CNC MACHINING

volume 9 • issue 32

TAB

VOLUME 9 ISSUE 32

FEATURES

CYCLE TIME

WHAT'S NEXT?

THE ANSWER MAN

CNC MACHINING is published by Haas Automation, Inc., 2800 Sturgis Road, Oxnard, CA 93030, 805-278-1800, Fax 805-988-6918. Postmaster: Return invalid addresses to Haas Automation, 2800 Sturgis Road, Oxnard, CA 93030-8933 postage guaranteed. *CNC Machining* is distributed free of charge by Haas Automation, Inc., and its authorized distributors. *CNC Machining* accepts no advertising or reimbursement for this magazine. *CNC Machining* is distributed through a worldwide network of Haas Automation distributors, and by individual subscription request. Contact Haas Automation headquarters via mail or fax to be added to the subscription list. Designed and printed in the U.S.A. CPC # 40675626. www.HaasCNC.com.
Haas Automation Europe, ++32-2-522-9905 | United Kingdom, ++44-1603-760 539 | Haas Automation Asia, ++86 21 5046 2202

On The Cover

The device on our cover is called an "Oarsman." Although it looks like something from outer space, it spends most of its life under water. There are 213 of these devices under the surface of the lake at the Bellagio Hotel in Las Vegas. The Fountains of Bellagio, and the Oarsman, are the creations of Los Angeles-based WET Design.

In This Issue

Change is Good

It's a new year – albeit, a few months into it already – and it's time to review the past and look to the future. It's our ninth year of publication here at *CNC Machining*, and after some serious thought and discussion (and no shortage of arguing, cajoling and compromise) we've decided to revamp our pride and joy. Give it a new look. Spruce it up. Add some new sections. Tackle some new subjects . . .

What you hold in your hand is the first issue of the new and improved (we think, and hope you do, too) *CNC Machining*. Inside you'll find more pages filled with more of the stuff you want to see. As in the past, you'll find a selection of stories about shops and manufacturers around the world that use Haas machines to make cool stuff. Formula 1 cars, medical instruments, mountain bikes, fighter planes, surfboards, granite countertops, Mars rovers – the list is endless, and we'll continue to seek out and explore new worlds, to boldly go where no metalworking magazine has gone before . . .

But I digress. In addition to showing you all the interesting things people do with Haas machines, we also want to provide some insight into the inner workings of Haas Automation – what we do and how we do it – and show you what it takes to manufacture world-class machine tools that are reliable, affordable, and easy to maintain and service.

Our new *Cycle Time* section is a compendium of sorts, which will feature interesting tidbits from around the world (kind of a machine tool *USA Today*). Here you'll find a varying mix of industry news, racing reports, event previews and reviews, trade show information and more.

What's Next? is another new section, where we'll showcase the latest products, innovations and technology from Haas. New machines, new options, new capabilities – you'll find it all here.

We've also expanded the Answer Man section, so now there's double the space to answer your questions and provide you with real-world solutions to your applications problems. In this issue you'll also find a piece about how to get the most from your Haas control. It's the first in a multi-part series, so be sure to keep your eyes out for the next installment.

As we progress through 2005 and beyond, *CNC Machining* will continue to evolve, but we pledge to always keep it interesting, informative and fun.

Remember, change is good. So sit back, relax and enjoy!

Keeping it Together

Prolyte Enhances Turning Operations with its Own Haas TL-15 Turning Center

Been to a big trade show, car show or outdoor concert lately? If so, you've probably seen or walked beneath structures created by a company called Prolyte. While you may or may not have noticed them at the time, Prolyte's aluminium truss systems are world renowned, and they range from the mundane to the spectacular.

Prolyte Products Group, headquartered in The Netherlands, claims the mantle of the world's largest manufacturer of aluminium truss systems. With a range of products for use in exhibition, staging and rigging applications, the company's byword is "Performance in Aluminium." Prolyte's website affirms a commitment to top-quality products and exceptional customer service, noting that "Even the wildest project wishes are not a challenge to us, as long as it can be made from aluminium. Whatever the problem, we always find a solution." If that means developing a unique design for your application, they'll be happy to do that.

One of the keys to Prolyte's success, of course, is a state-of-the-art production facility. Efficient and flexible, the production process is continuously monitored and improved.

Since 2002, Prolyte has kept much of its formerly outsourced turning work in-house. Their choice for this task was the Haas TL-15 CNC turning center, a machine described by Fokko Smeding, Prolyte's CEO, as "a reliable middle-of-the-liner that finds optimal application in the kind of turning jobs we do." The TL-15 is equipped with a sub-spindle, a unique feature for a low-cost machine.

"By keeping turning operations in-house, we are able to select machines optimally suited to our type of product – an external supplier's options are much more limited," explains Smeding. And the decision is paying off. "In terms of both quality and cost, we're now scoring much higher than before. Plus, we've become more flexible – we can handle rush orders and production peaks much more efficiently."

(Opposite) Fokko Smeding: "We have always emphasized quality and customer-targeted solutions. This has won us a trendsetter position in the sector."

(Right) The sub-spindle makes it possible to back-machine products on the TL-15. Coolant can be conveyed directly via Prolyte's proprietary filter system.

(photos: Michel Zoeter, Reed Business Information)

Turning work figures primarily in the production of the couplers used to connect truss members. Prolyte produces about 500,000 coupler units per year, and two Haas TL-15s proved to be the best solution for handling that volume. Installed by the Haas Technical Center based in Vianen in the Netherlands, one machine has a 51-mm (2") bore and a 22-kW main spindle with speeds to 5000 rpm. The other has a 64-mm (2.5) "Big Bore" and a 22-kW, 3400-rpm main spindle. Both are equipped with a 3-meter (60") automatic magazine bar feeder, in which bar feeding is controlled via the CNC system. An advantage of the sub-spindle (6 kW, 4000 rpm) is the ability to machine both ends of the workpiece in one cycle.

Accuracy

The TL-15's turret accommodates twelve tools, including driven tools to permit common milling operations. Special twin toolholders can be mounted on the turret, if required, to back-machine the workpiece after its transfer to the sub-spindle. The tool presetter, a separate measuring arm, is used to index the tools. Positioning accuracies of ±0.005 mm (±0.0002) result from both the rugged design of the machine's frame and temperature sensors on the circulating ballscrews, which provide data for correcting ballscrew movement during machining.

Besides the two new TL-15s, Prolyte has also acquired a pre-owned Korean CNC lathe with a 70-mm (2.75") bore, and a conventional lathe. According to Smeding, 60% of turning work is now performed in-house.

The Stones

At Prolyte, the design of aluminium trusses is what it's all about. Any given package consists of a specific number of basic members, of varying dimensions but comparable forms. Using a kind of Erector-Set system, these are assembled to create rigging trusses for the entertainment industry, such as lighting rigs in theaters and TV studios, and podium canopies for use at outdoor events. "From local pop groups to the Rolling Stones" is the way Smeding characterizes Prolyte's customer base. "It's a small, specialized market segment, but we are certainly one of its major players. Ninety percent of our sales are international, from Japan and South Korea to the U.S." Prolyte systems are also widely used by exhibit builders in a variety of applications.

Each basic truss member is made of cut-to-length aluminium tube, with couplers and diagonal braces welded on to form ready-made modules (using TIG to give a good esthetic appearance to the weld). Prolyte's proprietary conical couplings ensure maximum strength and secure interconnection of the basic members. For these reasons, according to Smeding, they are now the predominant choice for scaffolding applications.

Trendsetter

Despite the relative simplicity of the product, its construction demands top professional expertise. In some cases the trusses must span distances of as much as 24 meters, bearing a suspended load of 10,000 kg (22,000 lb). Compliance with safety regulations and certification specifications is also important.

Prolyte's engineering group – "the core engine of our enterprise" – performs all design and calculation tasks in accordance with regulatory provisions. To achieve maximum reliability, a great deal of attention has been focused over the years on perfecting the welding process and selecting the most suitable aluminium alloys.

The company's engineers also excel at finding customer-specific solutions. The most recent example, says Smeding, is a collapsible podium trailer. "We have always emphasized quality and customer-targeted solutions, and we strive to ensure that our special solutions are to standard. This has won us a trendsetter position in the sector."

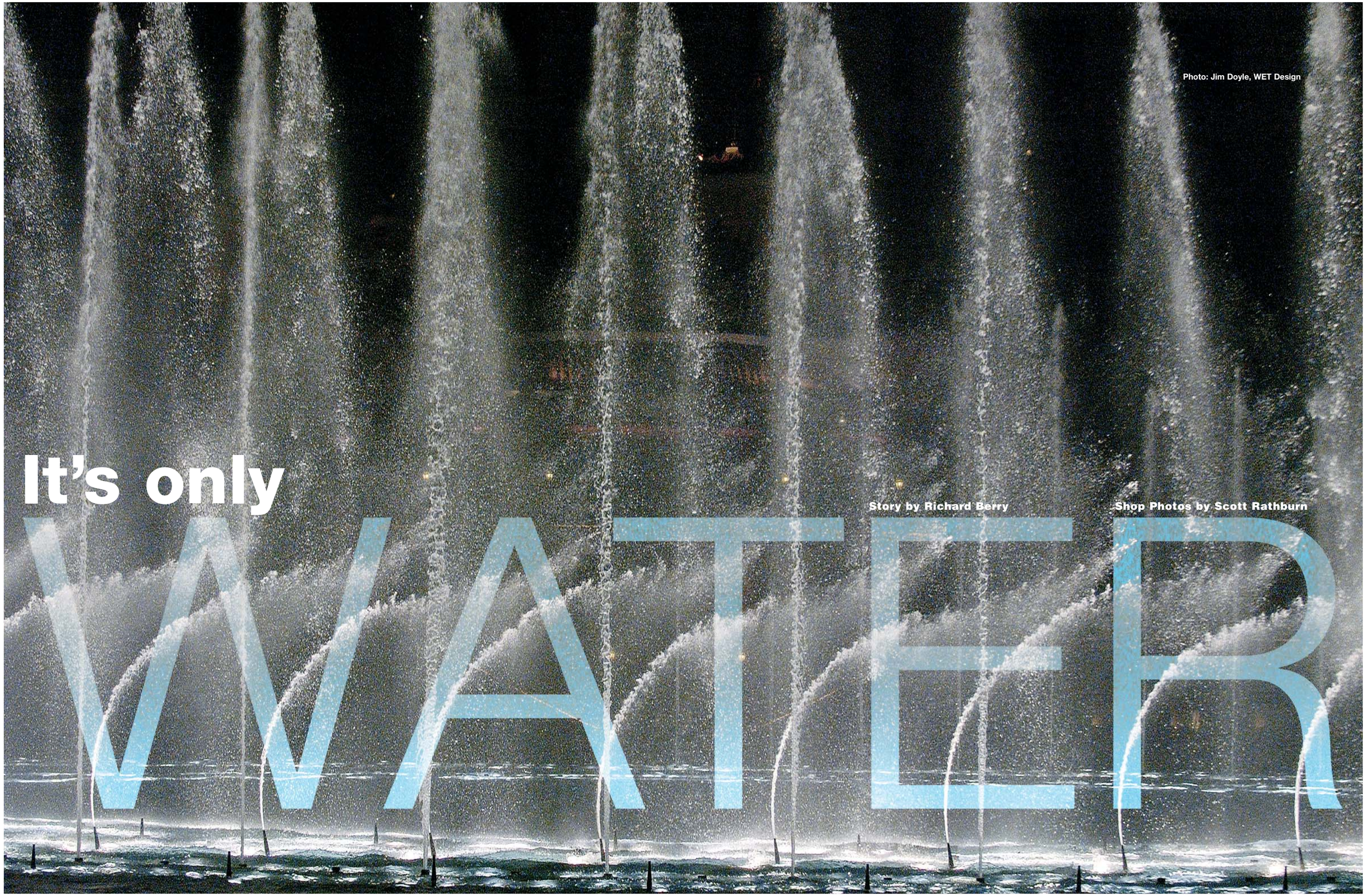


Photo: Jim Doyle, WET Design

It's only WATER

Story by Richard Berry

Shop Photos by Scott Rathburn

“It’s the ordinary things that truly fascinate us,”

confided legendary showman P.T. Barnum more than a century ago. That observation of human nature holds as true, if perplexing, now as it did then. For what, in today’s high-tech world, could possibly be more ordinary than . . . water? Most of the Earth is covered with it. The sky is often filled with it. And virtually none of us goes a day of our lives without seeing, touching and actually swallowing the stuff. Why, then, do untold numbers of sophisticated people, from Detroit to Budapest, stop dead in their tracks and stare in amazement at ordinary water streaming from the fountains built by a small Los Angeles firm named WET Design?

