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CNC West

December 2015/January 2016 • Volume XXXIII No 2

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A Northern California shop uses what they feel is the best equipment available including the PH20 from Renishaw
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Tina and Kevin Sanchez have built a reputation for precision. They partner with top of the line manufacturers like Mori Seiki, Mazak and Zeiss who share the same reputation.
- Pg.30



Bogue Machine Company in Albuquerque specializes in Aerospace Precision
- Pg 44

Coming in February/ March 2016

This issue will look at the aerospace and defense industries. These two industries are vital to the west coast, especially the Pacific Northwest and southern California. We will have articles on shops that specialize in these two industries and the machines and methods that make them successful.

Editorial: Jan 18, 2016

Ad Space: Jan 22, 2016

Ad Material: Feb 1, 2016



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Dec 2015/Jan 2016

The oldest regional industrial publication serving the Western States manufacturing managers, owners and engineers from 1 employee to those larger plants of 5,000 or more. Its editorials feature numerical control applications in all size machine shops, tooling, programming, robotics and shop operations, training personnel, financing of new equipment, cutting tools and all related manufacturing requirements. Coverage extends to all of Arizona, California, Oregon, Washington, Nevada, Utah, Idaho, Colorado, New Mexico and Texas.

Founder:

(714) 840-1300 FAX: 840-5555
 Email: sarnold@cnc-west.com

Thomas F. Arnold (1927 - 2009)
PRESIDENT/PUBLISHER:

Shawn Arnold

EDITOR: Sean Buur

CIRC. MNGR: Charlene Strawbridge

PROD. MNGR: Linda Arnold

PROD. ASST: Jennifer Hallman

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REMINISCING

Talking to someone at an Open House recently I realized that I have been in the machine tool business for 36 years. I spent my first two years at the now defunct Hitachi Seiki working in the parts department learning about the business. I then went to work with my father and his publication Machine Tools West. A year later we started CNC WEST in 1981. Now days I have taken all that he taught me and run both magazines. In all that time I have seen a lot of changes but a lot of things are the same too.

Some of the things that are the same are that the shops that invest in good equipment and do what they can to keep their good employees become luckier than those that don't. I have learned that every year I am shocked by an advertiser that does not renew their ad schedule with us and every year I pick up one or two that I did not think was going to advertise with us and it all evens itself out.

I have seen that there are people who LOVE publicity on their shop and there are those that are quite secretive. Our job is to find the ones that want to tell the world their story. It is not as easy as you think and it has been this way for as long as I remember.

I remember seeing my dad at trade shows wondering why he still did them when he had me to do them for him. Now I understand. This business gets in your blood. I love talking to people at shows and hearing about what they make and seeing their passion. That is another thing the same over the years, those with a passion for the job usually are doing pretty well at it.

This issue has quite a few stories with shops and people with passion and good equipment. I hope you enjoy reading them as much as I did. Makes me want to work another 36 years.

Sincerely

Shawn Arnold

Shawn Arnold

Publisher



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EXEC HOTLINE

Another Acquisition for L.A.'s Reliance Steel

Downtown Los Angeles-based metals service provider Reliance Steel & Aluminum Co. said it has agreed to buy Tubular Steel Inc. of St. Louis, which processes and distributes metal pipe, tubing and bars. The transaction amount was not disclosed.

Tubular has eight locations in the United States and its purchase will allow Reliance to expand its product offerings and diversify its customer base, Reliance said. Tubular's 2014 revenue was about \$200 million, according to Reliance. The deal should be closed in early 2016, pending regulatory approval and other closing conditions.

Reliance owns at least 300 metal services centers as part of a business model that has made it the largest metals processor and distributor in the country. The purchase of Tubular is the first for the company in 2015 after buying three businesses in 2014.

Military Contractor Wins \$42M Navy Job

Mercury Defense Systems, a subsidiary of Chelmsford, Mass.-based Mercury Systems Inc., was awarded a \$41.8 million contract from the U.S. Navy in late November. Mercury will manufacture 200 miniaturized Digital RF Memory modulators for the Navy by November 2020.

The work will be carried out in the company's facility in Cypress, CA.

Aerojet Soars With Space Contract

Aerojet Rocketdyne Holdings Inc. announced in November that the company had won two major NASA contracts worth \$1.4 billion.

The rocket engine manufacturer will do work at its Chatsworth campus on both contracts.

One is for the RS-25 engine for the Space Launch System, a contract valued at more than \$1.2 billion through 2024. The Space Launch System is NASA's next generation heavy-lift rocket that will take astronauts on missions into deep space, potentially even to Mars. The RS-25 engine is an updated version of the Space Shuttle's main engine. Four of the engines will be used on the SLS rocket.

The other contract, valued at \$200 million,

is the service module propulsion system for the Crew Space Transportation Starliner capsule, which is scheduled to begin transporting astronauts to the International Space Station in early 2017.

The main contractor of the program is Boeing Co., in Chicago. Aerojet Rocketdyne's contribution is four launch-abort engines, 24 orbital maneuvering and attitude control engines and 28 reaction control system engines, along with their associated hardware.

Faraday Future Plans Big Reveal

While mystery has been surrounding Faraday Future, an electric-car company in Gardena, CA. that is modeling itself after Tesla Motors, company officials just announced they will offer a firsthand glimpse in January of their concept car at the 2016 Consumer Electronics Show in Las Vegas, the Motor Authority reports.

Company officials are releasing few details about the upcoming reveal other than to say they will offer "a new concept inspired by our design and engineering vision for the future of mobility."

Faraday Future is apparently backed by a company in China that is owned by one of the richest men in that country.

SpaceX Challenged by Jeff Bezos' Vertically Landing Rocket

Blue Origin of Kent, Wash. on November 23 launched a rocket into space and landed it back on earth vertically, making history and creating serious competition for Elon Musk's rocket company SpaceX.

SpaceX of Hawthorne, CA. first landed a rocket vertically two years ago, but that rocket didn't go into space. Blue Origin's New Shepard rocket reached 329,839 feet before returning to touch down on its Van Horn, Texas concrete landing pad. The ability to land vertically is prized because it allows rockets to be reused and may increase the frequency of launches.

Blue Origin is a rocket company founded by billionaire and Amazon Chief Executive Jeff Bezos. The company aims to launch tourists as well as payloads into space.

Continued on page 86.....

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- Steve Thiele

Bradhart Products, Brighton, MI

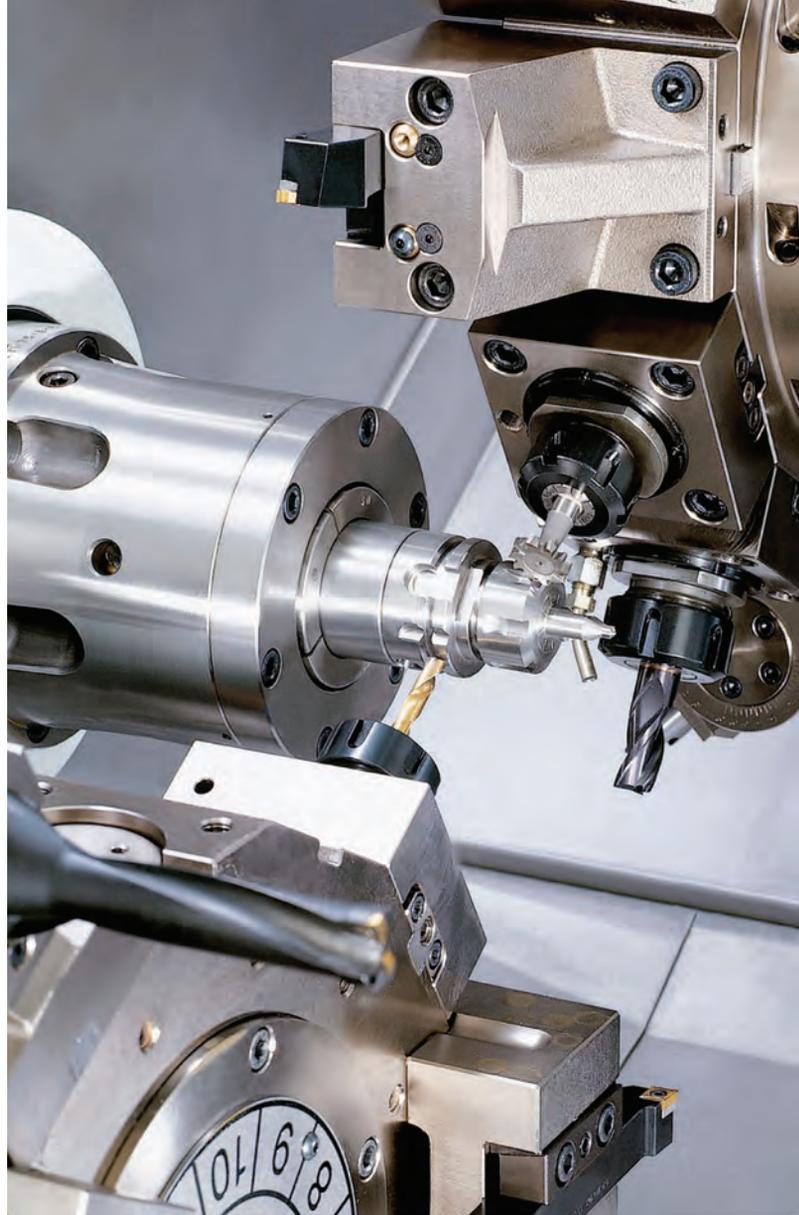


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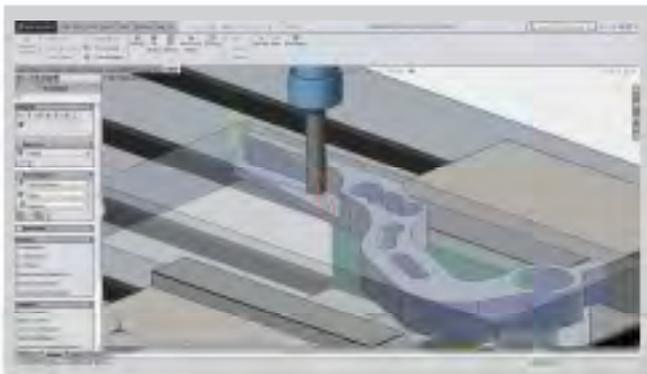
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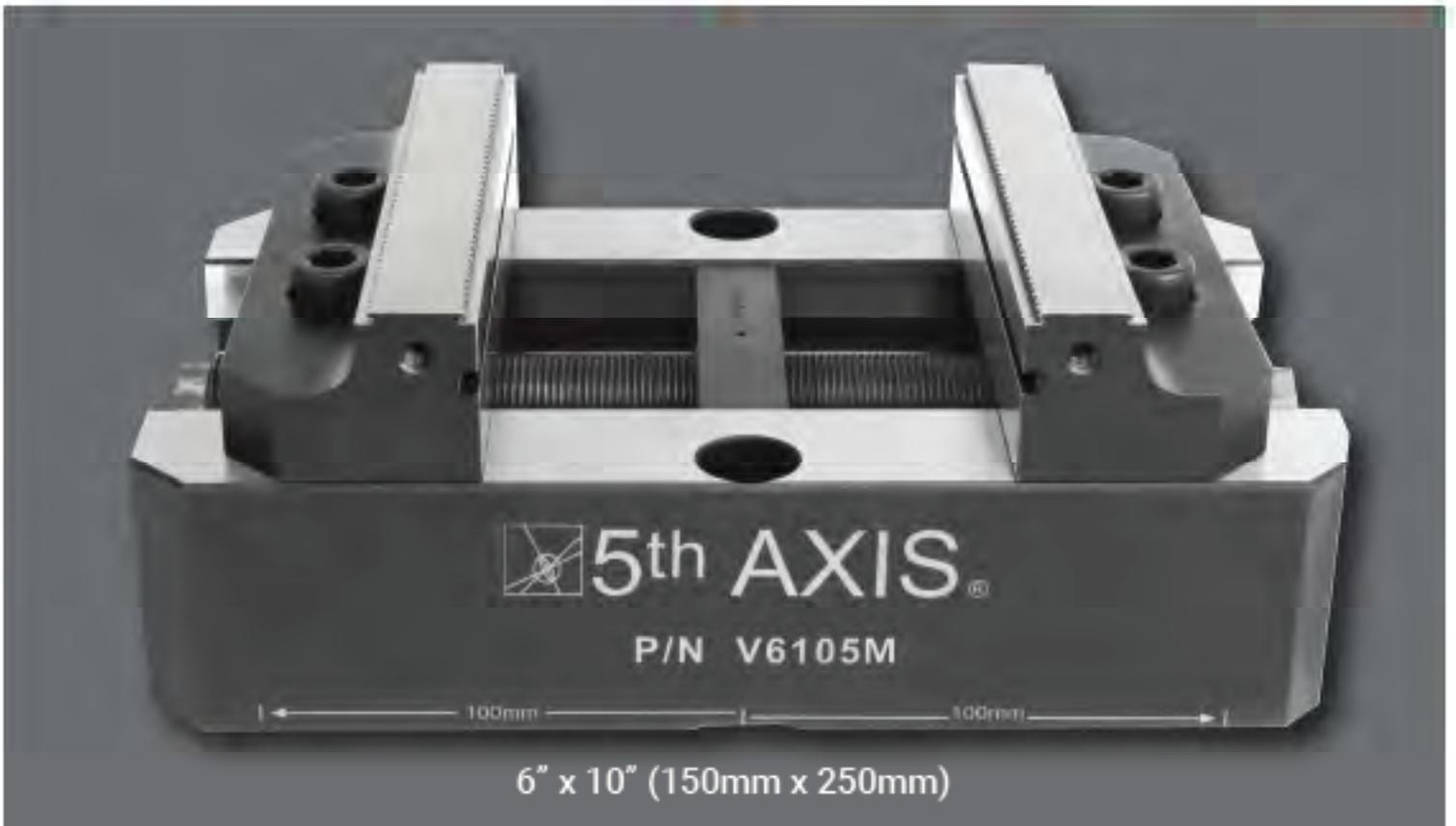
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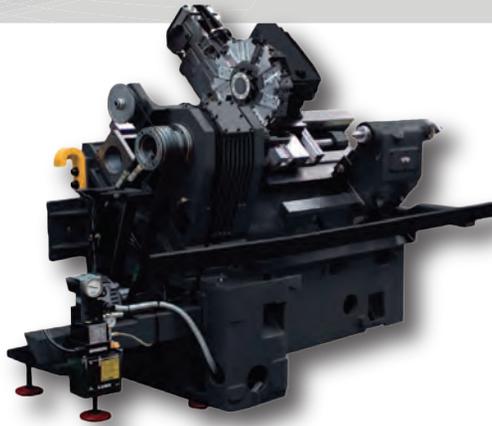
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						Part Number	Set Price	Part Number	Set Price
Kit B206 HS06	6"	0.472	10MM	0.787	2"	KT-6200F	\$ 30.31	RKT-6200A	\$ 71.87
					4"	KT-6400F	\$ 86.81	RKT-6400A	\$ 108.89
Kit B208 HS08	8"	0.551	12MM	0.984	4"	KT-8200F	\$ 39.68	RKT-8200A	\$ 84.48
					4"	KT-8400F	\$ 67.48	RKT-8400A	\$ 150.00
Kit B210 HS10 N210	10"	0.630	12MM	1.181	2"	KT-10200F	\$ 44.31	RKT-10200A	\$ 124.97
					4"	KT-10400F	\$ 72.75	RKT-10400A	\$ 201.19
Kit B12 HS12	12"	0.709	14MM	1.181	2"	KT-12200F	\$ 63.49	RKT-12200A	\$ 169.18
					3"	KT-12300F	\$ 95.20	RKT-12300A	\$ 255.35
Kit B212 N212	12"	0.827	16MM	1.181	2"	KT-12208F	\$ 63.49	RKT-12208A	\$ 169.18
					3"	KT-12308F	\$ 95.20	RKT-12308A	\$ 255.14

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B210, HS10	10"	KT-100HJ2-U	\$328.00
B-12	12"	KT-120HJ2-U	\$369.65
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HAAS BT40	M16-2.0	.590	45°	Yes	B40-4500H	\$ 21.71
HAAS CAT40	5/8-11	.589	45°	No	C40-4501S	\$ 16.88
Fadal CAT40	5/8-11	.740	45°	No	C40-4500S	\$ 14.48
Okuma CAT40	5/8-11	.589	60°	No	C40-6000S	\$ 16.88
Mazak CAT40	5/8-11	.740	45°	Yes	C40-4500H	\$ 15.00
Mori Seiki CAT50	1-8	.905	90°	No	C50-9000S	\$ 20.81



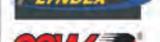
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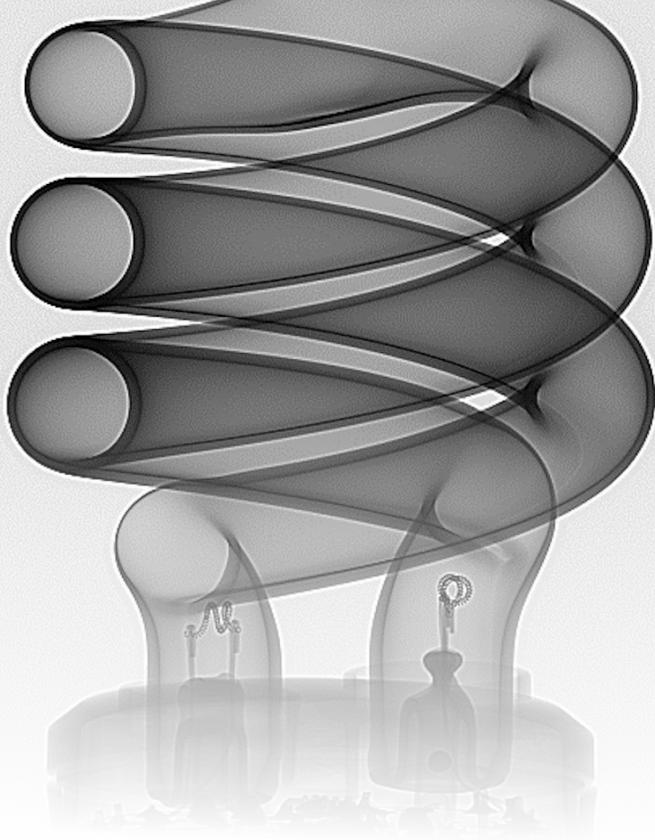


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APEX 2016
Booth #255

Product Review—

New Shear Brilliance Punching and Shearing Cell with Linear Drives



Prima Power introduced linear drives for sheet position in integrated punching and shearing in late 1990's. Since then, fabrication technology has been revolutionized by servo-electric technology, and this has now been applied to the Shear Brilliance product range. The new Shear Brilliance is constructed with the latest composite materials, servo-electric technology, and linear drives to achieve impressive performance values for higher productivity in versatile and flexible fabrication.

