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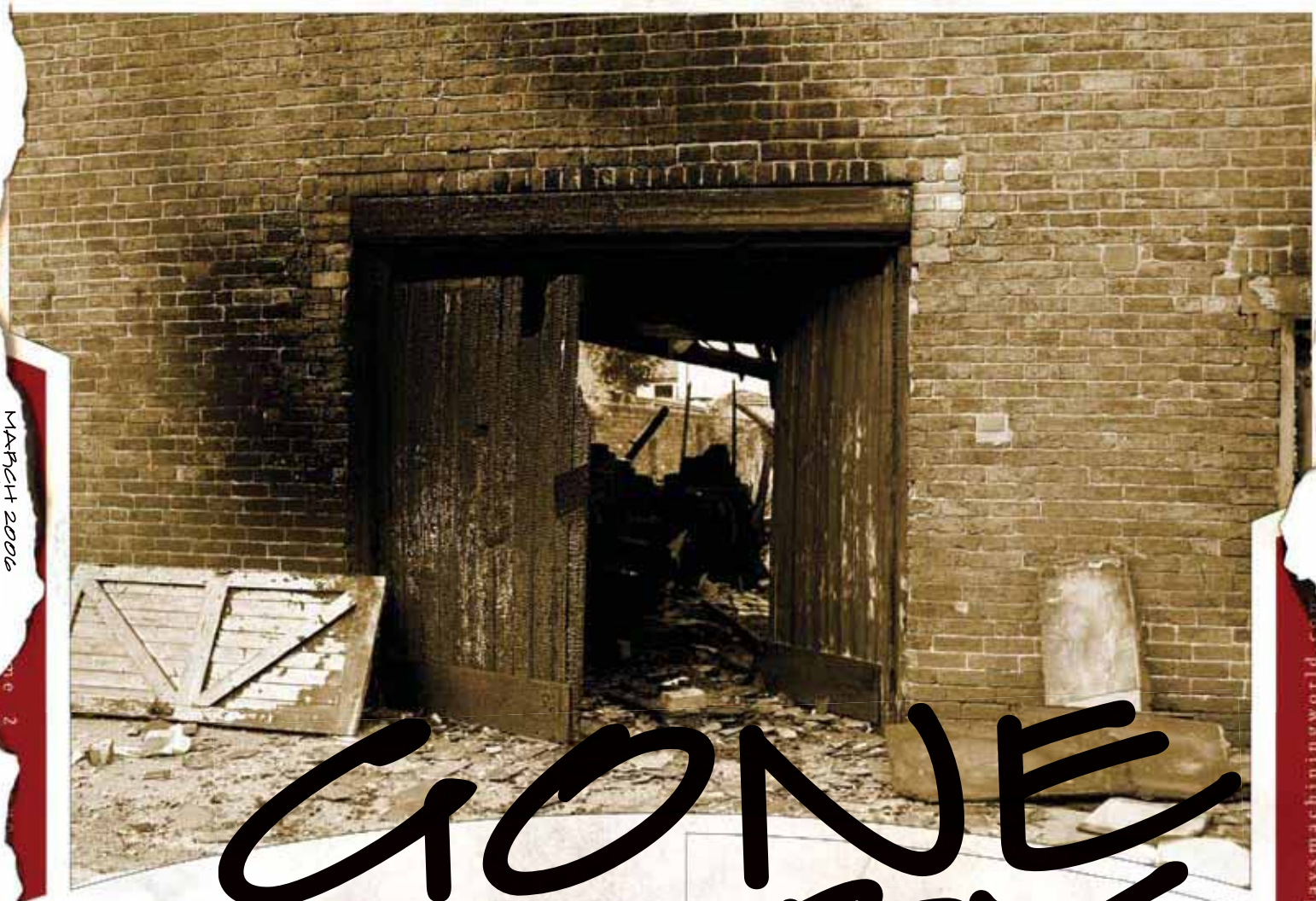

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MARCH 2006
VOLUME 2
ISSUE 3

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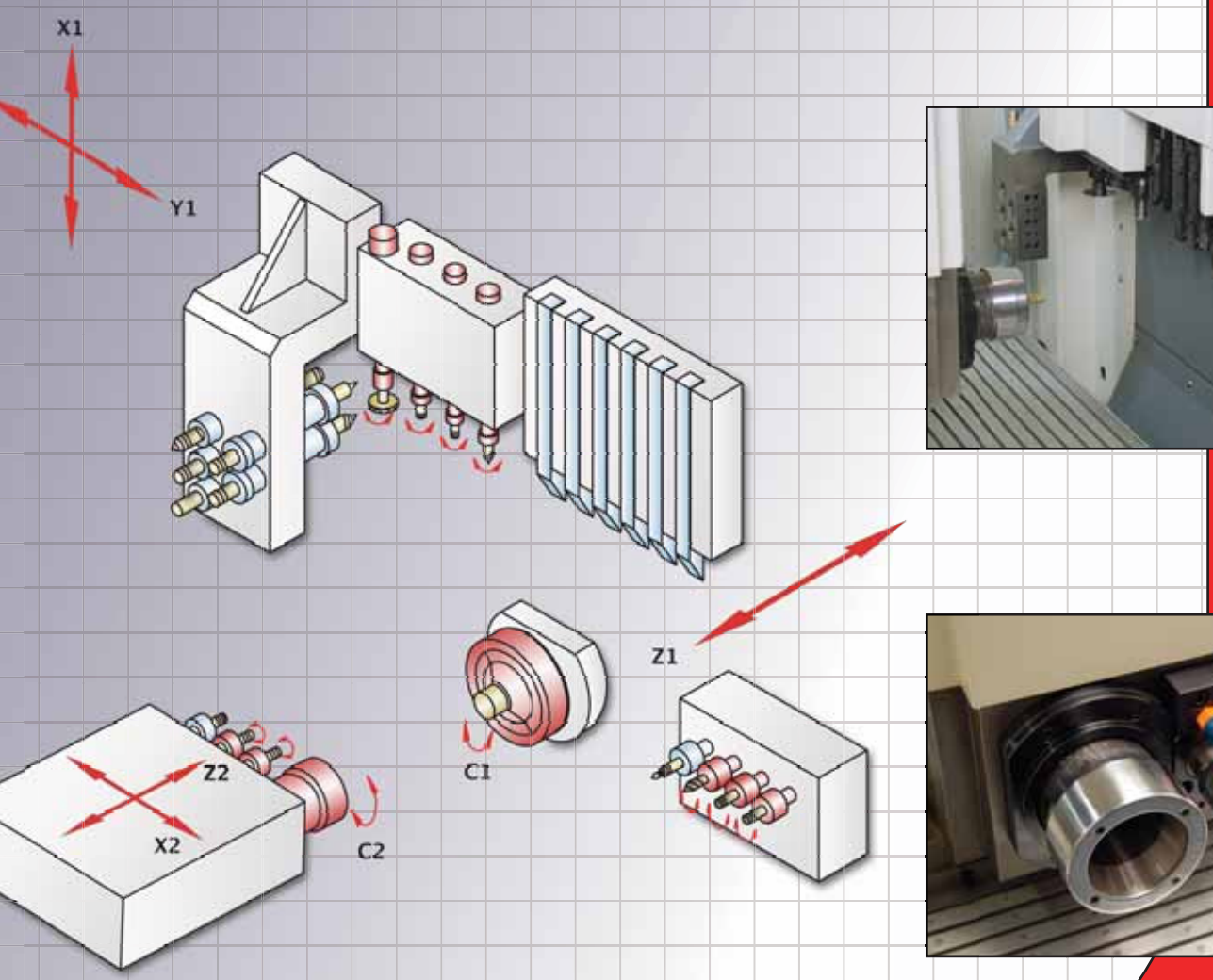

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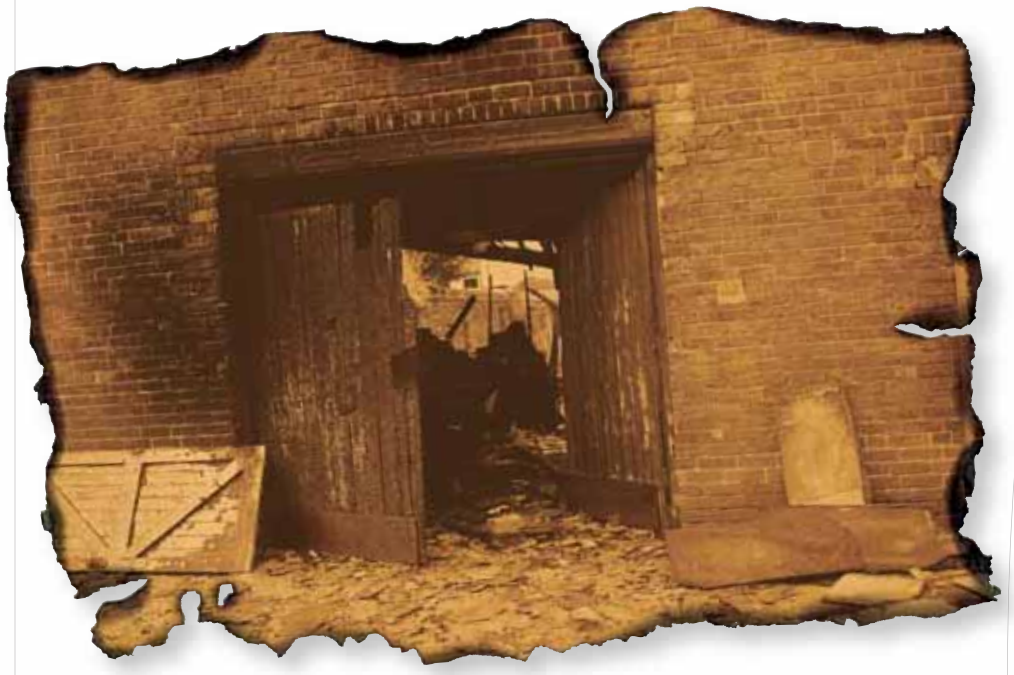

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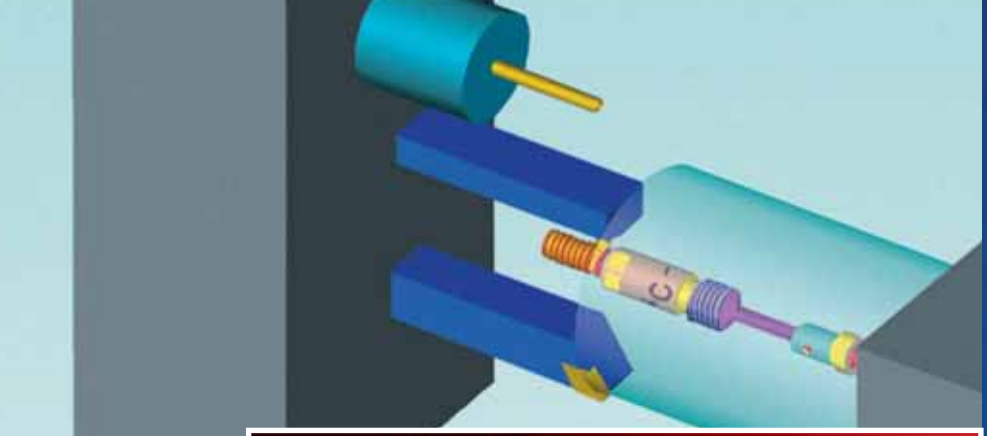

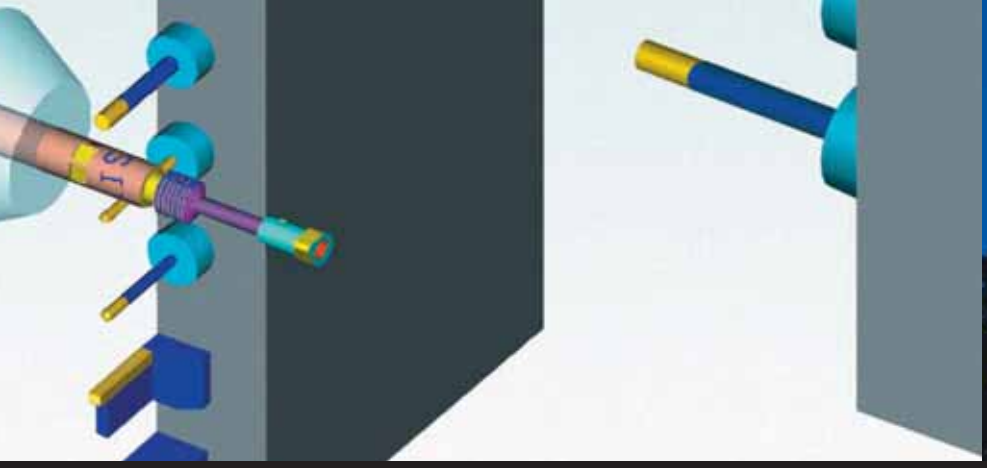

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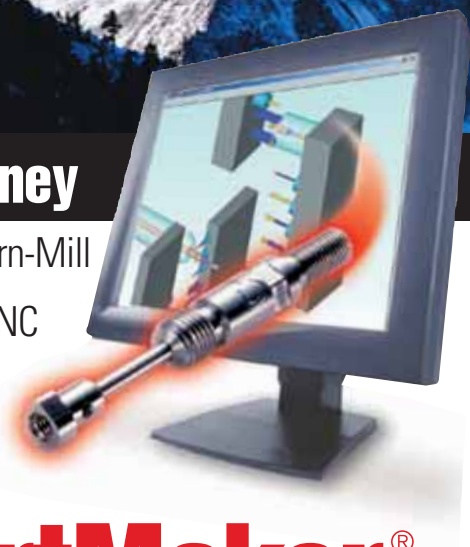

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Winning Streak

The great American classic baseball film, "Bull Durham," has many memorable moments, but the one line that always sticks with me is when "Crash" Davis (Kevin Costner) profanely chastises his protégé, Luke LeLouche (Tim Robbins), when he decides to chuck the womens undergarments he has been wearing when pitching. "Never f—k with a streak," Crash yells at him. Luke has been pitching superbly under Crash's tutelage after a horrible beginning, and Crash doesn't want anything to change Luke's karma.

Streaks, hot and cold, have always been an interest of mine. I think that there must be a DNA of momentum, which we do not understand well. When I look at companies like Apple and Microsoft, I see two great businesses – one on fire and the other stuck in the sludge. And it isn't that Mr. Softie is dumb and Apple is smart; it's more about the streak.

I have studied investment strategies for years, and I've learned it is easier to make money on a stock by buying it after it has started to move up rather than figuring out when it has bottomed. Buy high, sell higher is way easier than buy low and sell high because buying low is often like catching a falling knife – very easy to get cut.

In a business, you have to ride what is hot, like Apple is riding its iPod. If short-run, high precision is on fire – go there. If telecom and fiber optics are sizzling, get a piece of the action. Streaks always end, by definition, but progress and money are made by understanding the nature of streaks and having the guts to ride them and not "f—k with them."