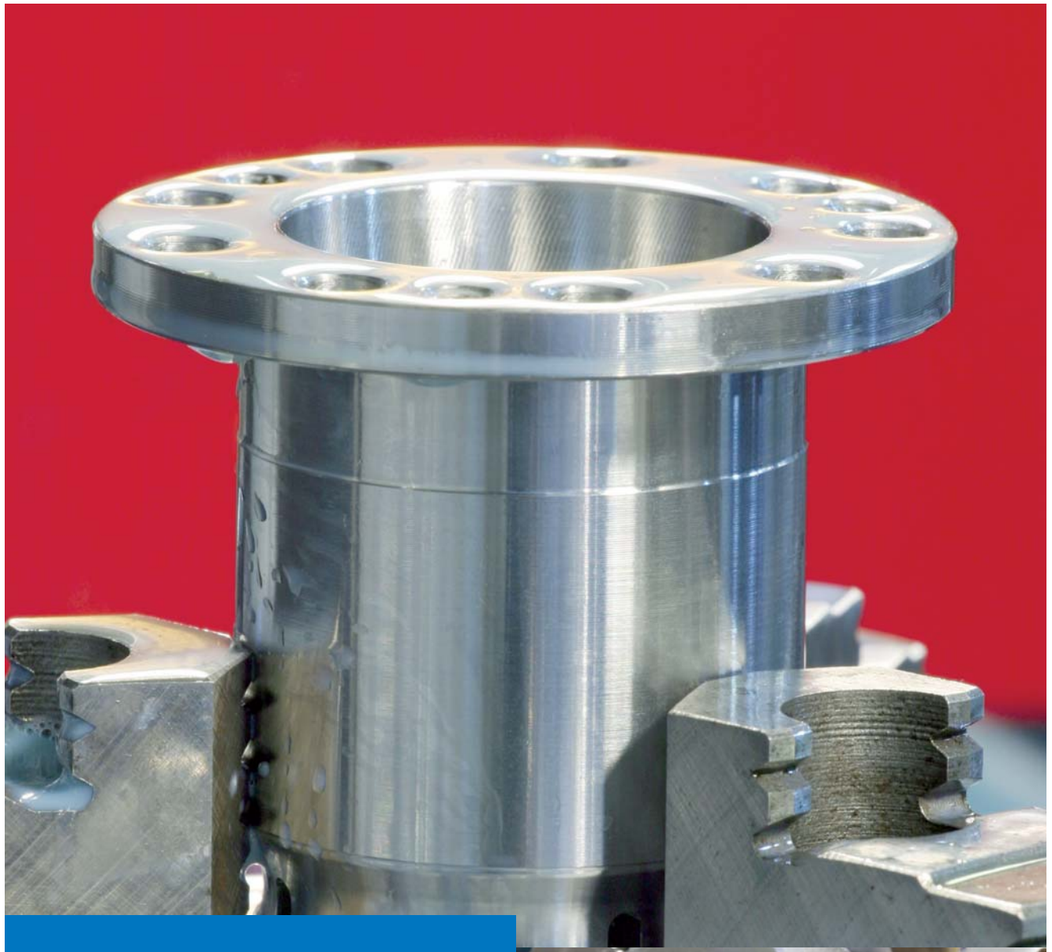
Those drop-jawed masses are responding to an unconventional mix of art, physics and engineering that at first appears simple, but upon further study, becomes so impossibly complex that it’s unlike anything they’ve ever experienced before. It’s water for water’s sake. Unlike historical fountains, where water is just a veneer falling over a statue or sculptured edifice, in these high-tech fountains, the water is the medium.

As the best known creator of water features in the world, WET Design is perhaps most renowned for its spectacular 9-acre lake of animated fountains at the Bellagio Hotel in Las Vegas, which entertain thousands of visitors daily. The same fountains were featured in a widely celebrated 4-minute scene of near-hypnotic reflection at the end of the otherwise action-filled motion picture, “Ocean’s Eleven.”

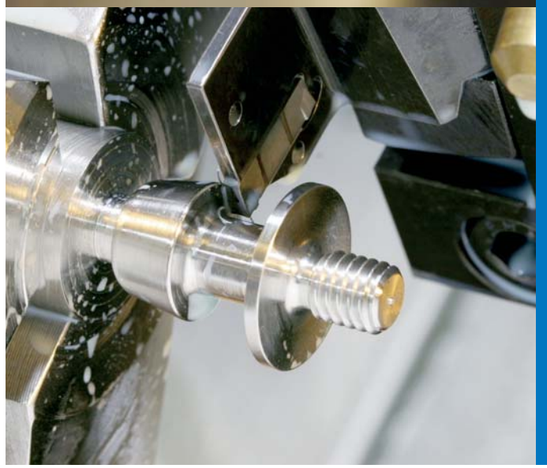
Tranquility, however, represents only one of the many styles of water features for which this firm is famous. Other WET projects range from the innovative Watercourt at California Plaza in Los Angeles, where water occupies the stage with live performers, to an expansive wall of animated fire and water constructed for the seven-star Burj al Arab Hotel in Dubai. In between are municipal water projects for major cities the world over; institutional designs for clients like the International Monetary Fund in Washington, D.C.; and unique commercial displays designed to attract and entertain crowds at major shopping areas from Hong Kong to Madrid. The interior fountain in Chicago’s McCormick Place Convention Center, home of the International Manufacturing Technology Show, is a classic WET design.

The initial incarnation of WET Design, WET Enterprises, was conceived more than 20 years ago by Mark Fuller, a man with a lot of energy and a lot of ideas. One of those early ideas stemmed from Fuller’s investigation of an obscure physical phenomenon known as the “laminar stream” for his undergraduate civil engineering thesis at the University of Utah. Scientists had long been aware of this peculiar turbulence-free behavior of flowing water, but little had been done to expand the curious effect into anything more than a complex mathematical exercise.

Fuller’s work led to the development of a technique for



“We’d like to be able to use **something easy,** like aluminum,” says Chuck Schmitz, WET’s Manager of Production, **“but we can’t,** because **the environment’s way too harsh.”** Most of the company’s products are ultimately sunk underwater, where they’re expected to perform **flawlessly for years on end.**



Cutting-edge thinking extends deeper into this company than just its product design. **WET Design** has full-on embraced the concept of **lean manufacturing,** the idea of machining, assembling and delivering their hardware as completed assemblies – **one at a time.**

producing rapidly flowing arcs of water that appeared completely motionless. The visual effect was stunning – almost unbelievable – leading the American Institute of Architects to quickly bestow an award on Fuller's accomplishment. The seed – for entertaining people with a combination of dramatic architecture and intriguing water effects – was planted.

A year later, with a master's degree in design from Stanford, Mark Fuller found himself employed in the Special Effects Design Department of The Walt Disney Company, "specializing," he recalls with a grin, "in the creative misapplication of high technology." He actually had interviewed for a regular engineering position at Disney, but fortunately, someone perceived Fuller's talent for unconventional thinking and changed his job assignment. "Any crazy idea that the Disney planners came up with that didn't fit into the realm of normal engineering," remembers Fuller, "was given to the special effects guys. We dealt with all sorts of technology – the volcanoes, the Energy Pavilion, the live steam effects and, of course, the water features. We were given a lot of freedom."

That all-important design freedom, combined with Fuller's innate fascination with the laminar stream, eventually led to the creation of the imaginative LeapFrog water-arc feature at Disney World's EPCOT Center in Florida. The public's reaction to the seemingly motionless flying water was both immediate and overwhelming: "Wow! . . . How did they do that?" This breakthrough combination of ordinary water and extraordinary technology quickly led to other project invitations for Fuller, and to the formation of WET Enterprises in 1983.

Today, the company is know as WET Design, and it has grown into a multifaceted organization of 130 designers, engineers, machinists, artists, architects and business development personnel. They've even had an astronaut heading research and development. There's a hardware division (WET Labs), and a service division (WET Care), each working toward the same cutting-edge goals as the design group. Though relatively small in comparison to most international enterprises, the company dominates the fountain design industry. In fact, it could easily be argued that WET actually created the industry as it is known today.

The division that gets down to the real nitty-gritty of transforming designed fantasy into practical reality is WET Labs. This hardware branch of the company is located a few miles north of the Los Angeles main offices, in a facility comprising 20,000 square feet of manufacturing space, including a 5,000-square-foot machine shop with a staff of seven busy machinists.

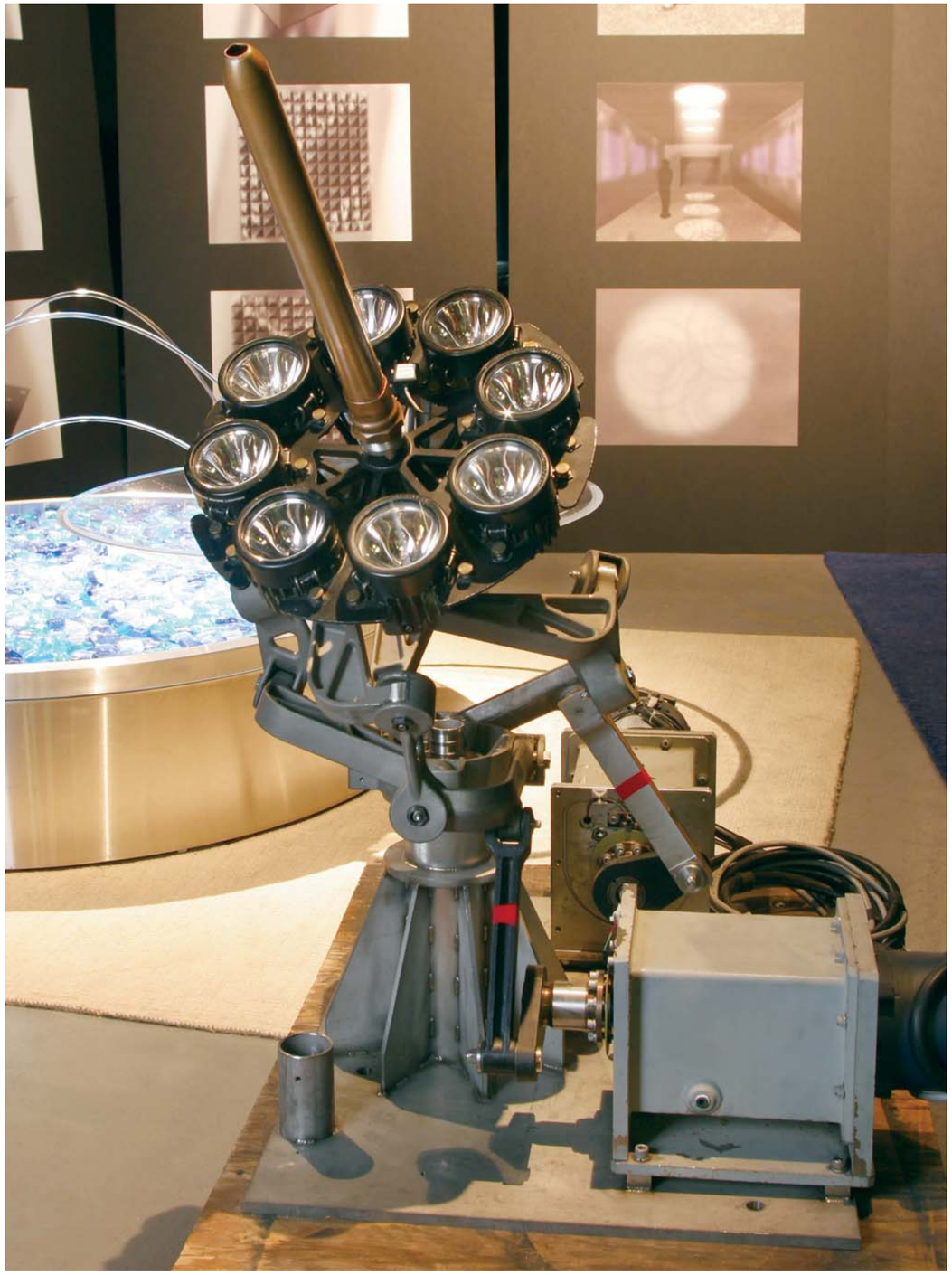
The majority of the work on the shop floor is produced from 17-4 and 304 stainless steel, or red brass. "We'd like to be able to use something easy, like aluminum," says Chuck Schmitz, WET's Manager of Production, "but we can't, because the environment's way too harsh." Most of the company's products are ultimately sunk underwater, where they're expected to perform flawlessly for years on end.

