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NEWS®

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Making the quantum
leap to a 5-axis CNC

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the tool-holder

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SB1093
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⚠ WARNING! †¹

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SB1110
pictured

SB1110
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SB1111
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⚠ WARNING! †¹

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⚠ WARNING! †¹

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SB1080
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⚠ WARNING! †¹

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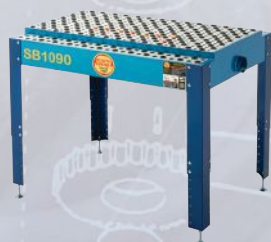
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⚠ WARNING! †¹

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- Remote controlled magnetic switch
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- Clear disposable plastic collection bags

SB1100
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⚠ WARNING! †¹

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SB1101
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⚠ WARNING! †¹

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5

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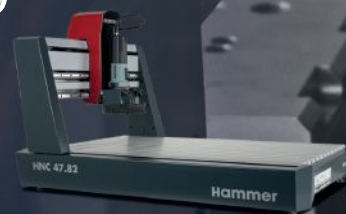
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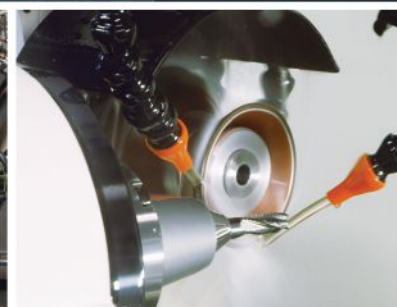
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BLOGS



Over the Workbench

Talkin' shop with former editor A.J. Hamler

2022 Online Resource Guide
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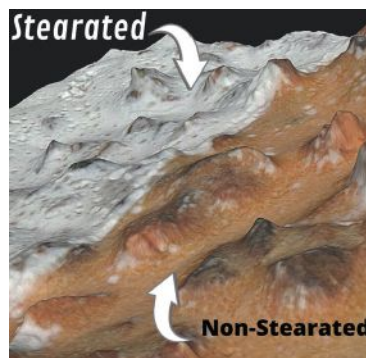
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TAKING STOCK

with TOD RIGGIO

Founder of Felder Group dies

The Felder Group is mourning the death of its founder and long-time managing director, Johann Felder (1930-2021).

"With his passing, his family as well as the company's employees are losing an inspiring and striking personality, who turned the Felder Group into the successful family business it is today," the company said in a statement.

"Johann Felder was known for his positive outlook on life and his progressive worldview. He was greatly respected, in Austria and abroad. His wife Gertraud, his sons Hansjörg and Martin Felder, the company's current managing directors, his daughter Elisabeth, his grandchildren Daniel, Patrick, Tamara, and Alexander Felder, the third generation working in the family business, as well as the entire Felder Group staff are deeply saddened by Johann Felder's passing. They are losing not just an altogether fascinating and strong personality, but also a mentor and a dear friend."

New CEO at Castle USA

Castle USA, a manufacturer of pocket cutting machinery, face frame assembly tables and tooling, has named Mathias Forsman as Chief Executive Officer. Forsman was hired by Castle as Director of Sales earlier this year.

"I am genuinely excited that Mathias will be our new CEO," Max Durney, founder of Castle USA, said in a statement. "His depth in marketing, sales, and industry knowledge is unsurpassed. With Mathias at the helm, our team is complete and the future auspicious."

"We've already accomplished great things this year and we have exciting initiatives ahead," said Forsman. "Leading a company like Castle, one that never compromises on quality and innovation, is truly an honor."

Cefla hires finishing lab manager

Cefla North America announces the addition of Jude Zimmermann as manager of its finishing laboratory in Charlotte, N.C.

"A dedicated production manager, Jude has 20-plus years of experience in manufacturing and operations," the company said in a statement. "With a background that has heavily involved printing, wood and metal boutique finishing, metal fabrication, and CNC, Jude is an ideal fit for the role and will offer a new lens with which the department can organize and be structured for success."

"With his team, Jude will facilitate daily testing either on behalf of Cefla customers, via virtual testing, or alongside them to conduct testing that achieves the customer's finish objectives."

Call for entries

The San Diego County Fair, in association with the San Diego Fine Woodworkers Association, invites entries to its 39th annual Design in Wood competition.

