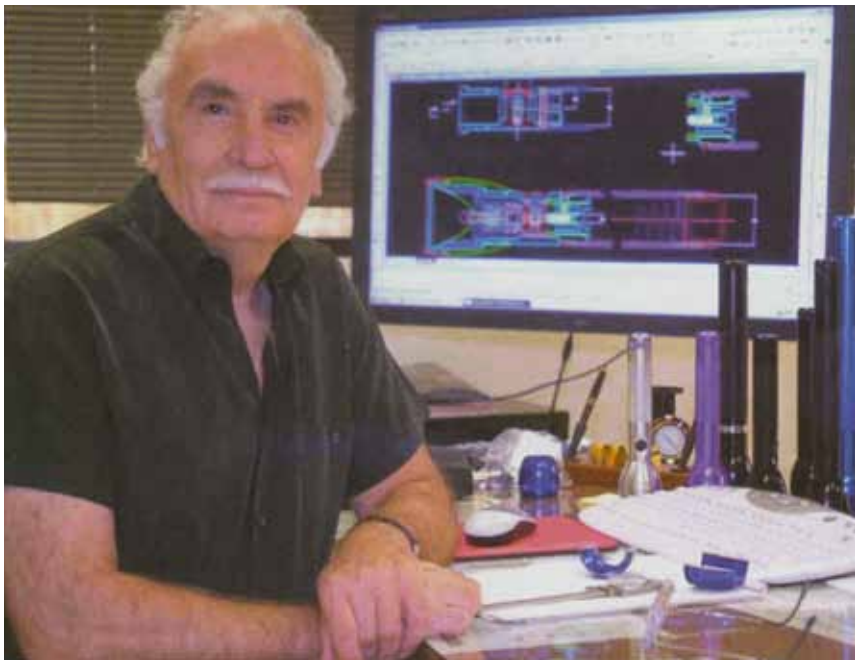
TM: Actually, I should give credit to one of my reps. He said, "Tony, you know, people cannot put that in a purse. There are a lot of women who will buy that stuff." In 1980 or 1981, I was in the hospital. I was going to build a building, and I had a rhythm problem with my heart....We went to a hardware show in Chicago. We thought we would probably sell about 15,000 a year. And the first sale I had was a quarter of a million, even before we left the show.

LG: How many lights do you sell in a year?

TM: I cannot tell you that.

LG: I was just curious.

TM: It is a lot of them, believe me. And you know what it is, the name is so well known. I could have sold this company for virtually whatever numbers I wanted. They don't even want my machines or buildings or anything. They just want to buy a name and not manufacture here, because they'll go to China, where they can make it for a fraction of what I can make it here. I have almost 1,000 employees here. Where are these guys going to go? I don't need money for myself, but I have to be thinking about them, because I didn't do all of this by myself. Maybe I was the captain, maybe I was steering the ship, but there is a lot of sweat, people put their life into it here. I mean, some of these guys are in their 60s. Who wants a 60-year old man? He is only a liability to somebody. But these are the guys that made it happen, so I cannot. I feel like I will commit a crime if I go to China.



By Noah Graff

Printed in the January 2006 issue
of Today's Machining World

Czech-Mate

Noah Graff reports on business and pleasure in the Czech Republic

Line of Fire

On October 5, 2004, I drove 12 hours with my friend Michi Tajariol from his home in Milan, Italy, to the town of Zlin in the Czech Republic. The primary purpose of my trip was to visit ZPS, a huge manufacturer of machine tools, where my 28-year-old friend Michi is the director. I am a filmmaker, and am presently making a documentary/promotional film on Wickman multi-spindle machines for Graff-Pinkert & Co. Because Wickmans are manufactured at ZPS, it was essential that I travel to the Czech Republic to document the machine's production process. Fortunately, I live in Florence, Italy, so it was a relatively easy journey through Austria to reach the alluring Czech Republic.

I don't know what images come to mind to the majority of *Screw Machine World* readers when they think of the Czech Republic, but if you have not been there in the last decade, it is probably not what you expect. I had always pictured this Eastern European nation, part of the former Czechoslovakia, as I had seen it in one of my favorite '80s movies, *Stripes*. The movie's images of ugly white buildings guarded by intimidating Russian soldiers had been ingrained in my mind since I first saw the film when I was 7 years old. I knew the trip would be an adventure.

The following is a personal account of my experiences during the two weeks on the trip. Everything I write is true; however, some specific details of my experiences have been omitted because well, they might be a bit too adult for the editor-in-chief of *Screw Machine World*.

Getting Started

My story begins in the quaint industrial town of Zlin, where I took a tour of ZPS and cruised the hot nightspots with

Michi. ZPS is a factory of immense size, producing machines for Wickman, Mori-Say/Euroturn, Okuma (under contract), among others. Although most of the employees at ZPS are men, Michi's charming personal assistant Hanna found three different female employees to show me around the facility and assist me in the filming. I was pleased that all were extremely friendly, spoke English and/or Italian well and were quite attractive. As I was to find out later, they were not alone in possessing these qualities.