Parts as diverse as specialized lighting fixtures, high-pressure air and water fittings, plumbing couplers, nozzles and multi-nozzle platens, gimbal yokes and control arms for robotic assemblies, and watertight enclosures for electrical items are all part of the normal workflow here. In addition, large quantities of proprietary fasteners, couplings and adjusters, all designed to allow for tool-free underwater maintenance by divers in bulky gear, keep the shop especially busy.

Fuller's commitment to in-house manufacturing capability for the firm's products is a relatively recent passion. "In the very beginning," he says, "the idea was to just design and build fountains using off-the-shelf components. But a couple of years into that, we thought, 'If only somebody made the black box we need, just think what we could do!' But nobody made it. So we began outsourcing. We'd draw it up and let the construction contractor try to build it, but we had no control over the process. The contractor would be scared [of the project] and price it to the moon, and our clients would know they didn't have single-point accountability if something went wrong later. So that was a very short-lived process."

Even after bringing assembly and some of the machining in-house, the growing company was still subject to the long and ever-increasing lead times of their sub-contractors. "In outsourcing," says Fuller, "you have to know more about the item than the person who's building it, just to ensure he does it right. You have to have the expertise on your payroll anyway, and last-minute improvements and changes cost a fortune. So, in terms of maintaining control of your destiny and delivering the best product to your client, it's just not a good business model."

Lessons learned, WET put its pinky in the water, so to speak, and began upgrading from manual machines to CNC – cautiously at first, with a single Haas VF-4 vertical machining center. That initial move, however, proved so successful that the shop soon found it had created a production bottleneck: They had too many parts they wanted to machine. The machinists were delighted with their newfound capability, but realized they needed more CNC machines. In a relatively short time, WET Labs added several



more Haas machines – a VF-2, a dual-spindle TL-25 lathe, a VF-3APC (automatic pallet changer) and a VF-8.

Improved production flexibility and turnaround speed were the main incentives for investing in that first Haas machine, but WET quickly realized that, as a bonus, they now had the ability to fine tune and optimize their designs, thereby significantly improving the quality of their products.

Today, the shop's approach to production work is purposely kept in a state of review and evolution. "We find better ways of doing things almost every day," emphasizes Nadine Schelbert, WET's Design Delivery Director. "We're trying to make products that are more durable and way more maintenance-free."

Almost nothing made at WET is as simple as it looks, and the design and machining procedures are always open for improvement. "We have a lot of really passionate people here," says Schelbert, "and occasionally we have some really heated arguments, but at the end of the day, we have a better product."

While each WET Design project is uniquely conceived and individually constructed, it obviously must come from an existing array of building blocks. "With each job," confides Fuller, "we build our bag of tricks. So everything that's new for one project becomes something we can use on another. In the end, though, the final project is completely custom for each customer; we never repeat ourselves. But does an architect use the same type of bricks from one project to another? Of course. At the component level you want to standardize."

But what happens to that inventory of standardized components when a design change occurs? "That's a driving fear," says Fuller. "The more inventory you have when you change something, the more scrap you have, and about 70% of our requirements are for existing components and inventory." WET's solution was simply to eliminate the inventory, or at the very least, reduce it to a bare minimum. The company has completely embraced the concept of lean manufacturing.

Many of the benefits of lean manufacturing, notes Fuller, are initially easy to overlook. "You can't deliver a product, and get paid for it, until you've got 100% of the parts. But this type of workflow all but eliminates the hidden costs of maintaining parts inventories, not to mention the total loss of inventory whenever a new design obsoletes an existing component. And by eliminating the overhead of ownership," he explains, "you're free to improve and evolve your concepts."

Fuller and crew have applied their "lean" methodology to other aspects of the company as well, including the design process. According to Nadine Schelbert, they have a "lean meeting" twice a week, where even the concept of a static part drawing has been eliminated. To counter the psychological inertia of "ownership" of time-consuming finished drawings, they project the rough designs onto write-on bulletin boards (which are installed nearly everywhere in the building, including the break rooms), and trace around them with a marker. "This gives us a good working diagram," notes Schelbert, "which no one objects to the group changing and improving. The meetings now take less time, and every couple of months we're seeing big jumps in improvement."

Fuller concedes that the change from long-established working procedures to the new lean approach can be a bit jarring. "You're asking people to change the way they breathe," he says. "But once you get the ball rolling, they all see, Wow, this really does work. And they understand that it wouldn't just be nice if they contributed their ideas – we now expect them to contribute."

WET's production planning is now "pull" oriented, driven by the immediate need for completed assemblies. Thanks to the capability of their Haas machines, about the only jobs sent out to sub-contractors are for spinning and plating the lamp reflectors. "And those jobs, more times than not," says Chuck Schmitz, "end up being the longest poles in the tent."

For that reason, machining is a much appreciated art at WET, and making sure the machinists' "tribal knowledge" isn't lost, if and when employees leave, is another facet of the company's lean strategy. What used to reside solely in the heads of the machinists is evolving into a library of G-code programs, common fixtures and established processes. The Haas machining centers are outfitted with identical sub-plate systems to ensure that nearly any job can be run on any machine, further simplifying production and increasing efficiency. For example, "The 4th-axis rotary table used to take us a day and a half to get off the floor and get it located," remarks Schmitz. "Now we do it in less than half an hour. And we developed all the tooling very quickly." Combined with the easy-to-use controls of the Haas machines, this universal fixturing provides the flexibility demanded by the shop's commitment to "pull" production.

For Fuller, the opportunity to get the ball rolling on lean manufacturing came with the acquisition of enough Haas CNC machines to establish the in-house production capability that WET Design needed. He jokes that they had a very organized process for getting there. "I'd ask the guys what they needed, and then I'd say, 'No, I'm going to buy something bigger and more capable.' They'd tell me I was crazy, but three months later they would be saying they couldn't be doing it without that machine. It's easy to sit back and say, 'Boy, that's a large investment.' But that investment broadens the spectrum of what we can do, and when we limit ourselves in the short term, we've limited ourselves in the long term."

"The VF-8 is a good example," says Schmitz. "We looked at that and said, 'That's such a big machine, how are we ever going to utilize it efficiently?' But when we got all the machines up and running, that's the machine we use the most! One thing we can do now is make the forms for spinning the lamp reflectors; we used to have to send that entire job out."

As CEO, Fuller still had to convince a somewhat skeptical board of directors that his expenditures were warranted. "Swallowing a bunch of half-million dollar machines in half a year was just not an option," he states. "But because of the way Haas puts these things together in pricing, it wasn't the unthinkable capital step we first thought it might be. We were getting top-drawer machines at a very good price, and it was easy to do the value justification. It enabled us, as a small- to medium-sized company, to play in the same realm as the really big guys. These machines opened the doors for us to be a state-of-the-art, very nimble and very lean manufacturing facility."

The shop's machinists are similarly pleased. According to machine shop supervisor Brad Keil, they feel they're being introduced to a broader and broader knowledge base each day. "Final machined components are designed almost exclusively in SolidWorks," he says, "and from there, tool paths are determined and the G code is generated in MasterCam. On the TL-2, though," he continues, "we're using MasterCam for some work, and the Intuitive Programming System for other. Our traditional machinists fell in love with it [the TL-2] right away."

To speed part setup and changeover of the many brass sand castings they machine, WET has installed probing systems (Haas Visual Quick Code Probing) on their Haas mills. "Having the ability to probe the casting before we machine it is saving us a lot of time," says Schmitz, "because the castings we receive are up to plus or minus 30 thou' in tolerance. It allows us to optimize where we punch the holes

Photo: Jim Doyle, WET Design

Photo: Jumeirah International

and stuff like that, and minimizes scrap." Based on the information provided by the probe, the program is automatically modified to optimize the datum points to produce perfect wall thickness in the machined piece.

Another feature that's paying off, Schmitz continues, is the dual pallet capability of the VF-3APC. "We can be setting up and changing parts while we're still having a spindle turning, and it doesn't have to be the same part. Because we're interested in single-part flow for a single product, the dual fixturing on one machine is perfect."

In conventional, batch-style production, maximizing spindle time is often the primary goal. With lean manufacturing, however, it's not always necessary, or even beneficial, to keep every spindle running all the time. "Having been schooled in the traditional way of manufacturing," says Fuller, "I assumed that an expensive asset had to be kept running all the time. So I'd pressure the shop to crank out unneeded parts and put them into inventory. Now we've changed. There'll be times when all the machines are running, and there'll be times when only one or two are running. But that's not the measure; the measure is throughput.

"I can have nearly everything I need," Fuller adds, eminently practical, "but without that final piece, it's just a box of parts. Having 99% of the parts is no good to the next step, which is assembling it. How we schedule and run the machines is based on our goal of having two completely finished, assembled and packaged robotic units per day. When these get to the job site, they can be installed in about the same time it takes to make the next two. It doesn't do the on-site contractors any good to get a huge box of assemblies from us that they'll mostly just have to set aside. Those first 99 parts generate inventory costs, but the 100th part generates an invoice and cash."

The real business of WET, as Fuller quickly tells you, "is the business of entertaining people." But having a practical sense of how to blend science and art with human behavior and manufacturing skill hasn't hurt the firm one bit. While its clients and competitors the world over are fascinated by this company's drive to grow and change, those within it are not. Fuller reminds us with a smile, "Evolution is a daily occurrence."

While surveying WET Design's cutting-edge facilities, Fuller reveals his passion for what he does with a simple observation. "You know," he says, "two things always thrill me. Taking off in an airplane" – he's done it thousands of times, but still finds it hard to imagine that much power – "and standing under a laminar stream," that hard-to-imagine but natural effect that started it all. It really is the ordinary things that fascinate us.

Getting into the ROUTINE *Maintenance, that is.*

By Alastair Brennan

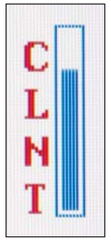
"If it ain't broke, don't fix it."

That's a frequent comment from those who use things mechanical. While that approach seems logical, in reality, a little routine maintenance will keep those mechanical things from ending up "broke" in the first place. Things with moving parts need to be taken care of, and should be inspected routinely to ensure they stay up and running.

Machine tools definitely have lots of moving parts, and when your machines aren't up and running, you're not making parts – or money.

Every time you jump into your car, you probably look at the gas gauge to make sure you have enough fuel to get where you're going. But before you turn the key, do you ever look at the voltmeter and ask, "Do I even have enough juice in the battery to start the car?" You probably don't ever think of that. Why would you? The car worked fine yesterday.

But then you drive by someone on the side of the road with their car's hood up. Do you ever wonder what went wrong? I'm sure they thought "the car worked fine yesterday," too.



Just like your car, machine tools need some basic maintenance to keep them from "stopping on the side of the road." Moving parts need to be lubricated, fluids need to be refilled, filters need to be checked – routine maintenance is necessary to keep these machines performing just like new.

The engineers at Haas have done their best to make machine maintenance as simple as possible. Handy items like a coolant-level sensor, which gives the operator an on-screen indication of the coolant level, ensure that more time is spent using the machine than working on it or tuning it up.

Haas engineers have also addressed things that normally are taken for granted, like separating water from the machine's air supply. Not only do Haas machines have the obvious air filter and regulator, they also have a not-so-obvious dump valve that collects any water that may be in the machine's air supply, and then purges it each time the air blow gun is used. This does two things: 1) It purges the water from the line (I just said that), and 2) The subsequent discharge of water through the air gun alerts the user that there is a problem with the air supply.

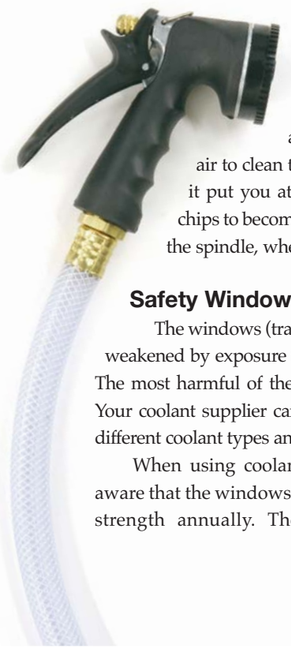
Other areas of maintenance, however, require a bit more effort on your part. Here are some of the key areas you should address.