The new, fully servo-electric Shear Brilliance features linear drive technology for fast sheet positioning and according to Prima Power raises manufacturing speed and productivity up to a new level. With long travel of the 4,070 mm coordinate table full 3,100 working area for punching and shearing can be used without repositioning, accurately and at great speed. The sheets are pre-positioned during machine operation which reduces loading time considerably.

In loading, the production time is maximized due to loading in hidden time. Also the fast 1,300 hpm punching speed adds productivity. Shear Brilliance offers a huge tooling capacity in a 24 or 30 station turret which the company reports ensures minimum set-up times and maximum tool quantity in single set-up. Tool sizes can be chosen by the customer, which adds flexibility required in modern production.

Up to 35 tons of servo-electric ram force, which Prima Power reports is the highest available in servo-electric punching - allows very complex contours, using one hit instead of two. As fewer hits are needed production is faster.

Despite this, the ram force speed has not been compromised.

Automatic clearance setting of the intelligent servo-electric right angle makes changing from one material thickness to another automatic and fast, saving time and adding productivity. A wide range of thicknesses can be sheared, up to 5 mm aluminium (5 mm mild steel, 3 mm stainless steel). Maximum sheet size for punching and shearing is 3,100 mm x 1,565 mm.

Flexible automation

Loading, part exit and scrap removal are automatic in the standard Shear Brilliance delivery.

Prima Power has engineered a wide range of modular technology for automating the fabrication process further.

Equipped with a COMBO storage Shear Brilliance can be used for extensive runs of unmanned operation. For automatic component handling, sorting and stacking systems and robots are available.

The COMBO storage can also be used for buffering ready components. If it is used only for raw material, a highly productive optional feature is available for loading single sheets the PSBB line is an excellent solution for lights-out production of production of even the to the machine with a special gripper. Thus the COMBO storage crane has a dual function: handling sheets stacks on cassettes and loading individual sheets.

Shear Brilliance can also be integrated with bending.



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DP PRODUCTS



Article & Photos by Sean Buur

DP Products Inc. President and owner Danny Papadatos.

DP Products Inc. President and owner, Danny Papadatos, has been in the machining business for 37 years. It started for him at a vocational high school and progressed from there. He “fell into the trade” when he got a job at a local San Jose, CA. machine shop. With an aptitude for machining, he continued his education through various community college programs and hard work.

“The first shop I worked in is where I picked up what I call my trade secrets,” describes Danny. “We do things a little differently here at DP Products and those differences are my competitive advantage.” Where most would run a particular

job on a mill, Danny and his team might not. His outside the box, can-do thinking is what draws customers from around the world for their short run and prototype needs.

Danny realized the old saying of “hard work is rewarded” is very dependent on the people you work for. Over the years he felt like he was being controlled, held back, and stuck inside a box. “I came to this country with my family when I was 7 years old from Greece,” tells Danny. “America is touted as the land of opportunity, but you have to take that opportunity and do something with it. I had engineering friends in the business that encouraged me to undertake side projects for them. For the longest time I didn’t. Then one day I did, and things took off from there.” Danny emptied out his bank accounts; sold everything of value that he owned, and in 1992 opened up a 7,000 sq.ft. shop with two manual mills, two manual lathes, two CNC mills and common tools like grinders, and measuring instruments. “I’ve always worked hard and given everything I had, but it was different doing it for myself. I liked that the lid of the box was open for me.” He hired a sales guy and reinvested everything he made back into DP Products. Soon he was able to work full time for himself, and he has never looked back.

Danny discovered right away that manufacturing parts on a vertical mill wasn’t a difficult task, and subsequently the price per part was getting lower and lower because of over saturation of shops with that same ability. So he moved the shop to a larger facility and began adding equipment with more capabilities. “As a small shop, versatility is important because you don’t know what is coming in the door next,” explains Danny, “I

made an investment in a 5 axis Mazak Vari-Axis 630 and that opened up a lot of doors for us as a company. The 630 is a medium size machine that lets us run a variety of parts on it.” DP Products found their niche in tight tolerance, high-end 5 axis parts machined from exotic materials like Molybdenum, Invar, Super Invar and Kovar. “Simple or basic parts for us are boring to manufacture,” touts Danny. “The pressure is always on in this industry and high complexity really wakes us up and keeps us sharp. We do a lot of prototype work here. Not many shops can make money doing that, but we are really good at it.

THRIVING ON CLOSE TOLERANCE 5-AXIS PARTS

I have trained the majority of my programmers and machinists and they are the best at what they do. We manufacture parts that require more than pressing the button and walking away, they require skill and focus above the average machinist's abilities. If you come to work at DP one of two things will happen. I will either break you, or you will become a star with the talents to get a job anywhere you want in the world."

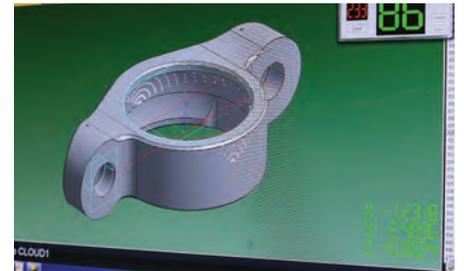
DP Products is ISO9000 certified and working towards their AS certification. Most of what they do falls under the label of aerospace and medical but microwave, semi-conductors, and satellite parts also find their way into production. "Complex parts are what we are good at regardless of the industry," describes Danny. "Providing my employees with the best tools to do their job is a big reason for our success." Everything from the NX software and Mazak machining centers down to the Mitutoyo CMM with the Renishaw PH20 head are all calculated purchases to streamline the operation and deliver the best possible products.

"Mazaks are the finest piece of equipment out there for my money," tells Danny. "They offer mills, lathes, 5-axis, large and small. Most of the other sales companies have to rep different brands to be able to cover all the bases. Mazak has everything we need. Uniformity is a big deal in a shop this size, and an employee not having to learn 10 different controls is a big plus." According to Danny, "Cutting down on variables leads to fewer problems on the shop floor and in QC." Mazak has always offered him great service and support. "We are a turnkey shop with multiple machines such as Mazaks, a couple Haas machines, a Matsuura, a few Fadals, grinding machines, and a brand new Sodick wire EDM."

One of the latest purchases made by DP Products is a Mitutoyo CMM Crysta Apex EX with a Renishaw PH20 5-axis head on it. "We were looking into getting a new CMM for a long time," tells Danny. "I had my QC manager, Ryan Osuna, do a lot of research on the various different brands and we chose the Mitutoyo. One of the good things about Ryan is that



Danny has been a big supporter of the Mazak brand for a long time. He feels they give the best bang for his buck and likes that they offer every size and type of machine he might need. The uniformed controls that Mazak machines have leads to fewer mistakes made on the shop floor. DP Products' 17,000 sq.ft. manufacturing facility includes mills, lathes, 5-axis machining centers, grinders, wire EDM, and a state of the art quality lab to support their complex parts made out of exotic materials.



Ryan Osuna checks a titanium bearing housing with an 8ra finish and two thousandths positional tolerance. It only takes about 15 minutes to check with the Mitutoyo CMM and Renishaw PH20 head. Before DP Products got the new machine, it would have taken him nearly an hour to inspect.

he is one of those gamer guys that just eats up any technology I throw at him. He took to the new machine and CMM Manager Software very quickly and didn't miss a beat."

"I like the Mitutoyo machine a lot for its simplicity of use," describes Ryan. "But the primary reason we selected it was because of the Renishaw PH20 head. It cuts down two-thirds of the time and is the real super star of the package." The Mitutoyo was custom built for DP Products in Japan where the PH20 head and CMM Manager Software were added, fit into place, calibrated and tested before being shipped to San Jose and installed in the quality lab. "For accuracy I give it an A," continues Ryan. "Over the length of the work envelope it is accurate in X, Y and Z within three tenths. I see it repeat within a tenth on any angles I'm running."

Unlike conventional CMM measurement methods, Renishaw's 5-axis technology uses synchronized motion of the CMM and the head axes to minimize machine's dynamic errors at ultra-high measuring speeds. It is the same technology

used on their high end REVO system. On a part with 600+ touch points it saves Ryan an immense amount of time all while adding to the accuracy of his measurements.

Like the Parthenon is dedicated to the Greek goddess Athena, Danny pays tribute to the machining deities through precision and accuracy. "Complex 5-axis parts, exotic materials and close tolerances are where we thrive," concludes Danny. "We are excellent at perfecting our processes and have excellent equipment and know our game. I work hard to educate my employees to be on top of their game. Meeting bare minimum requirements doesn't fly here at DP Products. The bottom line is, using up the tolerances on the print are only for a worst case scenario. We are calibrated for us to be on, and we stay on. We like to have perfect, high quality parts and our customers demand it." Word of mouth has always got DP Products work. With no shortage of manufacturing in the area, it is a true testament to their abilities when customers seek them out for complex and challenging parts.



DP Products manufactures parts for a variety of industries including medical and aerospace. On the left is a medical instrument made of 17-4 with full 5-axis and turning work. After machining, these two parts go on to be e-beam welded. On the right is another full 5-axis part made out of titanium for an aerospace customer. The features of this part consist of 3d machining, threading, port holes and positioning tolerance of five thousandths.

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Renishaw reports unlike conventional touch-trigger measurement methods which rely on speeding up the motion of the CMM's 3-axis to measure quickly, PH20 utilizes the head motion technology developed for the multi-award winning REVO system to minimize the dynamic errors of the CMM at higher measurement speeds.

PH20's unique 'head touches' allow measurement points to be taken by moving only the head, rather than the CMM structure. Points can be taken faster and with improved accuracy and repeatability. Furthermore, 5-axis motion eliminates time spent indexing the head. Together these speed increases typically result in a 3-fold improvement in throughput over conventional systems.

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Article & Photos by Sean Buur



SPECIALIZING IN PROTOTYPE AND SHORT RUN PRODUCTION OF HIGH PRECISION PARTS FOR THE DEFENSE INDUSTRY

The husband and wife team of Kevin and Tina Sanchez own and run Diversified Tooling Corp. in Albuquerque, New Mexico. Kevin was born and raised in Albuquerque, while Tina arrived in the land of enchantment with her parents when she was 11 years old. Neither family came from a machining background; and after 25 years of marriage their parents still don't know exactly what it is that they do.

Kevin found his way to machining because he needed a job and Tina stumbled upon it because of a special guy. Together, they fell in love with each other and the industry. "I started at a local shop sweeping floors," tells Kevin. "I progressed from sweeper to big green button pusher, and on from there." His experience continued to grow and he was doing setups, programming and eventually landed as the shop's quality manager. He jokes that he became quality manager because no one else wanted the job, but you can tell right away this man loves precision and it was a job he was born to do. "There are not a lot of pure quality guys out there because the number of job openings is limited," explains Kevin. "If the shop has 40 machinists the might have one or two guys dedicated to quality. It is a rare skillset and you don't find many shop owners with my background."

Tina learned the trade by watching Kevin and working at the same shop after school, but in 1994 they ventured out on their own to a small industrial unit with a single Sodick wire EDM machine. There were very few companies in the Albuquerque area that offered wire EDM back in the early 90's. It was a good niche to start a company with instead of buying a mill or lathe and competing with everyone else doing the same thing. Diversified has evolved a lot since then with Tina now piloting the company from the front office instead of in the shop with Kevin. "I used to run the machines with Kevin when it was just the two of us," explains Tina. "Now I handle everything but the machining. I manage all the material ordering, scheduling, and customer service while Kevin is busy manning the QC department and running the manufacturing." Their 6500 sq.ft. manufacturing facility houses state of the art milling, turning, EDM and QC with a current staff of six.

Diversified Tooling's forte is tight tolerance prototype and short run production. They do a lot of R & D for the defense industry in alloys such as aluminum, stainless, Invar and Kovar. "The Invars and Kovars are similar to stainless," explains Kevin. "They are specialty metals that not everyone is experienced in machining." With less susceptibility to thermal expansion these alloys are used frequently by industries that utilize lasers and

Right - Tina and Kevin Sanchez have built a reputation for precision. They partner with top of the line manufacturers like Mori Seiki, Mazak and Zeiss who share the same reputation. The shop is equipped with: Mazak FJV-250, Mori Seiki DuraVertical 5100, Fadals, Mori Seiki CL2000, Agie Charmilles CUT200 Sp, and a Zeiss Contura G2

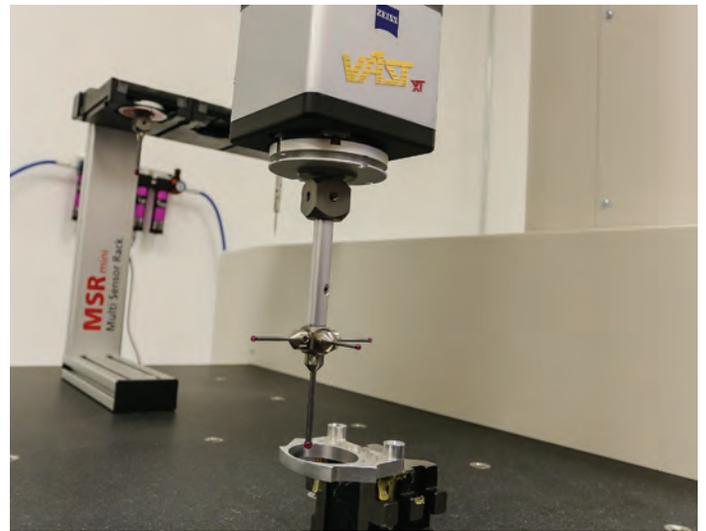
Opposite page - Not many owners come from a quality background, but Kevin's proclivity to perfection has attracted customers who share the same desires.

similar technologies. If you shoot a laser really far a little bit of change has a big effect. These alloys don't expand as much so keeping a tighter tolerance is made easier. Diversified is in on the ground floor of the design phase when their customer starts to R & D whatever it is they need. "There are several defense contractors in the area like Sandia Labs, Los Alamos, Air Force Research Laboratory, and Starfire Optical Range," tells Kevin. "These local companies are doing everything from solar to defense. Half of what we do we can't even talk about." Many of the projects the Diversified team works on have never been done before. Through a close working relationship between themselves and the customer's engineering squad they are able to produce a final product that not only functions, but meets every spec, and can be produced cost effectively.

Everyone in the shop has the ability to do everything, but they all have unique skill sets that help them excel in certain areas. Dean Smith is the primary mill guy. He does all the programming and setup on the ultra fast and super accurate Mazak FJV-250 and Mori Seiki DuraVertical 5100 vertical machining centers. Since Diversified does mostly prototype work they don't have a lot of parts loading and unloading. If they manufacture 30 of something it is considered a large run. "Nothing runs for days, weeks or months here," tells Kevin. "That's the way we like it, it's our niche. People who make thousands of parts are really good at making thousands of parts. If someone comes to us for 1000 parts we are not cost effective. Our mentality is not in that kind of manufacturing."

Diversified Tooling fell into the business of prototype style work by default. As a quality guy Kevin is very meticulous, and that doesn't lend itself to running thousands of commodity parts. If a part doesn't pass spec, or is even close to not passing it never leaves the shop, no exceptions. "I think the fact that I'm so picky about hitting all the marks we built our customer base up with similar desires," explains Kevin. "Factory automation tooling was how we started out, and that is almost the same as what we do now, just in a different industry." Their customers will have a product coming on line and need the fixture to make that happen. There is more concern about timing, and perfection than with cost. This falls right in the hands of Diversified's expertise. "Our customers want a perfect part that hits every mark. That kind of quality comes at a price because it takes longer. We have customers who want 100% of everything checked on a part. It can be as many as 500 dimensional checks on each part. That's where our Zeiss Contura G2 comes in."





Diversified picked the Zeiss Contura G2 with the VAST XT head because of its accuracy. Annual calibration puts it within .8 microns anywhere within the work envelope.

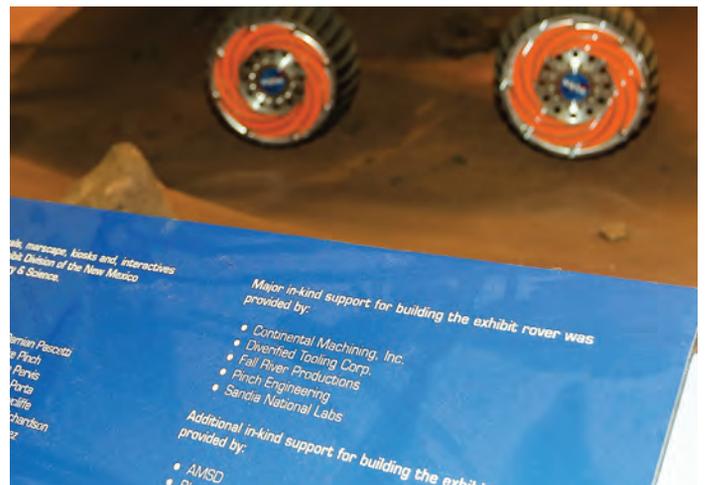
“We’ve had our Zeiss for a couple years now,” tells Tina. “Kevin just loves everything about it.” They upgraded from an older manual CMM and Kevin describes using it vs. the Zeiss as a 286 processor vs. a new I7 Pentium machine. Purchased through Todd Johnson of Total Quality Systems in Phoenix, Az. Kevin was attracted to the G2 because of its accuracy. With an overall working area of 700mm x 1000mm the Zeiss holds .8 microns on all axis anywhere in the volume. It is even more accurate when looking at just a single axis. Almost every part manufactured by Diversified starts out as a solid model, and they program the Zeiss from that model. “Programming off the solid model isn’t unique to Zeiss, but I find it to be easier on the Zeiss than on some of the other machines I’ve used,” conveys Kevin. “It is pretty much point and click. You have to put in the tolerances of course, but if you have 100 checks with the same spec or checking strategy it is straightforward to copy and paste. You don’t have to go item by item and type it all in over

and over and that saves me time.” Diversified ordered the Contura G2 with the highly accurate VAST XT head. The VAST head’s accuracy comes from using fixed probes at any angle instead of swiveling. “Admittedly it is a little less convenient,” pronounces Kevin. “But for us it is worth it because we are not checking thousands of parts. If you were a big 5 axis shop then a swivel head would be the way to go, but in our line of work pure accuracy is king. We can always add a swivel style probe down the line if that is something we ever need.”