Lloyd Graff
Editor/Owner

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Today's Machining World

Love Letter

We get a boatload of magazines weekly. I try to read some of them, just to try and stay "up to date" on progress in the machinery world. However, I have never really gotten a magazine I really liked until your magazine came across my desk. I truly love reading it from front to back. I try to work on the puzzles, which I am not so good at! You have great articles. I love how you do articles on everyday machinery, working people and inventors. It seems like I'm right there standing with the journalist, interviewing the people. It is so personal. I have been reading your magazine for a couple of months now. I look forward to getting them in the mail. Keep up the good work. Don't change a thing about your magazine. It's great just the way it is.

Beth Reedy
Capitol Precision Machine Tool
Dayton, OH

Revisiting our Redesign

Dear Lloyd, I had seen your media kit last fall and got a glimpse of the new logo. Right from there, I knew you were stepping up the look of the magazine big time. The new look is elegant, different and easy reading. I love the subtle borders on sections (see Forum) and the creative use of type (see Swarf—The big "if").

As for your writing, I sense you becoming even more of a visionary than before (if that's possible). Just as you wrote about the continuing demise of the Big 3, the headline news today is the huge cut that Ford is making in its workforce. Not a surprise, but one senses the walls are closing in.

Congratulations on attending the Nieman Conference. I'm sure you were one of the few B2B pubs represented there because so few are focused on quality editorial today.

Finally, I liked how you mentioned the stock question (3 years from now) that Dan Sullivan asked you, and how you then incorporated it into your interview with Haas. Do you think he skirted it with his answer?

Anyway, keep doing what you're doing. Keep innovating. Keep breaking the rules.

Larry Clayman
Clayman Advertising, Inc.
Akron, OH

Girl Power

You guys missed a great opportunity to truly cover all aspects of women in machining by not covering women machinery dealers. Harris Machine Tools and Universal Automatics are just two examples of machinery dealers with extensive female involvement, if not ownership. I believe you have Cathy, a woman parts expert, working for Graff-Pinkert. Just some additional thoughts. Enjoyed the issue.

Chris Steiner
Universal Automatics
Ft. Lauderdale, FL

Mea Culpa: We inadvertently rotated two photographs in the February's "How it Works" piece at Boston Centerless. *TMW* regrets the error.

Something on your mind?

We'd love to hear it.

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CHAMPION
SCREW MACHINE ENGINEERING, INC.

industry news & whispers

By Lloyd Graff

–$8.5 billion

Picasso had his "Blue Period" and it appears that this winter marks the beginning of the "Blue Period" for General Motors and Ford. Rick Wagoner and Bill Ford finally acknowledged in public that their businesses are very, very sick and they need to take drastic measures. Hallelujah. Ten years too late, but still an important event.

Can these companies be saved? Yes. Can these managements be saved? Doubtful. GM lost $8.5 billion in 2005 – about half of the total market capitalization of the company. Their business is an absolute train wreck, SUVs are languishing on the lots, and their bonds are junk rated. The guy who has presided over this nuclear blowup, Wagoner, is still calling the shots. Eleven coaches in the NFL were recently replaced and their teams at least made money, but handsome Rick Wagoner is still the face of GM.

At Ford, Billy Ford, whose name is on the cars as well as the Super Bowl Stadium, is the master of an equal mess. The Taurus that used to outsell the Camry and Accord was due for a facelift five years ago. Jaguar has blown billions and now it looks like a Taurus with a classy grille. What were they thinking?

Both GM and Ford suffer from a culture of arrogance and a cult of followership.

Why am I so mad about this? Because millions of people are being seriously damaged by this

swarf

brutal mismanagement. And it didn't have to happen. Nobody anointed Toyota as America's car company. GM and Ford handed it to them with the help of the UAW. This is a much bigger scandal than Enron. And the jokers who helped make this enormous mess have been entrusted with the power to turn it around. Hallelujah.

The rapid implosion of GM, Ford and a good chunk of domestic Tier One has prompted remarks that we are witnessing the disappearance of the unionized, blue collar, middle-class in America.

This overstates the case, but undoubtedly we are in the midst of a nasty transition. The great economist Joseph Alois Schumpeter would have lauded the "creative destruction" which adds wealth to the American economy. But for hundreds of thousands of factory workers, it's just bloody miserable destruction of a way of life.

We can laugh at the "jobs bank" in which unemployed GM and Delphi workers sit around all day watching ESPN in the lunchroom while they collect $31.80 an hour, but they are in a holding pattern, and will soon crash and burn.

Delphi is going to end badly for the workers in almost any scenario. Unfortunately, a worklife spent paying dues to the UAW has prepared them badly for the afterlife of post-Delphi Dayton and Kokomo.

From a metalworking standpoint the workers will be entering a Haas and Citizen world as they exit a Gridley and Milacron universe. They will have to hustle and learn computers, and they won't have much support. They'll have to advocate for themselves and keep their resume up to date. If they will do this, they will fare ok. If they don't, they'll be a faceless applicant at the next Wal-Mart opening.

I take no pleasure from the demise of big box factories. I've made a good living in that world. I've got my own shifts to make, and I'm too old for the NBA.

What were they thinking?

Plastered on billboards around the country are ads for the new Chevrolet Impala lauding its hot 303 horsepower engine. The name of this new model is the "SS." Have the marketing people at GM never heard of the infamous SS of Hitler's Germany? Do they not comprehend the negative connotation for anybody with an inkling about World War II atrocities?

A suggestion for Rick Wagoner of GM. If you think SS is a great name for a Chevy, how about KKK for your next SUV?

What is going on

in the steel industry? Arcelor, the European steel giant, is in play with the Mittal family making a bid for it. Earle Jorgensen & Co., one of the larger steel service companies in the U.S., is being bought by the acquisitive Reliance Steel. Ryerson and A.M. Castle's stocks have tripled in a year. Carpenter Technologies is rolling in money again. Steel prices have held their gains, but are currently stable.

Lakshmi Mittal controls the largest steel company in the world. If he can somehow convince the recalcitrant French unions and the E.U. to allow a takeover, he will become the pivotal steel player in the world with 10% of the output. In other words, Mittal could be the Saudi Arabia of steel, regulating supply and keeping prices trending up. Mittal has succeeded in this brutal commodity business by running extremely lean and managing his inventory much smarter than the old steel magnates. He makes just enough to keep his customers happy, but he resists the old approach, which was to make huge tonnages to spread the costs.

If Mittal can buy Arcelor, he will have the fulcrum capacity to be the swing producer of the world. Frankly, this scares me. I hope France shoots him down.

The consolidation of the steel industry makes protective tariffs for the American producers obsolete. Steel for U.S. manufacturers is the most expensive in the world. Chinese manufacturers are paying $100 a ton less than American ones for the metal.

The steel service centers are consolidating as a reaction to the steel producers merging. They are looking for more leverage in buying from fewer companies. The higher prices in recent years have brought more money to their bottom lines. The stock market has rewarded rollup artists like Reliance Steel and enabled them to pick up solid undervalued properties like Jorgensen. Ryerson still looks like a theft at its current price. I would not be surprised to see some of the specialty barstock firms bought up if the market stays strong.

Carpenter Technology is in the catbird seat because of infrastructure buildout and rebuilding, and their intellectual property in specialty steels. There may not be large tonnages in hip replacements and bone screws, but the metal is expensive and profitable. Selling metal in $10 per pound batches beats $1.25 bundles to automotive suppliers.

The voracious Chinese appetite for scrap will continue for the foreseeable future, which will keep a floor on prices worldwide. Mr. Mittal is in the eye of the storm. If we watch his moves we will get an idea of where the steel industry is headed.

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I want to discuss the future of eBay. Our Graff-Pinkert machinery business has embraced eBay for several years. In 2005 we sold more than $500,000 worth of equipment via the site, so it was an important part of our business. But it appears to me that eBay as it currently exists has peaked. It no longer has the buzz of two or three years ago. The novelty of bidding online for machinery has ebbed.

I think that one reason for the dwindling energy of the site is the incessant attack of the criminal scammers who try to trick people into sending them money and then vanish into cyberspace. Over time they have eroded some trust in eBay.

But more important than the threat of cyber-thieves is that eBay is beginning to be the victim of its own success. The greatness of eBay has been the willingness of millions of small entrepreneurs and individuals to play the eBay game and allow the bidding to run its course. In the last couple of years, eBay has become more and more corporatized with sellers asking for

swarf

fixed prices. This has added to the profits of the company and satisfied its investors to some degree, but the site is losing its uniqueness and cozy feeling of being a friendly world bazaar.

One of the web venues which is competing with eBay is Craigslist. Craigslist was started in San Francisco around the time of eBay by Craig Newmark, a visionary, altruistic, self-proclaimed nerd who wanted to make it easier for people to find a job or a pad. He built a free website for people to connect with each other locally.

After a slow start, Craigslist has really taken off. Early adoptees, mostly young people, embraced the peer-to-peer free advertising. Finding apartments and furniture were killer applications from the start, but now Craigslist is so hot in big cities like Chicago, New York and San Francisco it is threatening to devastate the classified ad sections of the big daily newspapers.

When I was in Boston at the Neiman writer's conference in December, Craigslist was a frequent topic of conversation for the newspaper editors who were there to speak. They are desperately afraid of it.

eBay clearly understands the potential of Craigslist, which has begun to monetize its vision by charging corporate advertisers. Recently eBay bought a minority interest in the company to get an insider's view of the local, peer-to-peer advertising world.

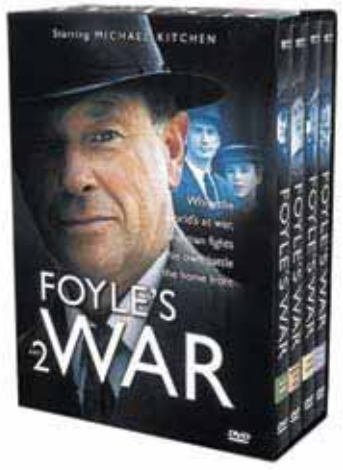
Currently most ads on Craigslist are free. This gives it enormous vitality and immediacy. Kids advertise looking for a date for the same night. Our book reviewer, Jerry Levine, tells me he used it to look for a caretaker for his 94-year old mother-in-law and had several excellent resumes within three hours. My son Ari furnished his apartment from Craigslist leads, and another friend found his girlfriend with a simple classified asking for applicants of a particular description.

If Craigslist charged just a dollar for an ad rather than zero it could turn into a goldmine. Just look at the deep discount stockbrokers for a model.

So while eBay has raised its fees and become more institutionalized, a Craigslist has found an opening and may eventually compete with its multi-billion dollar Bay area neighbor. Creative destruction at work again in the city by the Bay.

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

I was saddened to read that Dennis Kearns of Kearns Machine Tools in England was just sentenced to two years in jail for tax evasion. Kearns was a competitor of ours in the used Wickman business. We did an occasional deal, but we usually knocked heads. He was a tough trader, and he eventually tired of the machinery business. He went into commercial real estate. Inland Revenue in England has hounded him for years for hiding funds offshore. They ultimately won their case. I take no pleasure in Kearns's sentence. I hope the prison time will pass quickly for him.



When the TMW team was in Boston for the Neiman Writer's Conference in December, we interviewed Jake Grainger (see the January issue). Besides being one of the smartest machining guys around, Jake is also extremely literate and outspoken. We queried him about what he was reading (Ender's Game) and what he was watching. He told us he was into a British series called "Foyle's War," which had appeared on the BBC, and volunteered to send me the DVDs.

I'm passing on the recommendation to you. In 2002, 2003 and 2004, four of the 100-minute mysteries appeared. You can find them on Amazon or perhaps at your library in 4-disc sets. This is not Columbo or Monk, but high-quality full-length movies which build on the strength of the characters. The lead is Michael Kitchen, who plays the brilliant detective Christopher Foyle, who would like to do more for the war effort (the setting

swarf

is England at war in 1940-41), but is destined to solve war-related murders in Southern England near Hastings. This is no "Shoot 'em up Die Hard," but it has action and intrigue and when violence occurs, you feel it in the gut because the characters are so real.

I've never enjoyed a mystery series as much as I've enjoyed "Foyle's War."

I hate to see each episode end.

I was in Ann Arbor recently on business. I had a little extra time and mosied over to the Michigan Daily student newspaper where I had spent so much of my undergraduate time. I met Ann Joling, currently a news editor of the paper. She was wrestling with a difficult story, a suicide by a student of the university the previous night. It was the second campus suicide in two weeks and she feared it might be a "copycat" event.

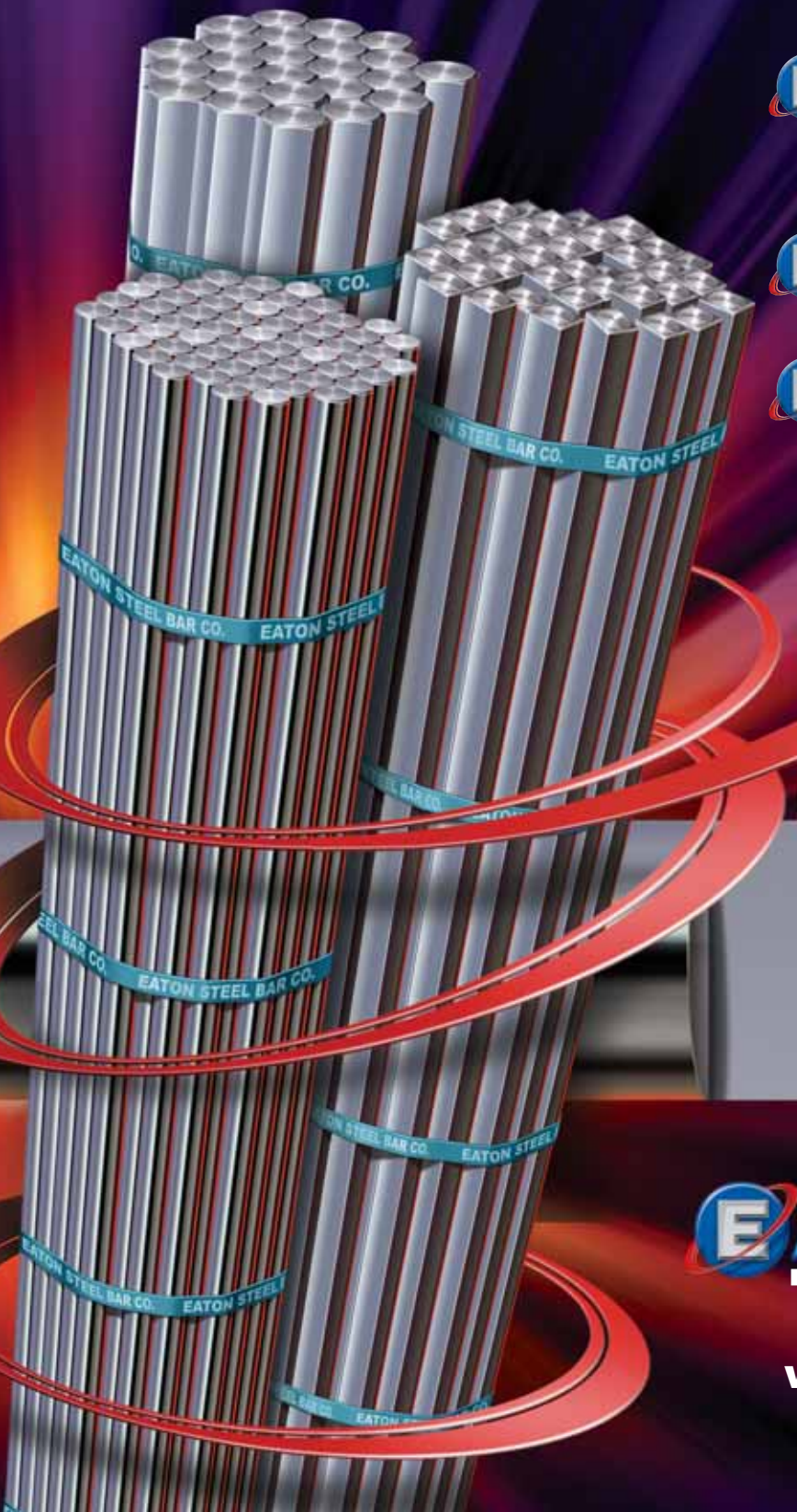
We discussed the possible risk of running the story against the desire to publish an important news piece.