Safety First!

Before doing any maintenance, power off the machine and switch the main breaker on the control cabinet to the "Off" position. (Refer to your shop's lockout procedure for proper shutdown.) Everyone should know coolant and electricity don't mix; that's pretty obvious. But remember, YOU and electricity don't mix either, especially when it's 480 volts!

General Housekeeping

Wipe down the outside of the machine, including the top; you'll be surprised at how much dust, grime and chips accumulate on the horizontal surfaces of the machine. Eventually, this grime will find its way into the machine's enclosure and contaminate the coolant. Or worse, it will work its way into the electrical cabinet, which definitely is no place for metal chips (it's that whole electrical-conductivity, sparks-flying, shorted-whatnots, magic-smoke thing – not good).



While you're at it, clean the inside of the machine. If the machine is equipped with a wash-down hose, use it to wash the chips and grime from the machining process into the auger trough. NEVER use compressed air to clean the inside of a machine – not only does it put you at risk of flying chips, it can also cause chips to become wedged under the way covers and in the spindle, where they can cause all kinds of trouble.

Safety Windows

The windows (transparent guards) of the machine can be weakened by exposure to certain cutting fluids and chemicals. The most harmful of these fluids are those containing amines. Your coolant supplier can provide more information about the different coolant types and their ingredients.

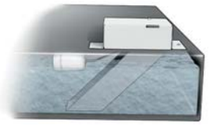
When using coolants that contain harsh chemicals, be aware that the windows can lose up to 10% of their remaining strength annually. Therefore, you should give definite thought to replacing the windows regularly. We recommend an interval of every two years. Obviously, if windows and guarding become damaged or severely scratched, they should be replaced. Cracked windows should be replaced immediately!

Lubrication

All Haas machines (except Toolroom and GR series machines) feature an automatic lubrication system for the linear guides, ballscrews and spindle, each of which requires a specific amount of lube. Again, Haas engineers have made this process simple for the owner: Keep the reservoir full and the machine takes care of the rest. The system automatically lubricates all critical points through metered orifices, ensuring that each component gets the proper amount of oil. It is activated by the CNC control at regular intervals.

The auto-lube system consists of a pump, a reservoir and an inline filter, which are located on the air/lube panel at the back of the machine. Check the reservoir daily, and top it off when necessary with the lube oil recommended in your operator's manual. The reservoir holds about 2.5 quarts, so be sure to have enough on hand. The inline filter is located inside the reservoir and should be changed each year, or every 2000 hours of machine cycle time. While it's not the easiest filter to change, the extra time you spend making sure it's clean will save you from unnecessary repair bills and downtime later.

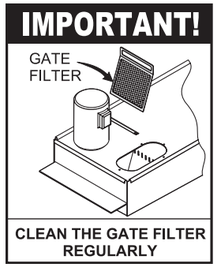
Coolant and Coolant Tank



The coolant level should be checked at the beginning of each work shift. As mentioned earlier, a coolant-level sensor and on-screen indicator show the level of coolant in the tank. This feature is standard on all Haas mills and lathes that have a separate coolant tank (except Toolroom machines and Mini Mills). The coolant level is displayed on the first Current Commands page (the page that displays the current program).

If the coolant reaches a low level, the warning indicator will flash. At this point, coolant must be added to avoid pump cavitation and intermittent coolant flow.

The Ebb and Flow of Coolant Tanks



The Haas coolant tank has a built-in coarse screen before the pump that should be cleaned at the start of each week. The coolant tank itself should be cleaned weekly as well. To do this, remove the tank lid and wipe out any sediment that has collected. The design of the tank forces the coolant through a series of baffles as it makes its way back to the pump. These baffles give any sediment or small chips suspended in the coolant time to settle out. Be sure to wipe out all areas of the tank.

Coolant Filters

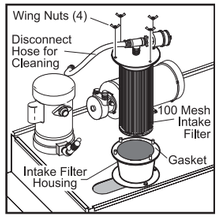
Haas machines are equipped with a cartridge filter for the standard coolant system, and an additional cartridge filter for the optional through-spindle coolant system (mills) or high-pressure coolant system (lathes). The filter housings are mounted on the machine enclosure near the coolant pump/tank. Indicators on the housings visually show when the filters need to be cleaned. The filters should be inspected daily, and cleaned when the indicator shows limited flow.

On mills with TSC and lathes with HPC, you must prime the system after changing or cleaning the filter. To do this, run the system for at least one minute to fill the filter body and purge any air from the system. Note: When priming the system on mills, do not have a tool in the spindle.

Replacing Coolant

Coolant should be replaced every six months. Drain the coolant and dispose of it properly. Abide by local rules and regulations, as most types of coolant are considered hazardous waste.

While the coolant tank is drained, it is a good idea to remove the lid and thoroughly clean the inside of the tank, as well as the screen and pump housing. Also check the coolant hoses for leaks or cracks, and replace them as necessary.



The Service Department at your local HFO can provide you with any replacement parts. In the unlikely event you need a service part from the factory, Haas Automation's 99% same-day-shipment goal for service parts ensures you'll have replacement parts quickly.

Types of Coolant

Use only water-soluble, synthetic-based coolants in your Haas machine. Using mineral cutting oils will damage rubber components throughout the machine. Using straight water as a coolant can cause internal machine components to corrode (rust). And – this really should go without saying – DO NOT use flammable liquids as coolant! Trust us on this one. Machine tool flambé can really ruin your day.

Machines with Transmissions

Transmissions also need minor attention. To keep the gearbox running smoothly and quietly, the transmission oil needs to be changed once a year. Like the transmission in your car, there's the usual drain plug on the bottom. Grab a bucket, remove the plug and drain the used oil (be sure to dispose of the used oil properly). Replace the plug (this part's really important) and refill the transmission with the proper type and quantity of oil. Your operator's manual will list the type of oil required for your machine.

Mill Spindle Pressure

The spindles on Haas mills are pressurized to facilitate the flow of lubrication to the bearings. This positive pressure also helps keep chips and coolant from entering the internal spindle taper.

Check the air pressure each week; the regulator is located at the back of the machine on the air/lube panel. Again, you can find the correct pressure setting for your specific mill in the operator's manual. Note that optional spindles sometimes have a different pressure setting than the standard spindle. Look for notes regarding this in the operator's manual.

Toolroom Machines

These simple machines do not have fancy enclosures or automatic lubrication systems like other Haas machines, but they need to be cared for nonetheless.

The linear guide trucks are lubricated manually using a grease gun. To make this task simple, grease fittings (zerks) are located at easily accessible points – there's no need to remove panels. Not only are these machines easy to work with, they're easy to work on, so there's no excuse for neglecting their critical moving parts.

Do not overgrease, however – it damages the seals. Two strokes of the grease gun are sufficient.

Tool Changers

Tool changers on Haas mills come in two flavors: side-mount and umbrella. The side-mount style has a gearbox, so, of course, there is oil to check and top off. Also, the tool-change arm (double arm) should be wiped off regularly to prevent chips from building up on its flat surfaces. Chip build-up may cause the tool changer to drop a tool, which tends to be bad for the tool, the workpiece, the table and, quite possibly, the operator.

The umbrella-style tool changer needs to be wiped down and lubricated; this should be done each month. When cleaning, be sure to clean any chips or grime from the V-rails the tool changer moves on. A build-up of chips here can cause tool changer jams.

Lubricate the umbrella-style tool changer by removing the tools and lightly greasing each of the tool changer fingers. Also lightly grease the V-rails.

Periodic Maintenance (On-Screen)

So, let's say remembering to check this and do that on your machine isn't your top priority when you walk into the shop in the morning. The phone is ringing, customers are expecting parts, you haven't had your daily dose of caffeine yet . . .

The software engineers at Haas understand your plight, and have tried to ease the chore of remembering when you last checked the way lube, coolant filter or anything else. The user-friendly Haas CNC control features a periodic maintenance page that makes taking care of the machine worry-free. It's like an electronic Day-Timer that reminds you to perform the routine checks your machine requires.

In the Current Commands display, PAGE UP three times to find the Maintenance screen. You'll find a list of items that are tracked by either accumulated power-on (ON) or Cycle Start (CS) time.

An item on the list can be activated or deactivated by placing the cursor on that line and pressing ORIGIN. When an item is activated, the control will enter the default value (number of hours), which may be adjusted by the operator. When any activated item reaches zero, the message MAINTENANCE DUE will appear at the bottom of the control screen. This is not an alarm, and will not interfere with machine operation; it simply alerts the operator that one of the items on the list requires attention.

In Closing

All of these recommendations are guidelines; your machining techniques or work volume may require more frequent upkeep. Your Haas operator's manual discusses machine maintenance in detail, and gives machine-specific service information on some additional items that need to be checked, such as the hydraulic power unit for Haas turning centers.

Doing it yourself is always a good idea, but it may not be practical for many of you, both in the sense of time and money. That doesn't mean you should avoid routine maintenance schedules. Better, contact your Haas Factory Outlet – they can set you up on a preventive maintenance program. A factory-certified Haas service technician will show up at your shop and perform a complete maintenance routine while you do something else.

We've covered a number of topics here – if you need more information, or replacement parts, contact your local Haas Factory Outlet or the Haas Service department.

The Big and Small of it.

and everything in between

Twin-Pallet 40-Taper HMCs

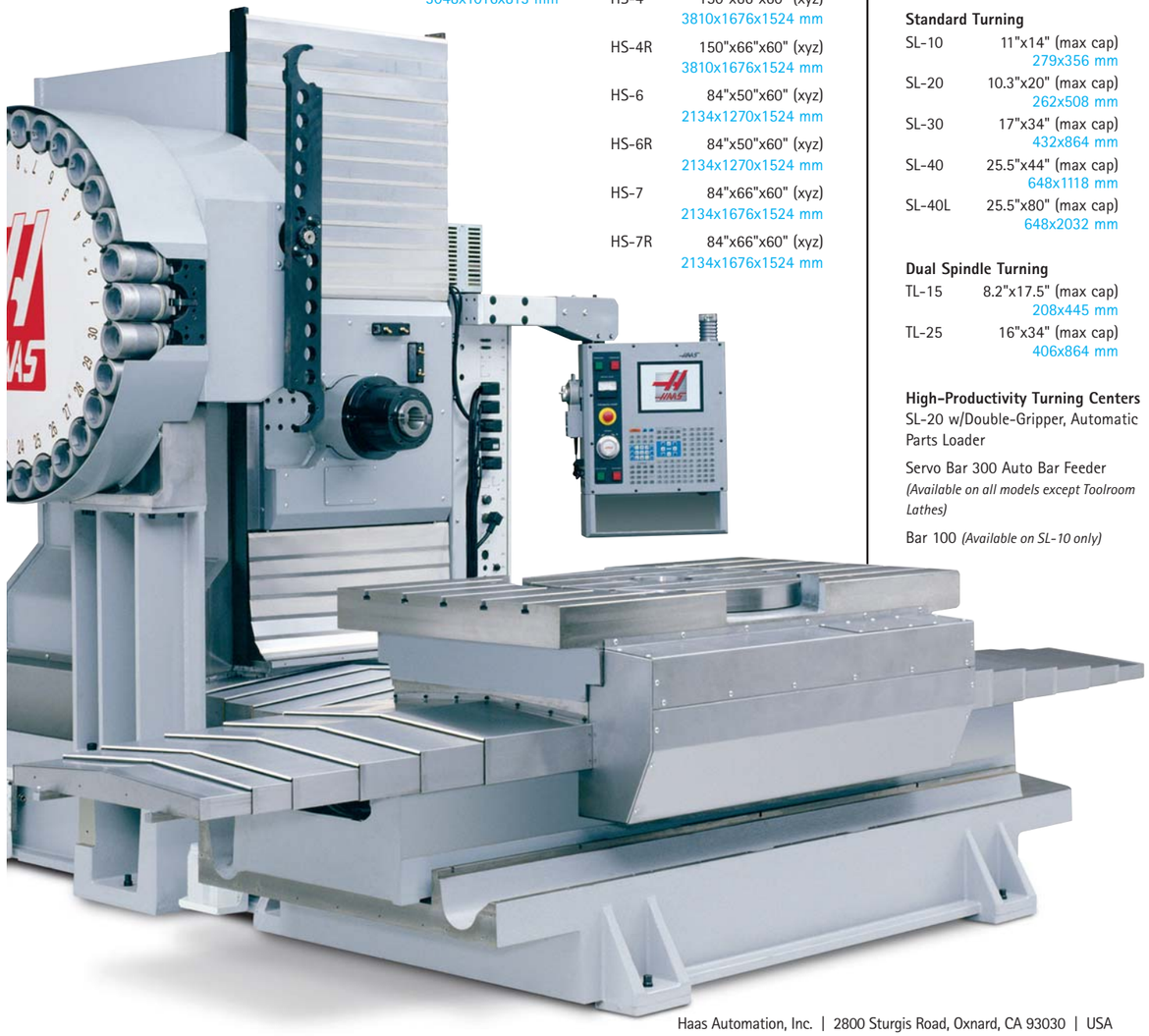
EC-300	20"x18"x14" (xyz) 508x457x356 mm
EC-400	20"x20"x20" (xyz) 508x508x508 mm

