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The renaissance of the North American die/mold market continues in 2014 at all-time high levels. The Gardner moldmaking business index in May was at 56.0, which showed strong growth for the fifth straight month and the fastest rate of growth since August 2013. Overseas manufacturing investments in North America, led by the automotive industry giants, continues to fuel the die/mold market and its supply base.

IMTS 2014 is right around the corner and opens its doors to the largest technical “candy store” in North America. On display will be the latest and greatest manufacturing tools, promising to improve efficiency, increase your bottom line and put your company ahead of the competition.

With three years of solid business as a foundation, many companies will be looking to the show to help them find the next piece of machinery to meet their business needs. Still, many of you will face the dilemma of trying to figure out what will fit your needs not only today but also three to five years from now. Should you purchase another vertical or maybe a horizontal machining center? Do you need more automation? Should you obtain 5-axis or will 3-axis be sufficient?

This edition of Competitive Mold Maker highlights two of our customers that have asked these very questions. One zeroed in on a horizontal machining center for their shop in order to improve efficiencies with multiple part setups. The pallet changer and highly reliable spindle technology combined with a thermally controlled stable machining structure helped the company to run a lights-out operation.

The second customer chose a Vi-Series vertical machining center that allowed for zero stock machining and eliminated polishing. These results were made possible through patented under-race spindle lubrication technology that eradicates thermal growth and leads to hours and days of unattended machining.

Both customers are unique in their organizational structure and business needs, as is your company. The common denominator is that they sought our consultation and dialogue in order to decide what made the most sense for their company needs.

We trust that if you have similar discussions within your organization that you would also seek our help—whether it is at IMTS 2014, at our North American Die/Mold Technical Center in Auburn Hills, Mich., or through your local Makino contacts. We look forward to speaking with you!

Sincerely,

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If you visit Fallbrook Technologies Inc. in Cedar Park, Texas, and meet David Markley, the vice president of technology development, ask him if he can explain what his company does. You just might be surprised by his reply:

“Sure. Go ride this bike.”

That’s because it’s easier for Markley to let you experience Fallbrook’s revolutionary NuVinci® continuously variable planetary (CVP) than it is to try to explain it—it’s that far removed from anything riders would have previously experienced from the seat of a bicycle. Born from the mind of a man who was working to break the land-speed record for bicycles and who realized that traditional bicycle gearing was a significant limitation, the NuVinci N360™ hub replaces...
the cogs of gears and derailleurs that have been standard issue on multi-speed bicycles for decades. Unlike conventional transmissions, the NuVinci hub enables riders to continuously, seamlessly and silently change the bike’s drive ratio. Exclamations from those who experience it turn quickly to, “Wow, that’s smooth!”

Fallbrook began commercializing this transmission in bicycles, and when the company first demonstrated it at the Interbike trade show in 2004, it caused quite a stir. “Everyone thought that it was cool, but it was clear from talking to people in the booth that only 5 to 10 percent of people really understood what it meant for the industry,” explained Mark House, engineering manager for the prototype shop. “Before they ride it, people want to know things like ‘What’s the efficiency?’ After they ride it, they want to know ‘How much is it?’ and ‘Where can I buy one?’”

But what’s equally appealing as a ride on a NuVinci-equipped bike is the wide range of applications where the innovative transmission can be used. Everything from lawnmowers to heavy equipment, from automobiles to electric vehicles can use a version of this transmission. What’s more, it can provide not only a continuously variable forward-ratio range but also reverse with an infinitely variable planetary configuration—all without using a single gear.

It was in working through the R&D required to develop solutions for these additional applications, as well as further innovation in the original design for bicycles, that Fallbrook found its prototype shop pushing the limits of its machine tools. Like many manufacturers, Fallbrook brought the designs coming out of its R&D department to life as prototype parts produced on commodity production vertical machining centers.

Since introducing the NuVinci CVP almost a decade ago, Fallbrook has been on the leading edge of mechanical power transmission, and the company is further pushing the envelope with its new designs. Over the years, Fallbrook relied on the creativity of its operators to overcome commodity machine limitations in order to produce prototype parts for testing. Some of Fallbrook’s new designs and larger transmission sizes started exceeding its machining capabilities.