She was a thoughtful, sensitive person with a difficult decision. I have considered doing stories about machinists who have ended their lives after being fired from their jobs, but have shied away so far because the gain didn't seem to be worth the pain to the families.

One of the hardest things to do in business is to assess not just where things are today, but where they will be tomorrow. I think this is one of the reasons you are reading this magazine. At least we make a stab at divining the future, though we are far from clairvoyant.

Because of a typographical error, we gave the impression Lloyd Graff had had a conversation with Doris Kearns Goodwin, when he had actually "heard" her. TMW regrets the error.

THE EATON STEEL EDGE



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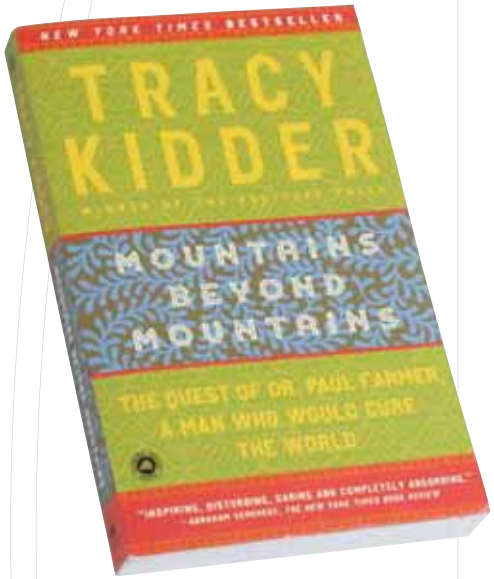
book review

By Jerry Levine

Mountains Beyond Mountains by Jerry Levine

Mountains Beyond Mountains by Tracy Kidder records the journey of a young American doctor, Paul Farmer, volunteering in the squalor of Haiti. Farmer's cause grows over a twenty-year span and evolves into a worldwide infectious disease program that completely revamps standard treatment of malaria, TB and AIDS in the Third World.



For me, a similar journey began with my son volunteering in Haiti, rescuing abandoned babies left to die, finding them a home in an orphanage and school founded by the Catholic Church run by my son's school friend, Father Tom Hagen. For many years, this Haitian/American Catholic organization's brochure featured a tall, lanky, Jewish teenager (my son) standing in a Haitian slum, hoisting a tiny black child with a deliciously infectious smile. The brochure helped raise a lot of money for food, housing, medicine and education, and it definitely raised one's spirit. In Isaiah it is written, "...and a young child shall lead them." Those two smiling young children led me to my 15-year long commitment caring for the homeless and poor on the south side of Chicago, as well as Katrina evacuees.

As a college undergraduate, Farmer focused on medical anthropology and believed there was a close tie between disease and social conditions. He felt doctors were the natural attorneys of the poor, and social problems could and should be solved by them. Today, when government bureaucracies fail to act, we see church missionary groups often filling the gaps. Farmer, an essentially non-practicing Catholic, became impressed by liberation theology and its concern for the poor, especially in the third world. He felt the need to bring the Third World first-world medical care. His success accomplishing this goal is an inspirational, heart-warming story.

Farmer's first facility in Haiti was located in Cange, a small rural village located beyond the end of paved roads. Patients walked for hours to the clinic, as did Farmer during his frequent house calls. He recognized the need to treat the social situation as well as provide medication to cure patients. He published extensively in all the major medical journals, and his treatment for drug resistant TB and AIDS became the World Health Organization's standard. He currently travels the world, organizing and consulting on infectious disease programs but still takes the time to hike the mountains of Haiti, providing personal care for his patients.

Farmer is always of two minds – one, the globetrotting doctor working to cure epidemics in Russia, Peru, or Africa; the other, a country doctor tending to poor farmers. His social conscience prevails throughout. His standard disease treatment includes a house with a concrete floor, metal roof and improved plumbing, along with nutrition and tuition for the children's school. Even though he has received considerable funding from large donors like the McArthur Foundation and the Bill and Melissa Gates Foundation, he still devotes enough of his time to Haiti to stay grounded and carry back the image of families living in medieval huts. Mountains Beyond Mountains is a moving story that should leave one questioning (and motivating) one's own life and values.

"Farmer is always of two minds – one, the globetrotting doctor working to cure epidemics in Russia, Peru, or Africa; the other, a country doctor tending to poor farmers."

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

Cutting Edge

Hydromat Inc. has announced the formation of Edge Technologies. Edge Technologies' family of products specializes in Bar Feeding, Parts Cleaning Systems, and other lathe automation products. The new division will showcase their products in Booth #3816 in the South Hall at WESTEC. These product lines include: sales and service in North America for the full line of FMB Bar Feeders, the new Edge Minuteman 320 bar feeder, and representation of Dürr Ecoclean's parts cleaning systems in the U.S. and Canada, as well as potential future product offerings.

FMB bar feeders have the capacity to feed round, hex or square bar stock from 2 mm to 100 mm in diameter and in lengths up to 3200 mm or 4200 mm for single-spindle or Swiss and fixed headstock lathes as well as multi-spindles. Several models of FMB bar feeders will be displayed, including the newly redesigned Turbo 3-36.

Edge Technologies will also introduces the Minuteman 320, an economically priced 12' magazine bar feeder. The Minuteman features a 3-20mm diameter capacity, hydrodynamic quick-change polyurethane guide channels, roller steady device, hand-held pendant and a Swiss synchronization device.

The Dürr Ecoclean product lines include the C-Series Hydrocarbon Systems, W-Series Aqueous Systems and the new Polar technology utilizing exclusive Dowclene fluids. Edge Technologies will feature the Minio 85C at WESTEC. The Minio 85C is the compact machine in Dürr's Hydrocarbon C-Series. These environmentally friendly parts cleaning machines utilize a hydrocarbon system which delivers the reliability of solvent-based cleaning without the environmental complications of the traditional chlorinated solvents.

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

STAR Quality

Techniks will be featuring the BohrSTAR, a 12 piece boring kit in Booth #3900 at WESTEC. Techniks BohrSTAR kit combines the range and rigidity machinists need without sacrificing accuracy. The BohrSTAR kit does not require special training to use, and all components are easy to assemble.

Features include: accuracy: of 0.0001"; range of 0.31" to 6.69"; a strong design for maximum rigidity; the AccuSET vernier dial is adjustable in 0.0001" increments; a tapered screw coupling design dampens vibration. Benefits include an introductory price of only: $1,995.00 and the AccuSET dial cuts set-up time with fast incremental adjustments.

The BohrSTAR 12 piece kit comes in a protective, foam-lined case and includes: 1, 54mm head with dial adjustments in 0.0001", 6 boring bars, 2 adapter plates with cartridge, 10 inserts, and all necessary wrenches. Purchase tool holders separately.

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

Casting Call

Haas Automation, Inc., will introduce the new VF-3YT/50 vertical machining center with extended Y-axis travel in booth #3200 at Westec 2006. The VF-3YT/50 features a 40" x 26" x 25" work envelope and a 54"x25" table. The extended Y-axis travel is achieved through a larger base casting, yet the new machine retains a footprint only slightly larger than the standard VF-3. Heavy cast-iron construction provides the rigidity and stability necessary for heavy cutting, and the wide T-slot table provides plenty of room for fixturing and large parts.

The VF-3YT/50 comes standard with a 30-pocket side-mount tool changer and a 30-hp, 7500-rpm geared-head spindle system that delivers up to 450 ft-lb of torque. Standard features also include an automatic chip auger, programmable coolant nozzle, floppy drive, remote jog handle and the Haas Visual Quick Code programming system.

A large selection of high-productivity options are available, including a 10,000-rpm spindle, 1,000-psi through-spindle coolant and high-speed machining software with full look-ahead.

For more information, call 800-331-6746 or visit www.HaasCNC.com.

Romi-O, Oh Romi-O

Romi Machine Tools has introduced the D Series of vertical machining centers (VMCs), its newest solution for mixed volume, short-run operations as well as high-volume applications.

The D Series has a work envelope of 40.2" (X) x 20.1" (Y) x 25.2 (Z) and a table work surface of 48" x 18.1". Rapid traverse rates of 1,181 imp (X-Y-and Z-axis) means accelerated machine cycle times and reduced non-cut time. Servomotors are directly coupled with high-precision ball screws for precise feed movement. There is an automatic tool changer with bi-directional selection mode, 22-tool capacity and a 5.5 second station-to-station index time.

A new belt-driven cartridge-style headstock features a high-torque 20 hp GE AC spindle motor with variable high-speed drive. 40 taper spindle options are 6-6,000 RPM or a 10,000 RPM spindle with semi-ceramic bearings to minimize heat.

For more information, please contact Romi Machine Tools, Ltd. At 877-ROMIUSA or visit the company website at www.romiusa.com.

fresh stuff

To the Wire

The MD+PRO, Mitsubishi's newest wire machine, is designed specifically to accommodate the medical field's need for 24/7 production work. The MD+PRO delivers ultimate high-speed production and precision. The full servo B-axis indexing option introduces two new EDM processes: indexing and turning & burning.

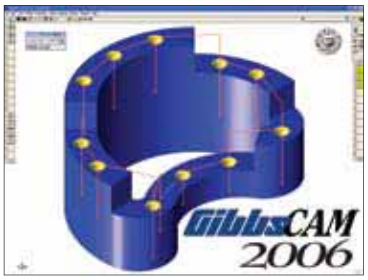
The FA-S series incorporates key features from other product lines to provide the best overall cost-performance series yet. The V machine's V500 Ultra High Speed Power Supply combined with the P machine's fine finish power supply and non-isolated workpiece table provide unmatchable speed and surface finish. PM4 control works with the inverter driven flushing system, providing 20-30% faster cutting speeds in poor flush conditions.

The sinker line's EA12V enhances accuracy and productivity, combined with a space-saving, automation-ready design. The patented ESPER software provides simple routines for electrode and workpiece location and measuring. ESPER also makes generating power settings and orbital amounts very simple. Cutting technology that has been proven over many years gives the user unparalleled performance.

Roku-Roku's HC-658 High-Speed Vertical Machining Center combines high-speed machining of mold steels and a multi-purpose design that provides unsurpassed graphite-machining capability.

Visit Mitsubishi EDM and Roku-Roku at Westec booth #2528 for demonstrations and more information.

CAM-DO



Gibbs and Associates will demonstrate the latest GibbsCAM enhancements along with previewing GibbsCAM 2006 in Booth #3268 at WESTEC 2006.

Enhancements include: programming tombstone fixtured parts, multi-task machining machine tools, and 4- and 5-axis simultaneous machining. Other enhancements include: Hole Making – Hole AFR (automated feature recognition) supports intersecting holes, Profiler circles can be used as input to Hole Manager, enhanced hole processes, which support multiple retract levels and depths and fixture/clamp avoidance; Operations Manager - provides a spreadsheet interface to sort and interact with large program files with large numbers of operations; HSM Toolpath Modification – introduces arcs and feedrate changes to minimize the effect of direction changes in the toolpath; Tool Holder Support – introduces a comprehensive library of milling tool holders along with corresponding tool holder support in process simulation; Surface Flow Gouge Checking – introduces gouge checking to surface flow process; OpenGL support – improves solid model rendering performance with true color and material properties, multiple/colored light sources, shadows and transparent working planes; Enhanced CAD Compatibility - ensures full compatibility with popular mainstream, PC-based CAD systems: Autodesk Inventor R11, Solid Edge V17, and SolidWorks 2006.

For more information, contact Gibbs and Associates at info@GibbsCAM.com, or call 800-654-9399.

Groovin'

THINBIT®, manufactured by Kaiser Tool Company, will showcase their simplified GROOVE 'N TURN® toolholder system in Booth #4027 at WESTEC. This toolholder will replace several existing toolholder styles.

GROOVE 'N TURN® toolholders can be used on conventional, Swiss and CNC machines to hold grooving and face grooving inserts in sizes fro .004" to .155" and threading inserts. They are available in square shank sizes 5/16" through 1-1/4" with straight and 90 degree presentations. THINKBIT® will trade older style S-series holders for the new GROOVE 'N TURN® toolholder style.

For more information, please contact Kaiser Tool at 260-484-3620 or visit the company website at www.thinbit.com.

fresh stuff

A Notch Above

Briney CNC tool holders with customer-specific features will be introduced in Booth #224 at WESTEC. Briney special tools can incorporate details such as 5 unusual gauge lengths, pilot diameters, ID diameters, taper styles and other nonstandard features, including special mill work such as slots, notches, holes (such as coolant thru the flange), or error-proofing for HSK holders.

Briney special tooling includes end mills, shell mills, tap holders, collet chucks with long reach, larger diameters, and short lengths, metric or special sizes for drilling, tapping, slot milling, end milling and more.

All Briney tooling delivers consistent shank quality, avoiding stick-slip during tool change and assuring machining quality to the limits of the spindle capability. Concentricity and repeatability are guaranteed to 0.0002", shanks are ground to AT3 ANSI tolerance (.0003 taper/ft).

For more information, contact Briney at 800-752-8035.