More than \$20,000 in prizes will be awarded, including a \$1,000 prize for Best of Show. The competition features 26 entry categories, including contemporary and traditional furniture, scroll saw fretwork, wood carving, and more. The entry deadline is April 29. For more, visit sdfair.com.

Show dates announced

KL Communications has announced shows dates for 2022, including the May Day Market on May 21-22; 27th annual Fine Furnishings Show on Nov. 4-6, and Holiday Market on Dec. 3-4.

"All our events will be at the WaterFire Arts Center [in Providence, R.I.] which is the perfect venue for exhibitors, vendors and attendees alike," says show owner Karla Little.

For more, visit finefurnishingsshows.com. 

Working with tools and wood is inherently dangerous. We try to give our readers tips that will enhance their understanding of woodworking. But our best advice is to make safety your first priority. Always read your owner's manuals, work with properly maintained equipment and use safety devices such as blade guards, push sticks and eye protection. Don't do things you're not sure you can do safely, including the techniques described in this publication or in others. Seek proper training if you have questions about woodworking techniques or the functions of power machinery.

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NEWS DESK



Axiom produces the Iconic, Pro and Elite Series of small-format CNC routers.

JPW Industries acquires Axiom Tool Group

By Jennifer Hicks

JPW Industries, a manufacturer of metalworking and woodworking equipment sold under the Jet, Powermatic, Wilton, Edwards and Baileigh brands, recently acquired Axiom Tool Group.

Founded in 2014, Axiom is a designer of CNC machines and accessories sold under the Axiom Precision brand with operations in Westerville, Ohio, where its warehousing, customer and technical service will remain. Scott Leichtling, JPW's CEO, says the transaction will help address a growing need

among younger generations for machinery leveraging technology to improve accuracy, efficiency and safety.

"Axiom is a natural fit into the JPW family of brands, and we look forward to providing our customers with even greater access to the depth and breadth of high-quality CNC equipment. Axiom's leading position in the growing CNC market perfectly complements JPW's platform capabilities. We are eager to welcome the team, support the growth of the Axiom brand and to leverage JPW's supply chain and customer service capabilities to

improve the overall value proposition to our collective customer base," Leichtling said in a statement.

Todd Damon, Axiom's founder, will join JPW to support the growth and expansion of the Axiom brand.

"I am exceptionally proud of the loyal and entrepreneurial team responsible for our growth to date and feel confident that together with JPW's platform and experience, we are well-positioned to continue to deliver exceptional products for our dedicated customers," Damon said in a statement.

"Joining the JPW platform will help us beginning on day one as we enhance our product offerings and attract new consumers while propelling our growth within the CNC market."

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SAPFM honors Chuck Bender with Cartouche Award

By Jennifer Hicks

The Society of American Period Furniture Makers has selected Charles (Chuck) Bender of Jim Thorpe, Pa. as the 2022 recipient of its Cartouche Award for lifetime achievement and contributions made to the genre.

Bender, 57, is the founder of the Acanthus Workshop and a former senior editor at Popular Woodworking. Bender told Woodshop News that he's deeply humbled by the award.

"I'm just amazed that the judges for this actually held my work in the same company as [previous winners] Phil Lowe, Tony Kubalak and others. I do what I do and don't think about it in terms of being in the same league as those guys."

Bender, 57, started woodworking at age 12 and immediately gravitated to period furniture.

"In seventh or eighth grade I took a

class trip down to Colonial Williamsburg and [after] looking at the furniture in the museums and going into the cabinet shop, I just sort of felt at home with it, in spite of the fact that my parents were into 1950's polyester furniture," he says.

Bender studied under Werner Duerr at Central Chester County (Pa.) Vocational Technical School. He spent nearly 10 years working with Irion Company Furnituremakers where he became head of case and chair production. He opened his own business in 1991 and founded the Acanthus Workshop, a school for avocational woodworkers, in 2007.

A few of Bender's favorite styles include Chippendale, William and Mary, and historic Pilgrim pieces.

Bender will receive the award at the SAPFM's Mid-Year conference, scheduled for June 24-27 in Fredericksburg, Va.

For more, visit sapfm.org and acanthus.com. 