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complicating matters—because the transmission essentially also serves as a large bearing—it requires hardened materials, typically 52100 alloy steel hardened to HRC 62, making tool life a significant concern as well. This situation was untenable, since the company needed its R&D team to produce quality parts in order to prove that its newest design innovations were commercially viable for production. Fallbrook knew it had reached the limits of what creative processing could get from its commodity vertical machines and decided to seek other solutions.

Markley explained, “We were limited by the equipment we had, but we became masters of using it to get the parts that we needed.”

House said, “We got incredibly creative in overcoming the machine limitations in order to meet the specifications that we needed to achieve, but we finally hit the wall. We had to be able to machine the hard materials to take the next step.” Outsourcing was not the best option, according to Markley. “We looked at outsourcing the work to a mold-making shop, but we would be coming in with such small numbers, one to 10 of something, that there was no way we would be able to get any attention or the quick turnarounds we need.”

He added, “Had we not been able to do things on our own schedule—often under tight timeframes—in order to make it to all the different industry shows and events we have done, we wouldn’t be here today. There’s simply no way we could outsource it.”

LOOKING TO MOLD-MAKING TECHNOLOGIES
It’s that kind of productivity on short lead-times that has fostered in Fallbrook’s leadership a significant respect for the value that the R&D shop provides to the company. House summed it up, “We have incredibly creative people working here, and the ability to quickly take the engineers’ imaginative solutions and develop a path to put on a bike and ride in the parking lot is the value our R&D department provides. With our machining talent, we can evaluate the benefits and drawbacks of a design in real-world terms almost immediately.”

Based on specifications for one of its most challenging parts and desired cycle times, House conducted extensive research into machine technologies that could handle Fallbrook’s requirements with ease. Typical of the out-of-the-box thinking at Fallbrook, the search was not limited to the usual production machines.

“The V56i allows the tools to perform at their upper limit and we can barely hear the machine running. That’s all rigidity.”

House added, “Focus remained largely on prototyping, but we needed to demonstrate quality typical of production solutions. In keeping the complicated simple, we realized that processes previously tried had potential if they were refined and utilized on capable equipment.”

“We needed a path to production in the tens of thousands. Our R&D team could make tens of things or handle any one-off designs, but we needed to move into what we called medium-volume production. Higher volumes also demand cost reduction, increased surface finish and repeatable accuracy. We needed something more than our current prototype practices provided. We made the most of hard milling and hard turning, but this is where we hit the limitations of the machines in terms of tool life, surface finish and ultimately part cost.”

And with that in mind, the investigation led him into the world of mold making. While they’re not making molds, these machines are specifically designed to deliver the high speeds and feeds in the hardest materials—exactly what Fallbrook needed to achieve the levels of accuracy and finish required for its unique products.

FROM PROBLEM PARTS TO NO PROBLEM
Fallbrook reached out to several machine suppliers, requesting sample part runs for one of its more difficult parts, giving them very aggressive cycle-time targets to try to push throughput as far as possible, along with improving part quality. Makino was the first company to meet the part requirements and deliver a sample part, using its V56i vertical machining center.

As a part of his pre-purchase research, House visited Makino and was taken to see a mold-making customer that operates a V56i for hardened materials. Upon taking a tour, House noticed something odd. “I realized that they didn’t have any metrology equipment in the shop,” he said. When he asked about it, he was informed that the shop was so confident in the Makino’s ability to hold two-tenths tolerance that it didn’t need to do metrology. He was told that when there is a dispute, which doesn’t happen often, the shop’s policy is to go to a qualified third party to perform the measurement testing and resolve the issue.

After Fallbrook’s research was completed and the results from the test-part runs were in, it was time to prove the ROI. “We did a cost benefit analysis of the V56i over replacing
with an existing brand, looking at what could be kept in-house versus what would need to be outsourced. Through this calculation, we saw a full repayment period of two to three years,” said Markley. With leadership convinced, Fallbrook purchased a Makino V56i from its local SST representative in Texas.

In order to get the most out of the V56i and the R&D department as a whole, all operators in the R&D department were trained on the machine, and Fallbrook got to work.