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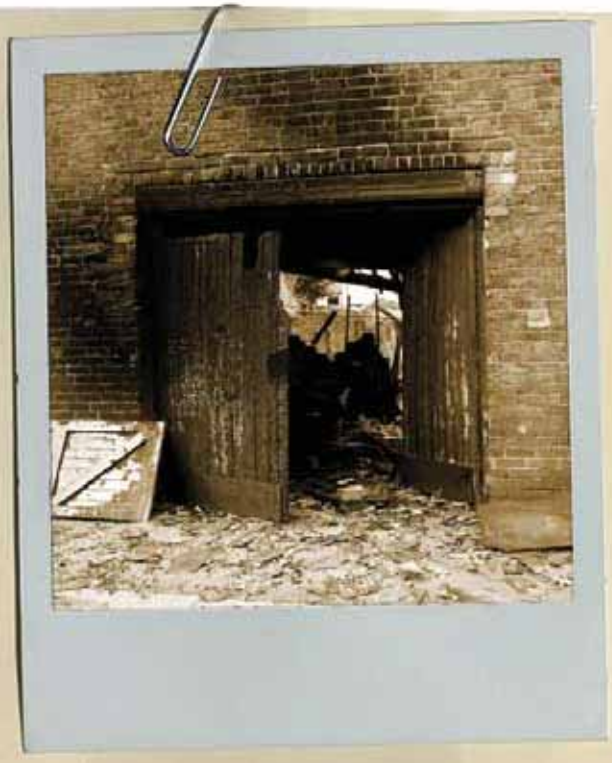

GONE BY MORNING

WHAT HAPPENS WHEN A BUSINESS BURNS

BY LYNN WALTERS

At first, Dan Miller thought the Saturday morning phone call was a late – and very bad – April Fool's joke.

But, the April 2, 2005 call was not a prank. An employee was calling the owner of Extreme Industrial Knife, Inc., to say a fire was raging at the Salem, Ohio, machine shop.

Reality sank in, and Dan Miller cried. He was certain his years of hard work had literally disappeared into the smoky air.

"I was totally devastated," said Miller. "When I walked in and looked around, everything was covered in black. It looked like everything was on fire. I was out of business."

The fire's origin was at a critical piece of machinery in Miller's shop, although the exact cause of the fire has not been determined. The CNC six-axis tool and cutter grinder machine had been running lights out the night of the fire, so no one was there to sound the initial alarm.

"I WAS TOTALLY DEVASTATED, WHEN I WALKED IN AND LOOKED AROUND, EVERYTHING WAS COVERED IN BLACK. IT LOOKED LIKE EVERYTHING WAS ON FIRE. I WAS OUT OF BUSINESS."

Miller knew the machine was so specialized that finding a ready replacement would be next to impossible. Soot and smoke had also impaired the shop's other machinery. Maintaining the shop's commitment of under-a-week-turnaround for industrial knife sharpening would be impossible.

That day, Extreme Industrial Knife, located adjacent to the Quaker City Raceway, began its own race – for survival.

The situation Miller confronted is one that any business owner dreads. Prolonged downtime can result in cash flow disruptions. More important for the long-term, such disruptions can lead to the loss of business, as customers form relationships with new vendors.

For machine shops, the risk of fire is very real. Everyday production pits metal against metal in grinding, milling and other processes. As tools dull, friction builds up, creating a ready ignition source for lubricating and hydraulic oils. In mist form, oils are more easily ignited. The resulting fire acts like a blow torch and can't be extinguished unless the fuel source or the oxygen that feeds the fire is eliminated.

Keith Domagala is engineering manager for Affiliated FM, a commercial property insurance company, whose parent company, FM Global, is known for its loss prevention research capabilities. FM Global statistics on insured companies indicate about 25 percent of all losses in machine shops are directly related to flammable liquid weaknesses. (Affiliated FM was not the insurance company used by Miller's company.)

"Flammable liquids really drive fire losses in machine shop type occupancies," said Domagala. "A lot of people think oils won't burn, but when it's atomized, you have all the fire you want. Whether it's combustible or flammable liquid, once that liquid gets ignited, the hazard is really the same."

The potential for fire damage is much greater with lights-out production because of delays in discovering a fire, according to Mike Angstadt, owner of DaBo-Tech, Inc., a Palmetto, Florida, distributor of special hazards fire suppression, control and detection products. Angstadt noted the phantom shift is the wave of the future, growing more popular as a means of countering lower labor costs abroad.

"That's where they make their money," said Angstadt. "It's basically sheer profit. Even manned facilities are on a dramatically diminished scale. If only two or three guys are working, they can't be in front of 70 or 80 machines. Once the fire starts and there's no one standing right there, they're never going to put out the fire with an extinguisher."

Angstadt pointed out that it's a balancing act between money saved in lights-out production and the increased risk of a fire going undetected until it creates significant damage.

"If the entire facility burns down, you're looking at a quarter million to a couple million just to replace one machine," said Angstadt. "Plus increased costs of replacement machines and increased cost of insurance."

For Miller, 36, and his eight employees, the fire prompted a life-or-death struggle for the business. Manufacturing since 1987, Miller had relocated from South Carolina to his native state of Ohio in 2000 to open Extreme Industrial Knife. With sales of $750,000 in 2005, his company had developed ongoing relationships with customers across the United States in the plastic, paper, rubber and metal working industries, providing prompt repair, sharpening and replacement of knives used in industrial machinery.

The morning of April 2, a total of 33 firefighters from six townships around Salem, midway between Canton and Youngstown, responded to the fire. The emergency

"A LOT OF PEOPLE THINK OILS WON'T BURN, BUT WHEN IT'S ATOMIZED, YOU HAVE ALL THE FIRE YOU WANT".

"We had to clean up, re-wire, repaint and put back together everything – all that good labor stuff."

call came at 8:10 a.m. Since the local volunteer firefighters were already gathered for a fund-raising breakfast, they were able to travel the 3.5 miles to the fire within seven minutes.

Firefighters quickly located the fire in an oil pit of the CNC machine and had the blaze under control in less than 10 minutes. Green Township volunteer fire chief, Todd Baird, said the fire had been burning for quite a while, although he was unable to pinpoint the exact time of origin. Four other businesses that lease space in the facility suffered smoke damage, along with the raceway business office, where Meow the cat, the track mascot, died.

When Miller arrived, he saw soot, dirt, oil and water everywhere he looked. The sight was terrifying. The odor of smoke was overwhelming.

Oily soot stuck to machinery like magnetized metal shavings. The sticky, corrosive mix filtered into machine crevices, blanketed ceiling tiles, crept into the light fixtures and dirtied snow outside the building. Water from fire hoses helped extinguish the fire but left puddles throughout the facility.

It could have been worse. An employee arrived at the shop for work in the morning and found it filled with smoke and fire. With quick action, the building was still structurally sound. But it was bad enough.

"It was like starting from scratch," said Miller.

Miller and his employees, also known as the "Extreme Team," banded together to try to recover the facility. They hired a fire damage restoration company. After the service ran up a bill of $50,000 the first day, Miller called a halt to the operation.

Then, Miller and his employees set out to do the dirty work themselves. Experienced machine operators in the area suggested techniques for restoring the machines. The Extreme Team hauled every single machine in the shop out into the yard. Using power washers, they meticulously cleaned stubborn soot from machine surfaces and components.

Because of the corrosive nature of the soot, actions often had to be repeated. They applied WD-40 on machine parts but had to reapply it just days later when the rust returned.

"We had to detoxify everything," said Miller. "We had to clean up, re-wire, repaint and put back together everything – all that good labor stuff. We replaced insulation and put in new light fixtures. Geez, it took a while."

After a solid week of work, the team started putting cleaned equipment back in the building. It took at least two and a half to three months before the company was settled in again.

Miller needed more than muscle power to deal with the heavily damaged key piece of equipment.

"When you have a fire and get a piece of equipment ruined, if you [bought] that equipment for $100,000 and you [depreciated] it over five years like we had, then you get next to nothing," said Miller. "So you get rid of it and get a piece of equipment that's even older cause you can't find any other. Then, you purchase a piece of equipment at the end of the year."

"You're already down, and just because you had the thing depreciated and on the books, it looks like you've made more money than you did," continued Miller. "You have to pay Uncle Sam his chunk. That was the worst thing."

Miller had insurance, but didn't receive any emergency money for at least three weeks. Nine months later, he was still awaiting a settlement with the insurance company as litigation proceeded on the fire cause.

The business was squeezed to the breaking point. Miller has no doubt he would have been out of business if not for an acquaintance, whose personal loan provided desperately needed cash flow during this time of hardship.

"We were very fortunate to get one machine up within a week, and we had very understanding customers," said Miller. "We were also fortunate to get back most of our customers."

"With high-value equipment, you want quick detection and quick suppression using clean alternative gases like CO2 or Halon."

Today, Miller said his operation is still not 100 percent, and the employees continue to cope with interruptions.

Before the fire, Miller didn't have automatic sprinklers or any other fire suppression systems. He began investigating prevention products after the fire and settled upon a fire suppression system that encapsulates each machine.

Business owners like Miller are confronted with an array of fire suppression options. Nothing, however, can substitute for the first line of defense; automatic ceiling sprinklers, said Affiliated FM's Domagala. In all, 90 percent of fire losses are controlled with 10 or less sprinkler heads opening.

Also important is training employees, whose actions can avoid and control loss. In addition, companies should consider flammable liquid safety interlocks and shutoffs to eliminate the fuel source. Affiliated FM's Domagala also recommends special protection systems on high-value equipment. With orders of new equipment, Domagala urges business owners to seek less-hazardous fluid. Affiliated FM's parent company, FM Global, is currently conducting research on water-mist type systems for protection.

One fairly new fire suppression system by Firetrace of Scottsdale, AZ, uses flexi-tubing and a pressurized delivery system of suppression agent, either water, foam, dry chemical or gas. Initially invented for vehicular and laboratory fires, the system was soon updated to protect other small, enclosed areas, such as machinery. Within a span of less than four years, the company has fire suppression systems in more than 10,000 machines worldwide, says Scott Starr, Firetrace marketing manager.

"With high-value equipment, you want quick detection and quick suppression using clean alternative gases like CO2 or Halon," said Starr. "This approach quickly puts out the fire but does not contaminate the oil so you can get quickly back into production."

Mitsubishi, ships all its EDM equipment to Firetrace for retrofitting with the suppression system. The minimally invasive system, which uses tubing to cover all potential ignition areas within the enclosed area, can be installed usually from $1,000 to $2,000 for smaller machines, said Starr.

Quick detection and minimal harm from the extinguishing agent are critical because machine shops seek to return to normal production as fast as possible after a fire, said Angstadt. He also said a big question in the industry is the use of cutoffs, since the potential for machine tie-ups and breaking of machinery parts exists during the shut down.

"Some dry powders are so fine, they get inside bearing surfaces and cause degradation; the machines don't work as well, so you're almost looking at replacement," said Angstadt, who recommends cooling gases to his clients.

"I've worked with about half a dozen clients who'd lost machines to fire previously," remarked Angstadt "After installation of the fire suppression system, there's been a record of 100 percent extinguishment of the fire. And, there's no downtime other than changing out bits, putting on a new fire tank and starting the machine back up, where it's allowed by local fire regulations."

For Miller, the April fire was his first. In his opinion, one is too many.

"Zero is a better number," he said.

Lynn Walters is a freelance reporter based in Rye, NH, with more than 25 years of writing experience. A frequent contributor to the Boston Globe, her articles have appeared in a number of newspapers and magazines. She has served as editor of an industrial property conservation magazine and contributed to the NFPA Fire Journal. Lynn holds a master's degree in journalism from Columbia University.

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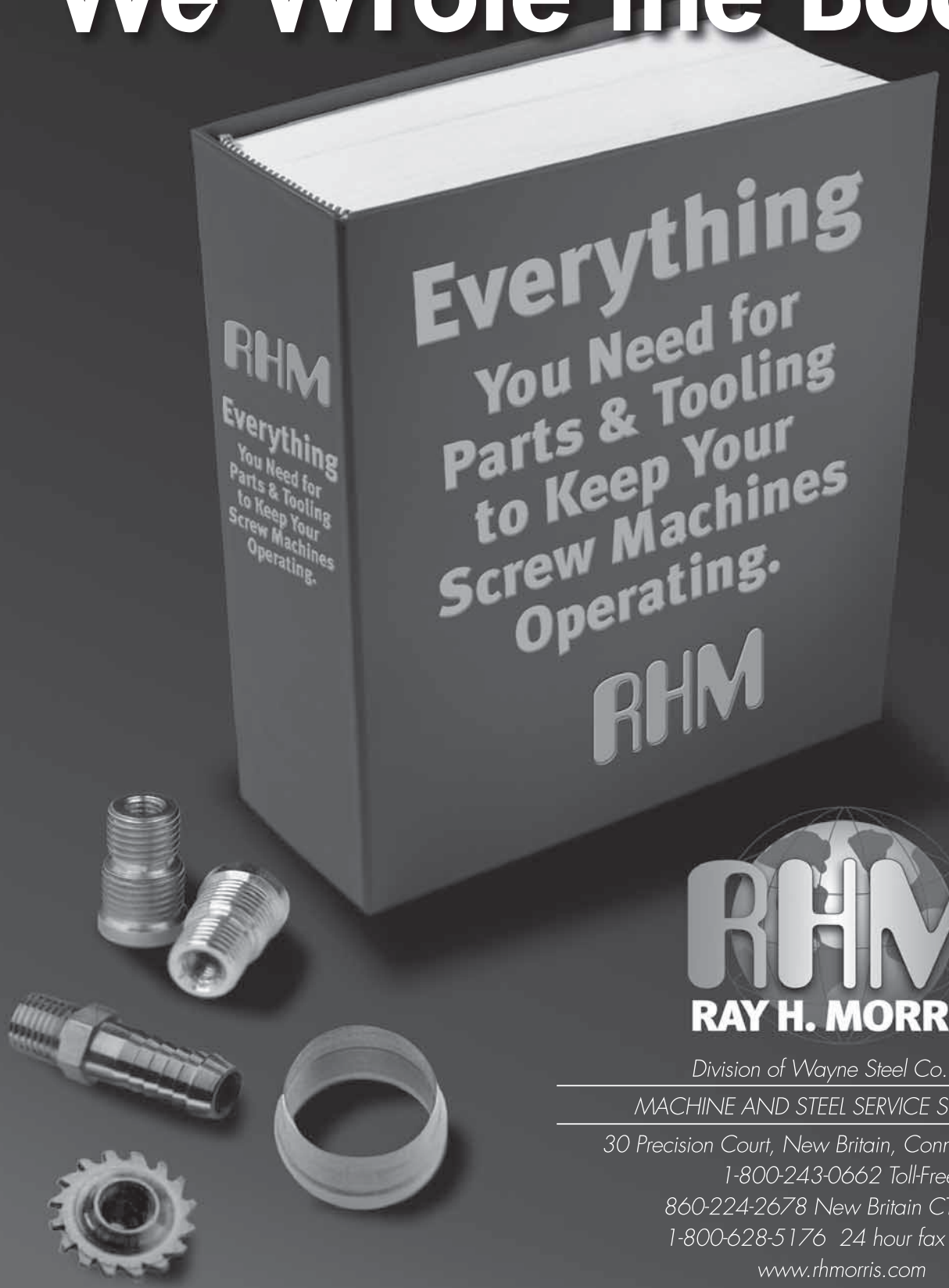

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Capture and

Top: The original Graff-Pinkert building on the south side of Chicago.