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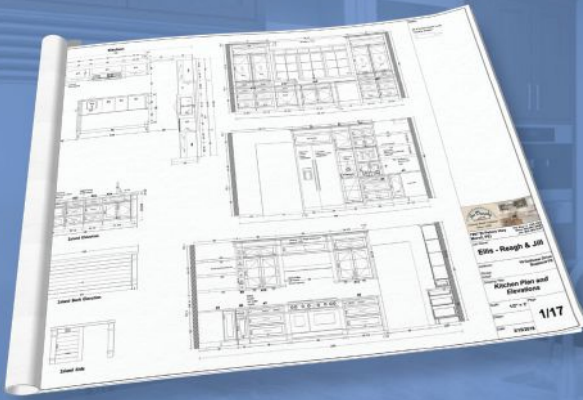
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Hickory's stands out for its color and character

By Jennifer Hicks

The hickory market enjoys stable prices and moderate demand, according to hardwood dealers interviewed by Woodshop News.

"Right now, we're sitting on more FAS than rustic as far as what we have in stock. It's not a huge mover," says Scott Limone of Keiver-Willard Lumber in Newburyport, Mass. "My buyer was saying that a lot of mills are sawing less of it because they're prioritizing other species to meet demand for things that have more value and are more expensive. I'd say as far as cost goes, it's creeping up slowly, but not so much as other species."

"A lot of hickory has been going into flooring," says Chad Muterspaw of C.R. Muterspaw Lumber in Xenia, Ohio. "I think the only thing we're doing differently is we've been color sorting it a lot more. We used to do a complete unselect for color, but right now we're doing a lot of sorted for heartwood where they want it all brown, or occasionally white."

Hickory is a dense hardwood, often chosen for its dramatic, rustic appearance.

"When people are looking for hickory, usually they are looking for something a little more organic than an FAS lumber," says Rick Hearne of Hearne Hardwoods in Oxford, Pa. "Hickory is not as refined or have a refined grain as some of the other domestics. It has the same grain pattern that red oak has, but it has a lot more variety of colors to it. Some people who come in for hickory are looking for all the light sapwood color, others are looking for the heartwood color."

"There are about seven different species of hickory that are generalized and put into one category, and it's usually in the grade books denoted as hickory/pecan. We carry a little bit of hickory here for when somebody only needs a few board feet to do a project. It's readily available if we need more. The part that we do specialize in is if they're looking for true pecan, not the orchard tree, but bitternut wild pecan. It has a real lively heartwood color that looks actually more like a maple than an oak, and it can have some beautiful purples and reds in it." **W**



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TOOLS & TECHNIQUES



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Roseburg introduces Armorite Exterior MDF

By Jennifer Hicks

Roseburg Forest Products has introduced Armorite Exterior paneling to its line of specified MDF products. Able to resist moisture, rot, decay, and insects, with no added formaldehyde, Armorite was engineered with machinability in mind for peak performance in profiling, cutting, and making custom designs, according to the company.

"Armorite is a great alternative for plywood in some of those decorative uses. Unlike plywood, it won't require a lot of sanding. It's nice and paintable in outdoor applications where MDF couldn't perform before," says product manager Renette Rier.

"Typical MDF is not insect resistant, not rot resistant, and most of them are not water resistant. Armorite is all of those things. Woodworkers know MDF for its paintability and machinability for interior uses, but our product can be used outdoors in decorative applications for signage and things like that where people want the benefits of an MDF,

the smoothness and those kinds of things, but couldn't use it outside before."

Roseburg recommends the product for exterior cabinetry, countertops, furniture, garage doors, shutters, and non-structural paint-grade millwork. Rier adds that Armorite is also ideal for interior use in climates with heavy humidity.

Manufactured from Western softwoods, Armorite is treated with a proprietary biocidal treatment process that conforms to the International Building Code and International Residential Code. It is available with the option of FSC or SFI certification and contains 92 percent pre-consumer recycled content. Panels are offered in 4' and 5' widths, and lengths up to 18', in thicknesses ranging from 1/4" to 1-1/4", according to the company.

The product won a Visionary Award in the materials category at the 2021 AWFS. It can be ordered through distributors listed on the company's website.

For more, visit roseburg.com. 



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C.R. Onsrud adds 7' wide G-Series CNC

By Jennifer Hicks



The G-Series with infeed and outfeed options.