With a reputation for accuracy, Diversified Tooling relies on the skills of their employees and equipment suppliers who share the same reputation. “We strive to be the best at what we do,” concludes Tina. “Our customers demand the utmost is precision that is only attainable by using top of the line manufacturers like Mori Seiki, Mazak and Zeiss. The difference in quality is obvious to us, and to our customers.”



With such a diverse customer base Diversified Tooling offers an array of services and abilities. Most of the parts they make can’t be photographed but they do a lot of plate style fixtures, intricate EDM and parts for AR-15s. If you are lucky enough to be one of their customers they send custom manufactured holiday gifts each year.



There is a great sense of community in Albuquerque, New Mexico and many different local companies got behind a Mars Rover replica project for the Natural History Museum. Diversified's involvement came via the local SME (Society of Manufacturing Engineers) when the original concept included wood, Styrofoam and PVC pipe as material. "We instantly wanted to take part in the project, but those materials are not what we do. More and more local manufacturing companies came on board and the group was able to make something really special for the museum." Diversified called dibs on making the six rover wheels as well as a few less cool looking parts. Their prototype wheel is still in the office and gets passed around to local schools. The Mars Rover went on tour for a few seasons, but is now back at in its permanent home at the Natural History Museum right next door to famed Old Town Albuquerque.

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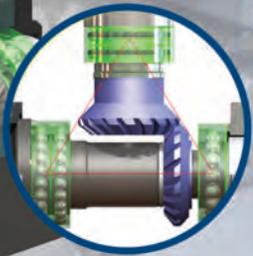


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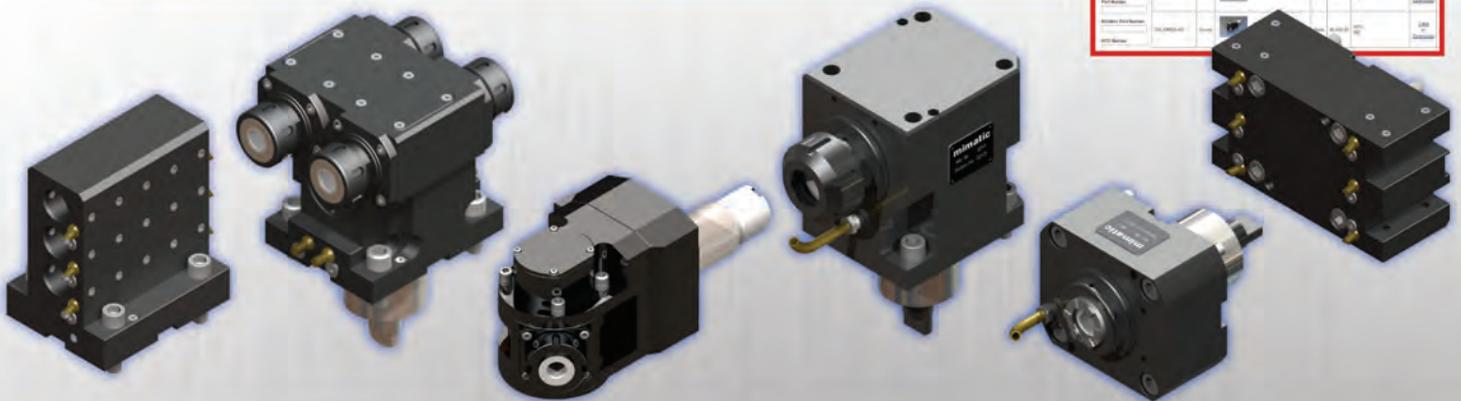
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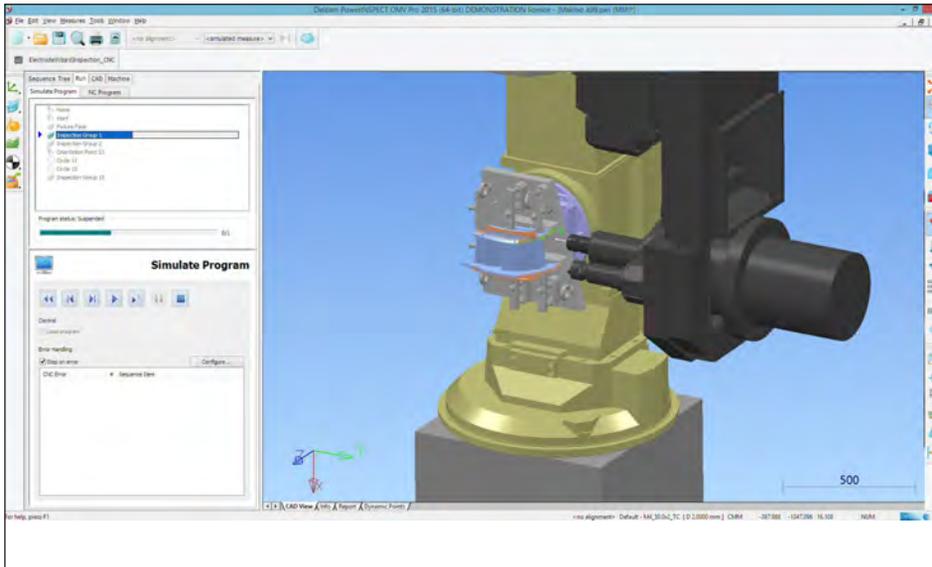
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Delcam's PowerINSPECT OMV Provides "an Invaluable Tool" for Makino-NCMT



The On-Machine Verification version of Delcam's PowerINSPECT inspection software provides "an invaluable tool" according to process application engineer, Stewart Seedhouse, from the Makino-NCMT grinding division.

PowerINSPECT OMV uses probing equipment on the machine tool to allow initial checking of parts to be carried out on the machine rather than having to transfer them to coordinate-measuring machines for inspection.

Viper grinding employs small, vitrified aluminium oxide wheels in creep-feed grinding mode on Makino machining centers, in place of conventional, plated cubic boron nitride wheels. It is mainly used in the production of components from nickel-based alloys, principally in the aerospace and power generation industries.

They report the technology is not only up to eight times faster than the conventional process but also reduces the cost of consumable significantly. Furthermore, the Makino range is the first to combine creep-feed grinding with milling, drilling and turning in a multi-processing environment, reducing the number of separate operations.

Even so, the process remains extremely challenging due to the use of difficult-to-machine materials, such as Inconel, the complexity of the shapes that need to be produced and the high levels of accuracy that are required. In addition, many of the components are produced from forgings or castings, which can be both expensive and in very limited supply.

"In a typical project, our customer might be required to produce at least 30 conforming parts from 32 high-value castings," explained Mr. Seedhouse. "Anything that can make the process more reliable and more accurate is hugely valuable."

The first stage of most projects uses the PowerINSPECT

software to check the machine kinematics by taking measurements from a standard sphere in a known position on the machine. This takes one to two hours but is essential to ensure that the accuracy of future measurements can be trusted.

The next stage is to inspect the datum locations of all the fixtures to be used in the process and, in some cases, their clearances. This is necessary, said Mr. Seedhouse because "although we expect to receive the fixtures in the correct state, being able to ensure they are correct to what we expect at this stage can save a whole lot of time and effort trying to find a problem later on."

Following these checks, the first part is loaded and OMV is used to measure the amount of stock to be removed. If necessary, the position of the part can be adjusted or a modification made to the datum being used in the machine-tool control to give a more even distribution of stock around the required final shape. The complex shapes found in many of the components would be difficult to check with physical measurement but are easy to measure with PowerINSPECT OMV.

"With new parts and possibly multiple casting suppliers, we often check the amount of stock on the component prior to machining," explained Mr. Seedhouse. "Too much stock on the component can lead to metallurgical problems such as cracking and burning, or wheel breakdown leading to geometrical problems, and, in extreme cases, even damage to the machine. Once you know that there is more stock than expected, it is easy to add in an extra cut to remove this excess material safely."

Another potential problem is that residual stress within a forging or casting can be released during machining and change the shape of the part. "If we think this might happen, we carry out an initial cut with extra material left on to release the stress," said Mr. Seedhouse. "We can then check if any movement within the part has occurred with OMV and so allow the finish machining to be performed accurately."

OMV is also used to check fixture and part positions after any heavy cuts that might have moved the part or if any problems have occurred during machining.

"PowerINSPECT OMV is an invaluable tool when making any new component or installing a new machine," claimed Mr. Seedhouse. "It gives you a high degree of confidence almost immediately because it is very, very quick to provide basic measurements on the key points of the part."

Product Review—

Nikon Insight L100, CMM Laser Scanner Combining Productivity and Accuracy



This summer Nikon Metrology introduced its latest CMM laser scanner, the Nikon InSight L100. Nikon Metrology reports 20 years ago they pioneered laser scanning and gradually sharpened the capabilities of this non-contact measuring technology. Nikon's superior optics combined with innovative camera technology resulted

in this new, Nikon scanner. The InSight L100 CMM laser scanner offers an excellent possible combination of speed, accuracy and ease-of-use. Suited for both surface and feature measurement, even on shiny or multi-material parts, the InSight L100 quickly delivers accurate data and insightful part-to-CAD comparison reports.

Focus on Inspection Productivity

According to a Nikon Metrology spokesman, the InSight L100 is ideal to inspect larger components where productivity is key but without having to compromise on accuracy. The 100 mm wide Field-of-View combined with the data acquisition speed of 200,000 points/second results in a measurement productivity that Nikon reports wasn't achievable with CMM scanning before.

To facilitate manual scan path programming, the InSight L100 features a brand new full Field-of-View (FOV) projector. By making sure that the scan line falls within the projected FOV, the user can be sure that he gets good part coverage.

Capture the Finest Details

The InSight L100 is equipped with a high quality glass Nikon lens optimized for laser scanning. Combined with the high definition camera this results in a point resolution of only 42 μm enabling fine detail capture and measurement of sharper edges. The InSight L100 has an exceptionally small probing error of 6,5 μm -which is a measure of the scanner's noise level- resulting in smooth meshes with high levels of detail.

The InSight L100 is perfectly suited for combined surface and feature measurement. Thanks to the low noise level and high point resolution, feature measurement accuracy approaches the accuracy of a touch probe.

Cope with Changes in Surface Color

A greater range and mix of surface materials, finishes, colors and transitions can be measured more efficiently without user interaction, manual tuning and part spraying. Nikon Metrology's unique fourth-generation Enhanced Scanner Performance (ESP4) technology adapts the laser intensity for each point in the scan line to varying colors or materials faster than ever.

Extend the Measurement Reach

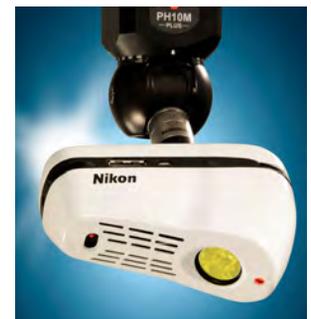
The patent-pending integrated mount rotation allows the scanner to rotate around its auto joint axis in 30° increments up to 90°. This saves the use of auto joint adaptors and is particularly interesting to measure turbine blades or parts with vertically oriented features and edges. The InSight L100 also allows the use of an extended 105° PH10 A-angle allowing better access to measure underneath or behind parts.

Better Insights, Earlier

By utilizing laser scanning, manufacturers can gain full insight of the dimensional quality of their products without compromising on cycle times. As the entire part is checked to CAD model, any areas of concern are immediately highlighted using color mapping. Further investigation and analysis is possible using fly-outs, sections and a library of Geometric Dimensioning and Tolerancing (GD&T). As a picture is worth a thousand numbers, these easy-to-interpret graphical reports facilitate exchange of results with internal or external colleagues or suppliers.

Multi-sensor applications, ready to retrofit to your CMM

The InSight L100 scanner can be combined with tactile probes and change rack to create a versatile fully automated multi-sensor CMM. Depending on the application both technologies can be used independently or together within the same inspection program. The InSight L100 can also be retrofitted to a wide range of CMM brands.



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San Diego Composites Commended for Contributions to 3D-MAT Development for Orion Spacecraft



A 3D-MAT Pre-Infused Woven Preform (Left, Credit: NASA), Undergoing Infusion at SDC (Middle), and an Infused 3D-MAT Billet (Right, Credit: Ken Kremer, AmericaSpace)

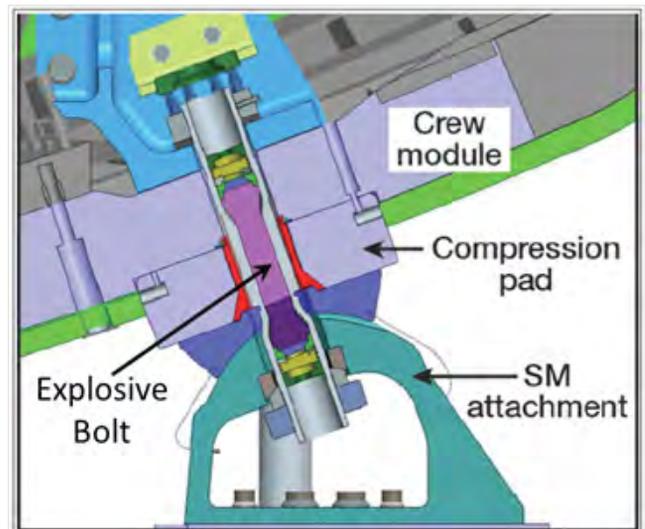
NASA's Game Changing Development (GCD) program presented San Diego Composites, Inc. (SDC) SDCComposites.com with a special commendation during their annual meeting in Washington, DC. The special commendation was bestowed to recognize SDC's key contribution to the development of the 3-Dimensional Multifunctional Ablative Thermal Protection System (3D-MAT) – an innovative material that consists of a resin-infused 3D-woven quartz preform. Currently, the 3D-MAT material is the largest fully-densified 3D composite billet in production.

In order to develop the 3D-MAT material, SDC worked on a team that included researchers at NASA Ames Research Center and Bally Ribbon Mills, who developed the automated weaving process. When other processes were found to be insufficient to achieve full densification, NASA turned to SDC to develop a robust RTM process for the large scale preform. SDC's resin infusion process achieved the low porosity (<0.5%) that was required for the material to function at its peak.

The 3D-MAT material will be used to fabricate the Orion Compression Pads, which connect the Crew Module to the Service Module. During future missions, the Compression Pads will experience high shock and thermal loads that the carbon phenolic material used for the less-demanding EFT-1 flight test in December 2014 could not meet. Due to its woven structure, the 3D-MAT material exhibits superior properties relative the carbon phenolic used for EFT-1 – including improved interlayer strength, higher compression strength, and lower thermal conductivity. The emergence of 3D-MAT

allows NASA to pursue deeper space missions, such as a human mission to Mars by the 2030s.

The 3D-MAT billets produced by SDC will be next used in Exploration Mission 1 (EM-1), the first planned flight of the SLS launch vehicle in 2018. During EM-1, the Orion vehicle, with the 3D-MAT compression pads, will complete a seven day flight around the Moon. In addition to developing the 3D-MAT resin infusion process and producing billets for EM-1, SDC also provided material testing and machining services.



3D-MAT Will Be Used for the Compression Pads on EM-1 Flights and Beyond (Credit: NASA)

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Form Grind has over 20 MÄGERLE grinders from United Grinding

Shop Grinds Precision Parts for Land, Sky and Space



Form Grind Corporation, located in Rancho Santa Margarita, California, employs precision grinders, innovative processes and experienced staff to process critical parts for customers that include energy-products makers, major aerospace OEMs and NASA. By using the latest CNC grinding technology integrated with engineering, tooling and quality assurance, the company can efficiently take on varying production volumes while maintaining strict customer requirements. In fact, NASA's Goddard Space Flight Center recognized Form Grind for its advanced engineering role in the Cassini mission to Saturn and Maven mission to Mars.

Form Grind can grind any shape or profile generated along a surface. Specific parts include turbine blades for aerospace engines, auxiliary power generators and locomotive turbo chargers. For NASA, it profile grinds extremely precise titanium hyperbolic quadrupoles used in space vehicles' mass spectrometers. The instruments analyze planetary atmospheres, a key task in the Cassini and Maven missions.

Established in 1978, Form Grind started out in a leased 4,000-square-foot manufacturing space with two manual crush form grinders. Today, the company is a 42,420-square-

foot operation with ISO 9001:2008 certification, including the AS9100 standard set forth by the aerospace industry to satisfy DOD, NASA and FAA quality requirements.

Among its keys to success, Form Grind relies on the precision output of more than 20 MÄGERLE surface and profile grinders from UNITED GRINDING and a wide array of support equipment. The company also takes pride in its advanced creep-feed grinding operations, which involves removing large amounts of stock on any material in a single pass, with higher precision and better surface finishes than conventional methods.

Form Grind produces turbine blades with tight tolerances and rigid specifications, ranging in size from a few inches to over two feet long. For example, some blades must meet weight tolerances reaching three decimals in grams in addition to strict dimensional requirements. Because turbine engine manufacturers continually raise the operating temperatures of their products to reduce emissions and increase efficiency, the blades often feature complex contours and internal coring engineered to manage heat. The acute contours and coring increase the challenges of grinding and fixturing the blades.

Form Grind fills a mid-range production niche. Vice president and general manager Gary Treichler said, “although some blade programs are as large as 100,000 pieces yearly, at the end of the day we are a job shop. Most of our runs are 500 to 1,000 blades at a time.”

CNC technology enables the shop to efficiently handle varying volumes. While the shop’s first manual machines required constant skilled attention, today’s CNC equipment permits setting up multiple machines that can be tended by one operator after production runs begin.

“We don’t do strictly untended operation, but certainly there are jobs where cycle times may be 10 or 15 minutes and an operator can load and watch multiple machines,” Treichler said. “The CNC equipment basically allows us to work smarter. We’ve had around 50 employees for the last 10 years, and with additional MÄGERLE grinders we have doubled our output over that decade with the same workforce.”