**PEDAL TO THE METAL**

Partnering with SST and Makino, House and his team immediately began to test the machine’s capabilities by filling customer orders. Similar to the change in thinking it took for Fallbrook to look to mold-making technology for its prototyping needs, it realized a new perspective on the entire machining process. “We no longer have that wall—that equipment limitation which previously stopped us dead in our tracks,” House explained. “Now we have fun. For example, rather than turning on one part, we chose to helical interpolate a traction surface on a large ring and held 2 microns circularity.”

Due to the rigidity of the V56i, Fallbrook was able to increase speeds and feedrates by 55 to 65 percent on typical applications, and operators believe those numbers can eventually grow much larger with additional process optimization. “It’s the rigidity of the machine, the core cooling and the control with its ability to look ahead that’s allowing us to run at those speed ranges,” said House. “We’re still learning how to look at this as a mold maker might. As we get more familiar with the high-speed machining (HSM), we expect to see our productivity on many types of parts continue to increase. These run rates and the overall machine performance brought a huge boost in morale to our engineering machinists, Kris, Jason and Keith.”

Despite employing significantly more aggressive cutting strategies, the V56i has enabled Fallbrook to use more advanced tooling. Where previous machines would cause the floor to shake with certain tools, the V56i processes parts without any struggle—as quietly as a NuVinci N360 operates. “On the old machines, when we tried to move into more expensive tools, we would get vibration due to the lower rigidity, and as a result, we didn’t get good enough tool life to justify the investment in high-performance tools,” said House. “The V56i allows the tools to perform at their upper limit, and we can barely hear the machine running. That’s all rigidity.”

And while the tools cost more than previous tooling, the rigidity and stability of the V56i have led to tool-life increases in excess of 800 percent in certain applications. House pointed out: “The cost of the tools is about four times as expensive, but with the extreme gains we’ve seen in tool life and overall throughput, it’s still worth the investment.”

Previous concerns surrounding accuracy and finish were eliminated with the V56i, which has enabled Fallbrook to easily hold profile tolerances. House explained, “This machine is supposed to be able to cut within a 5-micron band and we have confirmed that. Thus, an additional way in which the prototype shop expects to benefit from the precision of the Makino is in reducing production part costs. “With the accuracy of the V56i, we’re actually able to machine in tiny defects just to test what the effects of loosen tolerances or production variations might be. We have confidence in the accuracy, so we can put in defects artificially to test what we may be able to do to open up our part tolerances without affecting performance, thus possibly reducing part cost.”

The company also has experienced improvements in cycle time. In one component transferred to the V56i from previous equipment, cycle times dropped from approximately eight hours to just two hours.

**PROVING COMMERCIAL VIABILITY FOR NEW INNOVATIONS**

Innovative is a word that has been used so much in business that it’s almost lost all meaning. But purely mechanical breakthroughs, truly new ideas not dependent on computers or software, are becoming more and more rare. Fallbrook Technologies was founded on a product that is unlike anything in its space and that has uses in innumerable applications. This company is the very embodiment of innovation.

For a company that’s turning power transmission on its head, it’s not enough to have designs that are good in theory. They have to be commercially viable at a cost that the market can bear. Such a company cannot deliver its products without equipment that removes the limitations on what can be produced, equipment that frees its engineers to develop anything they can imagine. The Makino V56i has made the impossible possible for Fallbrook, bridging the gap between prototyping and production readiness and proving that its innovations aren’t ahead of their time.

“Bringing innovations to market is what matters most to all of us at Fallbrook,” said House. “We’re not just here to make a profit. We want to make a positive impact on the world around us, producing lasting experiences that people can’t experience anywhere else.”

With the nature of the traction-drive principle used in the NuVinci CVT, surface finishes for its parts are vital and profile accuracy is required for proper operation.

“Not only did we reduce cycle time on critical cam features, but parts per finish tool increased four times, conservatively. Now cutting bearing-grade steels that are heat-treated to HRC 62, or any other hard steel, is no problem.”
MOLD BUILDER OF THE YEAR:
CS TOOL ENGINEERING PERFECTS THE MOLD-MAKING PROCESS

“We all know that young people are good at video games. Well, I say let’s take that passion a step further. Toolpathing a mold cavity is very similar to playing one of these games. The block of steel is the enemy, and your weapon is your CAD system and the multi-axis machine tool. Let’s make some chips!”