I quickly became aware of the great challenges Michi faces in running ZPS, a company that his father Andrea Tajariol, owns. Michi is an astute guy who knows a great deal about the global machine-tool business. He works his butt off, putting in 70 to 80 hours a week, in addition to constant travel. But he is only 28 years old, younger than most of his employees, and after three years in Zlin he still has difficulty with the Czech language. Often he communicates with his employees speaking English to interpreters who translate for him. I immediately learned how difficult speaking Czech is. I had enough trouble learning how to pronounce "thank you," which is "de k u j i" and "you're welcome," which is "prosim." Not only are the words hard to remember and pronounce; the grammar is a headache because verbs, as well as nouns, are conjugated. But Michi told me that his language handicap is a minor obstacle compared to having to deal with the mentality of older employees whose minds have been inculcated with Communism. He explained to me that under Communism people were not rewarded for the quality of their work, because most people made the same amount of money. As a result, people were often more concerned with their status and appearance than with what they produced. This preoccupation with status persists today, 15 years after the fall of Communism.

Road Trip

Three days after I arrived in Zlin, I took a four-and-a-half hour bus ride to Prague. While in Prague, I was lucky enough to find some locals to stay with. Jana, an ex-girlfriend of an Italian friend of mine, had an apartment in Prague and bartends at a strip club there. Her roommate Teressa is a stripper at a different club. They were gracious hosts, but they both worked from 7:00 p.m. until 5:00 a.m., so I was on my own during the day while they were sleeping, and at night while they were working. We still found time to party together. I regret I cannot give further details than that.

So what is so interesting about Prague, or "Praha" as they call it in Czesky, and did the buildings turn out to be like those in *Stripes*? Interestingly, one of the first things that comes to mind when I think of Prague is the architecture. If you walk down the lively streets of the downtown you may see three buildings in a row with entirely different styles. One building might be in the bright colored 17th century Baroque style, the next in the boxy, sterile, Communist style, and then a modern building full of glass windows, which would be at home in a city such as Chicago. Billboards of multi-national corporations such as Samsung, Konica and Castrol are found everywhere atop the classical historic buildings. One cannot walk far before seeing a KFC, McDonald's or a casino.

I was both fascinated and revolted by all the blatant capitalist commercialization, but a native justified it for me by saying that after Communism fell in 1989, the country needed all the money it could get to build its capitalist economy. When I came to Prague, the city's Communist history was one of the things that I was most interested in learning about. However, after being there I have come to the conclusion that, for most Czech people, it is a subject they do not care about, do not want to think about, or are simply ignorant of.

Though my hosts Jana and Teressa were busy, most nights I still went out. I salsa danced at a Cuban bar, saw a classical performance of Vivaldi works for around eight dollars, and somehow wandered into a strip club. Unfortunately, it was not one of my hosts' clubs. The place was a bargain with no cover charge and drinks for 100ck (about $4.00), but the women were still very attractive. While in the club, I sat with a 37-year-old guy from Belgium and a 19-year-old student from Finland. There were many British people there too. Jana and Teressa told me that Prague strip clubs are a common destination for Brits.

Back to Zlin

After five exhilarating nights in Prague, I took the bus back to Zlin. When I got back to Michi's apartment, some of his old Italian friends from Milan were just arriving and were ready to go out. One evening we went to a local disco called "Music Land." There were a lot of beautiful women there, most just wearing jeans and t-shirts. Most people drank beer, not fancy cocktails or wine. As I stood on the dance floor, I reflected on the uniqueness of this country I was enjoying so much. I wondered what values from Communism had seeped into this new world, and if some of them were good. A lot of the kids at the club were not old enough to remember a life under Communist suppression. I asked myself, "How does this new generation view their country's history? Are they affected by the social and economic ideology which was forced upon their parents for more than 40 years?" Then I asked myself, "Am I the only person in this bar analyzing this stuff?" Maybe. I think I was the only one there who had not had a beer.

SMW Personals

Tools and machines looking for attention.

- Cuddly Empire shavetool seeks relationship with new owner. I will be your faithful slave with the right oils and cents.
- I'm your Jones if you're my Lamson. I'm a perfect 23. I'm easy. A $10 Starbucks coupon and I'll chase you forever.
- I'm a perfect spool Cam. I lust for my guard. I fit a 2 5/8 RB6. Will you be my mate?
- Divorced, white, Jewish collet. I am your Cone. Please be my Levi.
- Hot. If your Davenport gears run hot, I'll keep your temperature just right. I'm the lubricant of your dreams.
- I'm a Japanese model. A Citizen of the world. I have an Iemca boss who's very demanding, but I have 100 hours a month for you.
- I'm German. I'm rigid. I'm Schutte. You're really not good enough for me. Call me if you dare.
- I'm a bundle. 4000 pounds of solid-ground steel bars. Just the diameter you've been looking for. And I've been sitting around for years, just waiting for you.
- I've got the manuals. Mr. Wickman's best work. Every part, every process, every screw, every size. Excellent reproduction. As many as you need.
- I'm in the media. I can shake with the best. I'm so fine. You'll find me in the bag.
- Don't blow taps for me. My threads are the coolest around. How about a caper with my taper?
- Not heavy. Call me robust. Ruggedly built. Four inches all the way around. They don't get any tougher than me.
- She's a chaser. She's so versotool. She does the Cleveland twist. Let Chubby Check her out.
- I'm a real knee-turner. Solid steel. Mount me on your turret.

That's *Today's Machining World*

Howie Damron, AKA the Singing Lubricator, who we interviewed in the November/December issue, was recently inspired to write a song dedicated to *Today's Machining World*. Here are the lyrics.