Quick job turnover is crucial for Form Grind. The company may set up a job in a day, run it for two to five days, then take it off the machine to make room for the next job. Some jobs repeat on a monthly, quarterly, yearly or even longer basis.

Form Grind’s responsiveness and flexibility is due in part to the in-house design and fabrication of its workholding tooling.

“We are able to maximize efficiency by loading many parts into holding fixtures,” Treichler said. “We want to maximize efficiency where we get as many parts as close together as possible to get the best bang for the buck.”

For smaller blades in 1” to 3” sizes, the shop uses guillotine-type six point nest fixtures that hold 20 blades for an operation. The fixturing is engineered to position the parts so the wheel is not grinding air and operating at shallow depths of cut, maximizing wheel usage.

A sample of parts made at Form Grind



When two sets of multi-piece fixturing are built for a job, one is always on the machine and the grinder can run continuously. Treichler pointed out that continuous, accurate output is largely dependent on grinding machine capabilities, and noted that the MÄGERLE machines, some with 20” diameter wheels and 100-hp, water-cooled AC spindle drives, run 20 hours a day, six days a week.

“To compete in a global environment you must have a really strong piece of equipment that can continuously grind parts,” he said. He added that the grinders’ rigidity and strength also come into play when grinding the tough nickel-base alloys that comprise most gas turbine blades.

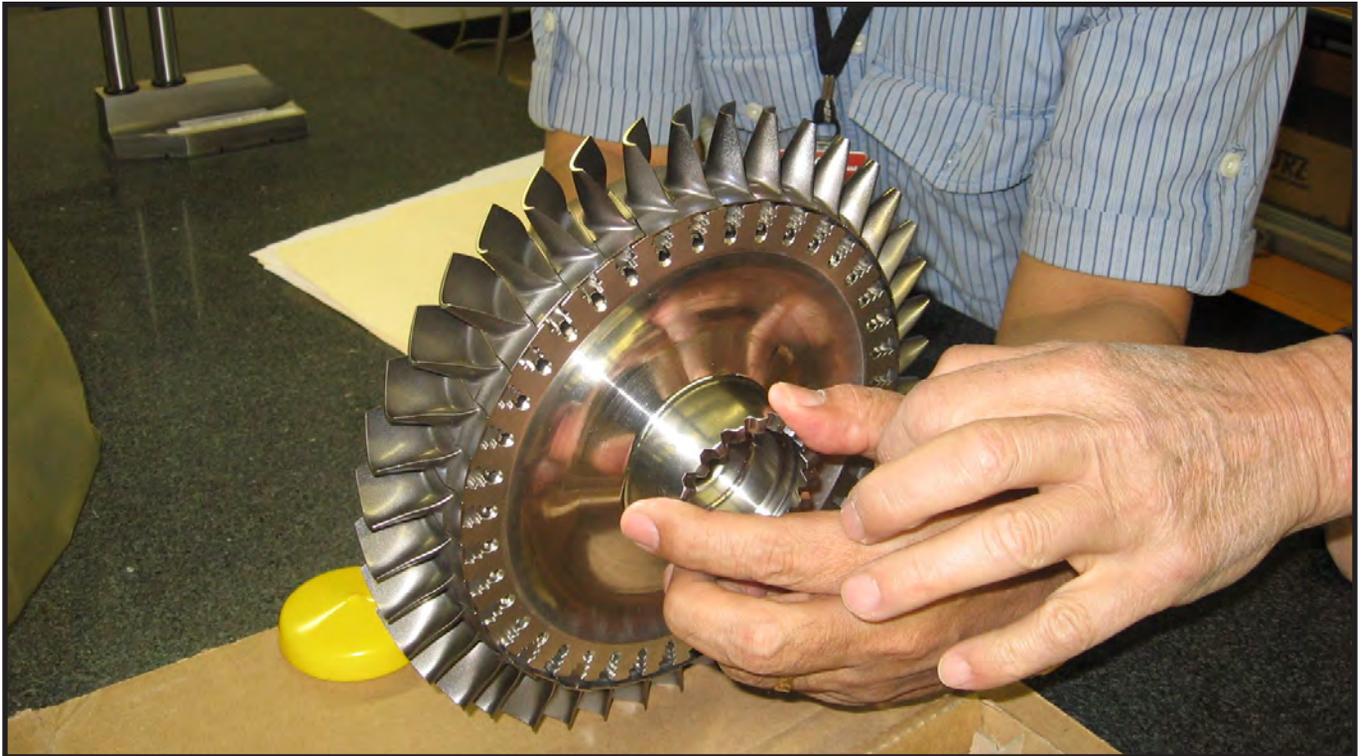
The complexity and permanence of Form Grind’s custom-fabricated tooling depends on job requirements. Typically, a blade-grinding program of 100,000 blades a year will employ elaborate, high-capacity tooling. Initial tooling costs will be significant, but will be more than recovered over the high-volume run. A blade program that has 500 to

1,000 pieces per year, on the other hand, may use fixtures that hold six to 10 parts as opposed to 20 at a time, and tooling costs will better match the program’s return.

Depending on factors such as blade size, workpiece material, and tolerance requirements, Form Grind establishes different grinding processes for different blades.

“For some larger blades we might want to creep feed





“The beauty with creep feed or profile grinding is that you can grind hardened materials to size”

grind and reduce the reciprocation at the end of the process,” Treichler said. “For other blades we may do some creep feed passes and then some reciprocating and final dressing at the very end. There is some tribal knowledge, or black magic if you will, in the art and science of grinding.”

Form Grind begins process planning with a team that includes marketing, tool designers, toolmakers and production managers. “We try to see what makes the most sense in terms of the best way to break down a process,”

Treichler said. “We will at times break up the operations to where we use certain machines for the fir tree operation then we’ll do another feature in a separate operation. There is no real clear-cut best way to do things. When you start a job you have to be pragmatic and look at what the goal is, what the volume is and what it potentially could be, and how elaborate your tooling should be to maximize efficiency. It is all about easing cycle time out of the process and achieving the most output.”

Shorter cycle times, however, must be achieved while maintaining process security. Intricate casting processes and new workpiece materials have pushed up the cost of rough blade castings, with some valued at \$1,000 or more.

As a result, much effort goes into establishing and verifying a reliable process. “It is important to have an open structure grinding wheel and speeds, feeds and coolant locations set so that you are removing the material as fast as possible, but also without burning or cracking parts,” Treichler said. “We are very proud that we have less than one tenth of one percent of scrap; OEMs tell us that that when they ship us a set of 100 blade castings, we will send 100 blades

back.”

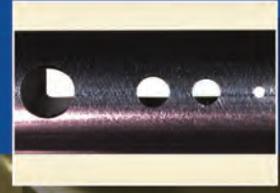
Blade dimensions are verified through dual inspection methods. Treichler said Form Grind always submits the parts it grinds to two methods of inspection: “We check first articles in the inspection room where we have a

CMM and a 30” optical comparator, then we empower the operators to perform in-process inspection.” At each of the more than 25 different grinders on the shop floor, there is a surface plate where the operator can use hard tooling and different types of go/no go and plug gages that verify certain part features.

For final inspection, the CMM holds parts in a free state to check and verify the six point nest dimensional features on the blade. Such overall verification is not possible in process when a part moves from machine to machine for different operations.

“Turbine blades tend to have 100 percent in-process inspection, and in final inspection we do a statistical process sampling,” Treichler said.

Treichler is a firm believer in the key role of grinding in the production of precision parts, especially of gas turbine components. “A company tries to mill a feature then sends the part out to heat treat and gets distortion. Then they try to fix those distortions,” he said. “Milling can be consistent and accurate, but for features such as fir trees with 0.002” tolerances, the speed and capability of the diamond dresser to dress all those points on a conventional wheel and grind them all at once offers a clear advantage. The beauty with creep feed grinding or profile grinding is that you can grind hardened materials directly to size.”



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B O G U E MACHINE COMPANY

Article & Photos by Sean Buur



Vice president and partner, Andrew Hisey with their Mazak Integrex e-410

46 YEARS OF PRECISION

Bogue Machine Company Inc. incorporated in 1969 as a one man tool and die shop. Today, they are a 30,000sq.ft. ISO 9001 and ITAR certified diversified manufacturing company specializing in aerospace precision for a variety of industries. Bogue Machine Company (BMC) came from very humble beginnings when Bob Bogue packed up his family in Pennsylvania and headed west. They stopped off in Albuquerque on their way to California and never left. Bogue was established as a three person garage shop in support of the two locally based national laboratories; Los Alamos and Sandia Labs. The company ran down that manufacturing path until the early 80s, about the same time Bob hired his son Mark.

"I spent my childhood being exposed to the shop," explains Mark Bogue, president of Bogue Machine Company. "But once I graduated high school I wanted nothing to do with the company and joined the Coast Guard for four years." The opportunities offered at that time by the military didn't coincide with what Mark wanted to be as a "grown up." So he went back to work at his dad's shop sweeping floors and began his appren-

ticeship for \$5 an hour; not much when you are supporting a wife and two kids. Long hours, long days and long weeks paid off and Mark's abilities and dedication to the trade grew. By the 90's he was buying ownership in the company from his dad, and together with his wife they formed a partnership to purchase a 10,000 sq.ft. building near by. "I had to go to my dad and say this is what I want to do. As a young man sitting before your father is a nervous thing, but we all had money on the line and it solidified in his mind that I was serious about the future of Bogue Machine Company."

Diversification was one of the first steps to fill the empty floor space of what seemed like a giant building. By taking on more commercial clients they experienced a growth cycle that had them buying one or two new machines every year, hiring someone to run them, then filling them with work. "We were an early adopter of technology," details Mark. "CNC wasn't as prevalent then so having a shop full of above average CNC machines gave us a competitive advantage. Many of our rivals were still all manual shops, so we were able to provide products and

services not available from other companies in our city, or even in the state.” That advantage still exists with two buildings filled with 25+ state of the art Mazak and Mori Seiki multi axis machining centers.

As the business grew Mark knew he needed a partner. Last year, after a three year search, Mark added Andrew Hisey as a partner and vice president. It is an interesting pairing on paper, but one that will see BMC continue to evolve and grow for years to come. “Mark and I complement each other really well,” describes Andrew. “I don’t know how to run the machines, but Mark is a fantastic machinist. He is teaching me about the technical side of the business, while I bring different business practices to the table like: lean thinking, operational efficiencies, sales, and marketing. We both have different backgrounds that led each other to the same place, with the same common goals.”

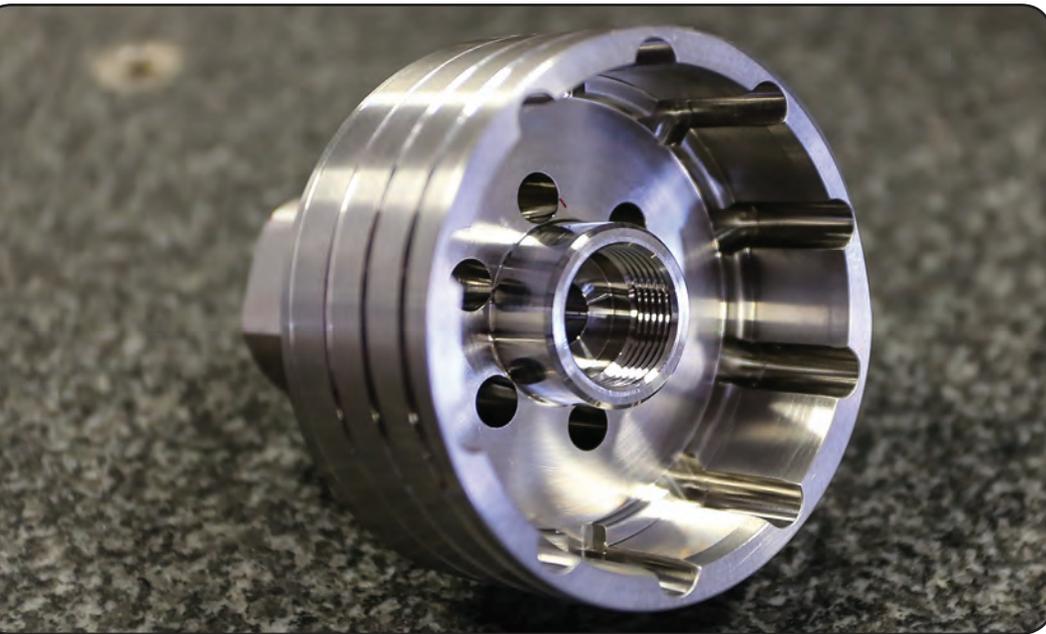
Andrew is a native of Albuquerque, but he left to earn a degree in marketing and business at the University of Arizona. He eventually found his way back home, but with successful stopovers in Mooresville, North Carolina and Los Angeles, California. “Recently I came back to the area after helping lead the marketing department for Penske Racing and heading up a group of high performance automotive parts brands for their parent company, a global diversified manufacturing business. The company made everything from injection molded plastic products to wiring and connectors for the space shuttle, so I am familiar with manufacturing.” What he didn’t know is that his search to buy into a company would land him at BMC. “I knew Mark’s lawyer and he kept telling me you need to meet Mark and look at this business. I had targeted businesses with a strong brand in manufacturing and Bogue was just what I was looking for. Mark bought it from his dad, and I’m buying it from him over the next couple years.”

The majority of Bogue’s customers fall under the label of aerospace and defense, but they have a much more diverse customer base today than they did just five years ago. “We are pretty evenly split between government-supported customers and what we call commercial customers,” describes Andrew. “We’ve taken our reputation for precision and applied that into other commercial areas which value our aerospace manufacturing practices.” One such customer is the world leader in water blasting tools. Bogue began making tools and accessories for them over twenty years ago. Tools might include a tip that connects to the end of a hose and blasts water at 40,000 psi. With that kind of force they require it to be exact, and exact is what Bogue is known for.

New Mexico’s economy in general is very dependent on government spending. They have two national laps that generate a lot of jobs and spending that filters through the state’s economy. They also have a fair amount of oil and gas in the state. If you don’t want to rise and fall on the whim of congress passing a budget you have to diversify. Bogue accepted the ebb and flow of the industry for many years, but now they are pulling the sales handle and selling what they are good at. “We’ve identified industries that are on the rise, and that appreciate our core competencies,” tells Andrew. “I’m really pleased by the work we do for the DOE and through blue-chip customers like Raytheon and Honeywell, but we want to expand what we do into commercial aerospace and alternative energies. Companies like



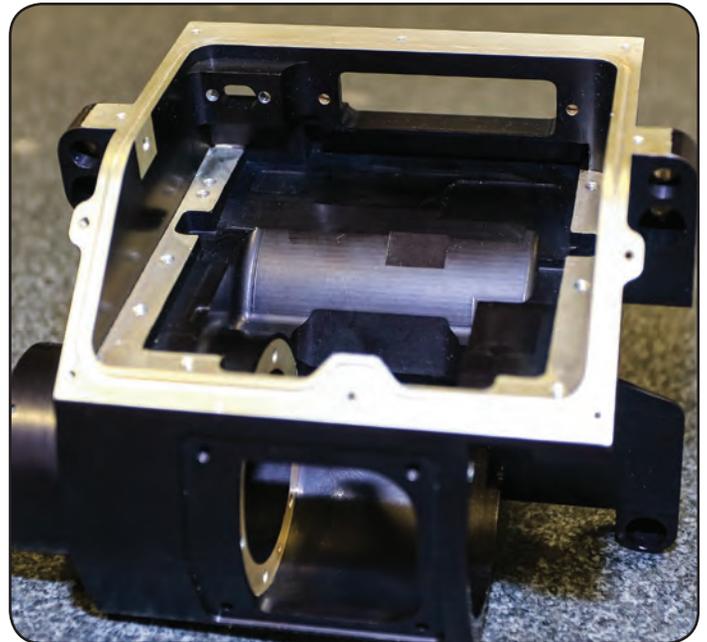
Bogue’s 30,000 sq.ft. manufacturing facility in Albuquerque, New Mexico is filled with more than 25 multi axis Mori Seiki and Mazak CNC machining centers



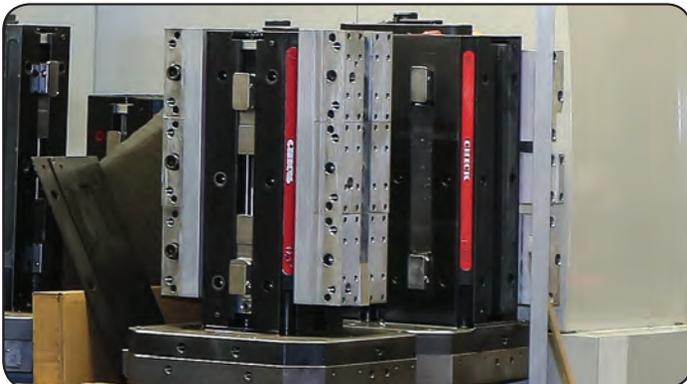
High-pressure stainless steel nozzles.

Boeing, Airbus, Bombardier can't build production lines fast enough and offer a great opportunity for companies like ours who have a reputation for precision and quality. We have a solid foundation in oil and gas, but solar and wind are exploding and not subject to the same kind of market pressures that the other two are. I'd like to see us get further in to those industries." Selfishly Andrew would like to see the company dabble in high performance motorsports applications too, but finding the right company that requires aerospace grade precision to partner with is not a simple task.

Mark and Andrew's goal is for BMC to grow into a more diversified manufacturing business by offering additional services and expanding on what they already do well. A few of their options include adding a plating line and bringing 3D metal printing services in house. "I'd like to see us with full design engineering capabilities," tells Mark. "We've gained a lot of manufacturing engineering expertise over the last 45 years. We deal directly with the customer's engineering teams about the manufacturability of the concept. Adding design is just the next rung on the ladder." Andrew echoes Marks views and concludes, "Expanding what we do and who we do it for is key to our future growth. Bogue Machine Company is more than a job shop, we are now, and will continue to be a solutions provider for industries requiring aerospace precision."



Complex prototype part used in aerospace application.



All of Bogue Machine Company's machines are equipped with only the highest quality tooling from Kennametal and work-holding fixtures from Chick.