Large 50-Taper HMCs

EC-1600	64"x40"x32" (xyz) 1626x1016x813 mm
EC-2000	84"x40"x32" (xyz) 2134x1016x813 mm
EC-3000	120"x40"x32" (xyz) 3048x1016x813 mm

Extra-Large Capacity 50-Taper HMCs

HS-3	150"x50"x60" (xyz) 3810x1270x1524 mm
HS-3R	150"x50"x60" (xyz) 3810x1270x1524 mm
HS-4	150"x66"x60" (xyz) 3810x1676x1524 mm
HS-4R	150"x66"x60" (xyz) 3810x1676x1524 mm
HS-6	84"x50"x60" (xyz) 2134x1270x1524 mm
HS-6R	84"x50"x60" (xyz) 2134x1270x1524 mm
HS-7	84"x66"x60" (xyz) 2134x1676x1524 mm
HS-7R	84"x66"x60" (xyz) 2134x1676x1524 mm



Toolroom Turning

TL-1	16"x30" (max cap) 406x762 mm
TL-2	16"x48" (max cap) 406x1219 mm
TL-3	20"x60" (max cap) 508x1524 mm

Standard Turning

SL-10	11"x14" (max cap) 279x356 mm
SL-20	10.3"x20" (max cap) 262x508 mm
SL-30	17"x34" (max cap) 432x864 mm
SL-40	25.5"x44" (max cap) 648x1118 mm
SL-40L	25.5"x80" (max cap) 648x2032 mm

Dual Spindle Turning

TL-15	8.2"x17.5" (max cap) 208x445 mm
TL-25	16"x34" (max cap) 406x864 mm

High-Productivity Turning Centers

SL-20 w/Double-Gripper, Automatic Parts Loader

Servo Bar 300 Auto Bar Feeder *(Available on all models except Toolroom Lathes)*

Bar 100 *(Available on SL-10 only)*

Mini VMCs

Mini Mill	16"x12"x10" (xyz) 406x305x254 mm
Super Mini Mill	16"x12"x10" (xyz) 406x305x254 mm

Toolroom Mills

TM-1	30"x12"x16" (xyz) 762x305x406 mm
TM-2	40"x16"x16" (xyz) 1016x406x406 mm

Compact Pallet-Changing VMC

MDC-500	20"x14"x20" (xyz) 508x356x508 mm

40-Taper Standard VMCs

VF-1	20"x16"x20" (xyz) 508x406x508 mm
VF-2	30"x16"x20" (xyz) 762x406x508 mm
VF-2YT	30"x20"x20" (xyz) 762x508x508 mm
VF-3	40"x20"x25" (xyz) 1016x508x635 mm
VF-3YT	40"x26"x25" (xyz) 1016x660x635 mm
VF-4	50"x20"x25" (xyz) 1270x508x635 mm
VF-5	50"x26"x25" (xyz) 1270x660x635 mm
VF-5XT	60"x26"x25" (xyz) 1524x660x635 mm
VF-6	64"x32"x30" (xyz) 1626x813x762 mm
VF-7	84"x32"x30" (xyz) 2134x813x762 mm
VF-8	64"x40"x30" (xyz) 1626x1016x762 mm
VF-9	84"x40"x30" (xyz) 2134x1016x762 mm
VF-10	120"x32"x30" (xyz) 3048x813x762 mm
VF-11	120"x40"x30" (xyz) 3048x1016x762 mm

50-Taper Standard VMCs

VF-5/50	50"x26"x25" (xyz) 1270x660x635 mm
VF-5/50XT	60"x26"x25" (xyz) 1524x660x635 mm
VF-6/50	64"x32"x30" (xyz) 1626x813x762 mm
VF-7/50	84"x32"x30" (xyz) 2134x813x762 mm
VF-8/50	64"x40"x30" (xyz) 1626x1016x762 mm
VF-9/50	84"x40"x30" (xyz) 2134x1016x762 mm
VF-10/50	120"x32"x30" (xyz) 3048x813x762 mm
VF-11/50	120"x40"x30" (xyz) 3048x1016x762 mm

Extra-Large 50-Taper VMCs

VS-1	84"x50"x50" (xyz) 2134x1270x1270 mm
VS-3	150"x50"x50" (xyz) 3810x1270x1270 mm

5-Axis VMCs

VF-2TR	30"x16"x20" (xyz) 762x406x508 mm
VF-5TR	38"x26"x25" (xyz) 965x660x635 mm
VF-5/50TR	38"x26"x25" (xyz) 965x660x635 mm
VF-6TR	64"x32"x30" (xyz) 1626x813x762 mm
VF-6/50TR	64"x32"x30" (xyz) 1626x813x762 mm
VR-8	64"x40"x30" (xyz) 1626x1016x762 mm
VR-9	84"x40"x30" (xyz) 2134x1016x762 mm
VR-11	120"x40"x30" (xyz) 3048x1016x762 mm

Super High-Speed VMCs

VF-2SS	30"x16"x20" (xyz) 762x406x508 mm
VF-2SSYT	30"x20"x20" (xyz) 762x508x508 mm
VF-3SS	40"x20"x25" (xyz) 1016x508x635 mm
VF-3SSYT	40"x26"x25" (xyz) 1016x660x635 mm
VF-4SS	50"x20"x25" (xyz) 1270x508x635 mm

Mold Maker VMCs

VM-2	30"x20"x20" (xyz) 762x508x508 mm
VM-3	40"x26"x25" (xyz) 1016x660x635 mm

Gantry Routers

GR-510	121"x61"x11" (xyz) 3073x1549x279 mm
GR-512	145"x61"x11" (xyz) 3683x1549x279 mm
GR-710	121"x85"x11" (xyz) 3073x2159x279 mm
GR-712	145"x85"x11" (xyz) 3683x2159x279 mm

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When a company calls itself Craftsman Tools, its customers have high expectations. Fortunately, for the Yorkshire-based company in question, there's a machine tool builder that's equally confident when it comes to providing quality and reliability. They make a winning combination.

for CRAFTSMEN, *by* CRAFTSMAN

story by Matt Bailey | photos by Scott Rathburn

Machining contracts worth approximately £1 million per annum do not arrive every day. When they do, such high-profile orders typically come with high pressure, and to have a chance of successfully managing and processing contracts of this magnitude, manufacturers need reliable, fast, robust and accurate machine tools. So, when Otley-based Craftsman Tools Limited* won an order to supply internal pump components to Sulzer Pumps UK in Leeds, it knew it would be able to rely on its recently acquired Haas SL-30 turning centre with live tooling.

"We bought the SL-30 as we were machining thousands of turned parts that required a second operation," explains product manager Brian Teasdale. "Parts would wait next to a manual milling machine simply to have a single hole or slot added. Whereas now, we can complete parts in one hit, thanks to the driven heads on the SL-30. We no longer have scheduling bottlenecks on secondary machines, and delivery performance in our subcontract machining cell has improved from 75 to 98 per cent."

The components for Sulzer Pumps are relatively complex parts manufactured from abrasive materials such as Duplex, a high chrome content nickel-steel. Such is the scale of the Sulzer contract that it keeps the 432 x 864 mm (17" x 34") capacity Haas SL-30 busy for 51 weeks of the year on a double-shift, 16-hours-a-day basis.

"Everything we manufacture for Sulzer goes straight to their production line," adds Teasdale. "They don't inspect the parts; we have to guarantee that everything is correct, as well as certified for traceability."

With so much riding on successful component manufacture, there are high expectations of the company's Haas SL-30, and not just from Sulzer. The cost and long lead-time associated with the raw Duplex material means that any scrap is both expensive and time consuming for Craftsman Tools.

Prior to purchase, Haas presented Craftsman Tools with the opportunity to see the SL-30 in action at two other manufacturers in order to help the company reach a decision.

"Since we bought the machine in 2002, it has done everything that we have asked of it," says Teasdale. "We opted for the Haas SL-30 because it had all the ability of so-called high-end turning centres, at a much better price. It is extremely fast, and repeatability is second to none – holding tolerances of less than 0.025 mm. It has been a very successful machine for us. In fact, in terms of cycle times, the SL-30 runs consistently at 125 percent – actual versus planned."

Sulzer too, is very satisfied. In fact, the company no longer operates an in-house machine shop, preferring instead to outsource to selected contract manufacturers that it knows have the capability to meet its demands. The success story, however, does not end there, as Teasdale goes on to explain.

"Thanks to the Haas, we have managed to eliminate grinding from some of our jobs. The quality of the finish machining, and the fact that it can turn material as hard as 48 Rc, has allowed us to make a substantial cost saving."

Craftsman Tools has also owned a Haas VF-3 vertical machining centre for the past six years, and since the addition of the Haas SL-30, the company has capitalised on an unforeseen benefit.

"Because the two controls are so similar," explains Teasdale, "we are able to deploy operators to look after machining centres and turning centres."

This is quite a feat for manufacturing disciplines that are traditionally so divided. It means that Craftsman Tools is able to reduce its cost base through a reduction in labour content.

"When we were looking at turning centres, one of the overriding factors in favour of the Haas SL-30 was that the control was so much simpler than anything else on offer. We still say that today; it is very simple to learn."

Craftsman Tools Limited is a precision toolmaking company situated in Otley, West Yorkshire, United Kingdom. The company operates as Chevin Tools in the United States, and as Craftsman Tools throughout the rest of the world. The company is not associated with Sears Roebuck in any way.

The simplicity of the control is verified by SL-30 operator Mark McLaren, who says "the control makes such a difference," before stating that the addition of the live tooling and the tool probe make the machine a far more effective solution than the lathe it replaced, especially considering the SL-30 can be subject to as many as 15 jobs a day over a double shift.

Also impressed with the Haas control is VF-3 operator Simon Binns, who says he constantly makes use of the Haas Quick Code programming feature to rapidly generate finished part programs. Both operators regularly "swap" machines when required.

Decision to Buy

Armed with a selection of material, Craftsman took a trip to the Haas showroom in Leicester to see the VF-3 in action. It proved to be a decisive moment in the purchasing process.

"We tend to take large cuts, so vibration can be a problem for us," says Teasdale. "However, we needn't have been concerned; the trials showed that the rigidity of the VF-3 was superb. The big cast frame is a lot more sturdy than on models from other suppliers that typically use fabricated frames."

The VF-3 at Craftsman Tools, with its 1016 x 508 x 635 mm (40 x 20 x 25 in) capacity, is generally set up with a vise, chuck and rotary indexing table to offer maximum machining capability and flexibility.

"The VF-3 has been put through its paces over the years," Teasdale says. "We do a lot of jobs that require quick setup and quick programming, and the VF-3 lends itself to these very well."

In fact, such is the impact of the vertical machining centre at Craftsman Tools that the company says it will seriously consider Haas machines when one or two of its other milling machines reach the end of their serviceable life.

The reliability of both Haas machines has been exemplary. Teasdale says that since 2002, downtime of the SL-30 can be calculated at just one day, while in six years of constant use, the VF-3 has required just one replacement part. With a total of 14 CNC machines operating at Craftsman Tools, Teasdale declares that the non-Haas machine tools require far more attention: "I wish all of our machines were as reliable – we have a lot of breakdowns," he says.

Haas UK, however, is more than prepared for the rare eventuality of machine failure. For instance, within a 30-mile radius of Otley-based Craftsman Tools, the company has three service engineers who can be dispatched to aid the company in an emergency.

"This is important to us, as machine cost rates are quite significant and we can't afford to have much downtime," explains Teasdale. "Service does have a role to play in the decision to buy."

Applications support is also a major strength of the Haas UK operation, a fact not lost on CraftsmanTools.