That’s the perspective of Don Snow, operations manager at CS Tool Engineering, who was honored as the 2014 AMBA Mold Builder of the Year for his efforts in bringing youth to the tool and die trade. Snow knows that since the economic recovery, things have changed. There’s a demand for both the people and technologies that can make this work more efficient. Being able to combine the two is key to success in this new machining world.

Snow makes a point to stay up on high-performance machining technology, such as the company’s new Makino a82 Horizontal machining center, which has expanded its capabilities and reduced cycle times by one-third while cutting setup times in half. But, like many businesses, CS Tool also needs qualified people.

“We want to encourage students who are interested in working with their hands and their brains to learn this kind of equipment,” said Snow, who has been with CS Tool for 35 years. “For a 10-year stretch, the mold machining industry didn’t bring anyone into the trade because it was simply surviving. It has now come out of that survival mode and has gone into replenishing mode. Mold shops need high-tech equipment and also need people to run it.”

YEARS OF PERFECTING THE PROCESS
CS Tool is known for its work as a Tier 2 supplier to the automotive industry. The company, located in Cedar Springs, Mich., got its start in 1967, founded by brothers Tom and Don Mabie. In early years, it made molds for smaller automotive parts, like hood ornaments, garnish trim and lamp bezels, and it was soon also producing the molds for “Star Wars” characters for Kenner Toys.

By 1981, CS Tool began a relationship with a major Tier 1 automotive supplier that still endures to this day. This work really helped it gain a foothold in the automotive industry via making molds for auto interiors and overhead consoles. Today producing plastic injection and compression molds for automotive interiors remains the company’s specialty for its Tier 1 customers, but it also continues to produce molds for various consumer products.

Over the years, the company has always updated technology to change with the times. In 1980, it purchased its first duplicator for electronic tracing, and then in 1982 obtained its first CNC equipment. The equipment upgrades continued until, like many businesses, the company went through the economic downturn that began in 2007. CS Tool managed to

FEATURE STORY
survive because it was not overextended in terms of credit, had loyal customers, and had a fast and precise machine to handle the P20 steel and Mold Max® alloy it works with.

CS Tool had purchased a Makino MCC2013, horizontal machining center back in 2003 in order to efficiently handle a large workload of injection-molded door panels and a floor console package. This machine made the company more competitive in its ability to handle large dies and molds—creating parts faster, reducing benching times dramatically and giving it the ability to promise better lead-times. CS Tool was pleased with the machine's 4th-axis table that could handle large pockets and varying angles from the face, achieving fine finishes on tight corners and walls and reducing handwork. It helped the company meet its immediate and ongoing capacity demands while improving agility. In fact, on one mold in particular, its cycle time was cut in half with the MCC2013.

So it was no surprise that by 2011, when business was ramping back up and it was time to upgrade equipment, that obtaining another MCC2013 was top of mind for Snow. When he and his colleagues approached their contacts at SST, their local Makino distributor, the people at SST asked to come out and tour the CS Tool plant to determine requirements. What did surprise Snow, however, was that the SST representatives thought that Makino’s a-Series horizontal machines would be a better choice for CS Tool’s current and expanding needs.

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ADOPTING A PRODUCTION MIND-SET

SST suggested that CS Tool purchase the Makino a82 horizontal machining center. This machine, for all intents and purposes, is a production machine tool most commonly used in automotive engine block production.

“I thought it was a bit strange that SST was recommending an a82 because we are a mold operation, not a production machining environment,” said Snow. “It wasn’t until I saw this type of machine in action in other mold shops, and talked with other owners, that I began to see the benefits.”

Snow was able to see that mold components can be machined with the same mentality as used in production machining, even when building custom components where only two pieces are alike.

“SST and these other mold makers were able to show me that the benefit comes from having the agility to switch jobs quickly—being able to spin the workpiece around, get it cutting and then getting to the next job,” said Snow. “This was a mind change.”

While investigating viability of the a82 at other mold shops, Snow also noticed a new modular clamping system being used at each of these facilities.

“This FCS clamping system caught my eye the first time, but after seeing it again and again, I had to ask SST about this system that everyone seemed to be using.”

Designed to provide quick, custom setup options for unrestricted access to five workpiece surfaces, the FCS-clamping system (Breyl) enables mold makers to spend less time on setups and more time on machining. Its flexible and repeatable clamping options are ideal for any type of workpiece, and it is advertised as turning hours of setup into minutes.