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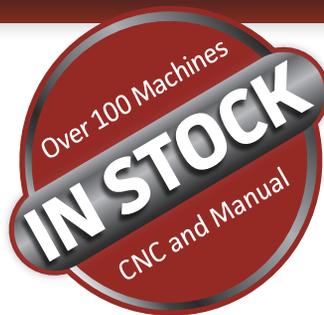


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Manufacturing DaySM 2015 Helps Change Perception of Industry

Manufacturing Day 2015, including all events scheduled throughout the year, has far exceeded expectations of scale and impact, reaching more than 400,000 participants and improving the public's perception of manufacturing.

Teachers, students, parents/influencers, and employers shared their perspective on Manufacturing Day (MFG DAY[®]) using the new Deloitte perception survey developed in collaboration with The Manufacturing Institute. The survey was distributed to more than 2,500 manufacturing hosts across the United States to gather national data from teachers, students and parents on how MFG DAY events truly make a difference in local communities. The survey found after attending Manufacturing Day events, eighty one percent of student respondents are more convinced manufacturing provides careers that are both interesting and rewarding and seventy-one percent are more likely to tell friends, family, parents or colleagues about manufacturing.

"The co-producers of Manufacturing Day could not be more pleased with the results of the 2015 celebration," said Ed Youdell, president and CEO of the Fabricators & Manufacturers Association (FMA), one of the co-producing organizations. "Our goal, when we created Manufacturing Day just three years ago, was to bring manufacturing into the mainstream. We wanted to showcase this important sector of the American economy and introduce young people to the career options and exciting work environments manufacturing offers."

Educators' responses to the survey also illustrated the positive impact Manufacturing Day has on public perception. Ninety percent indicated they are more likely to encourage students to pursue a career in manufacturing and ninety one percent found the activities/tours to be interesting and engaging.

"By capturing the impact of a national Manufacturing Day, we can see how it has made a difference in changing the image of the industry," Institute executive director Jennifer McNelly said. "Every day we aspire to make this industry better than it was yesterday, and the results of the Manufacturing Day survey illustrate how we are improving the image of the industry through Manufacturing Day, and positioning the industry as a rewarding career path for future generations."

"This survey further demonstrates the changing perception of manufacturing across the country, particularly among

young people, and we have events like Manufacturing Day to thank in large part for this positive trend," said National Association of Manufacturers president and CEO Jay Timmons. "We appreciate the continued efforts of thousands of manufacturers from across the country to educate students, parents and their communities about the many career opportunities through our industry."

Manufacturers responding to the survey also expressed positive feedback regarding their participation in Manufacturing Day. Ninety four percent found there was value in participating in the event and eighty eight percent are more likely to continue engaging with high schools or colleges in their area.

"It is powerful to see that our collective efforts are making a difference in educating the public about manufacturing and its rewarding careers and how we are helping manufacturers throughout the U.S. connect with the next generation workforce" said Carroll Thomas, director of the Manufacturing Extension Partnership.

For MFG Day 2015, a total of 2,620 events were held across North America including all 50 states, Canada and Puerto Rico. Based on data collected from host company evaluations, more than 225,000 students and 55,000 parents, teachers and other attendees participated in these live events. Twelve virtual events helped even more people participate, with the Discovery Education and Alcoa online program reporting the largest participation of any single event, with more than 120,000 students. This brings the total number of participants in MFG Day 2015 activities to more than 400,000.

MFG DAY addresses common misperceptions about manufacturing by giving manufacturers an opportunity to open their doors and show, in a coordinated effort, what manufacturing is — and what it isn't. By working together during and after MFG Day, manufacturers begin to address the skilled labor shortage they face, connect with future generations, take charge of the public image of manufacturing, and ensure the ongoing prosperity of the whole industry.

"As manufacturers opened their doors to the public on Manufacturing Day, they shared firsthand the opportunities available in today's advanced manufacturing environment. By gathering research through the Manufacturing Day survey, the Manufacturing Day producers can measure the impact Manufacturing Day is having on perception, provide

insight into building upon that momentum, and further efforts to improve public perception of manufacturing,” said Craig Giffi, vice chairman, Deloitte LLP and automotive industry leader.

MFG Day is designed to amplify the voice of individual manufacturers and help them coordinate to address their common concerns and challenges. The rallying point for a growing mass movement, MFG Day empowers manufacturers to come together to address their collective challenges so they can help their communities and future generations thrive.

Manufacturing Day 2015 was supported by more than 20 sponsoring companies and organizations. The sponsor list was headed by Platinum sponsor Shell Lubricants and Gold sponsors Alliance for American Manufacturing and SME. In addition, more than 170 organizations endorsed Manufacturing Day and served as the conduit through which information about the event was disseminated.



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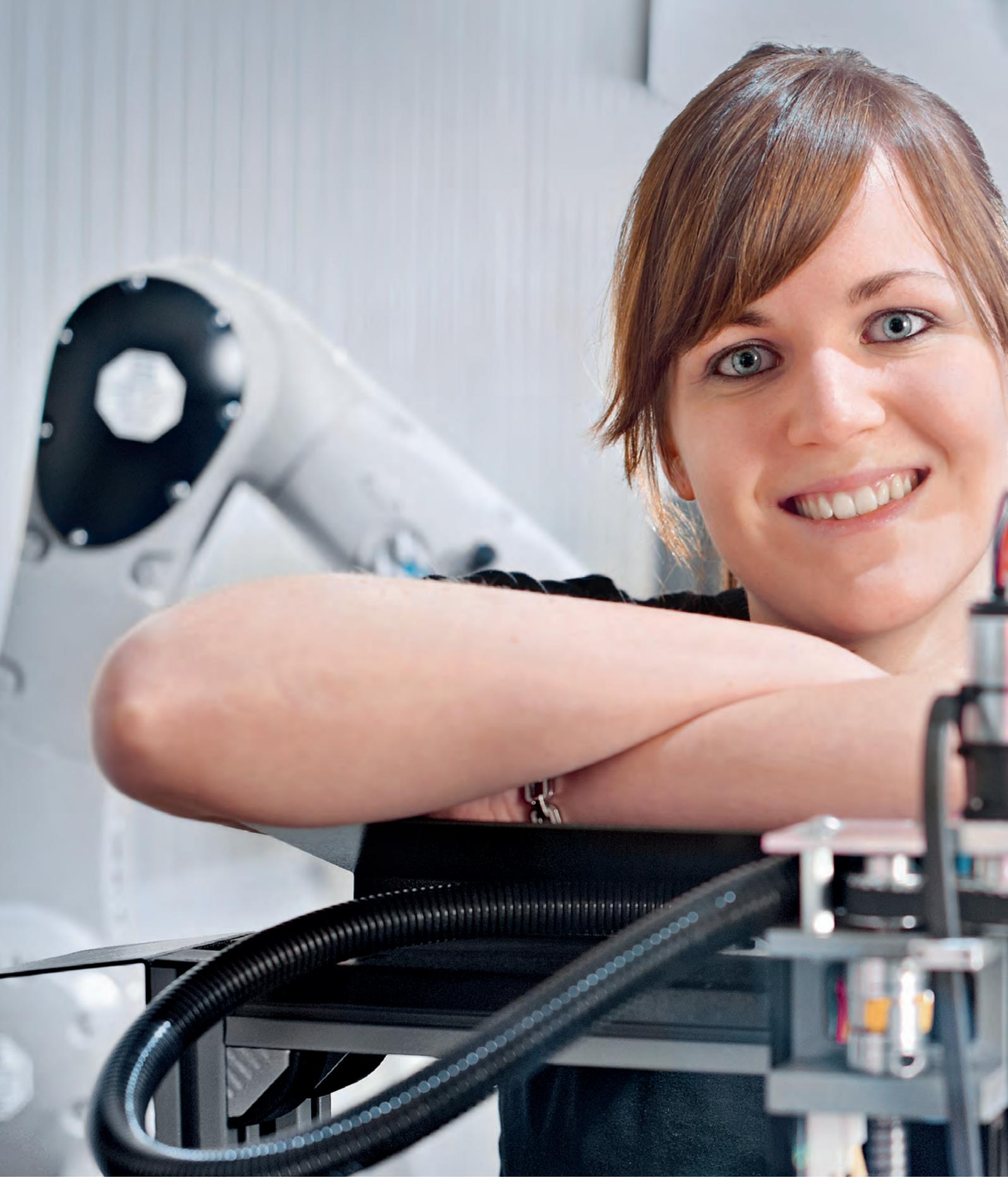
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Selway Machine Tool launches software division

Selway Machine Tool, one of the largest sales and service providers of quality CNC machine tools and state of the art automation systems has acquired P9 Cam Solutions. The Western regional Autodesk CAM Reseller.

According to company President Bill Selway, “The addition of the Autodesk CAM product line is aligned with Selway Machine Tool’s strategy to offer customers the most complete CNC machining solution in the Industry. Encompassing Machine Tools, Robotics and CAD/CAM software.”

Selway Machine Tool is one of the leading Haas Factory Outlets in the Country.

Joe Madden, Chief Operating Officer expanded on Selway’s larger strategy in a recent interview: “Selway has looked at a variety of business opportunities to diversify its market area and risk. This started back in the early 1980’s when we opened a new office in Washington so that Selway was not completely impacted by the volatile semi conductor industry in Northern California.” In subsequent years Selway expanded regionally, opening additional offices in California and Oregon for full West Coast coverage. “We have continued to look at opportunities in 2014 and 2015 to help offset some of the large swings we have experienced with machine tool consumption in the past. The following are some of the changes that we have implemented in 2014/2015”

1. We have added a new facility in SoCal bringing together the Trinity Robotics team, Matsuura USA, and Selway Southern California operations.
2. Trinity Robotics Automation, Division of Selway Machine Tool Co., Inc. has experienced record level sales volume in 2015 for robotics and automation projects! The growth rate in Robotics and Automaton is very positive.
3. Along similar lines, we have become a master reseller of Autodesk HSM works for the US market. Our initial focus is within existing west coast sales territories and our current customer base. However, this software solution will provide us with entry into OEM's and job shops whom we have previously not sold any products or services - thus, increasing our customer base within the manufacturing industry. The orders have been very strong in the first month of operations!
4. We have recently added Utah as a Selway sales territory to our west coast markets and we are excited about growing our sales in this new market.

For further information regarding software products at Selway Machine Tool, Contact:

Derek Goodwin

Software Applications Manager

Selway Machine Tool

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Industry News

Protek CNC and CNC Solutions Joins Forces with Samsung Machine Tools of America

Samsung Machine Tools of America, a builder of CNC turning centers and vertical machining centers, announced the addition of Protek CNC Sales Corp. of Simi Valley, CA and CNC Solutions of Milpitas, CA as its newest North American machine tool distributors.

“We are excited to begin this relationship with Protek CNC and CNC Solutions, two distributors that share our dedication to customers by offering quality machine tools with excellent service and also have long histories of success within the machine tool industry”, says a spokesperson from Samsung.

With over 30 years combined experience, Protek CNC Sales Corp has created a reputation of excellence in Southern California and Nevada machine tool markets. They’ve recently moved to a new location that will showcase 3 Samsung machines in their state of the art showroom.

CNC Solutions is positioned for excellence with vast knowledge of the machine tool market in Northern California and Nevada. CNC Solutions combines the talent of over 60 years in the industry, ranging from service to applications and sales.

Matsuura Machinery USA Adds Three Team Members

Matsuura Machinery USA, announced the addition of three new team members. “As Matsuura USA continues to experience tremendous growth combined with our consistent unparalleled service to our customers and extensive distributor network, we continuously seek talented individuals to join our innovative and diverse team

of professionals,” said Matsuura USA president Craig St. John.

David Danielson will assume the position of service support in Matsuura USA’s Service Department. Danielson most recently held the position of technical services coordinator in the customer support services department at Continental Machines Inc.



Dave Danielson

Barker Hollingsworth has joined the Matsuura USA sales team as regional sales manager. Hollingsworth has more than 29 years of professional CNC machine tool sales, project management and sales management. He will be responsible for the Southeastern US.



Barker Hollingsworth

Jim Shiner joins Matsuura as the company’s new VP sales and marketing. Shiner most recently held the position of general manager of operations at DMG/Mori Seiki USA, where he maintained responsibility for all phases of office operation, service, application engineering and order processing. Prior to his role as general manager, he served as regional sales manager at DMG/Mori Seiki USA.



Jim Shiner

As Matsuura USA’s VP sales and marketing, Shiner will be directly responsible for all sales and marketing activities at Matsuura. He will provide leadership to the Matsuura USA sales and marketing teams, develop new business opportunities and enhance distributor relationships.

Sharp Precision Machine Tools Hires CNC National Sales Manager

Sharp Precision Machine Tools announced that Joe Bockrath has joined the team as the CNC National Machine Tool and Robotic Automation manager. “Joe brings to Sharp and our national network of equipment resellers an extensive background in robotic automation and CNC machining solutions. Joe has been on both sides,” said Mike Innab, Sharp’s general manager and chief operations officer.

Bockrath has worked in the robotic automation and manufacturing industry for over 30 years. Previously, Bockrath was the vice president of Kohol Robotic Systems in Dayton, OH. Bockrath then became the sales manager for Ellison Machinery in Santa Fe Springs, CA, which offered the GM Fanuc line of robots where he integrated several systems in the automotive wheel industry loading and unloading CNC wheel turning lathes and developed an expertise in military coatings field using Fanuc P150 spray painting robots. Bockrath then went into sales management positions with Yamazen with the Mori Seki line, YCI with the Supermax line, Machinery Sales with Bridgeport and CNC systems with Chiron and Citizen screw machines before going into business as a distributor offering several lines including Sharp, DMG Gildemeister, Okuma and Howell, Heian Routers, Quintax, Nicolas Correa and Tekna profile mills and saws.

“Joe’s proven performance in vertical milling machines, 5-axis milling and the robotic automation field will be a great asset to our dealer network as we further develop our 5-axis machining and automate our equipment to offer our end customers the best return on their investments when they making their purchasing decisions,” said Mike Innab.

Industry News

Methods Machine Tools Enters 3D Print Market With Full 3D Systems Line

□3D Systems announced it has entered into a partner agreement with Methods Machine Tools Inc.. Under the new agreement, Methods will immediately begin to offer 3DS' full line of professional and production 3D printers and materials to its customers to enhance its portfolio of leading-edge precision machine tools and solutions for traditional manufacturing with advanced 3D printing solutions for additive manufacturing.

To spearhead its entrance into the 3D printer market, Methods will add dedicated 3D printing sales, application engineering and support teams to its seven regional offices throughout the U.S., and will create a state-of-the-art 3D printing showroom with a range of capabilities in each location.

Methods will put a strong strategic focus on 3DS' Direct Metal Printers (DMP) to deliver enhanced solutions to their customers. By leveraging their expertise in metal precision machining and applications across industries such as aerospace, medical, automotive and electronics, Methods will bring advanced digital manufacturing solutions through DMP to its customer base of over 30,000 companies.

Design-2-Part Shows Announce 2016 Schedule

Design-2-Part (D2P) Shows, America's largest design and contract manufacturing tradeshow, has announced their 2016 show schedule. The eleven event slate includes six spring shows and five fall shows.

The schedule is anchored by six annual shows. D2P will hold these events in Grapevine (Dallas), TX; Atlanta, GA; Schaumburg (Chicago), IL; Santa Clara, CA; Long Beach, CA; and Marlborough (Boston), MA. The Southern

California show rotates between Long Beach and Pasadena giving Greater Los Angeles area manufacturers two convenient, every-other-year options.

The D2P schedule is rounded out with five events that revolve every two to three years. The Santa Clara show will be in early June and the Long Beach

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show will be in late October.

Design-2-Part Shows provide design engineers, manufacturing engineers, managers, and purchasers an excellent opportunity to meet local and national job shops and contract manufacturers face-to-face to source custom parts, components, services, and design.

D2P Shows exclusively feature exhibiting job shops and contract manufacturers with manufacturing operations in the United States. Companies that do not have facilities in the U.S. are not permitted to exhibit.

CNC Solutions Now Represents Ganesh Machinery

CNC Solutions of Milpitas, CA now represents Ganesh Machinery in Northern California and Nevada. CNC Solutions combines the talent of over 65 years of experience in the machine tool industry to support their valued customers. This experience ranges from service to applications and sales. "The vast knowledge of the machine tool industry positions CNC Solutions to provide the best product support in the industry in their market, which perfectly matches up with our commitment to Ganesh customers," stated Harvinder Singh, president of Ganesh Machinery when signing the dealer agreement.

Ganesh manufactures all of their machines in Taiwan, like CNC lathes starting at 2-axis going up to the multi-tasking CNC lathes that offer up to 11-axis.

The Ganesh "Big-Bore" manual and CNC lathe series starts at 30" swing and goes up to 63" lathe swing capacity. The Ganesh premium line of CNC vertical milling machine go from 24" x 16" in X, Y travels up to 100" in X and 39" in Y.

"Providing our customers with high quality machine tools that allow them to successfully compete in the world economy and then following up with great training and superior service are the means we use to ensure our customers are profitable for years to come", stated Jim Selway while explaining the mission of CNC Solutions.

OMAX Corporation Expands Abrasive Waterjet Training Program

OMAX® Corporation, recently increased the capacity of its state-of-the-art training center in Kent, Washington, to provide OMAX and MAXIEM®

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Industry News



JetMachining® Center owners with enhanced resources for improved productivity and profitability.

As a key element of the company's headquarters and manufacturing campus, the training center features a new technology-training classroom that supplements an existing equipment-training lab.

According to Dr. John Cheung, CEO and co-founder of OMAX Corporation, the company has always taken a comprehensive approach to helping customers utilize the full potential of their OMAX or MAXIEM machines. And, through the training center expansion, his team can ensure customers continue to receive total training support.

The new classroom provides additional space for training that takes customers step-by-step through the process of making parts, including all the ways in which the company's intuitive Intelli-MAX® Software Suite speeds up and simplifies complex part production.

In the equipment-training lab, customers receive hands-on experience on how to operate and maintain OMAX and MAXIEM machines for maximum performance.

To complement its on-site training, OMAX Corporation offers several eLearning opportunities that include certified instructors hosting live and on-demand webinars, software and maintenance training videos, and tutorials available through the company's online support site.

OMAX Corporation also offers software, machine operation and main-

tenance training at customer locations.