Bottom: Leonard Graff (left) with fellow machinery dealer Raymond Zaknoff (center) and Aaron Pinkert (right).

Top: Leonard Graff abd Aaron Pinkert ran a screw machine shop during World War II.

Bottom: "Mutt and Jeff" as they were known to fellow machinery dealers.

Can all parties benefit from Business Transition?

Continue:

Dana: you have been reluctant to be the subject of an article on business transitions. Why?
Lloyd: I'm worried about writing too much about myself. I don't want to develop a cult of personality. I'm also reluctant to show too much vulnerability, and finally I'm confused about the issues.

Concern about showing vulnerability and ignorance of the issues are what prevent many people from preparing for transition. This is a great starting point..
I decided to do this because it is a crucial topic. Secondly, many people have come and thanked me for writing candidly about our bookkeeper stealing from us. Through writing on that subject in a very open way, I realized that people respond to frankness, vulnerability and authenticity. I feel like the best way to do justice to business transitions is to do an authentic article. This requires a real company and I decided to use ours.

Whose idea was it for you to join your father's business in 1969?
Mine. He left the option open, but he did not push me.

What was the business when you joined it?
It was a small business trading used machines, run by my father and his cousin Aaron Pinkert (whom I called uncle). It made money every year, but was run cautiously from my perspective. Now others would say it was quite speculative, gambling every day, buying obscure machine tools in the used market. But to me, it was conservative.

How did you know that there was an opportunity to join the business?
I worked summers for several years. I liked the business and was familiar with it. I thought it could be lucrative, enjoyable and that I could add value.

What did you do during those summers?
I went on the road and tried to locate machines for sale. I would go to a town and call businesses asking if they had any equipment for sale or if they were interested in buying. It was an interesting way of learning. It was a way where my father didn't have to teach me a lot – he allowed me to teach myself.

In the operations of this business, is there anything more crucial than going out, locating machinery, and then identifying someone who wants to buy it?
That is the essence of the used machine tool business – that and understanding relative values of these items, and I picked up the values by listening, studying, and observing.

You became valuable because you provided new inventory on the front end and new customers on the back end?
That and I started some new initiatives in terms of buying more modern equipment. I provided energy because my father had some medical issues, my uncle was getting older and they were slowing down and knew it. So they needed someone if they were going to continue.

Was it their objective to continue?
I don't think they cared much at that time. But then gradually, I believe my father wanted the business to continue if my brother and I would be involved with him.

A conversation with business owner Lloyd Graff and business planner Dana Barfield

Above: L to R: Leonard, Jim and LLoyd Graff, Plant Manager Paul Carlson, Aaron Pinkert and Rodney Hannafus.

Capture & Continue

Did you encounter interference in taking the business where it needed to go?
Yes, dad was concerned about my ability to value machinery accurately and he overruled me at times, annoying me greatly. We had considerable friction through the years over my aggressiveness and his wanting to be careful.

Did he have a valid point in the times he overruled?
Generally not (laughing). His view was one shaped by the Depression, some medical problems, and fear of making mistakes. My view was even if I made a mistake it wasn't going to be fatal. But he did not see it that way. He absolutely did not want to make ANY mistakes.

Take us back to 1969 to when you joined the business.
In 1969 I was 25 and had already graduated from college with a Masters in Journalism. My father and I collaborated to pay for college. I used the money I earned in the summers, but he paid for much of it.

What about your brother and sister?
My sister is one year behind me. Jim is five years behind and was in the middle of college, but money for us and for college was no issue.

His aversion to mistakes was not a financial survival issue?
No, but my father, despite having adequate funds, was insecure about money.

Why didn't your sister enter the business?
She was not interested. She got married and there was some interest in her husband joining the business, but nothing solid became of it.

When did Jim enter the company?
Soon after I entered. At that time his career plans were not clearly defined. The fact that I had come in and had some success, demonstrating that it could be done, interested Jim. I think Jimmy and I had a stronger relationship than he and my father did. From my perspective, Jim did a great job of seeing me as someone to emulate rather than compete against and we would not be where we are today without him.

That almost sounds like Jim followed YOU into the business rather than your father, accurate?
I think so.

That's an interesting twist. Aaron Pinkert was your "uncle" - was he involved in 1969?
Yes until 1984. His role was confidant to my father. My father was the energy, creative force, passion and soul of the business. But dad was subject to wide mood swings. He would become discouraged and it would affect his decision making. He was wise to recognize this and knew intuitively that he needed someone to help provide perspective in tough times. Pinkert was a kind, tender man with

great strength and he could tolerate the mood swings. He was terrific in crisis and that is why my father needed him.

What was Pinkert's perspective about you joining the business?
First, his younger son Dan and I were close – so Aaron and I knew one another well. We were neighbors, relatives and really liked one another. We developed a wholesome business relationship. In the beginning he didn't know if I would work out, but he did not resist.

Above & Below: The Graff men were inseparable in business and out.

Are there Pinkerts involved today?
No. We gradually bought him out while he was alive.

You mentioned that there were times of friction between you and your dad, were you concerned about this entering the business?
No, because I knew my father well. But later it caused concern. As I became more confident in my ability to shape the business and he resisted it, I felt thwarted. This caused a fair amount of friction.

Did you become rivals?
Yes. I think it came out of his conservatism. He also observed his role shrinking.

When you were a kid and conflict came up, how did you and your father work it out?
There was no conflict permitted when I was a kid because my father grew up in a family riddled with unresolved conflict. He decided not to permit it in his family.

About 1972 conflict comes into the business. In a family where conflict is not permitted, how does conflict now work its way out?
I tried to do what I thought were good deals and at times he disagreed. I remember one case vividly. I went to Europe and bought 15 Davenports. When I returned he said I had paid too much and forced me to renege on the deal. It was an emotionally wrenching experience. This was not a question of money, it was a question of dad's reluctance and his concern over valuation – that we MIGHT be making a mistake. I called from Italy, he approved it, I travel home and during that time he worried himself sick, and he made me undo the deal. Even though he listened carefully to my thinking, he refused to let it go through. He was sure that I had been duped or was blinded by wanting to make a deal. It took years to restore the relationship with the man I reneged on.

As you're growing up disagreement isn't allowed. But at this point you have a passionate conversation in which the two of you disagreed.
Let's just say that it was not the first such conversation.

Did your father reach a point where he was proud to have you involved?
Yes, from the beginning. He always communicated that I was valuable to the business. As he deteriorated physically he came to rely on Jim and me heavily, complimenting me frequently, and bragging to his friends about me.

When did you start to feel a sense of pride and accomplishment?
From the beginning, even the summers I worked. That was a major reason why I came in. I found myself capable of and fascinated by doing the fundamental aspects of the business and I loved it. I realized early on that it played to my strengths.

When you started did your dad establish a cap for the size deal you could do?
No, we just discussed every deal. Obviously if I brought a deal to the table I was confident of it, but I'd get on the phone and the three of us would have a collegial conversation over the market values and approaches.

How did your dad pay you?
Adequately. Money was never an issue because I always felt like I had enough. I never had an argument with my father or Pinkert about money that they were paying me. I thought I was fairly paid. It never was about money – it was about succeeding. Sure we wanted to make a profit, but I felt if the company succeeded, then I was succeeding. I wasn't self conscious about how much I made either, because I knew and was told that I was contributing meaningfully.

You know in a lot of businesses money is a significant issue.
Sure, it's more of an issue to me today too. But my father worried about the business constantly back then. He did enough worrying for both of us and so I never worried about money. I was married in 1970, had my own place, my own car, my father had given us some stock as a nest egg and I was satisfied with my pay. It was about success for me.

I have a friend who says that 90% of what we worry about never happens. That just proves that worrying works!
I'm a believer in that myself, because I worry more now.

When did you come to recognize that he really trusted your leadership of the company?
Probably never entirely - remember he was a worrier and not really someone who trusted.

When were you confident in your ability to run the company?
Well, it was plain from the numbers that I was buying and selling machinery at good prices.

When your father died in 1995 did he own any of the business?
Yes, he owned a third. Jim and I had been buying him out over time. Pinkert exited with a completed buyout in 1984. We immediately began to buy my father out. We used book value as the basis for the purchase in both cases, because it most accurately reflected the value of our business back then.

What prompted you to do it that way?
My dad raised the issue and we agreed on the material aspects of the deal. He believed that he should not give us the business, so we concocted this arrangement and used some of the annual profits for the purchase. We also felt a certain responsibility because my sister was not involved. If we buy out dad, it provides him an opportunity to share with her.

How did you acquire the last third?
Through his estate plan.

Below: The three Graffs in younger, thinner days.

Capture & Continue

Did he reach a point where he had to rely on his investments for income?
No, he was active until his death.

In TMW writings you have described your dad as dynamic and passionate. How did that affect you?
It inspired me because I realized that businesses are based on passion and inspiration. It taught me that businesses rely on the confidence of the leadership. When he was on his game, he was terrific. But when he would have a mood swing, we would suffer. I felt a real responsibility to pick op the spear and lead. It was tough. So I learned from the strengths and weaknesses of my father's personality.

Did you ever struggle with the differences between you and your father?
I feel that many people, including my father, rely on me to provide encouragement. There are times then and now when it's a burden.

Is this responsibility a role of leadership?
Yes, but it is difficult and often lonely.

Where do you go for encouragement when it gets rough?
I had a long-time mentor, Bel Small, who was in the machinery business. I worked with a therapist for several years. I also rely on my wife to provide perspective for me. She is generally optimistic, listens intently and provides great counsel. My son Noah boosts me when I need it. I was in a men's group for ten years. These people have helped me preserve and maintain my confidence.

Do they help by telling you how wonderful you are, by reminding you of past success, or what?
They don't tell me I'm wonderful with no basis - that's hollow. What they do is provide perspective and reflect ideas that concern me. They remind me of my strengths and provide clarity. They showed respect to me when and where I needed it.

Where were you good and where were you lucky in the ownership and operations transition?
It was about relationships – my father, Jim, and I respected one another and worked to get along.

When you disagreed how did you maintain the relationships?
We always knew that we cared about one another. There could be disagreement over business issues, but we knew that we respected one another. Some of our issues we worked through. Some issues were NOT worked out and weren't put behind us. There are still times when there are strong disagreements and times when I feel frustrated. But we care about and respect one another despite this happening.

You've been through an emotionally charged business transition, with significant money involved, the welfare of the family at stake, in a complicated process that was ultimately negotiated successfully. What did you learn in this?
If the goal is agreed upon and process considered equitable by the parties, it can be successful.

How do you feel about conflict these days?
I view conflict as part of life and the means by which things can move ahead. Even though my gut tells me to run, my observation says work through it.

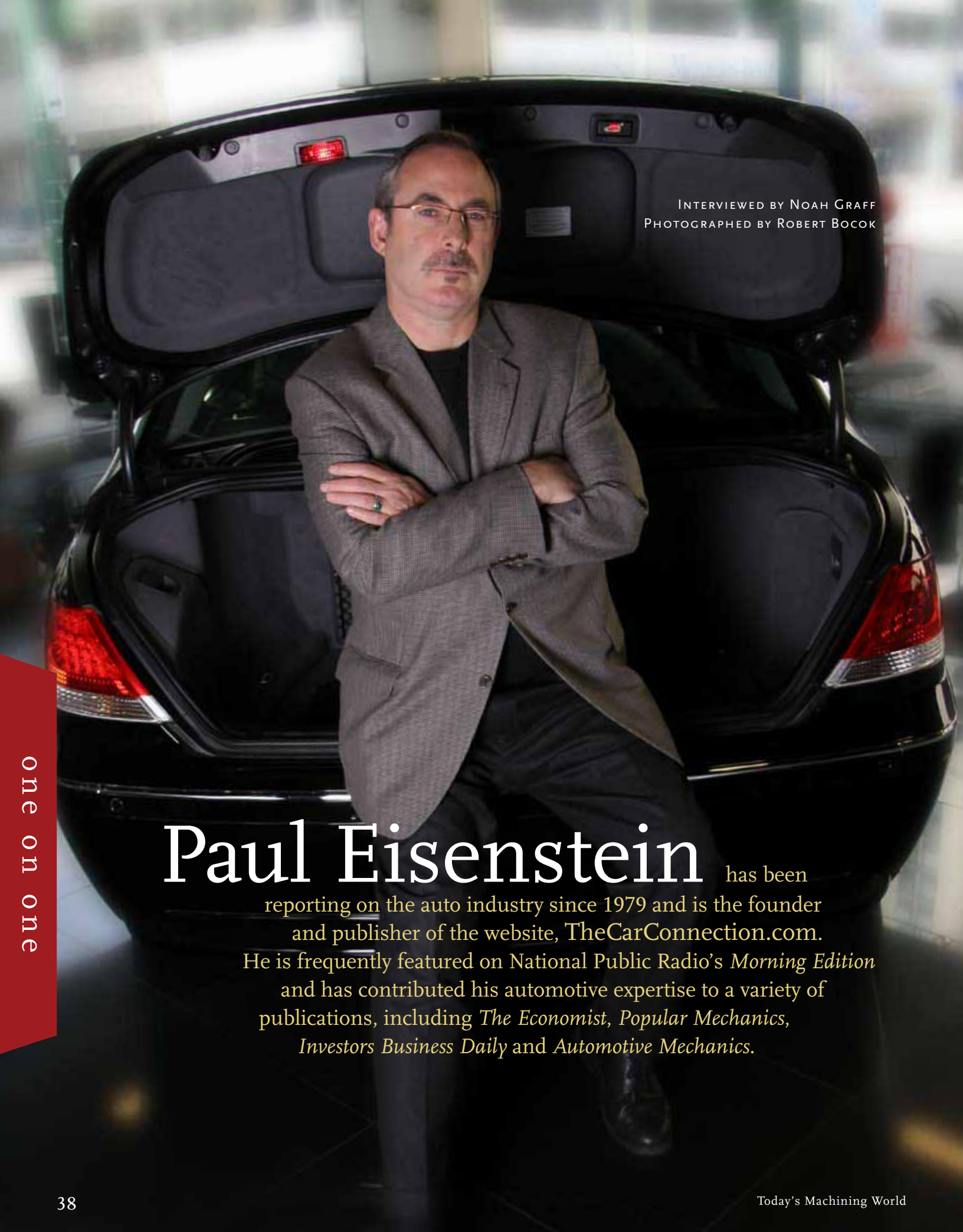
Can you use conflict to bring people together and how have you done that?
Yes. By identifying the issues and the motivation behind them, getting people to talk through the issues frankly, and then put a process in place to address them.