The accuracy of the machine, along with the precision work holding of FCS, has driven down costs and lead-times at CS Tool by reducing spotting and benching operations.

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Purchased in 2003 as CS Tool’s first HMC, the MCC2013 is still as accurate today as when it was first delivered.

CS Tool appreciated the pallet changer on the a-Series machine so that the company would no longer lose time during work setup. The pallet changer lets operators load and unload work while another job is cutting. These capabilities also helped improve the company’s agility, enabling it to pause and switch jobs quickly. With the full 360-degree B-axis, CS Tool was now able to machine all five sides and angled holes efficiently.

“The two-pallet system has helped our company improve utilization rates of the machines while also helping us become more agile in producing quick turnaround orders, such as the machine and be ready to make the cut for the new tool or repair,” said Snow. “It leaves no room for errors from pickup holes being wrong. The FCS has enhanced our capabilities even further. It brings value and accuracy to setups and reduces machining time, allowing the spindle to be in contact with the work even more.”

As far as the investment in the a82 and FCS system, CS Tool has found its ROI to be in the accuracy and uptime of the machine. It is seen in products such as the complex tooling the company does for its rearview mirror molds.

“We respect the quality of the Makino machines,” said Snow. “Our MCC2013 is 11 years old and is still highly accurate as day one. Day after day, we go out there and run the machines without issues. We can’t afford downtime costs. “Everyone strives to be better in this trade. Starting out, you purchase what you can afford. Then, you keep pushing the envelope as you grow—looking for ways to eliminate problems. Inexpensive machines don’t hold their accuracy. So as you grow, you try to move up with better quality. You need excellent machine flash. This means CS Tool needs its machine tools, processes, cutting tools and tool holders to give the required accuracy.

“Ultimately, we need a precise and rigid machine tool to do this,” said Snow. “And recently, we were able to spot a complex mold in two days, down from five days in our previous processes. This is because the machine’s speed provides a finer finish cut and less benching without an additional finish pass. Previously, that finer finish would cost us more machine time. The a82 helps us work faster and more accurately and produce our mold components.”

The FCS minimized setup even further because CS Tool no longer has to pick up and indicate the workpiece. The holes are always located in the block of steel to serve as permanent reference points to enable easy removal and reassembly of the workpiece on the pallet or base gages to keep the zero reference point locked in. This design facilitates engineering changes or part repair, and the original mounting holes enable quick re-clamping at the same point.

Snow says that while CS Tool operators must take the initial time to drill and tap a hole and qualify the counterbore, once that hole is made, the FCS follows jobs through engineering changes, production and repairs.

“In a matter of minutes, you can have the block, insert and slide mounted in the machine and be ready to make the cut for the new tool or repair,” he said. “It leaves no room for errors from pickup holes being wrong. The FCS has enhanced our capabilities even further. It brings value and accuracy to setups and reduces machining time, allowing the spindle to be in contact with the work even more.”

What CS Tool has found is that it has reduced its setup time considerably and is more accurate in the tools it cuts. In addition, the company is able to produce custom FCS designs and fixtures in-house, using the accuracies of a production-oriented machine.”

DEFINING QUALITY

Snow says that while CS Tool has minimized setup times at CS Tool by reducing spotting and benching operations.

For example, CS Tool may be cutting a block with a long run time. Then, an engineering change comes in. The operator is able to load that block while the machine still cuts. Operators can pick a point to stop, or pause the long-run-time application mid-process. They can then switch out the job and do the short-run order, before swapping the original long-running job back in.

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Part of CS Tool investing in its young workforce includes making the technology available that can take them through the future.

“What matters most to us is treating people how we would want to be treated,” said Snow. “And that means providing our employees with the best equipment we can.”

This philosophy of treating people well carries over to the company’s relationships with peers.

“I’ve seen that in the last 10 to 15 years of being in the trade, the relationships with peers and competitors has also helped us grow, like when we searched for our own machining solution and visited our competitors to see what machines they were employing,” said Snow.

“Even though those companies competed with us, they opened up and showed us what they do. That really means a lot.”