On-site training at OMAX Corporation headquarters takes place monthly on a first-come, first-served basis. OMAX machine owners receive free

training for as long as they own their equipment, while MAXIEM machine owners receive free training during their first year of ownership.

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Industry News

Fives Machining Systems to Add Service Center in Seattle

On January 4, 2016, Fives Machining Systems, Global Services will open a service center in Seattle, WA, joining the family of four other North American service centers, as Fives expands to meet the needs of its customers nationwide. The Seattle service center will stock spare parts, repair unit assemblies, and dispatch service engineers for customers in the northwest. Gerald Turner will be the director of this service center.

The Fives service centers are committed to proactively assist customers in maximizing machine performance, and the company's highly skilled technicians and engineers have a wide range of machining capabilities and expertise. "We believe that understanding our customers' operations is the best way to offer them customized service solutions that will increase their return on investment," said Gary Finney, v.p. and general manager, Fives Machining Systems Global Services. "We handle everything from spare parts, field service, unit repairs, machine certifications, rebuilds and control retrofits across a variety of industries including aerospace, automotive, energy, defense and heavy equipment."

GF Machining Solutions Names New Directors of Sales and Applications

GF Machining Solutions has appointed a new director of sales and a new director of applications to its leadership team. Don McMillan and Tony Salvado now fill these critical roles to enhance the sales, service and support for the company's milling, EDM and laser texturing solutions.

As director of sales, McMillan is responsible for the overall sales of the company's machine tool selection, including advanced 5-axis technology

and automation solutions. He began his career with GF Machining Solutions in 1985 as a field service and applications engineer. His career also includes serving as the EDM supervisor at Foreman Tool and Mold and general manager at Tri-Wire, Inc. before returning to GF Machining Solutions in 2001 as regional sales manager for the Central region. Prior to being named director of sales, he held positions as applied technology manager and head of sales for the central region.

Salvado brings extensive knowledge of customer applications to his new role as director of applications. Following positions with Klinghoffer Corporation and AK Stamping, he joined GF Machining Solutions in 1987 as an applications engineer in the Northeast region before being named applications manager for that region.

In his new position, Salvado oversees GF Machining Solutions' regional applications managers and applications engineers as they assist manufacturing customers with optimizing their part-processing operations for improved throughput, shortened lead times and increased productivity.

Tsugami/Rem Sales Opens New Technical Center in California

Tsugami/Rem Sales, the exclusive North American importer of Precision Tsugami machine tools, held a grand opening and ribbon cutting ceremony at its new Tsugami Technical Center in Fullerton, California December 9th and 10th.

Representatives from 35 local businesses attended the "invitation only" event, which featured live cutting demonstrations on several Tsugami machines, including the B0326-II opposed gang tool lathe, SS20M-5AX multifunction machine and the S206-II LaserSwiss, which combines Swiss-style 6-axis CNC machining with an integrated laser cutting system.



(L) Tsugami Vice President Mike Mugno and Pat Urian President, Ellison Southern California



Employees from Tsugami were there for the ribbon cutting ceremony. Left to right: Business unit manager Scott Anthony, applications engineering manager Steve Tragarz, vice president Michael Mugno and regional sales manager John Traver.

"We're here to support you," Tsugami/Rem Sales vice president Michael Mugno said as he addressed the crowd of Tsugami customers during the ribbon cutting ceremony. "Without our customers, we're nothing. We know that. We appreciate you."

The new technical center, Mugno explained, was established to provide regional Tsugami service, support and customer training, as well as space for engineering services, such as preparing machines for turnkey delivery and producing run-off parts for customers.

The facility will also benefit Tsugami/Rem Sales' distribution partner, Ellison Technologies, Mugno noted. "It supplements Ellison's Santa Fe Springs and Fremont facilities," he said. "We can house more machines to allow local customers to see several demos in one visit. It's a win-win for everyone involved."

The Fullerton Technical Center is located at 1521 E. Orangethorpe Ave., Suite E.

Industry News

Jergens, Inc. Appoints Steve Schmidtke As The Group Manager for the Workholding Solutions Group

Cleveland OH, Jergens, Inc. appoints Steve Schmidtke as the group manager for the Workholding Solutions Group. "In his new role, Steve will be responsible for all of the Workholding Group's activities including application engineering, product management, new product and new market development as well as sales and support of our Workholding products through our network of partner distributors.", says Jergens general manager, Robert Rubenstahl.

"I'm very pleased to join the Jergens team and eager to continue the growth initiatives we have in place to support our robust products and technologies",

says Schmidtke. "Prior to accepting this position with Jergens, Steve served in both sales and operations management in our industry and other related industries. His experience and proven track record of success will play a key role in meeting our departmental goals and objectives."



Toyoda Announces CNC Solutions as Northern California Distributor

Toyoda Machinery USA is pleased to introduce 7 new companies to its distribution network, spreading their capabilities and service across the United

States. The announcement comes about as the Federal Reserve data released in November, a 0.4% growth during October for manufacturing production. With the industry's recent spark, Toyoda looks forward to providing access to the most advanced technology, engineering service, sales and product support through these new distributors in the Southeast, Northeast, Midwest and Western states.

Furthering Toyoda's expanding service on the west coast is CNC Solutions based in Milpitas, CA. CNC Solutions has been known for over 60 years to provide the best product support in the west.

CNC Solution's mission is to provide customers with the highest quality machine tools to allow them to compete in the world economy.

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Industry News

Mazak Broadens Management Team

Mazak Corporation president Brian Papke recently expanded his leadership team with the appointment of Daniel Janka to the position of executive vice president.

Papke hand selected Janka who will officially begin his new post on January 1, 2016. Under Papke's direction, Janka will be responsible for the company's North American operations, which includes providing strategic leadership and performance management of the company's short and long-term goals.

According to Papke, Janka is a perfect fit for the role in that his experience as an accomplished, results-driven leader perfectly aligns with Mazak's aggressive growth strategy. Overall, he has more than 30 years of machine tool experience, working with companies across a variety of manufacturing

segments, including aerospace, oil and gas, automotive and mining equipment. He also comes to Mazak with extensive international business development experience as well as merger, acquisition and joint venture expertise.

Most recently, Janka served as the president and CEO of Fives Machining Systems, an industrial engineering group based in Hebron, Kentucky. Prior to Fives, he spent eight years at MAG Industrial Systems serving in a presidential capacity. Throughout his tenure with MAG, he led four different areas of the company to success.

Currently, he is an active member of the National Association for Manufacturing as well as the National Tooling and Manufacturing Association. He also served as chairman for the Association for Manufacturing Technology from 2009 to 2010 and was involved with the U.S. Manufacturing Revitalization Task Force Board in 2010.

OMAX Corporation Names Brad Tumbleson Regional Sales Manager

In response to increased demand across the country for its advanced abrasive waterjet systems, OMAX® Corporation has expanded its sales force. The Kent, Washington-based company has added Brad Tumbleson as regional sales manager to serve customers throughout Southern California.

In his position, Tumbleson will support existing customers that rely on OMAX Corporation's abrasive waterjet technology, which includes OMAX and MAXIEM® JetMachining® Centers. He will also introduce manufacturers, job shops and metal service centers serving the aerospace, medical, and transportation industries as well as educational institutions to the benefits of abrasive waterjet technology for the fast, precise cutting of vari-

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ous materials.

With nearly 10 years of outside sales experience, Tumbleson has a proven record as a dedicated and highly motivated sales manager. Prior to OMAX Corporation, he was a branch manager and outside sales manager for House of Threads where he was responsible for the overall growth and production of a distribution branch within the fastener business. His career also includes serving as an outside sales engineer and service manager for Aqua Blast Corporation and directing sales and service of pneumatic and ultrasound equipment through an independent office of Foodtools Inc.



Fives Reinforces, Expands in the Aerospace Industry with the Acquisition of Lund Engineering

With the acquisition of Lund Engineering, Fives is expanding its automation offering for composite parts manufacturing.

Founded in 1995 and based in Seattle, WA, Lund Engineering is an engineering firm known for designing and building electro-mechanical equipment for the manufacturing of composite aerospace structures and components.

The company currently employs 64 people, including 41 engineers. Its technical expertise and the partnership-based approach Lund Engineering adopts with its customers enables Lund Engineering to develop very technologically advanced solutions and systems.

“For the last three years Lund En-

gineering has had an average turnover of around \$30 million. There is major growth potential for the company due to the expanding use of composite materials in the aerospace industry, as well as in other sectors such as renewable energy and bio-medical. By joining Fives, Lund Engineering is teaming up with a strong industrial group with global reach and will, in due course, be able to expand its field of business,” said a company spokesperson.

“With Lund Engineering, Fives continues to expand in the aerospace industry, an area of high added value, acquiring a designer and supplier of advanced technology and innovative equipment,” said Frédéric Sanchez, chairman of the executive board of Fives.

Erik Lund, the current CEO and majority shareholder, will continue to manage the company and remain involved in its development.

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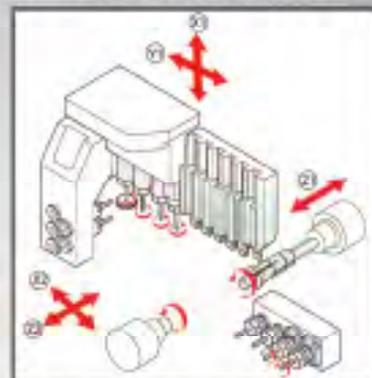
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Industry News



Goldenwest Lubricants Celebrates 30 Years in Business

GoldenWest Lubricants, Inc., a leading manufacturer of premium industrial fluids for the metalworking industry and automotive products, announced that the company commemorated 30 years in business on November 1, 2015.

For the past three decades GoldenWest has applied advanced manufacturing technology to develop a wide range of high-quality fluid products, including automotive performance, machine lubricants, metalworking oils and coolants, and specialty fluids. All products are formulated using the finest base stocks and premium ingredients, and combined with the company's stringent quality control and packaging processes, ensures adherence to the highest product quality standards.

In 2006, GoldenWest acquired Pro-long Super Lubricants Inc. a leading brand of automotive chemicals and car care products, including engine, fuel and transmission additives; motor oils; chassis and wheel lubricants; vinyl and leather protectants.

Today, with over 25 employees and a 65,000-square-foot facility, GoldenWest provides a wide range of industrial organizations with consistent, high-quality products and responsive customer service. "We are very fortunate to be doing business in California; it affords us the opportunity to stay on top of the regulations in our industry. This makes it easier to do business and grow in other states and countries," said Dan Griffiths, owner and president, GoldenWest Lubricants.

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Industry News

Workholding Partnership Expands

Mitee-Bite Products LLC and TECO LLC have officially announced their new partnership with Raptor Workholding Products, LLC.

This strategic partnership will expand the group's complete workholding solution for the metalworking industry, from small to large workpieces now to include 5-axis workholding. The companies will mutually benefit from their combined domestic and international distribution network and complementary product lines. Mitee-Bite, TE-CO and Raptor will continue to operate as individual companies utilizing their mutual strengths.

Raptor Workholding Products is a manufacturer of workholding products for 5-axis machining applications.

Mitee-Bite Products LLC is a manufacturer of workholding systems and components for small to medium workpieces. Its products will continue to be distributed internationally through a comprehensive distribution network.

TE-CO, LLC is a manufacturer of workholding devices and components, including jig and fixture components and precision vises

Surfcam by Vero Software, Hires Account Manager for the West Coast

Surfcam, by Vero Software, has hired new west coast account manager Scott Inslee to serve its growing customer base in the northwestern United States.

Inslee brings to Surfcam 15 years of experience in computer-aided engineering, design, and manufacturing software, as well as product data management systems.

"My focus is on helping clients achieve greater results in CNC programming, such as reduced machining time and enhanced quality," says Inslee, who will be working from an office in Seattle, Washington.

Inslee served the northwestern territories of Washington, Oregon, British Columbia, and Alberta in previous positions, and has gained extensive experience working in the aerospace, automotive, marine, transportation, electronics, medical, and consumer products industries.

"Scott has a strong background in many facets of various engineering environments, so he brings a depth

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Industry News

and breadth of experience that helps to provide best-in-class solutions to our customers,” said Surfcam general manager Peter Marton.

Workshops for Warriors Awarded \$75,000 Grant by JPMorgan Chase & Co.

Workshops for Warriors has been awarded a \$75,000 grant by JPMorgan Chase & Co. to assist in its efforts to train veterans transitioning into civilian life with job skills and placement.

“JPMorgan Chase is committed to serving the unique needs of America’s military, veterans and their families through valuable employment and education programs such as this,” said

Myeisha Peguero Gamino, JPMorgan Chase’s vice president of corporate responsibility for Southern California.

“We recognize that many employers have job openings but no properly trained job applicants. Through our initiative called New Skills at Work, we are working with great partners like Workshops for Warriors to close that skills gap.”

Founded in 2008, Workshops for Warriors provides veterans and injured vets with training in CNC machining, CAD/CAM programming and welding. Since 2011, 194 veterans and wounded warriors have been trained on-site and received third-party nationally recognized credentials, with 100 percent of graduates obtaining jobs in advanced manufacturing.

Parlec Opens West Coast Warehouse

Parlec Inc., a provider of tooling and presetting solutions, has opened a new West Coast warehouse in Anaheim, CA.

“Parlec’s increasing growth on the West Coast has made it necessary to expand into additional warehouse space,” said Mark Higgins, executive vice President, Parlec, Inc. “This will allow us to expand inventory and fulfill orders to the western states with a greater level of efficiency.”

Customers in and around the region can expect a reduction in freight expenses and delivery in one to two days. Customer pick-ups will be available Monday through Friday.



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Ophir Optics Receives International Aerospace Accreditation For Whole Range

Ophir Optics, a leading designer and manufacturer of precision infrared and laser optics, received certification to the AS9100 quality systems standard of ISO 9001:2008 for the design, development and production of its entire range of products.

Achievement of the AS9100 aerospace quality systems standard was certified by The Standards Institution of Israel in accordance with SAE International requirements. SAE International sets rigorous standards for quality assurance in the design, development, and production of aerospace equipment as well as its installation and servicing.

Ophir Optics, which produces a wide range of state-of-the-art, high performance, infrared components, lenses, and motorized zoom lens systems and laser optics, has a wide range of customers in the defense, security, manufacturing, marine, industrial and environmental thermal imaging industries.

The standard specifies requirements for effective application of a quality management system, requires that a company strive to meet customer needs, enhance customer satisfaction, and demonstrate continual product improvement while meeting applicable statutory and regulatory requirements.

SAE's Aerospace Standards apply to missile, airframe, ground-support equipment, propulsion, propeller, and accessory equipment.



CNC Solutions Shows Off New Lines at Open House

CNC Solutions held its annual Octoberfest Open House on the 28th and 29th of October at their office in Milpitas, California. The Open House was well attended, and included live cutting demos, door prizes and a catered BBQ.

Highlighted at the event were: Toyoda FH400J high speed horizontal



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machining center, Samsung SL-15M mill turn CNC lathe, Ganesh Cyclone 32CS 8 axis turning center, Tornos CT-20 4 axis Swiss CNC lathe as well as the YMT Quaser MF-500U full 5 axis milling machines.

Jim Selway VP Sales said “that this was their best attended Open House, and that he was very encouraged by the amount of interest in the new products that CNC Solutions is now offering.”

CNC Indexing & Feeding Technologies Appoints Steven Smith as President

Steven Smith has been named President of CNC Indexing & Feed-

ing Technologies, Mason, Ohio. He will be responsible for managing CNC Indexing’s daily operations as well as building a new national distribution network in the United States.

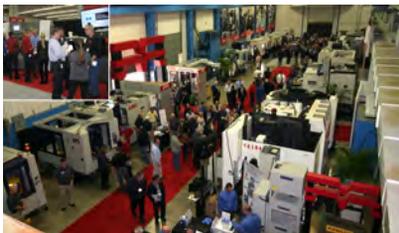
Smith comes to CNC Indexing & Feeding Technology from Heartland Machine & Engineering (Dayton, Ohio) where he spent three years expanding the company’s customer base into new territories throughout Ohio and Northern Kentucky. He is



experienced in identifying the best manufacturing solutions for different customer needs while at the same time significantly reducing production costs through streamlining workflow, trimming labor and material costs, and lessening risk.

As a project manager for Dayton, Ohio-based Gosiger, Smith marketed such top machining brands as Okuma and Hardinge after a successful career as a sales engineer at both Yamazen and Technical Equipment, Inc. where he sold \$2million in CNC machine tools and robotic automation equipment in his first year, doubling it to \$4.5 million in his second year of sales.

Industry News



Methods "Techfest2015" Draws Hundreds

On November 4th and 5th, Methods Machine Tools, Inc., hosted a major open house / show, TechFest2015 – "Manufacturing the Future." The two-day event took place at the company's corporate technology center in Sudbury, Massachusetts. The highlight of the show was Methods' recent partnership with 3D Systems, of Rock Hill, South Carolina. 3D Systems offers advanced and comprehensive 3D digital design and fabrication solutions. Methods now offers 3D System's full line of professional and production 3D printers and materials to its customers.

Methods reports that they are the first importer/ national master machine tool distributor to offer a full line of 3D printers that include solutions for both metal and non-metal applications.

A new business unit, Methods 3D, has been formed and will be led by Benjamin Fisk, a former Pratt Whitney technology manager and engineer. Fisk will serve as Methods' general manager of 3D Additive Manufacturing and is helping to assemble a comprehensive Methods 3D team that will offer sales, installation, service, applications support and spare parts.

"There is a very strong market for 3D printing. We are on the front end of this technology, and we couldn't

be more pleased. Our customers have expressed a huge interest in it and we are poised to help integrate 3D printing into their manufacturing solutions," said Bryon Deysher, Methods Machine Tools president & CEO.

"This is a true complement to our other lines of products," added Jamie Hanson, Methods' director of corporate development. "We are dedicating a 3D lab and showroom at each of our seven facilities across the country. At our corporate headquarters in Sudbury, MA, we will house a new 2,000 square foot additive manufacturing lab."

Methods 3D will offer 3D Systems production printers that provide direct metal 3D printing, offering a wide choice of materials including ceramics and common metal alloys such as steel, chromium cobalt, Inconel, aluminum and titanium. Inquisitive TechFest attendees expressed interest in the 3D technology and printers on display, and the additive manufacturing seminars were well attended.