Business transitions can break down over unresolved conflict, yet that hasn't happened here.
No, not in the past, but in the present we don't have a real clear transition arrangement. What we have is an insurance arrangement in case a key person dies, but Jim and I don't have a specific person who wants to take over. What I have done is add a diversified business unit to our holdings – Today's Machining World, this magazine. I'm trying to build value through both the machinery business and the magazine. But I have no romantic illusions about preserving the Graff-Pinkert institution.

Then what are your objectives for the business?
I see no pressing need to provide wealth for my children. I want to continue the businesses, but the skills needed in running these businesses are not easily transferred, and that worries me.

So what are your fundamental objectives given that there is no clear successor?
Not all that much changes from what we've always done. Be successful, properly structure our finances, build profitable businesses, plan as best we can given what we know, and seek to fill the holes that we have. We're running the businesses to make them universally successful and not simply to attract our kids. However, my son Noah does have a greater interest in the media property than in the machinery business. Each business complements the other and I enjoy them both.

Dana Barfield is a frequent contributor to TMW and has worked with business owners through many company transitions in family and non-family businesses. He is the author of Capture and Continue: Essentials for Maximizing the Benefits of Business Ownership. E-mail him at dana@thebarfieldgroup.com.



Interviewed by Noah Graff
Photographed by Robert Bocok

Paul Eisenstein

has been reporting on the auto industry since 1979 and is the founder and publisher of the website, TheCarConnection.com. He is frequently featured on National Public Radio's *Morning Edition* and has contributed his automotive expertise to a variety of publications, including *The Economist, Popular Mechanics, Investors Business Daily* and *Automotive Mechanics.*

one on one

Do you think that the present management teams at GM or Ford are capable of turning their companies around?

I think there are some serious questions about the management teams, particularly at General Motors, which seems to have least satisfied the outside world with the simple turnaround plan announced last autumn. I think that there's a very good chance that we will see a shake up at the top, perhaps with the ouster of current CEO Rick Wagoner, if they don't show strong signs of improvement in the next six months.

Do you think the management teams believe they can turn the companies around?

I'm not sure that the strong hand that they tell the world they're holding is something that they actually believe internally. I think they realize that there are problems so deep at this point that even with a string of product successes, they may not be able to avoid future cutbacks, if not outright bankruptcy.

In the next ten years, do you think that Chinese cars will make much penetration in the United States?

There is no question that the Chinese see cracking the code to the U.S. market as critical to their success. Price alone won't let them declare victory. They're going to need a low price and high content. If they can pull this off, I think Americans will give a fair look at any new Chinese product.

Where do the designs come from for new cars? Where does GM go for their designs?

Car manufacturers have design and engineering facilities worldwide. A car sold by Ford may have started as an outsourced Italian design, tweaked by an advance studio in California, locked in clay in Dearborn, and made into a platform developed in Europe.

What emerging car features are you most excited about seeing?

One of the things I'm seeing, which I find particularly exciting, is that manufacturers are suddenly facing the reality that they have to deliver the best of all worlds. We're seeing that you can improve fuel economy while reducing emissions. And we're seeing that you can make cars that are fun to drive even under the worst conditions that also happen to be incredibly safe and no more expensive. I can't imagine a better situation for the consumer.

What is your greatest fear about the future of cars?

I still worry sometimes that all the pressures, particularly on issues like safety, mileage, emissions and other regulations could squeeze the soul out of tomorrow's cars. My other concern is that the automotive world is becoming so competitive that some of the great names and brands will disappear.

Which car do you think is the best value?

The way the Koreans are going right now, if they can push their quality up a little bit more, for the dollar they're one of the best out there. And I find it very surprising that I can say that.

If you could drive any car for one day, what would it be?

Probably a MacLaren F1. Or looking for something newer, I would probably be driving the Bugatti Veyron—that's got 1001 horsepower. And I think if I had it for more than one day, I'd probably no longer have my license.

If you could be any machine what would it be?

Oh, a Bugatti Veyron. Incredibly powerful, totally absurd and yet an object of pure lust.

Photo Location: Joe Perillo BMW, Chicago Illinois. Bugatti Veyron photo courtesy of www.bugatti-cars.de/bugatti/

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

by Noah Graff

High legacy costs, decreasing car sales, and a plummeting stock price in 2005 have caused many people to ponder the ramifications of a General Motors bankruptcy. If GM does indeed go bankrupt or "restructures," it will surly affect many contract manufacturers whose businesses rely significantly on supplying parts to the automotive industry.

If GM goes bankrupt, will it have a negative or positive effect on U.S. contract manufacturers?

First, I think the likelihood of a GM bankruptcy is fairly low. GM has clearly come to the conclusion that the benefits [of avoiding bankruptcy] are far outweighed by the negatives, including the likelihood of strikes by its workers and resistance by wary consumers. That said, one still cannot rule out bankruptcy entirely, as there are a variety of factors outside the automaker's control, as last year's fuel crisis demonstrated. Were GM to go bankrupt, and were it to avoid a devastating clash with its union workforce, I still believe the company's image would be sorely tarnished, and that would drive away even more consumers, meaning lower sales and still lower demand for components. Suppliers would only be in worse shape as a result, facing still lower demand and even more pressure for concessions from a company with an increasingly uncertain future. Any contract manufacturer waiting to diversify now is taking a risk.

Paul A. Eisenstein
Publisher, TheCarConnection.com

If GM goes bankrupt I think it will have an initial negative impact for contract manufacturers as they could possibly lose money owed on tooling, long-term agreements, etc. However, depending on how GM would restructure, the outcome could go either way. If GM would "re-tool" their product line to better compete with foreign competition and kept the work here in the United States, it could lead to more work and opportunities for our contract manufacturers. On the other hand, if they do not "re-tool" or decide to push more work out of this country, it will certainly have a negative impact on contract manufacturers.

Robert L. Akers
Chief Operating Office, National Tooling & Machining Association

The only observation I have is that Delphi's difficulties actually had a positive effect on our customers who deal directly with Delphi. Delphi's ongoing need for parts was more important to them than the payment of pensions. Money was readily available to our customers to continue production, more than there had previously been prior to Delphi's bankruptcy. Therefore, I believe we should remain optimistic about the success of contract manufacturers, even if GM is forced to restructure significantly.

Wes Skinner, President
Manth-Brownell Inc., Kirkville, NY

the GM facts:

GM's payroll pumps $8.7 billion a year into its assembly workers' pockets. Directly or indirectly, **it supports nearly 900,000 jobs**.

When GM **shut down for 54 days during a 1998** labor action, it **knocked a full percentage point off the U.S. economic growth rate** that quarter.

BusinessWeek Online

In 1983, GM owned 43% of the U.S. market. In the **third quarter of 2003**, the **share had dropped to just 26.4%**. Result: GM's sales have dropped faster than its ability to reduce production or cut costs.

Global Insight, the big economic consulting firm, forecasts that **GM's market share will be down to 23.5% in 2008**.

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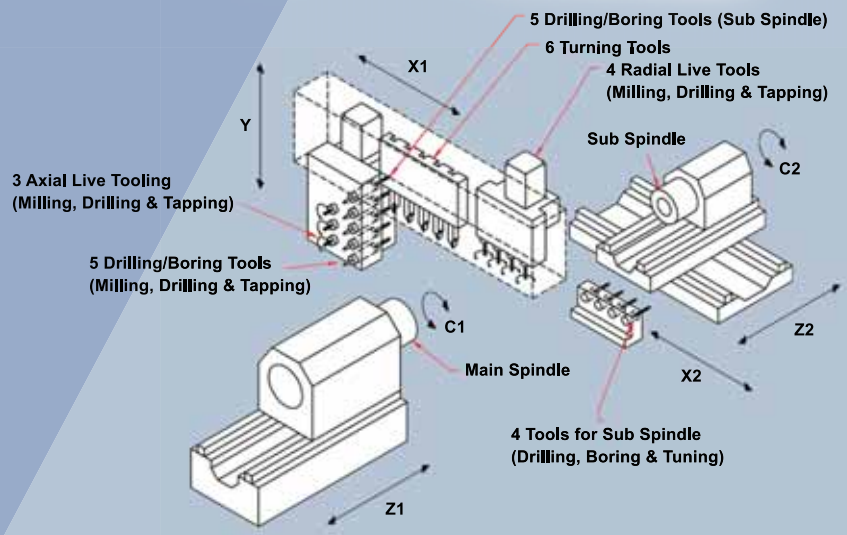

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By Noah Graff

Water Power

How the force of water works to cut just about anything

For the holidays, *TMW* art director, Rob Bocok, surprised the magazine staff with stainless steel paper weights in the shape of the new TMW logo. We were impressed at the quality and beauty of the paper weights, so we visited the manufacturer, Chicago Waterjet, in Elk Grove Village, IL., to find out how our cool gifts were made.

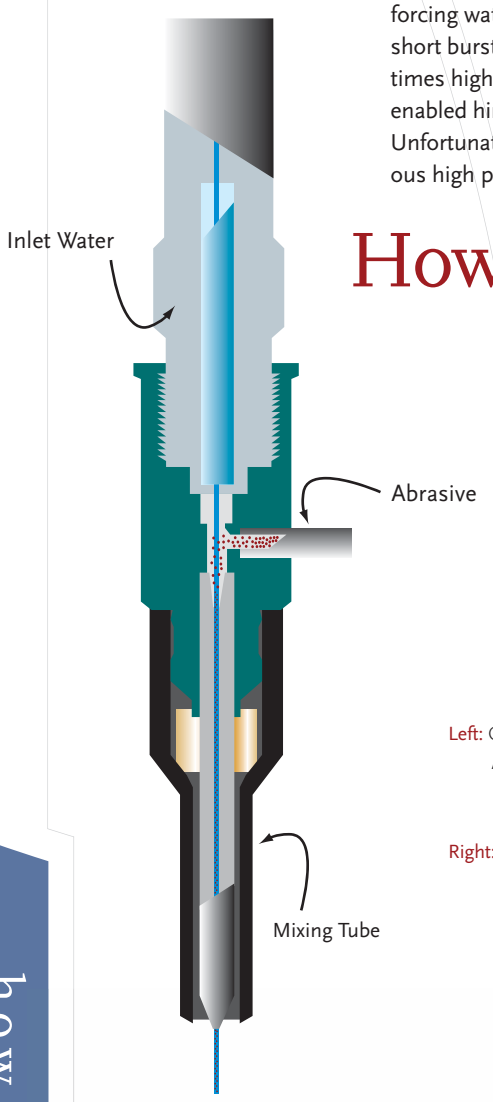
A waterjet is used in machine shops to cut metal with a high pressure stream of water. Waterjets produce net shaped parts with no-affected zone, heat distortion or mechanical stresses often associated with other cutting methods, and running them requires few secondary operations. They can cut a variety of soft materials, such as silicone, rubber, plastic, wood and gasketting material. Abrasive waterjets can cut harder materials such as marble, granite, stone, fiberglass and a variety of metals including titanium, inconel, stainless steel, aluminum and mild steels. Waterjets have the capability to cut diverse levels of thickness, ranging from .005 of an inch to 10 inches (under one inch is the most common thickness cut by Chicago Waterjet).

Photos by Chip Williams

History

In the 1950s, Dr. Norman Franz, a forestry engineer, was trying to find new ways to cut trees for lumber. He dropped heavy weights into water, forcing water through a tiny hole. He achieved short bursts of very high pressures (often many times higher than those currently used), which enabled him to cut wood and other materials. Unfortunately, he had difficulty creating continuous high pressures and never actually invented a production lumber cutter; however, he proved that a focused beam of water at very high velocity had great cutting power. In the 1970s the first commercial use of waterjet emerged for cutting corrugated cardboard. Eventually, waterjets came to be used for cutting disposable diapers, tissue paper and automotive interiors. In the early 1980s, abrasive-waterjet was developed for cutting harder materials like metal and glass.

How the waterjet process works



Left: Cutaway of Abrasivejet.

Right: The garnet.

A waterjet uses the same principle to cut through a sheet of metal as a power washer uses for getting rid of dirt and rust, but a waterjet's stream of water is 30 times the pressure produced by a power washer. Abrasive waterjet, or abrasivejet, is used for cutting metals to produce components for a variety of functions, such as components for tool and die sets, titanium parts for the aerospace industry and customized parts for motorcycles (like the ones seen on American Chopper). For Chicago Waterjet, one of the most common jobs is roughing out IDODs (Inner diameter/outer diameter materials), which their clients can then finish turn. That way clients don't have to saw cut out of a piece of round stock and then turn it themselves; this makes the material cheaper and the process faster. Although Chicago Waterjet produces volumes as high as 10,000 pieces, a typical job for them ranges from five to fifty pieces.

Abrasivejet, which can be hundreds or even thousands of times more powerful than pure waterjet, uses water fortified with abrasive particles, generally composed of garnet, a very hard yet inexpensive

A consolidated dictionary of waterjet vocabulary from www.waterjets.org

Abrasive Flow Rate
The rate at which abrasive flows into the cutting head, usually from 0 - 1 lb/minute.

Attenuator
A pressure vessel that maintains output pressure for a constant water flow.

Catch Tank
A tank of water underneath the cutting head to allow the cutting beam to disperse, and prevent holes in your floor; can also accumulate spent abrasive.

Dynamic Pierce
A method of piercing a material by allowing the jet to start moving along the part path

Jet Lag
As the cutting head moves across the material it is cutting, the spot where the jet exits, the material will lag behind the spot where it entered the material

how it works

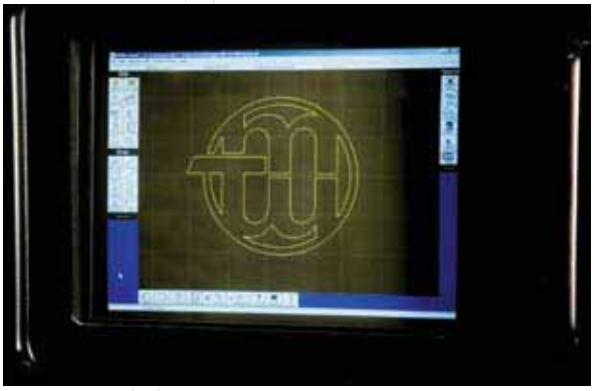
stone. The water mixture is channeled through a narrow jeweled nozzle of .03-.04 diameter, at anywhere from 2,200 – 2,600 mph, with water pressure generally between 40 – 60 thousand pounds per square inch. An abrasivejet has the capability of cutting within .002 of an inch (sometimes more precisely). Unlike a pure waterjet, which cuts material with water, an abrasivejet's water abrasive additive is what actually cuts the material. With a pump producing 55 KPSI (an average setting), an abrasivejet can cut a half inch sheet of titanium at the rate of 15 linear inches per minute.

One of the biggest challenges when using a waterjet or abrasivejet is limiting taper. Typically, no matter what thickness or material one is cutting on waterjet, a taper of approximately .005-.007 of an inch per side will result. However, in recent years, an articulating head has been developed, which can reduce taper to well under .001 per side for most applications.