Relationships with customers are also crucial. Just as CS Tool’s peers shared its technology, the company has also shared its best practices with customers. In fact, one of the Tier 1 suppliers that CS Tool works with purchased an a82 machine after seeing CS Tool’s success with it.

Employees at CS Tool also work as a team to provide excellent service to customers, especially as customer requirements change.

“We pride ourselves in our relationships,” said Snow. “We want to provide the best service on all the tools we build, ultimately taking care of our customers. This includes doing service work on the tools we make. It matters a great deal to us, and is what separates us from competitors.”

“We have the equipment to do the best job possible, and Makino has helped us in that area. We are thankful to SST for changing our mind-set on how to achieve our goals.”

This capability, along with a passion for customers and building the tool and die trade, has brought award-winning results to CS Tool.
PRODUCT PROFILE

The clamping body and workpiece are connected by a single rod. Where the rod interfaces with the workpiece, there are standard metric threads, typically M12 by 1.75 or M16 by 2.0. On the opposite end of the rod, a serrated feature fits into the clamping unit to fasten the workpiece securely to the base gage plate. When the final assembly is tightened, the tapers on the rings are guided into precise location.

FCS is incredibly simple to deploy, even for novice operators, despite the complexity behind the system’s design. With the prevalence of skilled labor shortages and growing demands to reduce scrap and unproductive time, this clamping system enables mold makers to simplify manual-labor activities and eliminate setup error.

Companies using FCS systems have reported an average 88 percent increase in production time, which translates to higher machine utilization and lower costs. Additionally, faster equipment and pallet changes mean a more standardized work process for improved workpiece quality and consistency.

Advanced users of FCS can also take advantage of the optional Guideline software, developed by BKC of Italy. This virtual design software enables users to design FCS work-holding systems based on the CAD model of a workpiece. Guideline software projects the FCS grid onto the workpiece to calculate the most efficient workpiece positioning for machining and chip evacuation. After checking for possible interferences with other holes, it automatically arranges the fixing seats based on the dimensions of the workpiece and combination of pallets and clamping available.

FCS is available through SST (Single Source Technologies) and can be purchased in a variety of package offerings, including a basic package that features a base gage plate and clamping components, which are available in lengths of 40, 80 and 120 mm. SST also offers services to help FCS users develop the most effective fixturing.

For more information on FCS modular clamping system, or to place an order, visit singlesourcetech.com/FCS or contact SST directly at 1-877-228-2884.

Further enhance the die and mold processing capabilities of FCS by also checking out SST’s new line of NV Tool carbide endmills. For details, visit page 24 in this issue of Competitive Mold Maker.
Here are 10 tips to keep in mind:

1. Ensure that your site is easily navigable: Page navigation is critical to the user experience, so the layout of your site should enable visitors to quickly and easily locate the information they care most about. Nomenclature and being intuitive to use are important, too. Use names that clearly describe specific areas of your website, and provide global navigation to facilitate exploration.

2. Provide visitors with a simple and appealing design: Have a straightforward layout with plenty of white space and no clutter. Include easy-to-find contact information. This seems like a no-brainer, but often companies miss the mark here. Use professional photos and easy-to-read forms. Be bold and concise with headlines.

3. Develop unique and engaging content: Provide content that demonstrates how your company’s capabilities and successes stand out from the crowd. Identify the primary key messages that you want visitors to take away about your business. Share your company’s personal story or background, along with what makes it unique. Offer customer case studies and testimonials that effectively demonstrate your value proposition.

4. Build your site for multi-device compatibility: Responsive website design can help ensure compatibility across all devices and the most commonly used browsers, automatically adapting layout to fit a variety of screen sizes and user interface devices. With over 114 million smartphone users in the United States, it is important to think mobile, ensuring that the site works well with both smartphones and tablets.

5. Structure your website for search engine optimization: Develop a short list of keywords most relevant to your business, industry and location, integrating them within prominent locations of your website. Remember that search engines crawl a page from top to bottom, so to optimize your site, make sure that the URL, page title, header tags and body copy contain the ideal keywords for that content. Ensure that metadata for all pages within your site is unique and pertinent to the content on that page.

6. Use video to enhance the user experience: If a website relies too heavily on text to convey all of its messages, visitors can quickly become overwhelmed with information. Photos and videos offer an alternative means for providing information in a simple and easily digestible format. Make sure that video is suitable quality, and do not overuse it to the point that it becomes a distraction to other information that you want visitors to see. Resize and reformat this media to ensure fast page-load times.