"One recent challenge was tapping some extremely large holes that, normally, would have required a huge motor to pull exceptionally big cutters. In the event, Haas UK application engineers produced a special macro to thread mill the parts on the SL-30, using the C axis, X axis and the live tooling."

Another first, the company claims, achieved by its team of Leicester-based, factory-trained applications engineers.

Since our visit to Craftsman Tools, the company has acquired yet another Haas machine: an SL-40 turning centre with live tooling and C axis. The 1118 x 648 mm (25.5 x 44 in) capacity of the SL-40 allows Craftsman to take on even larger work, and the live tooling eliminates the need for secondary operations on another machine. The result is yet another increase in productivity while further reducing labour content.

Craftsman Tools Limited
++ 44 1943 46 67 88

If you own or operate a Haas, you already know how easy the Haas CNC is. In fact, an independent market survey showed industry professionals rating the Haas control as the most user-friendly control they've worked with – which has always been our goal. Whether it's one-button tool offsets (vs. four- or five-step procedures on other machines) or copy-and-paste program edits (again, vs. four or five steps on other controls), Haas keeps the operator in mind.

Taking Control

By Eric Bowman & Linda Dorr

Unlocking Powerful Features Every CNC Operator Should Know.

For example, the jog handle on most machine tools will move the axes – period. On a Haas, you can also use it to scroll through a program (in EDIT mode) or through cursor-selected information in other displays; or turn on Setting 104 to single-block through a program (in MEM mode). The jog handle can also be used to adjust feeds and speeds: press HAND CNTRL FEED or HAND CNTRL SPIN to adjust the overrides by 1% with every click of the handle. Turn on Setting 103 to assign Cycle Start and Feed Hold functions to the same button. Accidentally hung up the tool changer? Just press TOOL CHANGER RESTORE, and the control walks you through fixing it.

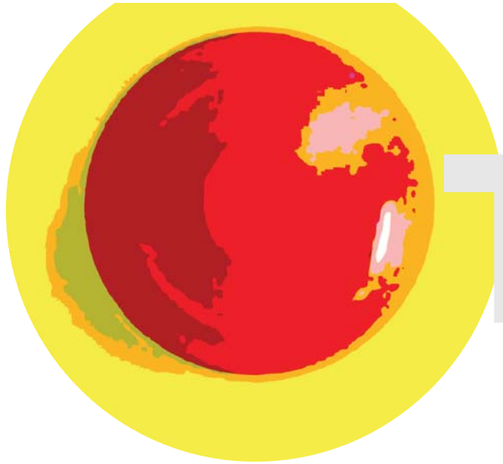
And those are just a few of the advantages of a Haas. If you're new to Haas machine tools, this article should give you a head start. And who knows – you might learn something even if you've been using a Haas for a while.

Pushing one of the DISPLAY buttons on a Haas is like opening a booklet – you'll find several pages worth of info on the topic at hand. In a nutshell:

- The PRGRM/CONVRS display shows the current (active) program.
- POSIT shows you both true and reference positioning.
- OFFSET allows you to manage tool, work and wear offsets easily.
- CURNT COMDS lists a ton of info about the machine, as well as about the active program.
- The machine sends messages to the operator using the ALARM display; you can post your own on the MESGS display.
- Our Service Techs use Parameters & Diagnostics.
- SETNG lists user machine Settings (change them as needed), and the GRAPHICS display lets you avoid crashes by seeing a program run on-screen before you cut a part.
- HELP/CALC is where you get answers.

The cursor arrows and the PAGE UP and PAGE DOWN keys get a lot of use when you're navigating the various Displays on a Haas. To find a particular machine setting in the Settings display, for example, you just type the setting number in the input buffer and hit the down arrow. The PAGE UP / DOWN keys, obviously, take you to either the previous or the following page in the display.

Let's look at each Display in more detail. >>



Taking Control

Once you've brought up the active program using the PRGM/CONVRS key, pressing F4 (you must be in MEM mode) allows you to use the Program Review function. It brings up a duplicate view of the active program on the right side of the screen, so you can cursor through it while the program is running.

You can also edit a program from the PRGRM display while a program is running (in MEM mode). First type in the program number you want to edit (Onnnnn), and then press F4. You can do simple edits (INSERT, ALTER, DELETE and UNDO) in an existing program, a new program or even the program that is presently running. Edits to the program that is running will not take effect until after an M30 (RESET) is reached.

Four of the five pages in the Position Display show Operator, Work, Machine and Distance-to-Go positions. The first page shows all four.

The POS-OPER page is a reference display only. Each axis can be zeroed independently (by pressing the alpha key X, Y or Z followed by ORIGIN), and the display will then show the axis position relative to where it was zeroed. If you enter an axis letter and a number (say, X-2.625) and then press ORIGIN, that value will be entered as the axis reference position.

The POS-WORK page tells you how far from the defined work zero point the tool tip is in all axes.

POS-MACH shows where the axes are in relation to machine zero.

The POS-TO-GO (aka DIST-TO-GO) screen is useful, too. When you're running a program or have stopped in a Feed Hold, this screen shows the travel distance remaining in each axis for the current program block. You can also use this Position display for a quick reference move if you're not running a program. From HAND JOG mode, press any other operation mode key (EDIT, MEM, etc.) and then go back to Handle Jog. This will zero out all axes on the POS-TO-GO screen and begin showing the distance moved.

This display contains pages for setting both tool and work offsets. Tool offset screens have both geometry and wear offsets – 200 on mills, 50 on lathes – with columns for length and for diameter (or radius). You can also enter tool configuration on these pages – number of flutes (mills) or taper/tip description (lathes). Pressing the OFFSET key repeatedly will toggle back and forth between the Tool and Work pages. Both mills and lathes allow 105 work offsets.

When entering offsets, pressing WRITE/ENTER will *add* a number typed into the input buffer to the cursor-selected offset value. Pressing F1 will *replace* the selected offset with the number in the input buffer. While F1 will set the entered value, F2 will set the negative of the entered value.

Mill controls also have a Coolant Position column on the tool offset screens. The coolant nozzle can be adjusted to one of 20 positions for each tool – position 1 is the highest, 20 is the lowest. The nozzle will shift to the position entered in the CLNT column, for the programmed tool offset being used, whenever an M08 or Hnn code is encountered in the program.

You can clear all the tool offsets at once by pressing the ORIGIN key. The control will prompt: "ZERO ALL (Y/N)?" to make sure this is what you really want to do. If Y is entered, all the offsets displayed will be zeroed. (You can do the same thing on the Work Zero Offset page and on the Macro Variables page in the CURNT COMDS display.)

The first page of the Current Commands display shows 24 lines of the active program, as well as feedrate and spindle speed. The column on the far right shows programmed feed and speed (PGM Fnnnn, PGM Snnnn), actual feedrate (ACT Fnnnn), commanded spindle speed (CMD Snnnn) and actual speed (ACT Snnnn). Actual speed and feed values are just that – what the spindle and feedrate are really operating at with any adjustments using the Override keys. In addition, this page shows spindle load, axis loads, surface speed, chip load, and spindle CW, CCW or STOP commands. Current axis positions are shown in the upper right corner. Change the coordinates displayed (Operator, Work, Machine, or Distance to Go) by using the cursor up and down arrow keys.

The Current Display Command page lists both modal and non-modal command values for the program that's running.

The System Timers page shows power-on time, cycle start time, feed cutting time, current and previous cycle times, and two M30 counters. To clear any of these displays, highlight it with the cursor and press ORIGIN.

For machines equipped with optional macros, the Macro Variables page lists those values.

The Maintenance page helps you monitor things like filters and lubricants, and schedule upkeep. Items are tracked by hours of use; when an item is activated, the control will enter the default value, which may be adjusted. (For example, you may want to change the coolant more frequently than every 100 hours.) When any activated item reaches zero, the message MAINTENANCE DUE will appear at the bottom of the screen. This is not an alarm; it simply alerts the operator that one of the listed items needs attention.

The last two pages in Current Commands, Tool Life and Tool Load Management, help you prevent tools from breaking and parts from being scrapped. The Usage register on the Tool Life page increases by 1 every time that tool is called up into the spindle. Enter the number of times you want the tool to be used in the Alarm column, and when the Usage number for that tool reaches the number of uses in the Alarm column, the machine will stop with an alarm. On the Tool Load page, spindle load can be regulated for each tool; if the spindle load limit defined for that tool is reached, the machine will notify you (see Setting 84, below, for details). The Tool Life and Tool Load registers are cleared by cursor-selecting the one you wish to clear and pressing ORIGIN. To clear everything in a column, cursor to the top of the column (onto the title) and press ORIGIN.

Alarms can be caused by programming errors or machine faults. When an alarm is generated, the machine will stop and flash the error message(s) at the bottom of the screen. Use the RESET button to clear alarms one at a time. The program cannot be restarted until all alarms have been cleared and the problems resolved.

Use the right or left cursor arrow and then scroll up to display a history of the last 100 alarms, with date and time. This Alarm History can be saved to a floppy disk (enter a file name and press F2) or to a PC (press SEND RS232). The output from either method will contain a percent sign (%) on the first and last lines. You can also enter an Alarm number and press WRITE/ENTER or the left or right arrow to view its description. Pressing the cursor arrow key again will bring you back to the normal Alarm display.

If you leave a message in the Messages display before power-off, it will be the first display shown the next time the machine is powered up, *if* there are no alarms other than the usual 102 SERVOS OFF alarm. If the machine was powered down using EMERGENCY STOP, the Messages display will not show up when you turn the machine on again. Instead, the control will display the active alarm generated by the emergency stop. In this case, you would have to press the ALARM/MESGS key to view a message.

These displays contain a lot of information – all of which is essentially **read-only** for end users. Modifying some of these functions will **void the warranty** on the machine. Parameters are seldom-modified values that change the operation of the machine. These include servo motor types, gear ratios, speeds, stored stroke limits, lead screw compensations, motor control delays and macro call selections. If you need to change parameters, contact Haas Automation or your dealer. The Diagnostics display is used by Haas Service engineers to check the status of the machine.

Because the settings give users a great deal of powerful and helpful command over the control, we recommend reading the entire Settings section of the operator's manual. There are dozens of settings in a Haas control. Here are three examples of how useful they are.

Setting 14: H&T CODE AGREEMENT. When this setting is turned on, the machine will check whether the H offset code matches the tool presently in the spindle. Usually you have one offset per tool, and usually it's the same number as the tool number. If it is not the same, when this setting is on you will get an alarm: "H and T Not Matched." This can help prevent crashes. If you need to use a different offset number, or more than one, Setting 14 should be turned off.

Setting 84: TOOL OVERLOAD ACTION. This setting determines what will happen if a tool overload condition, as defined by the Tool Load monitor page in the Current Commands display, occurs. ALARM will generate an alarm when overload occurs; FEED HOLD will do just that; BEEP will sound an audible warning; or AUTOFEED will automatically decrease the feedrate.

Setting 144: FEED OVERRIDE –> SPINDLE. This feature is intended to keep the chip load constant when an override is applied. When this setting is turned on, a feedrate override command will also be applied to the spindle speed, disabling the spindle override buttons.

The Help display is a sort of mini-manual, explaining many of the functions of the Haas control. Press the letter D for a list of all the subject areas available in the Help directory; then select the subject you want by pressing the indicated letter. To see a list of all the G and M codes available for the machine, press the letter C.

A second press of the HELP/CALC key brings you to the machining calculators, a very handy tool. There are five pages in this display, for help when calculating: feeds and speeds; a triangle; a circle or arc; a circle/line tangent; and a circle/circle tangent. The feeds and speeds page probably gets the most use – you can enter cutter diameter and desired surface feet/minute, for example, and the control will calculate the spindle rpm required.

In the upper left corner of each page is a simple calculator box, with the four symbols + – * / and a LOAD function listed beneath it. Enter a number in the box, cursor left or right onto the symbol you want, enter another number, and press WRITE/ENTER to perform the calculation.

The number in the calculator box (in the upper left corner) can be transferred down to any cursor-selected data line. Cursor to the line you wish to transfer the calculator number to, and press F3. To transfer a value in the opposite direction – from a data line to the calculator – cursor to the data line and press F4. If LOAD is selected, the number on the data line will simply be transferred to the box; otherwise the calculation selected (+, –, * or /) will be performed.

When you're in either EDIT or MDI mode and the number in the calculator box is selected, pressing F3 will transfer the number in the box to the EDIT or MDI input buffer. You will need to enter the letter (X, Y or Z) you wish to use with the number from the calculator.