Chorus
A vision turned to mission
Back many years ago
To present great information
And help all industry to know
About the greatest in technologies
With facts that are uncurled
A magazine full of value
"That's *Today's Machining World*"

Verse 1
In a world of advertising
We're all hit by many things
To decipher what is real
And what their values truly means
A talent from the pen
Of Mr. Graff through words of care
Began touching hearts in industry
And it started reaching everywhere

Everyone began to notice
Their commitment to the cause
Spreading knowledge and many listened
And now they're read by one and all
Now with Internet and Twitter
They blog the news out everywhere
Many benefits from their labors
For they're a magazine that cares

Chorus

product focus

The following companies have provided information on Parts Cleaners

Since the 1970s there have been many developments in parts cleaning to improve safety and environmental standards. Early on, kerosene, stoddard solvent, gasoline and diesel fuel were used to clean and degrease parts. Then, chlorinated solvents in vapor degreasers became the industry standard. Now aqueous-based systems that use heat, water and detergent are the most popular choice. The companies below have submitted information on their parts cleaning equipment.

▶ Amsonic

The Amsonic 4000 is a compact single-chamber cleaning unit developed for small to large businesses with a decentralised cleaning. It is usable for cleaning turned parts, precision cleaning prior to PVD or CVD coating, cleaning prior to plating or laser welding and for precision tools. It uses hydrocarbons at high temperature under vacuum. The unit cleans, vapor degreases, dries and distills automatically in a closed circuit. The vacuum technology increases the cleaning effect and guarantees the machine's safe operation. The cleaning quality is improved with help of ultrasonics and microfiltration.

For more information, please visit Amsonic at www.amsonic.ch.

◀ Cleaning Technologies Group

The LeanJet RB-2 immersion cleaning system processes two baskets of parts per cycle, up to 20 baskets per hour. The RB-2 carriage can be easily modified to accommodate much larger parts. Designed to fit into your work cell area or a smaller production environment, the Lean-Jet RB-2 immersion cleaning system cleans using our patented washing and rinsing process of agitation, spray impingement, rotation, hydraulic purging through immersion, and heated blow-off drying. Their patented "triple action" batch cleaning process was developed specifically to process a broad range of challenging parts, especially those with internal bores and passages.

For more information, please contact Cleaning Technologies Group at 513-870-0100 or visit www.ransohoff.com.

product focus

◀ Dürr Ecoclean

The Ecoclean 36W SFI has a proven cleaning method based on injection flood washing using a linear flooding system. A high-pressure water jet deburring function with subsequent spray treatment solves additional burr and flash removal tasks. A vacuum dryer system ensures a 100 percent removal of moisture from all workpiece surfaces. A vapor absorber system dries and cleans the circulating air and leads heat content back to the process. The result is operations that are free of exhaust air.

For more information, please contact Dürr Ecoclean at 248-745-8500 or visit www.durr-ecoclean.com.

▶ Ebbco

Ebbco's bag vessel filtration systems are designed for part washer or rinse applications. By incorporating a carbon steel bag vessel (stainless steel optional) you can reduce maintenance costs by running a cleaner more efficient system. These systems are designed for continuous operation. An eductor package is placed inside the wash tank, which allows the particles to be kept in suspension and pushed toward pump suction. The filter pump pulls the fluids though a strainer basket for protection and the fluid is pumped through a bag vessel. Clean fluid is then returned to the washer via the eductor package.

For more information, please contact Ebbco Inc. at 586-716-5151 or visit www.ebbcoinc.com.

◀ Exair

Exair's new precision safety air gun is extremely lightweight and comfortable to operate during periods of extended use. The highly focused, forceful blast of airflow provides excellent cleaning ability and is suited to a wide range of industrial applications. This safety air gun has a small diameter nozzle and extension that will fit into tight spaces while packing the punch of strong blowing force. The sleek profile is a perfect fit for small and large hands alike.

For more information, please contact Exair Corp. at 800-903-9247 or visit www.exair.com.

▲ Grieve

Grieve Corporation introduces number 818, a 1000 degree high-temperature universal oven, currently in use for cleaning and heat-treating fuel nozzles at a customer's facility. Workspace dimensions inside this unit measure 24" wide x 36" deep x 24" high. 24kW power is installed in Incoloy sheathed tubular heating elements. A 1000 CFM, 3/4 HP recirculating blower provides a front-to-back horizontal "universal" airflow to completely surround the workload.

For more information, please contact Grieve Corporation at 847-546-8225.

▲ Omegasonics

Omegasonics ultrasonic cleaning tanks reduce cleaning time and costs by eliminating the need for hand cleaning and soaking in costly solvents. Using OmegaClean, a safe water-based solution or OmegaZyme, an oil-eating enzyme, these ultrasonic machines create microscopic vacuum bubbles that remove residue from surfaces that are not reachable by brushes, picks or rags. A built-in filtration system removes oils and coolants from the solution to avoid recontamination.

For more information, please contact Omegasonics at 805-583-0875 or visit www.omegasonics.com.

Clockwise from top left: Radel R is resistant to hot water and steam and can withstand repeated cycles in a steam autoclave. Acetal is a high strength, low friction engineering plastic that has excellent wear properties in both wet and dry environments. Polyurethanes are extremely tough, resilient and abrasion resistant.

Photo courtesy of Curbell Plastics, Inc.

By Barbara Donohue

Machining Plastics

Plastics can behave in mysterious ways, but a lot of shops machine them successfully.

Machining plastic is another technology often regarded as a black art by those who don't do it. Imagine trying to machine a part to print in a material that changes size and shape as you work it (and sometimes afterward), chips or melts as you cut it, and cracks when you squirt it with your usual degreaser. No wonder many shops accustomed to cutting metal don't want to deal with the wide range of mechanical properties and the sometimes strange behavior of plastics.