7. Tell audiences what you want or need them to do: Ensure that a call to action is clearly visible on each page. The “contact us” button should be included within the global navigation so that it is accessible from any page.

8. Get social: If your company has a presence in social media, be sure to inform your website visitors by prominently displaying social media icons within the global navigation.

9. Internal Linking: Internal links are links that go from one page to another on the same domain. These types of links are useful because they allow users to easily navigate a website, preventing them from getting stuck on a particular page without options for additional navigation. Internal links also help establish information hierarchy, and they help spread ranking power around websites.

10. Test and update! During and after website development and implementation, it is critical to test all pages and functionality thoroughly, using multiple browsers and devices to effectively identify any errors prior to launch. Also remember that a company website is never “done”—it should grow and change as technology and user behaviors change.

When designed and programmed well, a website can help you grow leads and develop new business opportunities. Whether designing the website yourself or seeking third-party support, following these tips can help you make the most of this important business tool.

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Today’s mold-making processes require innovative cutting-tool technologies that are capable of delivering the highest degree of precision, flexibility and efficiency. With its latest line of endmills, NS Tool equips manufacturers with capabilities for boosting productivity and maximizing output in high-performance hard milling.

NS Tool specializes in very high-precision, small-diameter tools. Their intense focus on the tiniest detail in creating their product translates into products that perform consistently superior to most of their competitors. The fine details of quality are so precise that one must magnify the cutting edge thousands of times to see how flawless each cutting surface is.

Endmills from NS Tool feature a variety of coatings and flute designs, offering a solution for any modern mold-making challenge. Many of them have NS Tool’s patented MUGEN premium coating, which features a hardness of 3,600 HV for longer and more stable tool life in the machining of hardened steel (48 to 65 HRc) applications. MUGEN premium coating is widely known for its excellent heat resistance, making it ideal for dry, high-speed-cutting operations. Although originally designed to cut hardened steels, MUGEN premium coating has proven to provide excellent wear resistance to machine steels in the lower hardness range. Tools with this coating are designed to deliver superior levels of accuracy and finish.

Combining NS Tool’s exceptional attention to quality with advanced coating technology equips the MUGEN premium coating with outstanding characteristics. These high-precision, small-diameter tools can consistently create the tiniest details for excellent finishing capability.

MSBH230
The MSBH230 ball endmill features a two-flute, 30-degree helix design with MUGEN premium coating. This tool is capable of producing superior surface finishes in hardened materials ranging from 48 to 65 HRc. Its unique cutting-edge design reduces chatter and increases strength to eliminate possibility of chipping.

MRBH230
The MRBH230 long-neck ball endmill also has MUGEN premium coating, and it is ideal for machining rib features in hardened materials ranging from 48 to 65 HRc. Similar to the MSBH230, this model features a unique two-flute, 30-degree helix design that reduces chatter and increase cutting-edge strength to eliminate possibility of chipping.

MSBH345H
The MSBH345H is a three-flute ball-nose endmill. Its spiral shape, coupled with unequal flute spacing, yields excellent performance in alloy steels, stainless steels and other heat-resistant materials.

MRBTHNH345
The MRBTHNH345 is a three-flute, long-neck ball-nose endmill. The additional flute enables increased productivity without sacrificing finish. MUGEN premium coating provides the wear resistance and toughness to machine steels and other materials with hardness up to 65 HRc.

MSXH440R
The variable helix angles and pitched flute design of the MSXH440R micro-grain solid-carbide corner radius endmill has the ability to suppress chatter for stable milling conditions in a variety of applications. The 40- and 42-degree helix angles of this MUGEN-coated tool deliver excellent performance in alloy steels, stainless steels, titanium and other heat-resistant materials.

MSZ345
The MSZ345 is a MUGEN-coated square endmill with Z-axis plunging capability. Its ability to center cut, drill and side mill in the same tool makes the MSZ345 an ideal solution for opening up pockets. The tool has a three-flute, 45-degree helix design with chip-breaker in the end that provides efficient cutting in steels, stainless steels and pre-hardened steels.

These endmills yield superior performance, excellent finishing capability, durability, longevity and high performance in hard-milling applications.