When a circular calculation has been completed, the control will display several different program lines for executing that circular move at the bottom of the screen. One of these program lines can be transferred to either EDIT or MDI:

1. Cursor onto the program line you wish to use.
2. Press EDIT or MDI (where you wish to insert the circular move).
3. Press F3; this will transfer the circular move that you highlighted into the input buffer at the bottom of the EDIT or MDI display.
4. Press INSERT to add that circular command line into your program.

IN CONCLUSION

The info in this article is just the tip of the iceberg – there's much, much more to know and love about the Haas CNC. We'll be featuring a series of articles in the next several issues to help you learn about the Haas control – and why our customers like it so much. Stay tuned!

This article is the first in a series that will examine the many advantages of the Haas control. The information you'll find here can also be found under the *solutions/applications* menu on the Haas Automation website, HaasCNC.com. Check us out there if you can't wait for the next installment!

New Haas HMC Really Swings

The latest addition to Haas Automation's new generation of horizontal machining centers – the EC-500 – features a 32" x 20" x 28" (813 x 406 x 711 mm) work cube, 1000-ipm rapids, a dual pallet changer with 500 mm pallets and a built-in pallet indexer. The machine comes standard with an 8,000-rpm, 40-taper spindle powered by a 20-hp vector dual drive system. Also standard are a side-mount tool changer (24+1 tools), a high-volume coolant system and a triple-auger chip conveyor system.

The EC-500's pallet indexer provides 45-degree incremental indexing for multi-sided tombstones. The maximum part swing on the indexer is 29.5" (750 mm), with a maximum swing for the pallet changer of 71" (1800 mm). Pallet swaps take just 9 seconds, and each 500 mm pallet has a load capacity of 1,000 lb (453 kg) {660 lb (300 kg) with full 4th axis}. A separate load station allows the operator to safely load/unload parts or change fixtures on one pallet while parts are being machined on the other, keeping spindle run time at a maximum.

High-performance options for the EC-500 include a 12,000-rpm spindle powered by a 30-hp vector dual drive system; a high-precision face-gear indexer (1-degree indexing) or full 4th axis; and either a 40- or 60-pocket high-speed side-mount tool changer.

Cast in the Same Mold – New High-Speed VMC for Mold Makers

Following on the success of its VM-3, Haas Automation, expands its new line of VMCs designed for the mold industry. The company's latest entry is the VM-2, a high-performance machine with a 30" x 20" x 20" (762 x 508 x 508 mm) work cube, a 36" x 18" (914 x 457 mm) table, a 12,000-rpm inline direct-drive spindle and a high-speed control with full look-ahead.

The VM-2 features massive cast-iron construction, with extensive internal ribbing on the castings to increase rigidity and damp vibrations. High-precision linear guides on all axes further increase rigidity and stiffness, while providing a low coefficient of friction and long-term reliability. High-speed brushless servos, fine-pitch ballscrews and high-resolution digital encoders ensure ultra-precise positioning and extreme repeatability.

For maximum fixturing versatility, the VM-2's unique cast-iron table features standard T-slots in both vertical and horizontal directions, as well as precision dowel-pin bores and an array of drilled and tapped holes. It has a maximum weight capacity of 3,000 lb (1360 kg).

The VM-2 comes standard with a side-mount tool changer (24+1 tools) that swaps tools in 2.8 seconds. Also standard are an automatic chip auger system, remote jog handle, automatic air gun, high-speed machining software with look-ahead, hard drive with Ethernet interface, floppy drive, Visual Quick Code programming, user-definable macros, coordinate rotation & scaling and spindle orientation.

Ultra-Compact Rotary Products For High Production

Two new Haas rotary products provide accurate small-part positioning in easy-to-mount, high-quality packages smaller than anything Haas has made before.

Smaller than a 7" (178 mm) cube, the HRT110 provides 4th-axis capabilities, while the TR110 is a dual-axis trunnion table. Their compact size and adaptable mounting configurations allow the HRT110 and TR110 to be secured practically anywhere, on almost any machine.

Haas engineers broke the size barrier by designing the HRT110 and TR110 around an 80:1 harmonic drive system that offers dramatic space-saving advantages over traditional worm drive configurations. The system provides indexing speeds up to 300 deg/sec for fast cycle times, and spindle torque of 65 ft-lb (88 Nm).

Paired with a Haas machining center, the HRT110 and TR110 provide full, simultaneous interpolated motion in four or five axes. And, like all Haas rotary products, they're easy to interface with other CNC machines as well.

The Grand Re-Opening of Haas Automation Europe – Zaventem

Haas Automation Europe is delighted to announce the official opening of its new 3,500-square-meter (37,000 sq ft) European Headquarters and showroom in Zaventem, Belgium, just 10 minutes from Brussels airport.

The move comes just three years after the company first opened its European operations at the city's Paepsem Business Park. In that time, Haas' business in Europe has increased dramatically, and the company has outgrown its original location.

As well as providing vital additional office space, the new building incorporates a 750-square-meter (8,000 sq ft) showroom, allowing some 25 Haas machines from the company's extensive and growing range of affordable CNC machine tools to be exhibited and demonstrated simultaneously.

According to Haas Europe Managing Director Peter Hall, the relocation marks an important milestone for the company.

"Since establishing Haas Europe we've exceeded our annual sales targets in all of the key European markets. In the past year alone, we've experienced a sales increase of more than 80%. This is in line with the growth Haas has enjoyed in other markets around the world, and reflects the universal appeal of low-cost, high-quality CNC machines."

The new headquarters includes a massive and comprehensive spare parts warehouse run by factory-certified support personnel, which will provide same-day dispatch for more than 90% of requisitions, and dispatch 100% of requisitions within 24 hours. A stock of 200 new machines is maintained in nearby Antwerp, allowing delivery to almost anywhere in Europe within 2 days of receiving an order.

The new facility also includes a modern, fully equipped training area and classroom, where Haas personnel will instruct HFO service engineers and customers from all over the Continent.

"As both our European customer base and our distributor network increase, we intend to offer the best service and support in the industry," adds Mr. Hall. "Our investment in the new office, showroom and parts warehouse will help ensure we do just that."

Mars Rovers Amaze Scientists

A few issues ago, we reported on Next Intent, a small California machine shop making parts for a pair of NASA rovers destined to explore the surface of Mars. The shop used Haas machines (primarily a VF-2 and VF-5) to fabricate a number of components for the robotic vehicles that were launched from Cape Canaveral, Florida, in the summer of 2003. The two rovers, named Opportunity and Spirit, landed on the Red Planet early in 2004, and have since found unmistakable evidence that Mars was drenched with water at some time in its history.

Editors of the journal *Science* judged the discoveries by the robots as the most important scientific achievement of 2004. "Inanimate, wheeled, one-armed boxes roaming another planet have done something no human has ever managed," *Science* reported in a December edition. "They have discovered another place in the universe where life could once have existed."

Opportunity and Spirit were expected to last only about 90 days in the harsh Martian environment – provided they survived the torturous landing in the first place. But now, more than a year later, both machines are still going strong, amazing scientists and recording more important discoveries than anything that has ever landed on Mars.

The machines are regarded now as great national resources, and as *Science* proclaimed, "Their finds mark a milestone in humankind's search for life elsewhere in the universe."

Georgian College

Georgian College in Barrie, Ontario, is the site of the newest Haas Technical Education Center – oops, Centre. The grand opening in November, which was open to the public and covered by the local TV news crew, attracted crowds interested in the live demonstrations of Haas machine tools.

Georgian has nearly a dozen Haas machines, including several Toolroom Mills and Toolroom Lathes. The Haas Toolroom series machines, with manual handwheels as well as full CNC capabilities and the Haas Intuitive Programming System, are widely used in educational shops. The Barrie HTEC also has a geared-head VF-4 vertical machining center, plus a Mini Mill.

The Engineering Technology programs at Georgian will make good use of the Haas lab, which also boasts six Haas CNC simulators. Georgian was recently awarded funding from the Ontario Ministry of Economic Development, under a program aimed at increasing the number of skilled workers needed by industry. The Strategic Skills Investment program offers financing for "business-led training partnerships" such as the Haas Technical Education Centers. The number of HTECs (which function as Haas showrooms as well as student machine shops) across North America continues to expand. Dan Ferko, president of Haas Factory Outlet Toronto, a division of Sirco Machinery Company, sums it up nicely when he notes that "All in all, it is an excellent arrangement."

Customer Scores Big at Demo Day

The Super Bowl – the Holy Grail of football-dom – is the most widely viewed sporting event in the United States. For most of us in the real world, that viewing takes place in the comfort of our own living rooms. Attending the actual event is simply beyond the wildest dreams of mere mortals like us.

True, tickets can be had for the right price. But for us huddled masses, quaffing beer in front of our TVs, they might as well be machined from unobtainium.

So, when one lucky bloke had four of those tickets dropped in his lap, along with airfare and hotel accommodations, it was akin to winning the lottery. And all he had to do was visit his local Haas Factory Outlet.

He did, however, have to visit on the right day – which, in this case, was Demo Day 7 last November. Demo Day, an open house held twice a year at Haas Factory Outlets across North America, is an opportunity for anyone who's interested to see Haas machines in action. Last November's was also a "Customer Appreciation Event," where all you had to do was drop off your business card for a chance to win a trip for four to Super Bowl XXXIX.

Frank Cerny's visit to the Cleveland HFO on Demo Day was a follow-up visit.

Frank is the plant superintendent for Flo-Tork, Inc., a manufacturing company in Orrville, Ohio. He and several colleagues discovered Haas last September. "It was our first trip to IMTS, and we hadn't even intended to stop at the Haas booth," he said. "But it was the first thing we saw when we got into the show, and it was so impressive we ended up spending the first two hours there." Flo-Tork, with just over 60 employees, has been in business for nearly 50 years. "Over the last few years we've really been stressing the need for new ideas – better processes and setups, new tooling, lean manufacturing concepts. Our productivity is up by about 30% over what it used to be, and we learned a lot more at IMTS. We were blown away by some of the stuff we saw in the Haas booth – like the programming screens, and some of the setups."

Flo-Tork took delivery of a new Haas VF-2SS Super Speed vertical machining center in February. "It's the first brand-new machine we've bought in a long time," noted Frank. The Haas VMC is employed full-time for high-speed production work, currently making parts for Northrop-Gruman submarines.

As for the Super Bowl trip, "My wife was ecstatic," Frank reported. Not so much because Mrs. Cerny is a huge football fan – but "we live in Ohio, and the Super Bowl's in Florida, in February," he laughed. Their two 20-something kids were happy to take this vacation with Mom and Dad.

2005 Demo Day Lineup

DEMO DAY #8 WILL BE HELD JUNE 22.

DEMO DAY #9 – OCTOBER 26

DON'T MISS 'EM!

Haas CNC Racing – 2005 Season Changes

Haas CNC Racing chose NASCAR veteran Mike Bliss to pilot the No. 0 Monte Carlo in this season's Nextel Cup competition. The former Craftsman Truck champion drove Busch Series entries for Joe Gibbs Racing during 2003 and '04, accruing 14 top-5 and 28 top-10 finishes. Bliss made the last two starts of the 2004 Nextel Cup season for Haas, at Darlington and Homestead, posting a top-10 finish at the final Southern 500. Working well with the Haas team, Bliss' strong showings demonstrated the right combination of skills and experience to move the program to NASCAR's top competitive level. The Best Buy Company joins NetZero this season as co-sponsor of the Nextel Cup team.

The team's 2005 Busch Series campaign centers around 24-year-old driver Justin Labonte, son of two-time Cup champion Terry Labonte and nephew of Cup and Busch champion Bobby Labonte. Justin has a background of championship wins, including the 1996 and '97 Summer Shootout Series, the Division Championship in 1997, and the Late Model Stock Car Championship in 2003. The U.S. Coast Guard sponsors the new Haas No. 44 Chevrolet, retaining its racing affiliation with Justin.

Overhaulin' at SEMA

If you're a *CNC Machining* reader, there's a good chance you're also a fan of TLC's *Overhaulin'* show, a program that "tricks the owner while tricking out the car." For each episode, the show's staff enlists the help of friends and family to "steal" a car – usually a fixer-upper or forgotten project – from its unsuspecting owner. Then they give it a total mechanical and cosmetic makeover. Once transformed, the car is miraculously "found" and reunited with its (thoroughly surprised) owner.