O'Brien Consolidated Industries, Inc. started out machining metal, said Jeff Parisi, a manufacturing engineer at the Lewiston, Maine, shop, but when one of their biggest customers asked if they could make some insulators from Teflon, they gave it a try. After that they quoted jobs in plastic. "Now we do 13 different kinds," Parisi said. At trade shows, people see the plastic parts on display in the company's booth and they stop to ask what plastics they have worked on, Parisi said. "A lot of it is our being willing to try out the different plastics."

You have to deal with each plastic on its own terms. "Some like to be climb milled, some conventionally," he said. "Some, like the acrylics and polycarbonates, are very brittle and crack easily. Some cut just like metal."

Here is a brief tour of some things you need to consider when working with plastics.

Thermal Expansion

Just about any material "grows" as it gets warmer. When you're machining metals, this is not usually an issue. However, some plastic materials expand at five times the rate of metals, or more. Over the same temperature rise, a part made of UHMW (ultra high molecular weight polyethylene) will expand 10 times as much as a similar part made from aluminum.

So if you machine UHMW in your cool shop in Minnesota and send it to your customer in sunny Phoenix, it's likely to get rejected. A foot-long UHMW part machined and inspected at 65 degrees will measure about 0.046" longer when it reaches its destination where the temperature is 100 degrees.

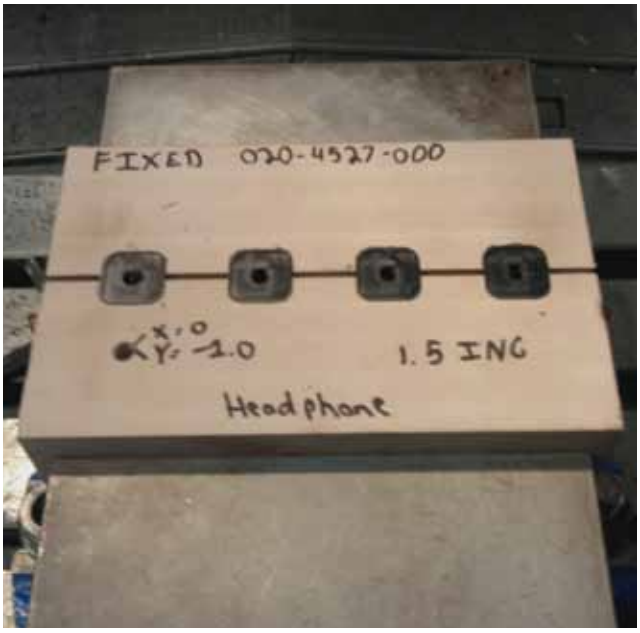
Though it would make sense to specify the temperature at which a plastic part is inspected on the drawing, Keith Hechtel, director of business development, Curbell Plastics, Inc., Orchard Park, N.Y., said he has never seen such a temperature spec.

Moisture absorption

Some plastics absorb moisture from the air, which causes them to grow larger. Nylons are known for this. "If you machine a part in New Orleans and put it on the shelf in a non-climate-controlled area, it will be out of spec after a while," Hechtel said. If you're working with a moisture-absorbing material, keep it in an air conditioned room, or seal it in a plastic bag that allows little moisture transfer.

Below: PAI is a very dimensionally stable plastic with an extremely low coefficient of thermal expansion, making it an excellent choice for applications that require machining to tight tolerances.
Photo courtesy of Curbell Plastics, Inc.

how it works



Left: Soft jaws machined to hold a plastic workpiece without damaging it.
Photo courtesy of American Plastic Fab.

Residual stress

The processes used to form your plastic stock tend to produce residual stresses in the material. Extrusion leaves stress in plastic, and so does the cooling process—the outside cools faster than the inside, leaving a lot of residual stress in the surface, Hechtel said. When you machine the plastic, the residual stress can make the workpiece deform as you remove material.

Annealing (gradual heating and cooling) relaxes and removes residual stress. You can often purchase annealed, stress-relieved plastic stock. If you invest in your own annealing oven, you could rough out blanks and then anneal them before finish machining.

Reaction to chemicals

"The material may resist chemicals at room temperature," said Hechtel, "but raise the temperature a little and you can get cracking and crazing."

Acrylic or polycarbonate plastics, widely used as transparent windows and covers, tend to have poor chemical resistance. Hechtel told of a "beautiful acrylic greeting card rack made for our biggest customer." It was ready to ship when someone wiped it down with acetone to clean it, causing the acrylic to craze.

In one case, a bullet-resistant polycarbonate window had long cracks growing up from the bottom. It turned out that the person who had cleaned the window every night used Windex, and the cleaner pooled at the bottom in the u-channel that supported the window.

Be very careful what chemicals you use with plastics. Consider using clean compressed air as your coolant. "Some water-based coolants are pretty benign," Hechtel said, but best to consult your plastic and coolant suppliers to determine whether the materials are compatible.

Workholding

You have to be careful in workholding, as "obviously, the material is much softer and more delicate than metal," said Mike Morris, president, American Plastic Fab, Brookneal, Va. It deforms if you clamp down on it too hard. But you can easily make soft jaws from a plastic material such as Raku-Tool modeling and tooling board, he said. You mill the shape of the workpiece into the jaws, so you can nest the part right into the jaw. Then, because the soft-jaw material is machinable, you can mill down into the jaws if needed.

With workpieces that have a flat surface, you can use a vacuum chuck. The advantage of this is you can pull the vacuum and profile the whole part—all four sides and the top.

"Remember, you don't have the cutting forces you have with steel," Morris said, so the workholding method doesn't have to clamp as hard and you can get creative with how you secure the workpiece.