TechFest2015 also showcased other machine tool partners, totaling over 30 machines under power. Attendees saw live demonstrations on machines such as the Nakamura-Tome NTRX-300, featuring true opposing twin spindles. This is a twin ATC multitasking B-axis lathe and also offers the new Nakamura-Tome Smart X control using Windows 8 software. Methods also showcased the Nakamura-Tome AS-200LMY-S sub spindle multitasking turning center. The new AS-200LMY-S offers an upgraded long bed with sub spindle. Also on display was the Nakamura-Tome TW-20-MMY multitasking turning center.

Other machine solutions highlighted included the Yasda PX-30i, a 5-axis machining center with multiple pallets, increased tool capacity with matrix style changer and an advanced tool and pallet management system, and the Yasda H40i, a well-positioned machine designed to meet the tighter tolerances and shorter cycle times required by manufacturers. Kiwa machines were also featured, highlighting the KMH-300 HMC that includes a 30-tool ATC and 15,000rpm BT30-taper spindle, and the Kiwa KH-45 series that now includes models with more Y-Axis travel to 29", to enable tall parts.

Fanuc machines showcased included the Fanuc RoboCut C400iA, which offers a solid performance in a smaller footprint and the RoboCut C600iA. These EDM machines include several important upgrades, such as the new Fanuc 31i-WB control, which is loaded with new features. The FANUC RoboDrill a-D21LiA5-10K long bed, the largest version in the Fanuc RoboDrill lineup, was also on-hand.

Feeler high performance machines on display included vertical machining centers, turning centers, vertical turning lathes and bridge/ boring mills such as the FT-350 MC, a 3-axis CNC mill -turn lathe, and the HV-1300, a high performance vertical machining center with a 30-Tool dual swing arm ATC and a Fanuc 31i-MB control. The VisionGauge® 300 and 500 series digital optical comparators with patented CAD Auto-Align™ and CAD-Auto Pass/Fail tools™, as well as the new 700 series that features a 5-Axis inspection and measurement system, were also on display.

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Industry News

L&S Machine Co. Acquires Bay Area Machine Shop

L&S Machine Co. has acquired Advanced Manufacturing, a full-service prototype and production manufacturing facility in San Jose, California. Advanced Manufacturing specializes in the fabrication of plastic and metal parts for the semiconductor, medical and aerospace industries.

The acquisition extends L&S Machine Co.'s geographic reach to the West Coast and provides an introduction to new customers with a need for high-quality, tight tolerance machining. L&S Machine Co.'s current facility in Latrobe, PA. is a highly automated machining operation that features 3-, 4- and 5-axis CNC machining centers, waterjet cutting and ASME-certified welding.

"We look forward to welcoming the vastly experienced and capable team from Advanced Manufacturing," reports Rob DiNardi, C.E.O., L&S Machine Co. "We have served the nuclear industry for over 50 years, honing our ability to machine parts to the most demanding quality and tolerance specifications. The timely acquisition of Advanced Manufacturing will accelerate our plans to deliver these capabilities to new customers in new markets."

Paul Coggeshall, former owner and now general manager at Advanced Manufacturing, adds, "The acquisition is excellent news for both our customers and staff. L&S Machine shares our commitment to quality and excellence."

CNC Software, Inc. Launches Global "Dynamic Motion Challenge"

CNC Software, Inc. has launched a worldwide Dynamic Motion Seminar Program where manufacturing managers, CNC programmers, machinists

and operators can learn about achieving higher material removal rates, cycle time reductions of up to 70%, and greater tool life using Dynamic Motion.

With support from their tooling and

machine partners they are bringing live cutting demonstrations, featuring difficult to machine materials, to local venues so attendees can experience the benefits of Mastercam's Dynamic Motion for themselves. In the coming months, Mastercam Resellers from



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Industry News

around the world will be conducting these seminars which include educational presentations by cutting tool and machine tool experts, followed by live milling and turning demonstrations using Dynamic Motion.

Jorgensen Conveyors Celebrates 65th Anniversary

This year Jorgensen Conveyors celebrated its 65th year in business.

The company is currently owned and operated by Chuck and John D'Amico, third generation descendent grandchildren of the founders. Today, Jorgensen is a global supplier, providing a broad range of custom engineered conveyor and coolant filtration solutions for CNC machine tool manufacturing for a broad range of industries.

Recent new products include the EcoFilter® and the MunchMan® II Conveyors. Each offers the company's customers innovative solutions to continuing and challenging problems with chip/scrap and coolant management in their manufacturing processes.

Jorgensen is growing the business with two internal promotions and two recent new hires.

Jorgensen Conveyors welcomes Zak Buth as the new national sales manager. Zak's role will be to manage Jorgensen's North American independent sales organization in the pursuit of metal working manufacturer end user business. Additionally, he will be responsible for sales to machine tool distributors, machine tool integrators and industrial distributors. Zak previously worked for Jorgensen in the proposal department.

Mike Weckerle was recently promoted as the national sales manager for OEM-Machine Tool Builders, Importers and Distributors in North America. Mike brings over 35 years of Jorgensen Conveyor experience from the manufacturing floor to manager of proposal department and has a strong track record for building solid working relationships with his customers.

Bill Johnson was recently promoted to the position of manager of the proposal department. His primary responsibility will be to manage the function of delivering timely, accurate and high quality quotations for product solutions. Bill brings over 14 years of Jorgensen Conveyor experience from the shear and form department.

Kristy Hembrook was recently on boarded in the position of marketing

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Industry News

specialist. She comes to Jorgensen with 12+ years of marketing and advertising experience which includes web development, lead generation, multi-media advertising, project and event management with manufacturing companies such as BCI Burke and The Kohler Company.

Methods Machine Tools Appoints Peter Jung as Marketing Manager

Methods Machine Tools, Inc., recently appointed Mr. Peter S. Jung to the position of marketing manager. Mr. Jung will be responsible for Methods' branding; content direction, development and production via the company's website, digital and print media; sales collateral; trade shows, open houses and other marketing support endeavors for Methods' corporate and partner brands, in addition to their national dealer/distributor network.



"We're pleased to have Peter onboard," commented Mr. Jamie Hanson, director of corporate development at Methods Machine Tools, Inc. "He brings a diverse skill set to Methods ranging from digital marketing to collateral and website development, in addition to machine tool sales and marketing experience. This will enhance our marketing now and especially moving forward, as we continue to grow and expand with new initiatives such as our recent entry into the 3D printing market."

Prior to joining Methods, Mr. Jung spent four years as deputy general manager of sales and marketing at Doosan Infracore America. There he had marketing responsibilities for branding, the company's U.S. website, social media, online marketing, CRM,

and other marketing functions including the creation of a mobile application designed as a sales management tool.

Jung specialized in creating and managing marketing and sales tools using emerging technologies.

Prior to Doosan, Mr. Jung held positions of progressive responsibility in web development, IT, digital marketing, and planning at various companies from 2003 to 2011. Jung also speaks Spanish and Korean.

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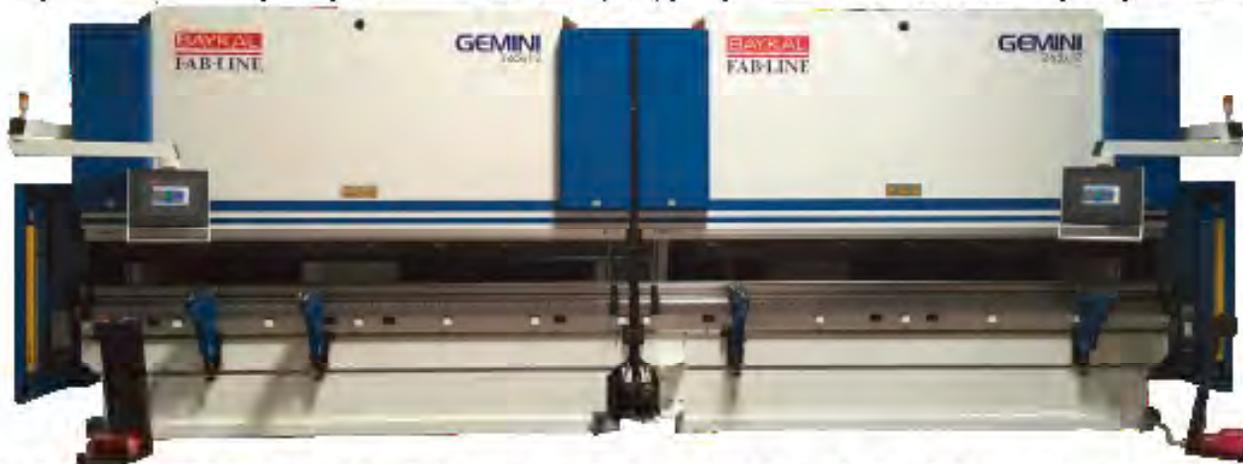


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Aero Def Preview



ProtoTRAK CNC Technology for Small Lot Machining —AeroDef 2016 Booth 202

Southwestern Industries will exhibit its TRAK 2OP portable VMC and TRAK product line of mills and lathes at the AeroDef 2016 show in Long Beach, California. TRAK products feature Southwestern Industries' proven ProtoTRAK CNC technology, a powerful but easy to learn and use CNC conversational language that reduces time consuming machine set-ups, enables lower skill-level machinists to do higher level work.

The TRAK 2OP with its 8-station ATC is designed for second operations work. It can be used to create work cells and/or can be used as a stand-alone machine. It's 30" x 48" footprint allows it to be placed easily in most shops.

OSG USA Inc. to Show Cutting Tools—Booth #237

OSG Tap & Die, Inc. will exhibit their extensive line of high technology cutting tools featuring exclusive metallurgy, cutting geometries, and proprietary surface treatments to help increase productivity, reliability, and tool life while reducing machining time and scrap.

Fagor Automation Corp to Exhibit Automation Systems—Booth #232

Fagor Automation a member company of the MCC group, is a worldwide leader in manufacturing of Automation Systems for machine tools and automation industry. They have a comprehensive range of products including: CNC controls, servo drives and motors, linear and rotary feedback, DRO systems and motion control devices. Come by their booth at Aerodef and see their wide array of products.

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New Products



OK Vise Clamping Systems Added —Jergens, Inc.

Cleveland OH, Jergens, Inc. announces the addition of OK-Vise

clamping systems to its range of workholding solutions. At the heart of the product offering is a unique, patented wedge-operated, low-profile clamp that provides uniform pressure via a single hex screw. OK-Vise components can be used to build both general-purpose and dedicated fixturing and work in conjunction with other Jergens workholding platforms.

A systems approach provides all the basic elements needed for flexible fixturing. Among the components are Multi-Rail and Combo-Rail units, to which multiple clamps can be attached to accommodate numerous parts in a single set-up. The rail system can be modified per the need of the parts to be machined. Additionally, the OK-Vise line offers grid fixturing and blank fixturing for custom workholding needs.

The clamps are available with several jaw styles including serrated, smooth, machinable and adjustable. Single-wedge and double-wedge, pull down styles and a simplified economy version of the clamp round out the offering.

Best known as the original inventor and manufacturer of wedge-operated low-profile clamps, OK-Vise is a well-respected international brand with manufacturing in Muurame, Finland. The partnership between Jergens and OK-Vise is founded on a mutual approach to workholding innovations. "We have a high level of confidence in Jergens, especially as an international leader in workholding solutions", says Olavi Meriläinen, managing director of OK-Vise Inc.

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New Products



IMCO New High-Efficiency Machining Tools —IMCO Carbide Tool

IMCO Carbide Tool has launched the new POW•R•PATH IP Series of cutting tools, a new line designed

exclusively to maximize the benefits available with high-efficiency machining methods, the company announced.

While high-efficiency machining is great at improving productivity and tool life, IMCO designed POW•R•PATH IP series tools to take those improvements even higher, explained Perry Osburn, president and CEO of IMCO Carbide Tool Inc.

“Our new designs are made only for high-efficiency machining,” Osburn said. “Special design features take full advantage of continuous tool paths to get maximum performance out of every tool. Results achieved in our test lab have been surprising, even for us.”

Introduced at EMO Milano in early October, POW•R•PATH IP cutting tools include two series – POW•R•PATH IPT7 series and POW•R•PATH IPC

series with IMCO’s special Chip Management System (CMS).

Both series feature 7-flute configurations for amazing finishes. IP Series tools are made with a stronger, larger-diameter core for straighter walls in deep cuts and superior strength for longer continuous cutting at HEM’s high feed rates. POW•R•PATH IPC7 and IPC9 Series add the powerful CMS for reliable chip evacuation in virtually any material, making it the ultimate cutting tool with universal applications.

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New Products



New CNC Multi-Spindle Lathe —Index

Designed to supplant cam-controlled multi-spindle lathes up to 22 mm bar diameter, the new Index MS16 Plus of the Index MultiLine series

includes six CNC spindles for up to 22 mm diameter parts, accomplishing turning, drilling, milling, tapping, deep hole drilling or slotting in each of its six spindle positions. Workpieces are automatically indexed through the six positions, receiving two or more operations at each position. The company reports the result is very high production of precision turned workpieces.

The total of 27 NC axes of the MS16 Plus includes 5 NC grooving or boring slides, 5 NC cross-slides, 1 NC cutoff and/or back-boring slide, 6 work spindles, 1 NC synchronous spindle, drum indexing plus an additional 5 free NC axes of possible CNC-controlled auxiliary equipment are controlled by an Index C200-4D CNC control.

The compact Index MS16 Plus provides the speed of a cam-controlled

machine with the flexibility of CNC technology yet requires no more floor space than a cam-controlled multi-spindle machines. In addition, the MS16 Plus offers exceptionally high ease of setup and more versatile machining options.

Each of the six spindle positions can include a highly stable grooving or boring slide with 1 NC axis and a cross-slide with 2 NC axes (X- and Z-axes) that are arranged around each work spindle in a V-shape, allowing easy use of several tools simultaneously on each work spindle.

The NC-controlled synchronous spindle for gripping the workpiece and an NC cutoff and back-boring slide provide optimal conditions for efficient production of turned parts with simple to medium complexity and up to ap-

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B12	12"	0.709	1.181	2"	KT-12200F	\$ 63.49
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Chuck Model	Chuck Dia	Part Number	Price Per Set
B-206, HS06	6"	KT-60HJ2	\$328.76
B-208, HS08	8"	KT-80HJ2	\$388.96
B-210, HS10	10"	KT-100HJ2	\$463.06
B-12, HC12	12"	KT-120HJ2	\$500.09
B-212, HS12	12"	KT-128HJ2	\$500.09

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PH Workholding

- For OD workholding
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Head Dia	Part Number	Price EA
2"	550-002-PH	\$45.16
3"	550-003-PH	\$52.42
4"	550-004-PH	\$76.40
5"	550-005-PH	\$109.90
6"	550-006-PH	\$128.34

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OD	ID	Part #	Price
3/4"	1/4"	TBC-07-0250-B	\$47.13
1"	3/8"	TBC-10-0375-B	\$49.01
1-1/4"	1/2"	TBC-12-0500-B	\$53.74
1-1/2"	5/8"	TBC-15-0625-B	\$58.44
1-3/4"	3/4"	TBC-17-0750-B	\$64.10

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- Ideal for machining soft jaws
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- Bore jaws in a single operation
- Reduces set-up time
- Allows for through boring of jaws

Chuck Dia	Part Number	Price Each
6"	JBR-06	\$176.60
8"	JBR-08	\$209.70
10"	JBR-10	\$236.73
12"	JBR-12	\$263.18
15"	JBR-15	\$395.43

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Part # KURT-D688

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prox. 70 mm length.

The speed of each of the six spindles can be controlled separately. Spindle speeds can be varied during cutting for each spindle position and each cutting edge of the tool. Speed changes and positioning of the spindles are possible even during spindle drum indexing. Additional advantages include maximum surface quality, short production times per piece, and extended tool life.

For rear end machining, the MS16 Plus is equipped with a synchronous spindle driven by a hollow-shaft motor allowing speeds up to 10,000 rpm and which can move 140 mm in Z at 30 m/min to engage several rear end machining tools on the NC cutoff slide with the X- and Z-axis in succession more quickly.

TB-1680 and 2210 Heavy Duty Cutting T-Based Machining Centers —YMT

The powerful TB-series vertical machining centers are especially designed for industries that demand heavy machining applications; such as automotive, mold shops, job shops and aerospace.

With the unique one piece T-base design, the X Axis is underneath the Y Axis slide way this means no table over hang along the full X travel of the machine.

The heavily ribbed Meehanite casting provides durable, rigid support and the extra wide box ways provide cutting stability and accuracy for many years to come.

YMT TB- series structural design also offers a small machine foot print and an excellent chip disposal system.

The YMT TB-Series offers machine X travel of 47" to 86", and up to 39" for Y travel. With standard CT-50 taper 35hp two range geared spindle that has 6,000 rpm deploys precision angular contact bearings of extra rigidity on both axial and radial wises for very heavy cutting requirements. Coolant through the three axes ball screws is standard.

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Lifetime Guaranteed Boring Heads

—Techniks Inc.

Tooling manufacturer Techniks Inc. has introduced a lifetime guaran-

tee that eliminates costly repairs and replacements.

Techniks President Greg Webb says: “We are the only company that provides this guarantee as part of a customer benefits program that is the best in the industry. Our high-performance boring tools are proven world-wide to be accurate, reliable, and dependable, however if your Techniks boring head should fail for any reason (even crashing the tool) we will repair or replace it free of charge, as long as you have been using Techniks all-material inserts. We look forward to providing guaranteed tooling solutions that protect tooling investments.”

Precision Laser Cutting Machines With Integrated Sensors

—JMT

JMT’s latest fiber laser incorporates a high power fiber delivery system from IPG Photonics and a ProCutter head from Precitec. The company reports that the head is completely dust proof, protecting the beam path from contamination.

The ProCutter has a fully integrated sensor system that monitors the cutting process and provides the user with relevant information via machine controls, head mounted LEDs and a Bluetooth system that interfaces with the operator’s smart device.

“JMT has partnered with Lantek to provide users with a CAD/ CAM system that is powerful and rich in features, but still easy to use,” said a company spokesperson. “The automatic nesting feature optimizes part arrangements on the sheet for maximum material utilization. The Lantek Expert Cut integrates with our hardware and optimizes the performance of the fiber laser system.”