This past November, the Overhaulin' crew traveled to Las Vegas, where they had a booth at the 2004 SEMA (Specialty Equipment Market Association) show – a must-attend event for anyone in the automotive specialty products industry. Throughout the course of the show, the crew worked their magic on the car of the moment – a 1970 Ford Mustang that the owner's son allegedly lost while gambling. Prominently displayed in the Overhaulin' booth was a Haas VM-3 Moldmaker, busily cutting custom wheels for the lucky 'Stang.

After a Haas Service engineer set up the VM-3, a machinist from MHT Wheels, Inc., of La Palma, California, put it through its paces. MHT is a Haas customer that manufactures high-end alloy wheels for top-of-the-line aftermarket suppliers. At 6325

square feet, the Overhaulin' booth at SEMA had plenty of room for the VM-3, the car and – of course – the many spectators who watched the Mustang's transformation from grungy ride to gleaming classic.

MOR Keep an eye on *American Chopper* – that high-stress, custom-motorcycle build program on The Discovery Channel. A Haas VMC has been keeping the boys thinking hard about their new capabilities.

HELP

One of the best things about a Haas VF-1 is that it will fit just about anywhere – under the carport, say, or even in the house. This customer lives and works in Genova (Italian for Genoa), Italy.

Dear Applications:

Can I program an automatic shut-down on my Haas VMC that will also take the tool out of the spindle?

Andy Bloomington

Dear Andy:

You can use either Setting 1 or Setting 2 to automatically shut down your machine.

1 AUTO POWER OFF TIMER: This is a numeric setting. When it is set to a number other than zero, the machine will automatically be turned off after that many minutes of idle operation. This will not occur while a program is running, nor will it occur while the operator is pressing any keys. The auto-off sequence gives the operator a 15-second warning, and pressing any key will interrupt the sequence.

2 POWER OFF AT M30: This is an On/Off setting. If it is set to On, the machine will begin an automatic power-down when an M30 ends a program. The auto-off sequence gives the operator a 30-second warning, and pressing any key will interrupt the sequence.

To remove the tool from the spindle before the machine shuts down, program a tool change to an empty pocket just before the M30.

Sincerely,
Haas Applications

•••

Dear Applications:

I'm using a bar puller with my SL-20, and each bar gives me 32 parts. I have a main program and a sub-program, and the sub-program ends with M99. Is there a page or screen on the control that shows what the part count is at any point in the M98 L32 loop? I found the M30 count in Current Commands, but that doesn't tell me where I'm at in my 32-piece bar. Setting 118, M99 Bumps M30 Counters, doesn't work when the M99 is in a sub-program. Can you help me? Thanks.

Mike Hernandez

Dear Mike:

Page up to the Tool Life screen in Current Commands, and monitor the USAGE count for the bar puller tool number. If you don't have the Macro option on your SL-20, you'll need to manually zero out the Usage column for this tool number at the beginning of each bar (cursor onto it and press the ORIGIN key). With macro

variables, you could do that via the part program – or you could program an instruction that will bump the M30 counter at a sub-program M99.

Here's a sample program, using macros, that we have used to count parts on M30 counter #1 and count bars on M30 counter #2. Setting 118 may be either on or off.

```
%
O00001 (Main program)
#1=0
N1
M98 P100 (sub-program call)
#3901=#1    (tells machine to count M99s on counter #1)
#1=#1+1  (add 1 to the counter every time program is run)
IF [ #1 EQ 32 ] GOTO2 (repeat program 32 times)
GOTO1 (go to N1 until #1 = 32)
N2
M30 (these will be counted on counter #2)
%

%
O00100 (Sub-program)
N10
G28
T101
G97 S500 M03
G00 X2.0 Z.1
Z0
G01 X1.9 F.010
G00 Z1.0 M05
G28
M99
%
```

Sincerely,
Haas Applications

•••

Dear Applications:

I'm using G47 to engrave serial numbers, but I'm getting error message number 529: "Illegal G65 parameter. The addresses G, L, N, O, and P cannot be used to pass parameters." What can I do to fix this? Here's my program.

G47 P1.0 (5001) X0.5 Y0.75 J0.125 R0.05 Z-0.005 F25.0 E10.0

Thanks for your help.

Vijay Bakshi

Dear Vijay:

You need to take the decimal point out of the P command – in this case, P is an instruction (Engrave Sequential Numbers) rather than a value, so "P1" is the correct form of the command.

Sincerely,
Haas Applications

•••

Dear Applications:

Our current Haas machines have Setting 39, "Beep at M30." If we were to order a new machine, could we get a similar setting for M00? We would like it to toggle the same way Setting 39 does. Please let us know if this addition is possible. Thank you.

Chris Weber

Dear Chris:

You're not the only customer who has asked that Setting 39 be expanded – so, we've done it. In the latest Haas software release (Mill version 13.05; Lathe v. 6.05), turning on Setting 39 causes the control to beep at M00, M01, M02 and M30.

Sincerely,
Haas Applications

•••

Dear Applications:

I just started a shop with a couple of Haas machines. I live in the northeastern U.S., and I haven't been heating the shop. It's going to get pretty cold in there this winter – what's the lowest temperature that I can safely run the machines?

Chuck Ryder

Dear Chuck:

The operating temperature range for Haas machine tools is 41°F to 104°F (5 to 40°C). You should run a spindle warm-up program on a daily basis anyway, and it's especially important if the temperature in your shop has gotten below 41 degrees. Let the spindle warm up for at least 20 minutes. You should also run a program that moves the axes – again, for at least 20 minutes – to warm up the ballscrews before you start cutting. Finally, keep an eye on your coolant. The freezing point will depend on what mixture you're using, but if it gets cold enough to make the coolant slushy, you need to make sure it has thawed before you use it.

Sincerely,
Haas Applications

•••

Dear Applications:

How do I program helical milling in the Z axis? Do I have to loop circular interpolation with a Z value added for each revolution (G02 X__, Y__, I__, J__, Z__)? Or is there a G code for helical milling or interpolation in the Haas control?

Chuck Wong

Dear Chuck:

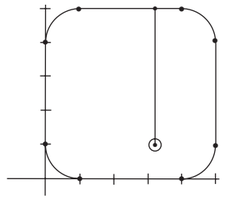
The simplest way to achieve helical motion is by X and Y circular interpolation (G02 or G03) with a Z value added per revolution. Use an I command to specify the distance in X from the starting point to the center of the arc. To cut a complete circle of 360 degrees, do not specify an ending point for X or Y. If you use incremental positioning (G91), you can loop the cycle to achieve your depth using an L command. Here's a sample program:

```
%
O1234;
(Helical Milling Example);
T1 M06;
G00 G90 G54 X0. Y0. S3000 M3;
G43 H01 Z0.1;
G00 X0.5;
G91; (incremental positioning)
G02 I-0.5 Z-0.25 F20. L4; (helical motion, 1 in. dia. x 1 in. deep)
```

the ANSWER M N

G00 G90 X0;
G0 Z0.1 M09;
G53 Z0.;
G53 Y0.;
M30;
%

Sincerely,
Haas Applications



This will cause an alarm.

Dear Applications:

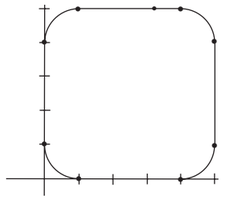
I'm a machining technology student at a community college. My latest assignment for the Haas CNC class involves pocket milling with G150. I put in G and M codes like the program in the workbook, and it worked fine on the simulator. Then my instructor and I tried another program, which is very simple but won't work. Maybe you could look at this and tell us what's wrong? Thank you.

Dave Martin

Dear Dave:

Your program is fine until the next-to-last line.

```
O00100
N1 (1/2 DIA DRILL)
T1 M06
G90 G56 G00 X3.25 Y1.0
S2000 M03
G43 H01 Z1.0 M08
G83 Z-2.0 R0.100 Q0.500 F10.
G80 G00 Z1.0 M09
G28 G91 Z0 M05
M01
N2 (1/2 DIA E'MILL)
T2 M06
G90 G56 G00 X3.25 Y1.0
S2000 M03
G43 H02 Z1.0 M08
```



The last move (Y1.0) back to the start point is causing the alarm. The sub-program should end when the pocket shape is complete.

```
G01 Z0 F30.
G150 P101 J0.4 K0.02 G41 D02 Z-1.0
Q0.25 R0.1 F12.
G01 G40 X3.25 Y1.0
G00 Z0.100
G28 G91 Z0 Y0 M09
M30
O101 (POCKET SUB-PROGRAM)
G01 Y5.0
X1.0
G03 X0. Y4. R1.
G01 Y1.
G03 X1. Y0. R1.
G01 X4.
G03 X5. Y1. R1.
G01 Y4.
G03 X4. Y5. R1.
G01 X3.25
Y1.0  (You must remove this line.)
M99
```

With a pocket routine, you can't take the tool all the way back to where you started from. The sub-program is only the pocket shape itself. If you try to drive the tool back to the center of it, you will get an alarm.

Sincerely,
Haas Applications

•••

Dear Applications:

I accidentally pushed the Emergency Stop button during a tool change. Now I have a tool in the T1 pocket (inside the shuttle) as well as tool 1 in the spindle. I restarted the machine and repositioned the XYZ axes home, and the spindle crushed into the tool inside the tool changer. I think there are two options: to retrieve the tool from the tool changer, or tell the machine that the spindle is empty. I'm not sure what to try, though. Can you please help?

Jon Davis

Dear Jon:

Press the TOOL CHANGER RESTORE key on the control. You will be prompted by the control, with instructions to restore the tool changer to normal operation. If there is a tool in the spindle, it will most likely need to be removed. If you want to read about the process before you try it, there is a detailed flow chart in your Operator's manual that describes tool changer recovery.

Sincerely,
Haas Applications

•••

Dear Applications:

I have a couple questions. How do you reset the timers (to see how long a cycle takes)? Also, is there a way to take tools out of the carousel without actually doing a tool change? I have a side-mount tool changer on my VF-4.

Dave Winterman

Dear Dave:

On the Current Commands screen that displays the timers and the M30 count, use the cursor arrows to highlight the timer you want to zero out. Then press ORIGIN.

On a Haas VMC, tools must be loaded and unloaded via the spindle, so the machine can manage the tool carousel. This is particularly important with a side-mount tool changer, since tools don't generally go back into the pocket they came out of (the Pocket Table in the Offset display keeps track of which tool is where).

Sincerely,
Haas Applications

•••

Dear Applications:

I'm loading programs into my SL-20 through the RS-232 port, using Microsoft XP-Pro's HyperTerminal. The data is reaching the control just fine; however, most of the program lines are encased in parentheses, with a question mark at the end of the line. I'm getting:

(N10 G01 X5.4375 Z3.50 ?)

when what I need, obviously, is:

N10 G01 X5.4375 Z3.50

I'm also getting Alarm 243: "Bad Number. Data entered is not a number."

Do you know what's going on here?

Steve Yang

Dear Steve:

Check Setting 9 on your SL-20 – it's probably set to MM (millimeters), which is the most common cause of this problem. When Setting 9 is set to INCH, the control reads programmed units to four decimal places; when it's set to MM, it only reads to three decimal places. If it's set to MM, and programmed values have four decimal places, the control flags those program lines as unreadable.

Sincerely,
Haas Applications

•••

Dear Applications:

I notice in the VF-7 operator's manual that I should be able to put an "H" next to a tool to designate it as heavy. We have the side-mount tool changer on the machine, but the control does not accept the H. Am I doing something wrong? I'm trying to do this on the Tool Offsets page.

Jim Smith

Dear Jim:

You have to be on the Tool Pocket Table page in the Offset display to do this – if you try to do it from the page where you enter tool offsets, the control will respond with "Invalid Number."

Older software will not let you flag the tool currently in the spindle; the tool to be designated has to be in the carousel. The following procedure, however, will work for all software versions.

1. Put a tool in the spindle (assuming you have the proper tool number in the spindle).
2. Press the 25% RAPID override key.
3. Press MDI.
4. Press ATC FWD.
5. Press the OFFSET key until you get to the Work Offset page; then press PAGE UP once. This should bring you to the Tool Pocket Table.
6. Highlight the tool number you want to flag.
7. Press H and then the WRITE/ENTER key.

This should do it. Please don't hesitate to contact us if you still have problems.

Sincerely,
Haas Applications


SL
20
HAAS VOP-A
20HP
TAIL STOCK
TOOL PRESETTER
HAAS