Feeds and speeds

You can't talk generally about feeds and speeds in plastic machining because there are so many different plastics with disparate characteristics. You have to play with the combinations.

"Keep trying to speed it up until something happens you don't like. Then back it off just a notch. All machining is like this," Morris said. "It's a problem solving thing. If you're not getting what you want, you have to figure out what to do to fix it."

Chip handling

"Certain materials have horrendous chip problems," Morris said. "Nylon is bad—long stringy chips. UHMW is worse."

"You can use roughing end mills—the geometry of the cutter breaks up the chip," Morris said.

With plastics you do have a lot of flexibility with feeds and speeds. "With different feed and speed, you can generate any kind of chip you want. Make a big chip that throws right off the tool. If you're drilling at 1000 rpm and five inches per minute, try slowing down to 500 rpm and increase the feed rate to 10 inches per minute," said Morris. "That will give you a chip that fills the flute, and when [the drill] pecks, the chip flies across the shop."

Phenolics and glass-filled plastics produce a lot of dust that can be irritating. You need to provide dust collection or cut with coolant to keep the dust down.

Left: Rigid PVC is a strong, stiff, low cost plastic that is easy to weld using thermoplastic welding equipment.

Photo courtesy of Curbell Plastics, Inc.

Right: Polycarbonate is a transparent thermoplastic with good strength and stiffness and outstanding impact resistance. Polycarbonate is often used for machine guards, indoor and outdoor signs, architectural glazing, and face shields.

Photo courtesy of Curbell Plastics, Inc.

Tools

"Generally tools don't fail," said Morris, "except on glass-filled materials, which are abrasive." In most cases, he can get away with lesser quality for tools such as drills, he said, "but you do have to buy the standard good-quality inserts to get that nice smooth surface."

"The difference between plastic, metal and wood tools is actually the rake or angle the tool is sharpened," said Victor Miranda, president, American Woodworking Equipment Distributor, Suwanee, Ga. Otherwise, the tools are much the same. His company offers a line of end mills and reamers for plastic machining applications where a polished finish is required.

Look for tools specially designed for cutting plastic, such as No-Melt saw blades from Forrest Manufacturing Company, Inc., Clifton N.J., and Plexi Point drill bits from FTM, Inc., Placerville, Cal.

Plastic is not metal

One of the reasons metal shops don't like plastics, Morris said, is because you can't do things the "normal way," the way you would in metal. "I grew up in a plastics shop, so I wasn't contaminated with such ideas."

Plastics can be so challenging—there are so many variables, Morris said. "Sometimes we'll have to machine it out of tolerance because we know it will relax and go into tolerance."

"Say I'm doing a UHMW bushing, hogging out all this material," Morris said. Stresses that remain in the material from its manufacturing process will make the part move. "Make one and set it aside" to see what it does. One lot of material will be fairly consistent, he said, but the next batch may be slightly different.

"We're a machine shop willing to do different materials," Parisi said. Some don't like changing over and cleaning out the machine between jobs, he said, but that's what makes it possible to cut aluminum and plastic on the same machine.

Help your customers

"A very common situation is engineers who want things in plastic that were really designed for metal. You have to tell them it's not possible in plastic," Morris said. On a 10-foot-long UHMW part one of his customers wanted to hold eight thousandths tolerance from the first hole to the last, which, of course, wasn't going to work. "You can't change physics," Morris said. "Instead of holes we made slots; it was still a functional part. You have to design around the qualities [of the material]."

Sometimes customers will want to use a particular plastic because it's inexpensive. But it may not be so machinable. You can recommend a different material, as Parisi sometimes does. "For just a few pennies more we can make [the part]," he said.

In some ways, machining plastic is a black art—there are so many variables you have to deal with. However, experience and the advice of plastic suppliers and other experts can take a lot of the mystery out of it.

For more information:

American Plastic Fab: www.americanplasticfab.com

American Woodworking Equipment Distributor: www.americanwoodworkingequipment.com

Curbell Plastics, Inc.: www.curbellplastics.com

O'Brien Consolidated Industries, Inc.: www.obrienconsolidated.com

Guide to Plastics Machining: www.boedeker.com/fabtip.htm

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

Is Facebook For Adults?

After Goldman Sachs valued Facebook at $50 billion Lloyd Graff reflected on the success of the social networking giant, which puzzles him. He asked readers to share their experiences using Facebook.

R. W. Hron January 6, 2011 at 10:06 a.m.
Facebook gives those afflicted with narcissism a real big high.

William Mackay (Retired) January 6, 2011 at 10:23 a.m.
This morning I read on Facebook that my granddaughter-in-law was admitted to the hospital in Virginia for surgery to repair a tear in her trachea. This was posted by my daughter in Vermont—she has six brothers and sisters. I got the message in my son's coffee shop in Waukesha, Wisconsin. Why do I use Facebook? It is a way for me to keep connected with my large family all over the country. I find it even faster than e-mail in most cases.

Do you like the ending to *It's a Wonderful Life*?

Right before Christmas, Noah Graff blogged about how the ending of It's a Wonderful Life *seems strange because everyone donates money to George, while the moral of the film is that money means nothing compared to the value of the people in one's life.*

Jerry Bayless December 22, 2010 at 11:06 a.m.
It's hard to suggest changes to a masterpiece, but maybe it would have been better if Potter had been exposed. The friends coming to George's aid would still be good, but instead of the telegram from Sam Wainwright at the end, maybe an announcement from the bank examiner that Potter had been exposed by his trusted assistant. By not focusing on the donated money but instead the generosity of the common people, the message would stay the same and also suggest that good trumps evil in the end.