NS Tool endmills are available at Single Source Technologies (SST) throughout North America.

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For people who make what matters, tool life is critical. Which is why these companies chose Makino. They appreciate how Makino’s comprehensive approach to machine design extends their tool life. But mostly, they’re thrilled with how Makino has helped their cost per part and improved their efficiency and profitability.

Read their stories and watch their videos and cutting demonstrations at makino.com/tool-life.

"OUR TOOL LIFE’S BEEN EXTENDED UP TO 23 PERCENT, WHICH HAS LOWERED TOOL COSTS BY ROUGHLY 15 PERCENT. AND OUR PRODUCTIVITY HAS INCREASED AROUND 25 PERCENT."

"WE’VE SEEN NOTICEABLE DIFFERENCES IN TOOL LIFE AND LOWER TOOLING COSTS."

"EXTENDED TOOL LIFE AND REDUCED TOOL BREAKAGE HAVE DECREASED OUR OVERALL TOOL COSTS BY 30 PERCENT."
The D800Z is the newest addition to Makino’s family of 5-axis vertical machining centers. Joining the Makino D-Series (D300 and D500), the D800Z is designed for high-performance job shops, precision parts machining, die/mold and aerospace applications.

Like the other two D-Series machines, the D800Z offers easy access to the spindle and table, a highly rigid structure for responsive cutting, outstanding surface finishes and optional automation devices. Workpieces of up to 1,000 mm in diameter and 1,200 kg in weight can be machined in five axes, with great efficiency and fewer operations for reduced production time.

Large-part 5-axis machining can present numerous challenges, due to the size, weight and range of features found on large components;
The D800Z (#40) offers a standard Cat #40 (or optional HSK-A65) 14,000-rpm spindle. As an option, the D800Z (#40) can also be configured with a 20,000-rpm HSK-A63 spindle. The D800Z (#40) incorporates a 40-tool magazine. The D800Z (#50) offers a standard Cat #50 (or optional HSK-A100) 12,000-rpm spindle. As an option, the D800Z (#50) can also be configured with an 18,000-rpm HSK-A100 spindle. The D800Z (#50) incorporates a 48-tool magazine. The range of spindle offerings gives the ability to customize the machine to suit a wide variety of machining applications. Feedrates of 56,000 mm/min. on the X-, Y- and Z-axes, and 18,000 deg/min. (50 rpm) on the B- and X-axes ensure productivity.

Also featured on the D800Z is Makino’s proprietary, next-generation Super Geometric Intelligence (SGI.4) software—developed specifically for high-feedrate, tight-tolerance machining of complex 3-D, contoured shapes involving continuous tiny blocks of NC data, which ensures production rates faster than standard CNC systems while maintaining high accuracy. SGI.4 has the lowest cycle time and costs achievable by reducing machining cycle times on dies, complex cavities and cores, and aerospace parts by as much as 40 percent, when compared to most other control technologies. Easy-to-apply functions are included to prevent interference between the spindle and trunnion during automatic operation, eliminating collisions.

This machine comes with a two-sided front-door design, for easy access to the spindle and table for setup purposes, and a large window for enhanced visibility. The machine’s compact size of 3,200 mm x 5,070 mm x 3,600 mm requires less floor space, and its intelligent design facilitates maintenance activities.

The D800Z has also been designed to lower a shop’s operating costs through reduced energy consumption. The machine’s compact size of 3,200 mm x 5,070 mm x 3,600 mm requires less floor space, and its intelligent design facilitates maintenance activities.

Watch a free webinar to see Makino technology in action.

Click to view these webinars:
► Considerations for Large-Part 5-Axis Machining Systems
► Unique 5-Axis Machining Techniques for Mold Lifiers, Inserts and Cavities

Go to makino.com/library
SURFACE FINISH IS HUGE.

[Especially at tolerances this small.] When you’re machining to less than 100 microns, you need to be prepared to deliver an unsurpassed level of surface finish in hardened steels with every job. With its patented MUGEN premium coating tools, NS Tool gives you exactly what you need to deliver the small-feature accuracy, consistency and durability the industry demands.

To learn more about the NS Tool offering, talk to SST at 877-228-2884.
Or visit SingleSourceTech.com/NSTool.

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