All-Electric CNC Tube Benders

—Horn Machine Tools

American manufacturer of tube bending equipment Horn Machine Tools, Inc., has introduced a line of all electric CNC benders from 2” to 10” capacity.

The machines are based on the design of the HMT hybrid benders with the clamp and pressure die now equipped with large electric servomotors. The machines are 100% domestically designed and produced at the company’s Madera, CA, facility.

The all-electric benders have special features, which can include “Quad Stack” design allowing the user to mount up to four sets of full size bend tools at once. This gives the flexibility

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to switch between sizes rapidly or allows for greater capability to bend complex shapes. The machines can also be equipped with a shearing device and load/unload automation for continuous production.

These machines are designed intentionally for 24/7 production. They are built to bend very tight radius stainless steel on the rated diameter size. Draw bending in combination with push rolling capability are included as standard features.

Removing the hydraulics and implementing all digital servo systems with fewer components, less wiring and greater remote diagnostics capability enhances system reliability.

The machines are equipped with the BendPro CNC control which is designed for simple to use yet very powerful features for teach moves, cycle time optimization and remote troubleshooting capability.

New CMM-Manager 3.5 Software For iNexiv™ Vision Measuring Equipment —Nikon Metrology

Nikon Metrology is announcing CMM-Manager 3.5 software for Nikon's iNexiv vision measuring equipment. With a powerful and user-

friendly interface, CMM-Manager 3.5 works with vision measuring, autofocus laser scanning, rotary indexing, and touch probing to provide a true 3D multi-sensor system for both physical products and 3D CAD models.

"CAD is now an integrated part of product measuring and inspection," says Nate Frost, Nikon product manager. "It's important because it opens up opportunities to take programming and inspection offline and save significant time bringing new products to market,"

Historically, vision hardware technology has outpaced software development. "Previous software versions assumed you were working in a 2D template on an X-Y workplane," Frost explains. The latest CMM-Manager

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can import 3D CAD models and pick features to create automatic probe paths for both vision and tactile measuring. It can align any part regardless of part complexity or geometry for the most efficient inspection and measuring. Simulations can be run and inspection results can be verified in real time. In fact, the more complete the CAD model, the more efficient the inspection process becomes”, Frost adds.

“With vision, autofocus laser, rotary indexer, and tactile input, we can even measure features and geometry you can’t see,” he says.” 3D input also can be expressed as 3D output in the forms of charts and models as opposed to long tables of X-Y data, making

reporting and decision making much faster and easier.”

CMM-Manager 3.5 is not only available for iNexiv equipment, it can be retrofitted onto existing CMMs and articulated arms from Nikon Metrology and other technology providers.

Introducing MechaLogix Cosen Predictive Computing —Cosen Saws

Cosen Saws has introduced MechaLogix Cosen Predictive Computing – a cloud based system that Cosen reports has an innovative feature that moni-

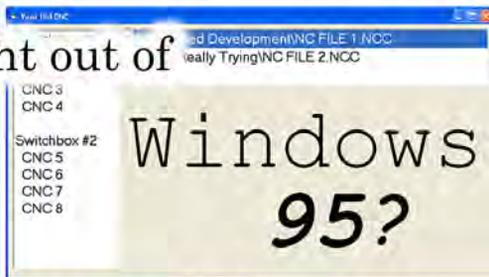
tors the performance of a blade and can accurately forecast the number of remaining cutting hours left before a saw blade dulls and is no longer cutting with precision or a complete breakage.

“Know the unknown – now you can,” said Joshua Sun, business development manager for Cosen Saws. “This completely changes the game for cloud based machine monitoring systems. “Our customers have told us how important it is for them to minimize waste and scrap. Having a blade fail in the middle of a cut is one of the primary causes of waste and scrap and it negatively impact profits.”

“With our technology, both operators and management will know the

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remaining useful life on a band saw blade” Mr. Sun added. “Gone are the days of tracking machine hours and accumulated cutting area. Now you have advance knowledge of the days and hours before a replacement saw blade is required. That’s what MechaLogix Cosen Predictive Computing does.”

MechaLogix also gives you real time performance data and can report issues like excessive vibration, overheating and changes in fluid line pressure. The root cause of an issue is reported in real time which equates to minimal down time.

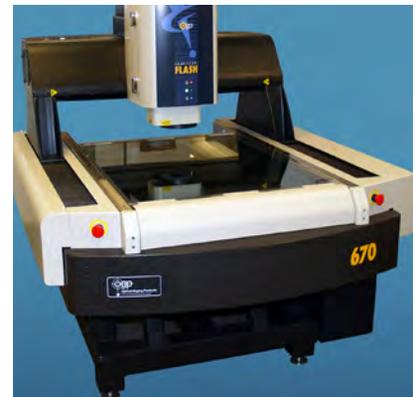
The technology is intuitive and user customizable. Adjustable alert notification settings work seamlessly with the mobile app.

Large Measurement Volume SmartScope® Flash 670

—Optical Gaging Products

Optical Gaging Products (OGP®), a division of Quality Vision International (QVI®), offers its large measurement volume SmartScope® Flash 670 dimensional measurement system to the metrology marketplace.

SmartScope Flash 670 is designed specifically to measure large XY area parts within its generous 650x660x200 mm measurement volume. The worktable is fixed and stationary, while a moving bridge transports the opti-



cal system overhead in X, Y and Z. Dual Y-axis drives and scales provide positive positioning of the moving bridge for measurement repeatability. SmartScope Flash 670 is fully multi-

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sensor-capable with video, laser, and touch probe sensors. Its versatility is expanded further with the availability of extended 300 mm or 400 mm Z-axis travel.

SmartScope Flash 670 is available with QVI's new ZONE3® premium CAD-based 3D metrology software. ZONE3 features a clear, simple user interface, and its kinematic model simulates the machine, part, fixtures, and sensor, updated in real time. Built-in productivity maximizing tools, integrated GD&T functionality, and visual validation of measurement intent offer speed and power to the measurement process.

New Low Cost DuraMax LTE CMM

—Zeiss

Zeiss Industrial Metrology announced the introduction of the new DuraMax LTE coordinate measuring machine (CMM), providing uncompromising access to Zeiss scanning technology at an affordable price. Equipped with the same controller technology, software and VAST sensor technology available in larger ZEISS systems, the CMM's specifications, small footprint and no need for compressed air make it ideal for manufacturers with smaller inspection labs.

“The Duramax LTE is an easy-to-use and affordable measuring solution with trusted Zeiss scanning

technology,” says David Wick, bridge CMM product manager at Zeiss Industrial Metrology. “The field-proven Vast XXT scanning sensor provides reliable measurement results, scanning hundreds of points per second to gather the data needed to provide accurate results. The 500 x 500 x 500 mm measuring volume on a machine that needs only 1100 by 1400 mm of table space, and no shop air is perfect for manufacturers trying to maximize their inspection lab space.”

The space-saving, ergonomic design offers a number of benefits for a machine with its measuring range. Extra leg room and soft-touch covers improve operator comfort while the stylus changer option adds convenience. Parts can be loaded from four sides, mak-

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ing access quite easy no matter what you're measuring. It also comes with an integrated passive damping system and covered guideways for measuring lab protection.

The popular Calypso 2015 software makes creating measurement programs easy. Customers can write a measurement program for the DuraMax LTE quickly for immediate inspection. It also comes with PiWeb reporting, the new, powerful quality data management software from Zeiss.

New Economical Scout 320 Magazine Bar Feeder —Edge Technologies

The Scout 320 is the newest and most economically priced Edge brand magazine bar feeder for feeding round, square and hexagonal bar stock in a diameter range of 3-20mm and lengths up to 12' into CNC lathes. It features robust construction with heavy gauge structural steel. A two-pusher system reduces the overall length of the unit by as much as 4 feet. A short pusher pre-feeds the bar then retracts, then a second full-length pusher lowers into position to continue the feeding process. The Scout 320's double pusher system is propelled by a toothed belt



for accuracy, and smooth quiet running.

The synchronization device for Swiss style lathes is standard and employs an electro-magnetic coupling, mechanically linking the lathes headstock's z-axis travel to the bar feeder's pusher to ensure synchronous movement.



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Dual anti-vibration devices stabilize the bar stock at two critical points between the guide channel and lathe spindle. Its adjustable roller design provides support and easy set-up.

The Scout features a 3-20 mm bar diameter capacity with hydrodynamic quick-change polyurethane guide channels. An extruded aluminum case surrounds the Scout's polyurethane guide channels. The channel is flooded with oil to create a hydrodynamic effect to support the rotating bar resulting in the ability to run at higher RPM with reduced noise and vibration. The top guide channel is profiled for all bar stock sizes. The "U" shaped bottom guide channel sections slide easily out of their base. To make the change for a new channel size, a new section is inserted, a screw is tightened and the

Scout is ready to run a new bar stock diameter.

The Scout 320 features an easy-to-use remote control pendant with a Mitsubishi control and servo drive that provides the Scout's motion control and functionality. Functions include: manual and automatic operation, manual load/unload of bar stock for set-up and/or change over, movement of bar pusher, and the emergency stop. The control is easy to program.



a wide variety of demanding applications such as three dimensional work profiles for dies and molds, aircraft components and more.

The CMV-100 features a column-feed design and construction that eliminates table overhang, assuring optimum prolonged machining accuracy. The wide +30" to -120" A-axis tilting spindlehead easily enables undercuts

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in a single setup.

The CMV-100 utilizes a 40/30 HP spindle motor that delivers both high-speed and high-power cutting capability. The spindle speed range of 40 to 8,000 rpm with a maximum torque rating of 600 N-m (442 lb-ft) continuous allows for a wide variety of machining requirements.

Table size (W x L) is 39.3" x 39.3" with a maximum table load capacity of 3,300 lbs (w/o APC). It also features Rotary Table Dynamic Fixture Compensation which automatically compensates for work origin moves due to C-axis rotation of the rotary table. Travels (X, Y, Z) are 59" x 52.3" x 51.1".

The CMV-100 employs a Fanuc 31i-B5 CNC loaded with control features.

Standard features include an automatic pallet changer (2 pallets), 80 tool ATC system (50-312 optional), tool axis manual movement function, scale feedback, work piece probe, automatic tool length and diameter measuring function with broken tool detection slideway covers, spindle speed and load display meters and cycle completion total shutoff function, through spindle coolant, splashguard and chip conveyor.

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...Hotline Continued From Page 8

Launching people and payloads into space is an expensive business. SpaceX's Falcon 9 rocket cost \$61.2 million per launch and is discarded after use. Because rocket components are the most expensive part of a rocket launch, the ability to reuse a rocket could drastically reduce the cost of launches.

While Blue Origin has pulled ahead in vertical rocket landing technology, its rockets have not been used to carry a payload into space yet. SpaceX's rockets have been used for commercial, military and NASA payload launches since 2012. And in mid November, SpaceX was approved by NASA for its first human transport mission to the International Space Station in late 2017.

Boeing, EVA Airways Finalize Taiwan's Largest Ever Commercial Airplane Purchase

Boeing and EVA Airways recently finalized a historic order for up to 24 787-10 Dreamliners and two 777-300ER (Extended Range) jetliners. The order, valued at more than \$8 billion at current list prices, marks the largest single commercial airplane purchase in Taiwan aviation.

"EVA participated in development of the Boeing 777-300ER and became a launch customer in 2005," said EVA president Austin Cheng. "From that first delivery through today, we operate 22 of these high-performance long-haul aircraft. We believe the future of the airline industry will be built on fuel efficiency and cabin comfort."

EVA Airways currently operates more than 40 Boeing airplanes and with today's order, the airline's backlog will increase to 37 airplanes, which includes fourteen 777-300ERs, five 777 Freighters and eighteen 787-10s.

US Air Force Says it Needs 100 Long Range Strike-Bombers

The US Air Force wants to buy 100 Long Range Strike-Bombers, Secretary Deborah Lee James said December 1, a figure at the high end of the 80-to-100-aircraft purchase the service predicted earlier.

"I believe the number is 100," James said at an event at the National Press Club, offering a rare detail on the service's plans for the hush-hush contract recently

awarded to Northrop Grumman.

The service has faced mounting pressure in recent months to procure more LRS-Bs than the planned 80 to 100 planes, particularly in the face of increased aggression from Russia and China.

Many advocates believe even 100 LRSBs are not enough. Lawmakers and analysts recently called for a fleet of as many as 200 next-generation bombers to project power in an increasingly dangerous world.

In study released Nov. 18 by the Mitchell Institute for Aerospace Studies, retired Lt. Gen. Michael Moeller made the case for the Pentagon to procure a modernized bomber force of 200 aircraft by 2045.

Bay Area Manufacturer Relocates to Dayton, Nevada

While the climate might pose a shock for some of his employees, Todd Peterson found the business climate in Nevada just to his liking.

The president and now 100 percent owner of Peterson Products, Peterson is in the process of moving his manufacturing firm from San Mateo, Calif. to Dayton, Nevada.

Peterson hoped to be in full production in Dayton by the beginning of December, a process that includes completing the permitting process and getting the plant's building ready for production as well as hiring to fill a staff that is bringing nearly half of its employees from the Bay Area.

Boeing Huntington Beach Awarded Contract

The Boeing Co., Huntington Beach, California, has been awarded a \$7,076,829 cost-plus-fixed-fee contract with options for a Defense Advanced Research Projects Agency (DARPA) research program. Fiscal 2015 research and development funds in the amount of \$3,220,288 are being obligated at the time of award. Work will be performed in Huntington Beach, California (84 percent); Dallas, Texas (15 percent); and Goleta, California (1 percent), with an estimated completion date of September 2016.

Continued on page 88.....

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...Hotline Continued From Page 86

Big Missile-Defense Announcement is Likely Good News For Aerojet

A large missile-defense contract announced in mid December likely means good news for Aerojet Rocketdyne. Defense contractor Raytheon Co. was awarded \$543.3 million to deliver its Standard Missile SM-3 interceptors to the Missile Defense Agency.

Rancho Cordova, CA-based Aerojet provides the launch engine and highly maneuverable third-stage engine to the system, which is designed to shoot down incoming missiles high in the atmosphere. U.S. Missile Defense Agency bought 17 of Raytheon's Standard Missile-3 Block IIA systems under the latest contract.

Aerojet builds the MK 72 booster, which launches the missile, and the maneuvering propulsion system that hits the target missile, said Amanda Schildt, spokeswoman with missile systems at Raytheon.

The new potential orders from Raytheon are more good news for Aerojet, which at the end of November announced that it landed two contracts related to manned space travel worth nearly \$1.4 billion. Aerojet is the region's largest locally based public company.

Faraday Future Selects Site For \$1B Electric-Car Factory

Faraday Future, a secretive electric car startup that has poached executives from Tesla and other major vehicle manufacturers, has selected North Las Vegas as the site of its \$1 billion factory.

The 3 million-square-foot plant would create 4,500 jobs, but the plan still hinges on a tax incentive deal that must be approved by the Nevada Legislature, Faraday representatives said in a press release.

Last year, electric carmaker Tesla chose a site outside of Reno to build its \$5 billion car manufacturing factory. Questions linger about whether Faraday is a viable threat to Tesla, in part due to the latter company's decision not to disclose its funders. Faraday representatives have said they hope to begin manufacturing cars in 2017.

Lawmakers Launch Effort to Help Washington's Spaceflight Companies Take off

Olympia, WA. has noticed the Puget Sound area's fast-growing outer space business, and is blasting off an effort to help.

Law makers from both parties convened at Seattle's Museum in mid December for an all-day hearing on the state's role in supporting the space industry.

Publicly Traded Portland-Area Manufacturer Sold for \$855M

Milwaukie, Oregon based Blount International Inc., a maker of saw chains and other equipment used in outdoor industries, in early December said it will be acquired for \$855 million by a pair of New York private equity firms.

The buyers - American Securities LLC and P2 Capital Partners LLC - will take Blount (NYSE: BLT) private, while maintaining its workforce, headquarters and manufacturing operations in Portland.

Sub-Zero Expands Goodyear, AZ Facility, Brings Supplier Along for The ride

The 248,000-square-foot, \$34 million expansion of Sub-Zero Group Inc.'s West Valley manufacturing facility is an economic coup for the city of Goodyear.

The company selected space near Indian School Road and Loop 303 and developed a 500,000-square-foot manufacturing facility. Promising Goodyear 100 jobs over seven years, Sub-Zero hit its goal in two. The high-value advanced industry jobs are coveted in the West Valley, paying more than similar jobs.

Trammell Crow, Principal Break Ground on North San Jose Manufacturing Campus

Trammell Crow Co. and Principal Real Estate Investors have kicked off construction of a major manufacturing hub in north San Jose, placing a big bet that Silicon Valley is poised for a new era of advanced production following decades of decline in the domestic manufacturing sector.

Midpoint@237, the name of the project in the city's Alviso district, will consist of three buildings totaling about 600,000 square feet. Construction officially started early December, with completion slated for the third quarter of 2016

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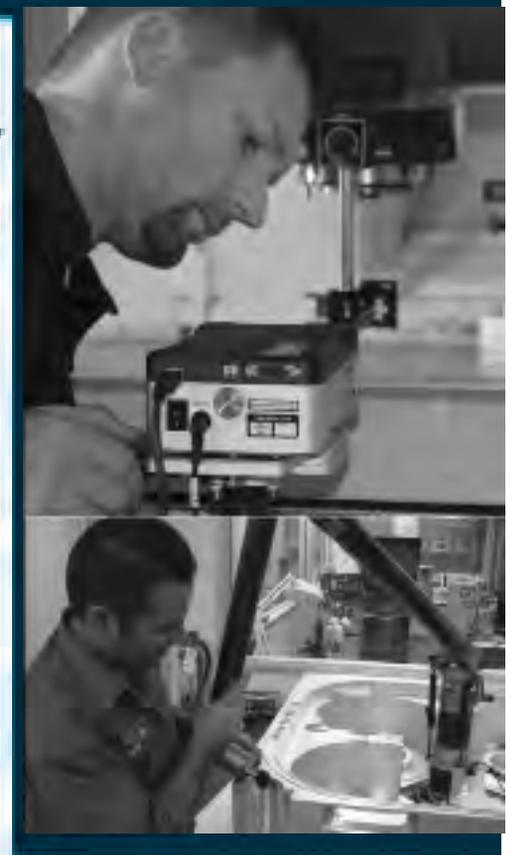
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