Jerry Johnson December 22, 2010 at 12:51 p.m.
Gosh, this story sounds eerily familiar.

There was this guy who owned a machine tool distributorship and owed a lot of money to the bank and employed a substantial number of people. His business's cash flow was destroyed when the evil Obama minions created "the Crisis" to get Obama elected, and the economy crashed late in 2008, right after the best IMTS ever!!!

Now, while he is not suicidal, he is waiting for his friends and customers that he so eagerly assisted in so many ways over the years to put some Christmas Love in his stocking.

Let's Make A Deal

Lloyd Graff wrote a blog comparing his role in the used machinery business to that of a pawn broker. Once upon a time he almost traded an Acme for a yellow Mercedes convertible. He asked readers if they would have chosen the Mercedes.

Matt January 11, 2011 at 1:06 p.m.
I'd take the ACME, unless the convertible came with a tall green-eyed blond.

Buelldog January 11, 2011 at 12:24 p.m.
Give a man a Mercedes, and he'll have a single Mercedes. Give a man an ACME, and he'll sell so many parts and make so much money that he can buy as many Mercedes as he wants. I'd take the ACME. However, if the Mercedes was silver, I might have a more difficult decision.

Bill Hopcraft
January 11, 2011 at 4:42 p.m.
I've got a '91 Porsche Turbo, and a few years ago I almost sold it in order to buy my first CNC mill. Sanity then prevailed and I found another way to finance the machine.

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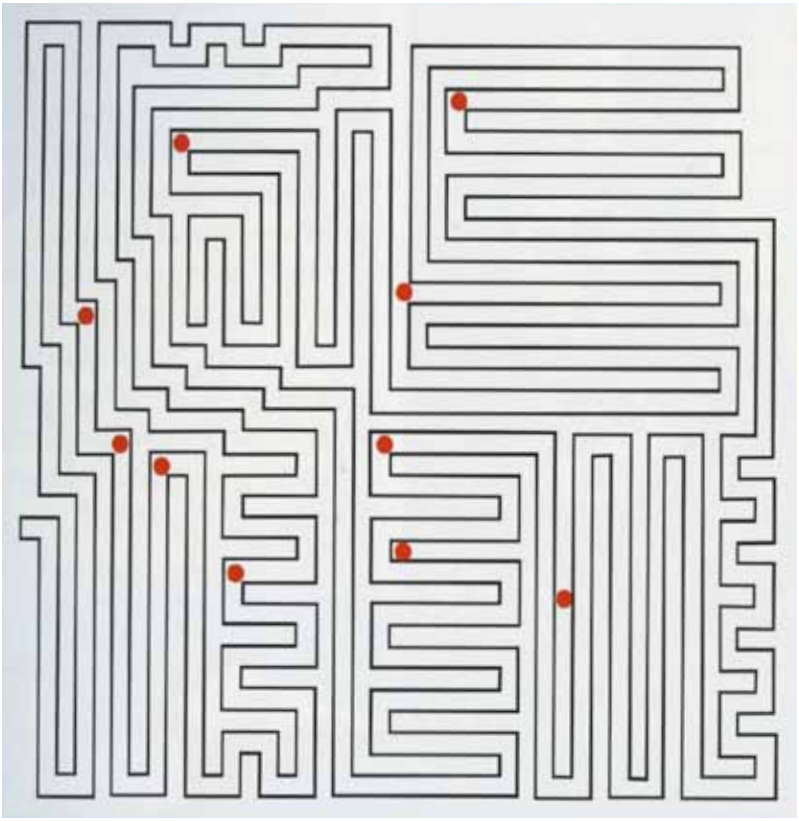
think tank

In or Out?

The black line forms one continuous loop. Can you determine which dots are inside the loop and which are outside? There's an easier way than simply following the loop around.



Who took and conquered the tough Sodoku challenge?

Chris Morgan of U&M Precision Products in Dexter, Mass.; **Jared Miller** of Quality Concepts in Goshen, Ind.; **Tim Handley** of E.H. Lynn Industries in Romeoville, Ill.; **Kathy Niemann** of Quality Machining & Fabricating in Springfield, Minn.; **David P. Smith** of Electroswitch Electronic Products in Raleigh, N.C.; **John Paul Koehn** of Edward Koehn Co., Inc. in Berkeley, Cal.; **Robert W. Richmond** in Mequon, Wis.; **Dan Cibulskis** of Aurora Air Products, Inc. in Aurora, Ill.; **Le Baron O. Ferguson** of COMPUTECH in Riverside Cal.; **John Schmitz** of Orscheln Products; **Christine Brown** of Apogee Machining Services, Inc. in Salem, Mass.; **Casey Wittekind** of The Tooling Support Group in North Canton, Ohio; **Mary Fasano** of Fasano Corporation, Inc. in Cranston, R.I.; **Tanner Mayhew** of VEKTEK, Inc. in St. Joseph, Mo.; **Nicholas Fanning** of Manheim Township High School in Lititz, Pa.; **Greg Drew** of R.W. Screw Products in Massillon, Ohio; **Patricia Rueb** of Northrock Industries Inc. in Medford, N.Y.; **Al Grella** of National Distribution, Inc. in Farmingdale, N.Y.; **Donald W. Mast** of Federal Broach & Machine Co.; **Adam C. Doughty** of Worthington Armstrong Venture; **Roselea A. Smith** of Smith Consulting in Burlington, Iowa; **Jim May** of dgs Marketing Engineers in Chicago, Ill.; **Sheldon Wheaton** of Garmin International in Olathe, Kan.; **Tamara Hawn** of Sunnen Products Co. in St. Louis Mo.; **David R. Weitz** Sr. of Davlan Engineering, Inc.; **Casey Wittekind** of The Tooling Support Group in North Canton, Ohio; **David Lorenz** of Cross Match Technologies, Inc. in Palm Beach Gardens, Flor.