Waterjet is also advantageous because it allows a maximum yield of any given material. Because the kerf is only .030-.040 wide, parts can be nested very closely. Also, waterjet produces no hazardous remains. The water is clean enough to go down the drain, and the abrasive substances along with the minute byproduct of the cut material (small particles) are suitable for landfill. Unfortunately, the water/garnet mixture must constantly be replaced because it is not cost effective to clean and dry the garnet, and the water is not pure enough to be reused without a purification process.

Computer Setup

Sophisticated, networked computer controls make designing a job and programming a machine easy and fast. There is no universal G code as with most conventional CNC machines. The geometric design, along with other specifications based on the type of material, quantity, etc. for the desired product are entered into a Windows-based program modeled after an AutoCAD system. The specifications are sent to Windows-based controls on the waterjet machine through a network connection. There is no need to program a computer on the machine, nor is it necessary to carry the program to a machine on a floppy disc. Each waterjet manufacturer has its own user friendly software. Pat Hill of Chicago Waterjet says, "[With this software] all I do is basically tell [the machine] how to apply a tool path to any given geometry, and the machine does the rest. You can be at home on your couch with a laptop with the software, and you will know exactly how long it is going to take you to do a certain job."



Design for TMW paper weight.

Maintenance

The biggest drawback to manufacturing with waterjets is the maintenance the machines require. Because of the extreme stress the water pressure puts on the machinery, the pumps, seals for pumps, and nozzles all need to be rebuilt or replaced over time. Chicago Waterjet estimates that after 400 hours, they take the machines apart and rebuild them. Because they are unsure when parts will break down, there always has to be someone monitoring the machines, which means lights-out operation is impossible. However, Chicago Waterjet is able to run their machines 24 hours a day, 7 days a week.

Kerf
The width of the cutting beam. Typically the kerf width for an abrasivejet ranges from 0.020" to 0.060", depending on the nozzle.

Mesh
The coarseness of abrasive used; 80 mesh abrasive is typical.

Mixing Tube
Sometimes referred to as "nozzle" or focusing tube, it is made from extremely hard material and focuses the abrasive and water into a coherent beam for cutting.

Splash back
The mess made when you don't cut all the way through, or the jet ricochets off a slat.

Stationary Pierce
A method of piercing the material where the jet turns on, then stays stationary until the material is pierced.

how it works

As thickness of material increases, the time needed for the waterjet cutting process increases exponentially. Chicago Waterjet advises that if the material thickness exceeds six to seven inches, it is probably best to use a different method, such as wire EDM. Wire EDM is also more accurate and better for a product's straightness and surface finish but is significantly slower than waterjet. Chicago Waterjet admits wire EDMs are half as expensive to run as waterjets and have the advantage of lights-out machining. For Chicago Waterjet just to run the machines, the operation cost alone is almost $30.00 per hour, not including manpower. Wire EDM is limited to conductive metals, while you can cut almost anything on a waterjet, including a "sandwhich" of different materials stacked on top of each other (see image on right).

Lasers are usually prefered on thinner steels (generally 3/16" to 1/4") because of their cutting power and because one can use secondary work tables, enabling new metal sheets to slide into position almost instantly after the previous sheet is used up. Waterjets have only one work table. However, lasers cannot cut reflective metals, which makes cutting polished stainless steel a problem. Lasers also generally cannot cut aluminum because of noxious gasses that the procedure produces (unless the laser has an exhaust system). Finally, lasers produce pieces with a work hardened edge, while waterjets produce parts with smooth edges that are not heat-affected.

Top: Chicago Waterjet encased a palm pilot in a block of clear liquid resin. After the resin hardened, they then sliced through the block, leaving a perfect side view of the palm pilot's inside design for engineers to study.

Diverse Applications

Waterjets are often used to make lettered signs, create sculpture, remove materials inside train tunnels, cut shapes into bullet-proof glass or cut patterns in stone for floor designs. Waterjet was even utilized to cut into the hull of the submarine, Kursk, to recover the bodies of the Russian crew. If you can imagine the same machine cutting bullet-proof glass and long sheets of diapers with water, you can begin to understand what a versatile tool it is for the market today.

Striation marks
The marks left by the jet as it wiggles around.

Tab / Tabbing
A method for holding parts in place, by leaving a small piece of material connected to the original plate from which it is being cut.

Taper
Taper is the difference between the top profile of the cut verses the bottom profile.

Weep hole
A small hole drilled into high pressure fittings to allow the water to escape should a leak occur.

Wiggle pierce
A method of piercing where the jet "wiggles" back and forth to "dig" its way down.

Thank you to Chicago Waterjet, www.howstuffworks.com and Flow International Corporation for information for this article.

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

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By its very nature, "letting the chips fall where they may" is not an option in our machining world. Swarf and chips have been an ongoing dilemma for as long as there has been manufacturing. Where to put it, how to store it, how to separate it from oil, how to process it to sell for scrap – all questions have its place in the turned parts industry. For many, chip-processing equipment has solved many problems and "what to do post-production" headaches. From chip wringing, chip briquetting, chip storage and transfer, chip processing equipment has allowed you to "cash in your chips" in today's marketplace.

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Inter-Source

Inter-Source's integrated storage and staging systems move and secure processed chips in a holding silo, advantageous for manufacturers who internally reuse their chips, and those who send them to a secondary smelter.

In a typical application, chips are automatically moved to a secured, dry, storage silo following processing. Automatic transport eliminates manual labor, carts, clutter, and the liability issues associated with in-plant handling. Automatic transport is also typically accomplished above or below the plant floor, supporting lean manufacturing initiatives.

Chip weight is monitored in the storage silo. When payload is reached, chips are automatically and rapidly discharged into an awaiting container. Manufacturers who re-melt their own chips realize a rapid ROI because the valuable raw material – clean dry chips – is easily and immediately available.

Manufacturers who send their chips to a smelter also benefit. Storage and weight monitoring mean more efficient hauling, as trailers are only onsite for the time required to load. The automatic monitoring also allows manufacturers to track what was sent to the smelter, for verification of monies due.

For more information, call 1-800-334-1470 or visit the company website at www.inter-source.com.

Chip Processing

Mayfran

Mayfran International has combined their FastPac™ Briquetter along with a vertical chip crusher and two conveyor units. The system transforms metalworking chips, strings, nests, fines, sludge, and space-wasting air into dense, dry and compact briquettes. The model RB4/2500/60 Briquetter, with a 350-lb/hr capacity and a 5.5:1 compaction ratio is just one Mayfran's FastPac series of briquetting machines.

Unique features of Mayfran's FastPac include a dual-stage compacting process and dual-action compression/ejection cycle, which help lower energy consumption and operating costs. A screw drive feeds the chips, strings and shavings from the hopper to the first compacting stage. A pre-charge chamber helps assure that a maximum chip volume and density will be achieved during the second briquetting compression stage. The screw drive's running time is programmed by a PLC control unit so it can be modified to optimize pre-charge loads depending on chip type and materials being processed.

The FastPac eliminates cutting fluid and coolant spill-liability risks during transport and increases the amount of fluids reclaimed. FastPac's "squeeze dry" chips feature removes up to 98% of the residual coolant and cutting oils. The excess fluid drains from the compression chamber and is collected in a reservoir making it available for immediate reuse or further processing in filtration systems.

For additional information about Mayfran International and products, visit www.mayfran.com.

product focus

National Conveyors

National Conveyors Company has introduced the Model VD40 pneumatic discharge chip wringer (centrifuge). The VD40 chip wringer can remove oil and coolant up to 500 lbs./hr. The VD40 chip wringer can be placed on the plant floor, directly beneath the machine tool chip removal conveyor, and pneumatically send the dry chips to a container up to 30 feet away. The oil can be discharged by gravity back into the machine tool reservoir. The pneumatic discharge feature permits the VD40 to be placed at machine tools without using valuable floor space. Multiple chip wringers can discharge to a common transport container.

The addition of the VD40 chip wringer adds to National's product line of chip wringers including the "Vari Screen®", "Time Saver" batch chip wringers; fixed screen horizontal gravity discharge chip wringers; vertical bowl pneumatic discharge chip wringers; vertical bowl gravity discharge chip wringers; pusher type chip wringers; and automatic batch type chip wringers. This broad product range permits National to supply a unit specifically suited to each customer's requirements, maximizing metal chip processing system efficiency and performance.

For more information contact National Conveyors Company, Inc. at 860-653-0374 or visit the company website at www.nationalconveyors.com.

Chip Processing

Custom Briquetting Systems

Custom Briquetting System's MetalPress Model 100 through 3000 briquetters are designed to convert metal, plastic, fiber, textile and sawdust chips into a near solid puck form. Briquetting chips and turnings will remove up to 98% of cutting fluids from the chips, saving hundreds of dollars in cutting fluids. This will also reduce a company's exposure to any hazardous waste problems.

The MetalPress briquetters will reduce the volume of scrap, providing savings in material handling, storage space, and the number of containers required for storage and shipping.

Whether you are trying to get a better price for your scrap, recycle your cutting fluids, recover fluids for safe disposal, lower your storage, transportation, landfill costs, or all of these combined; Custom Briquetting Systems can design a system that will fulfill these requirements. They also have Centrifuge Systems, Conveyors and Cart Dumpers.

Custom Briquetting Systems offers a two-year warranty on all MetalPress systems. There is 24-hour service and same day parts delivery to most areas. Their headquarters is located in Searcy, Arkansas; there is an extensive network of distributors throughout the nation to assist in promoting the best briquetting equipment to meet your needs.

For more information, contact Custom Briquetting Systems at 888-702-7100 or visit the company website at: www.custombriquettingsystems.com.

product focus

Barrett/Kinefac

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

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

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

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

Chip Processing

PuckMaster

PuckMaster® is a full service company that not only manufactures and installs briquetting equipment which converts chips into pucks, but also offers an optional service to market and sell a company's scrap material too.

PuckMaster's® general product offering consists of 10 different models of briquetting machines with processing capacities ranging from as little as 100 pounds of aluminum chip material (machine turnings) per hour and up to as much as 4,500 pounds of cast iron or steel chip material per hour.

PuckMaster® also manufactures the ShredMaster® line of shredders that are designed to break-apart machine turning material that has a long-stringy or tumbleweed consistency. These shredders also remove solids that are mixed in the chip material. Additionally, PuckMaster® manufactures the TipMaster® line of equipment which automatically lifts and dumps carts or tubs of chip material into the PuckMaster® system, thus eliminating the need for a forklift. They also manufacture and offer custom made carts or tubs used in the chip collection process. The Puckmaster® systems are designed to generate significant additional revenue from scrap chips by converting them into pucks; reduce substantial cost for material handling; reduce expenses by reclaiming, recycling, and reusing cutting fluids; reduce significant exposure to liabilities for hazardous waste disposal and create a safe chip handling plant environment.

For more information please contact PuckMaster, Inc. at 952-469-5542, or visit the company website at www.puckmaster.com.

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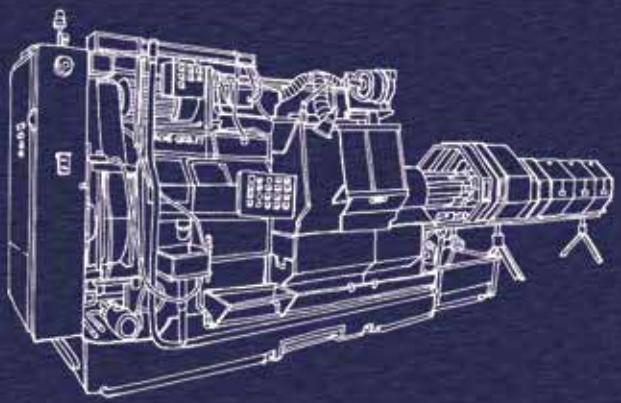
5/8″ 6-spindle, thdg., pickoff, 1971-88 (8)
1″ 6-spindle, 1960-1992 (9)
1″ 8-spindle, 1979
1-3/8″ 6-spindle, 1980
1-3/4″ 6-spindle, 1965-1979 (3)
1-3/4″ 6-spindle, factory rebuild
1-3/4″ 6-spindle, thdg., 1969
1-3/4″ 8-spindle, 1970
2-1/4″ 6-spindle, 1973-79
2-1/4″ 6-spindle ACW 2004
2-5/8″ 6-spindle,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

ACMES

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



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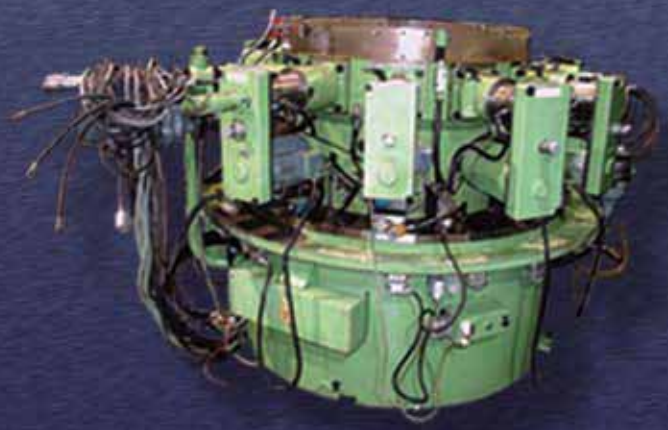
HYDROMAT & ROTARY TRANSFER



Hydromat HW 25-12, 1984
Hydromat HW2 25-12, 1985
Hydromat HW 25-12, 1985
Hydromat V-12, 1986 Trunnion
Goss & DeLeeuw 1-2-3, 7-spindle, 1970
Goss & DeLeeuw 1-2-3, 21-sp., 1970
Hydromat 30-60, 36-100, 20-80 units for drilling, threading, recess

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

Brown & Sharpe
#2 1-1/4" CNC Allen
Bradley 8200 FMB loader

CNC Machines
Miyano ANC 35S, 1989

Davenport
3/4" Model B Servo, 2002
3/4" Logan Clutches, Rebuilt 2001
3/4" Model B, 1989
3/4" Model B, 1970-89 (7)

New Britain
Model 52 1-1/4", 1979
Model 657 5-7/8" 6-spindle chucker, 1971

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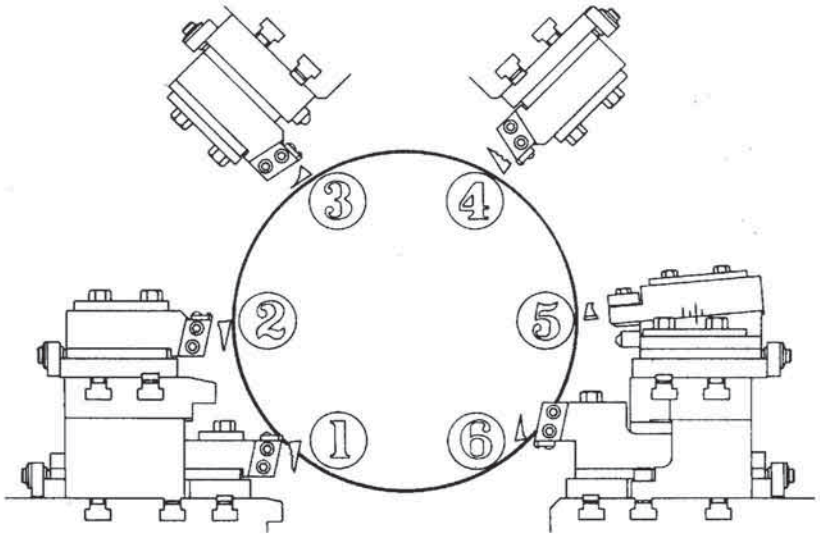

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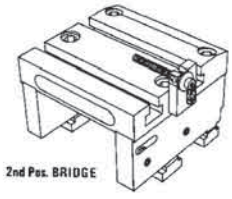

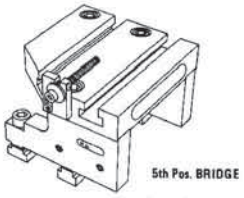

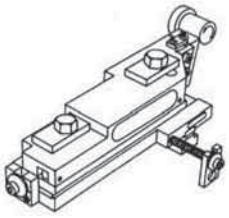

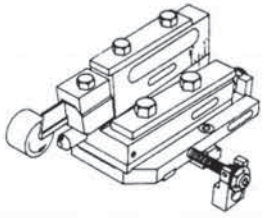

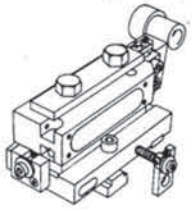

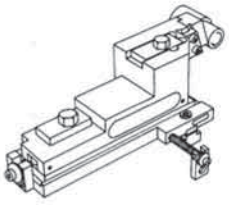

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April 15

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April 29 - May 2

Keynote Speaker:

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By Don Onyskow,
Toolmaker, Slater Tools

Custom Van Man

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

Remember the custom vans that ran the roads alongside custom cars in the 70s and 80s? I am one of those custom van owners. I've grown older, but I still love showing off my vans. I bought my first van in 1978 and am currently on my fifth. Each has its own personality.