Puzzle found in the Nov/Dec issue.

4	6	9	1	7	2	5	8	3
7	8	3	6	7	5	1	2	4
1	5	2	8	4	3	6	7	9
2	3	4	5	1	9	7	6	8
6	7	5	2	3	8	4	9	1
8	9	1	4	6	7	2	3	5
5	4	8	9	2	6	3	1	7
9	2	7	3	5	1	8	4	6
3	1	6	7	8	4	9	5	2

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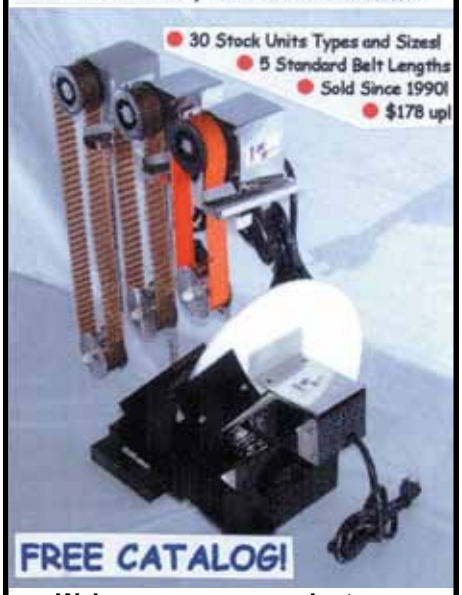

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1-3/8" 6-spindle, 1978 (4)
1-3/4" 6-spindle, 1965, 1984 (4)
1-3/4" 6-spindle 1984
2-1/4" 6-spindle, 1962, 1973-79 (3)

ACME
7/16" RA6, 1975 & 1964
3/4" RA8, 1974
1-1/4" RA6 1978-61 (9) - some w/threading pickoff
1-1/4" RA6, thrdg. pick-off 1987
1-5/8" RB8 CNC slide
1-5/8" RBN8 CNC slide, 1997
1-1/4" RB8, 1981, thdg., pickoff (2)
1-5/8" RBN8, 1968
1-5/8" RB8 thdg., pickup '68-72 (5)
2" RB6, 1967 & 1980
2" RB8, 1966 (2)
3-1/2" RB6, 1970
2 5/8" RB8, 1960 CNC slide
2 5/8" RB6, 1980
1 1/4" RB8, locked spindle, '68 (2)

HYDROMATS & ROTARY TRANSFER
HW 25-12 chucker 1998
HW 25-12, 1994, 2001, 1989
HB45-16, 1997, bar and chuck (2)
Pro-20, 1998
HB 45-12, 1991
HB 45-12 chucker, 1996
HB 4516, 1988

SCHUTTE & GILDEMEISTER
SF51, 1985-79 (3)

SWISS
Tornos Deco 20 mm, 2000
Tsugami BS20B, 2002
Citizen L-20, 2004
Ganesh Cyclone 32, 2007
Tsugami BS26B, 1998

NEW BRITAIN
Model 627, 2 5/8" 1980
Model 630, 3" 1980
812, 1 1/4" 8 sp., 1981

CNC Lathes
Mori-Seiki ZL153, 2002
Murata, MW120, 2004

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

MISCELLANEOUS
5 1/4" RAC Nat. Acme spindle bearings
3-1/2 RB6 thdg. attachment
IMG recess 1-5/8" RB6
Hydromat recess unit and flange 36-100
Siemens varispeed motor off Wickman
Wickman thread chasing 5/8" – 3 1/4"
Every Wickman spare part
Hartford 190 threader
Sweco 48" rotary finish
Agathon 175 grinders (3)
Barrett 1100E centrifuge, 1989hjh
Intersource chip system