I joined a Custom Van Club in 1980 and was hooked after my first van show. My wife and I usually go to local shows, but the "Van Nationals" are in different states. We take a week or two now and then and travel that area; we've been to forty-one states so far.

In mid 2000, I ordered a short wheelbase Dodge Van, with pop out windows in the rear doors, an am/fm/cassette/CD player and two special order seats. I added a heavy duty power cord to handle the 110-volt outlets in the ceiling and walls, then placed a spare battery behind the driver seat to take care of extra lights and equipment. An isolator keeps the battery charged when the motors are running. After insulating and covering the walls with plywood, I added corner cabinets; one to hold a jack and a tent, the other to hold three fishing poles, reels and a small tackle box. I added full length cabinets along the walls and a closet on the side door. There's an overhead counsel with nine rocker switches for the interior lights and an air horn button. Four flush mount lights light up the dash.

The bed has 4" of foam and a removable bed frame. The bed top lifts up so I can get to our camping equipment. The cabinet behind the driver seat holds a port-o-pot.

The roof inside has 2" of foam, is covered with light gray leather and then button tucked. I added purple carpet to the floor and strips on the ceiling. The dog house (engine cover) has been rebuilt to house a 40 channel C.B. and large beverage holders.

White and purple rope lights are my inside night light. Neon purple lights and rope (a gift from my son for Father's Day) are inlayed into the running boards. On the outside, I've added a sun-visor from an older van, a Chevy compact car wing, a smoke-colored windscreen, two driving lights on the bumper, headlight covers and a purple neon license plate frame.

The stock tires and wheels have been replaced by six spoke Prime wheels and Goodyear tires; 70 series in the front and 60 series in the rear. To protect the side of the van from rocks, I had wheel flares custom-made from a one piece flare and running board set. I machined a center slot for the rope lights. The running boards are made from white pine, stained black.

When summer rolls around and it's time to go camping, I load up the van, add my wife and two Cocker Spaniels. If the campground has power, I just plug in, and I'm ready to watch movies or play games on my DVD player, or turn on two overhead night lights and read my favorite magazines or paperbacks. When we camp where there is no power, the spare battery takes over.

I have shown this van in several shows in the past three years and have taken first place in class and best interior (under construction), but my best so far is the large trophy for first-place custom interior.

With Noah Graff

shop doc

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

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

Dear Shop Doc,

Recently, we accidentally dropped a Daewoo Puma, 12LC CNC lathe and broke the corner off the bed. We replaced the headstock, but we don't want to pay for a brand new bed. The piece that was broken off is at the end of the travel, where the headstock mounts, and then the travel is along the ways, so that the scraped-in machined area has a hardened surface. We are worried about the reliability of brazing or welding it because it's cast iron. It's very difficult to clean all the oil and other stuff that has saturated in the casting over the years. We are also worried about what kind of distortion that would cause.

Sincerely, Headstock Case

Dear Headstock Case,

This is actually a very predictable repair, which can be done both in our shop or on sight. What our company does is a mechanical repair, so there would be no heat or fusion involved. We do metal stitching – or metal lock.

In past cases, similar to yours, we first clamped the piece back as close to the original alignment as possible. Then we installed two grade 8 Allen bolts, counter sunk with the heads torqued down to make sure the casting did not move while we made the repair.

Next, we began the actual process of metal stitching. Metal stitching uses keys, which are made out of invar, the equivalent of 4340 tensile strength, but the invar has a high nickel content so it contracts and expands at the same rate as cast iron.

Using a fixture, we drilled the holes for the keys on 1" centers. Then, we milled out the webbing of the holes and drove in the metal lock keys. The keys were then shot-peened and ground. This procedure causes an interference fit, which prevents the casting from moving.

This process is basically repeated along the whole length of the crack. Then, in between the metal lock, we put in what we refer to as metal lacing. Metal lacing is a piece of threaded invar typically .25" in diameter. We drill a hole in the crack line, we tap the hole, then we screw the metal lacing into the hole. Then, we shot-peen the metal stitching and grind it off. This does two things: In an area where there is leakage, and you're trying to hold water pressure, it helps promote sealing, and it preloads the metal lock.

At this point, the metal lock will be in a ridged state. You don't want any flexing or moving of the metal lock. We then would remove the clamps, and the casting will be ready to be finish machined. The ways are ready to be scraped in, and it will basically be as good as new.

Fred Lewis
Service Manager, Metalock Corporation. Willow Springs, IL

think tank

This issue's puzzle was graciously submitted by Ahron Siev of SIT LC INC. a subsidiary of SIRON Ltd. in West Bloomfield, MI.

Nine Digits

Find a 9 digit number, each digit from 1 to 9 shows once – and once only - in the 9 digit number that will fulfill the following terms:

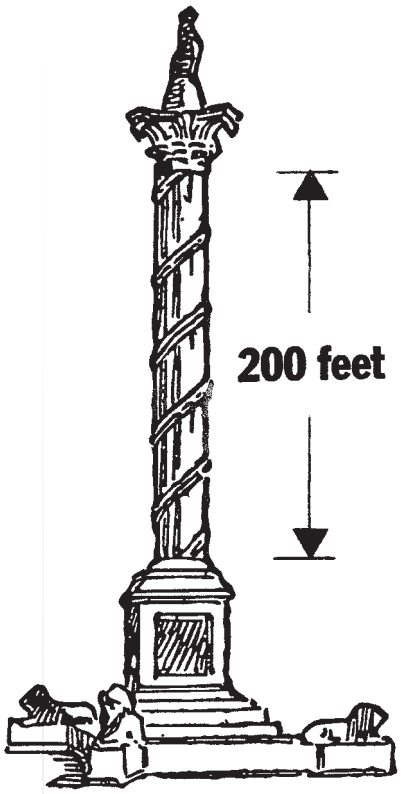
If you take the first 2 digits of the 9 digit number you will get a 2 digit number divisible by 2.
If you take the first 3 digits of the 9 digit number you will get a 3 digit number divisible by 3.
If you take the first 4 digits of the 9 digit number you will get a 4 digit number divisible by 4.
And so on, every X digit number will be divisible by the count of its digits (X) until the full 9 digit number will divisible by 9.

For example, in the number 1236XXXXX:
The first 2 digits yield the number (12) that is divisible by 2.
The first 3 digits yield the number (123) that is divisible by 3.
The first 4 digits yield the number (1236) that is divisible by 4.

This is an example only, and the final answer does not include the 1236 in the first 4 places.

There is only one 9-digit number that fulfills these conditions!!

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



February puzzle answer: First, recognize that a sheet of rectangular paper marked with a diagonal line will appear as a spiral when the sheet is rolled into cylindrical form. Then, one complete turn of the spiral is merely the hypotenuse of a right triangle, whose sides are the length and width of the sheet. For the column puzzle, the length of one complete spiral turn is 40 feet (1/5 the column length) and the width is 16 foot 8 inch circumference. Therefore, the hypotenuse (length of the garland) is 43 feet 4 inches times 5 = 216 feet 8 inches. This is, peculiarly, the sum of the column height and circumference!

Who wrapped their brains around the right answer?

Jerrold Levine of Chicago, IL; **Steve W. Loegering** of Loegering Co. in Casselton, ND; **Merle Fisk** of Cleveland, OH; **Tanner Mayhew** of Glendo Corporation in Emporia, KS; **Paul Sneider** of Taft Tool in Toledo, OH; **Frank Forman** of Astro Met, Inc. in Cincinnati, OH; **Jeff Kovalenko** of Key Machine Tool, Inc. in Elkhart, IN; **Pat Muscarella** of PLM Teknologies, Inc. in Penfield, NY; **Brian Rychcik** of S&R Manufacturing Corp. in Schenectady, NY; **William Seaman** of Huron Inc. in Lexington, MI; **Dean Locke** at Precision Swiss in Big Timber, MT; **Mark Serbu** of Serbu Firearms, Inc. in Tampa, FL; **Ahron Siev** of SIT Siron, Ltd. in Bloomfield Hills, MI; **Arny Rusnak** of National Acme (retired) in Northfield, OH; **Robert Brinkman** of Davenport/CJ Winter in Rochester, NY; **Greg Roan** of Roan Manufacturing, Inc. in Odessa, FL; **Scott Life** of Kirk Key Interlock in Canton, OH; **Edward N. Kadlec** of Accuneering Company in Minneapolis, MN; **Luis San Martin** of Hilite International in Carrolton, TX; **Duane Steel** of Wallace Steele Company in Ham Lake, MN; **Al McBride** of Threading 101 in Menomonee Falls, WI; **Willian Pearsall** of Corsair Industries, Inc. in Ashuelot, NH; and **Dianna Broshmur** and **Levi Hill** of Guide Line Industries in Scales Mound, IL.

Thanks to Rich Kaplan for this Henry Dudeney puzzle from "The Canterbury Puzzles", 1919, p. 146, 147, 242.

Today's Machining World

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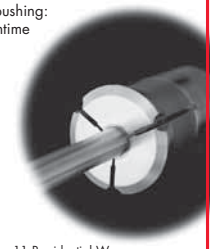

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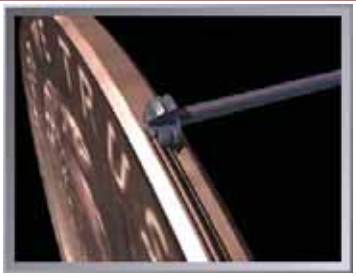

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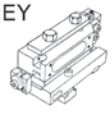

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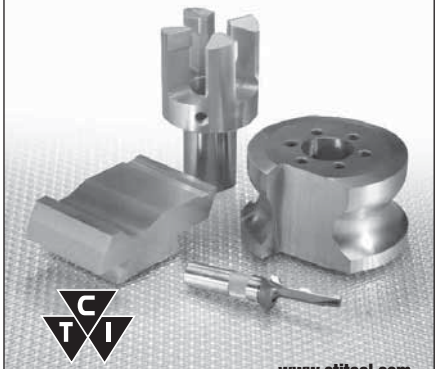

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afterthought

The Coat Tale

For my daughter's wedding two years ago, I bought an elegant black suit – Italian label, quality fabric, pricey, but what the heck.

Wore it to a funeral and to meet a banker afterwards, and then I decided to wear it at the PMTS show in Columbus last spring. I drove back with Noah and Martin Whitfield, our Wickman expert, and he dropped me off at our plant where I had left my car. I was wearing the black suit but had removed the jacket for the long drive from Columbus. When we got back, I wearily extricated my limbs from the van and removed my suit jacket. I needed a stretch and placed the coat on the roof of my car.

In my loggy state, I folded into my car and drove off with the jacket still on the roof. It slid off in the darkness onto 166th Street. I discovered it the next morning, laying in the street like a flattened corpse – tire pressed, disheveled, with the shattered fragments of a hard plastic bottle of artificial tears in one pocket.

I furtively picked up the pathetic suit coat in the street, not wanting to be observed. I misplace things often, but forgetting my suit coat on the top of my car ranked high on my personal fog index. I put the lifeless Cerruti in my trunk and made a mental note to blot it from memory. But I still had the incriminating pants hanging half-heartedly in my closet, longing for their significant other.

So what.

The jacket languished in my trunk for six months, an unexamined figment of my denial, but after a mundane sojourn to Home Depot for floodlight bulbs, I opened the car trunk and spied the inert remains in the late summer sunlight. I lifted it by the lapels and studied it in the 8:00 a.m. parking lot. It wasn't that bad. Dirty, misshaped, but the thing looked like it might be salvageable. I laid it on my back seat.

It stayed there for two more months.

In December, I made a pre-holiday run to the cleaners- Pride Cleaners. I sheepishly pulled the black Italian job off the seat and presented it at the counter for cleaning. The clerk inspected the garment and found several small holes. Her visage was hard. I didn't expect to encounter the cleaning police. "We don't do this," she said. I said, "Let me show it to your seamstress," an old Chinese lady surrounded by spools of thread. "Cannot do" she said after a brief look, "maybe reweave make ok."

I did know an Italian tailor who had connections. After two more weeks, I located him in an unmarked closet next to a State Farm agent in an almost vacant strip center. His name was Joe Rotoldi, and I instantly liked him because he played opera all day.

"Can this suit be saved?" I asked plaintively. "Let me send it to my people and see what they say," he said. I was comforted that he was non-judgmental. "Got run over," I told him. He did not ask for further explanation as Puccini played on." This will cost some money," he said. To which I responded, "Do it if it's under $100. Bought it for my daughter's wedding," As if that really provided context.

Mr. Rotoldi called me in two weeks to say that the coat was back. It took me another week to get over to him.

The jacket was perfect. Well, not perfect, but perfect enough, so my wife wouldn't notice. I wanted it for a Bar Mitzvah in February, so it was all good.

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