WICKMAN AND INDEX—ASK FOR OUR IN-HOUSE PARTS EXPERT

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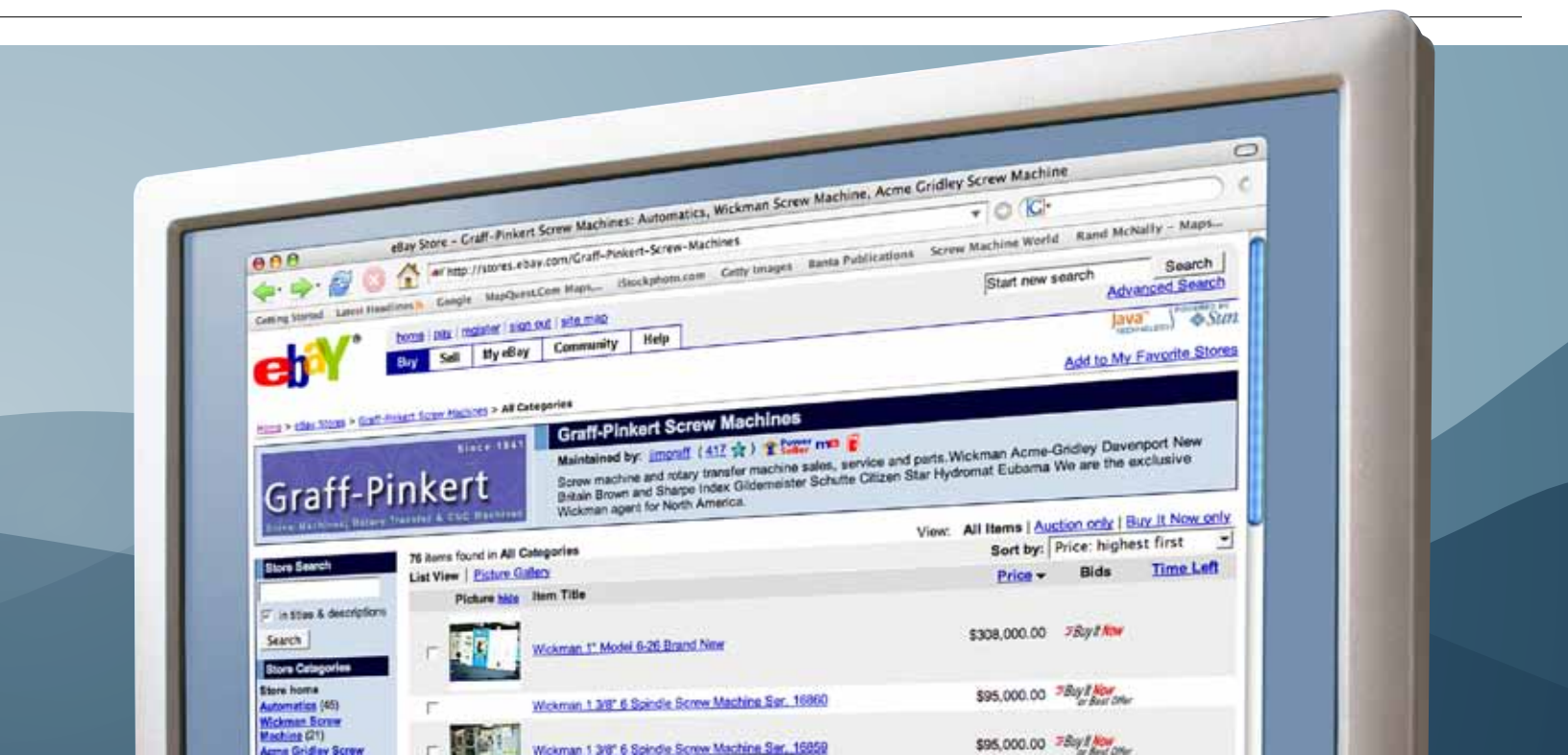

afterthought

The Next Decade

This magazine has lived 10 beautiful years and we celebrate with this special anniversary issue. I think a decade in publication years is a turtle's age. In machine terms it's a 50-year-old National Acme's age or a 30-year-old Cincinnati centerless. And like those old warrior machines, it's about time to change bearings.

I'll use the word bearings not in the tinkerer's lingo but in the more metaphorical sense. It's time to reorient and look away from a decade of manufacturing despair in North America to one of confidence and optimism.

The last 10 years have been a siege interrupted by occasional respites from war. The structural changes started in the 1990s but were masked by the tech boom. The bursting of the Internet bubble in 2000, the shock of September 11th, which killed the myth of American invulnerability, the folly of initiating two Middle Eastern wars while we failed to address the enormous drain of buying imported oil, and allowing unfettered derivative speculation on Wall Street set us up for the bust of 2008.

What a dirty decade.

But it's over now.

The country has changed enormously. Andrew Cuomo, the new Governor of New York, is talking like he's been invited to a Tea Party. So is Jerry Brown in California. These SODs (Sons of Democrats) are realistic enough to see that New York and California will become the next Detroit or Gary if they don't shape up fast. The world is different now.

The U.S. is not Japan—it can change relatively fast. I see it happening, and I am really optimistic. If GM can change itself in two years, what else is possible? If a black man can become the U.S. President, what else is possible? If Apple surpasses Microsoft in market cap, what else is possible? If Facebook touches 500 million people, what else is possible? If stent procedures are almost commonplace, what else is possible?

What I think is quite possible is a resurgence of manufacturing in North America. It will require a rebuilding of skills in the workforce, but I detect a change in attitudes about work. Community colleges and an array of private colleges like Apollo's University of Phoenix are changing American education. Kids want to work, become independent, buy homes and cars, and have children.

Give them work and training and they will grow. The Boomers were good, but their replacements are going to be excellent if we help them progress. And eventually they will buy the homes that are now finally being priced to the market.

We have lived through a brutal decade. Thousands of kids' lives have been wasted or devastated in Iraq and Afghanistan. But that's ending soon, I believe. This new decade is going to be a good one in America, and it could be a great one for the men and women who can make things well.

I did a piece for *TMW* last year about the Bothe family in Kenosha, Wisconsin. They had a languishing 50-year-old family business—a machine shop with dead customers. They had an idea to make beautiful, tactilely luscious knitting needles out of machined aluminum in their own plant on a CNC Swiss lathe. The business took off and now they are doubling sales every few months.

> "The Boomers were good, but their replacements are going to be excellent if we help them progress."

Their story is similar to Tony Maglica's flashlight business, Mag Instrument, which began 40 years ago. At 80, Tony is still making millions of perfect lights in his Ontario, California, factory.

The joy of doing *TMW* is writing about the creative, industrious and inspirational people who get to make good stuff on sweet machines and who keep getting better at it.

Hopefully, we'll keep getting better at writing about them. I'm really looking forward to a new decade of *Today's Machining World*, and to writing it for you.

Lloyd Graff

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