C.R. Onsrud has introduced a 7' wide model to its Custom G-Series of CNC machines to accommodate European-sized panels and standard North American panel sizes with minimal operator intervention.

Ken Stissel, the manufacturer's national sales manager, says this latest model was configured to meet the North American wood

manufacturing segment's growing interest in European sourced panels.

"Traditionally we've done 4' x 8', 5' x 10', 5' x 12' and even 8' wide machines for larger panels. But due to the increase in demand for the European panels, which are 7', we designed a machine specifically for the demand of those panels," says Stissel.

European panels, offered in 9' and 10'

lengths, offer end-users not only more finish and material choices, but better optimization, according to Stissel.

"With larger panels, you also get more material yield. There's less time put into loading sheets and more parts that you get out of a sheet. That's important especially in this market where material costs are rising. The less scrap you have the better," he says.

The G-Series features a new roller/infeed option with an integrated Barbaric storage retrieval system that automatically loads panels onto the machine. Once a panel is loaded onto the conveyor, labels will be printed and automatically placed on the panel before it is moved to the router for a fully automated set-up.

"The operator is at the end of the conveyor basically catching completed parts that are not only labeled, but cut to size, and ready for edgbanding or other processes," adds Stissel.

Pricing starts at \$200,000 for a G-Series machine.

For more, visit cronsrud.com. [W](#)



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Registration is open for the 2022 World of Wood Convention, hosted by the International Wood Products Association and scheduled for Apr. 6-8 in Orlando, Fla.

The convention offers attendees the opportunity to learn from and interact with speakers and panelists with expertise in market intelligence, regulatory compliance, and corporate leadership.

"World of Wood is the must-attend network gathering for the international wood products industry and we are thrilled to return to meeting in person this year," Michael Schultz, president of the IWPA, said in a statement. "This is an invaluable opportunity to meet with potential customers and suppliers and learn about industry developments that will impact my business in the coming months and years."

To register, visit iwpawood.org.

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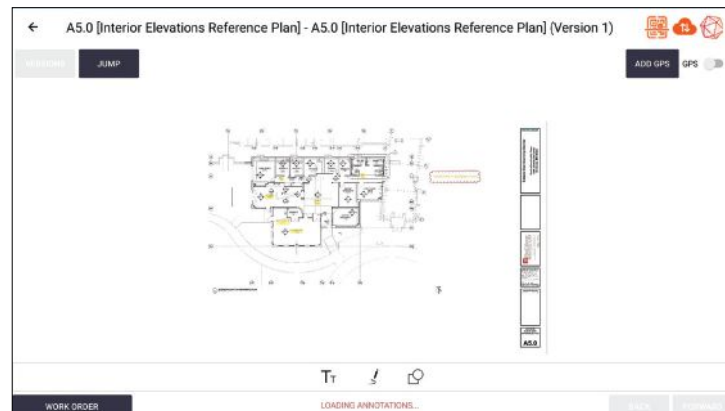


← The Norwegian Remodel

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WO No.	Name	Exceptions	Critical Date	Dates				Labor	Status	Impervments	% Inst
				Ready Actual	RV Actual	Plan Hours	Act Hours				
P-21-10 16-0311	01 Parker		11/19			80	147.36		Completed	Electrical, Drywall	100
P-21-10 16-0309	02 Bar	Update 5, Update Hours, No plan, Update 5, Update Hours	11/05		12/02	140	3.68	136.32	Field Verifications Done		80
P-21-10 16-0308	02b Stage	Update 5, Update Hours, No plan, Update 5, Update Hours	10/25		12/02		.01		Field Verifications Done		80
P-21-10 16-0313	03 Library	Update 5, Update Hours, No plan, Update Hours	11/05		12/02	500	3	499.9	Field Verifications Done		80
P-21-10 16-0020	10 Lobby	No plan, Update Hours	10/25						In Production Process		80
P-21-10 16-0038	225	No plan, Update Hours	10/25						In Production Process		10
P-21-10 16-0304	33 Main Stair	No plan, Update 5, Update Hours	10/25				.11		In Production Process		
P-21-10 16-0035	82 Bedroom	No plan, Update Hours	10/20						Review		
P-21-10 16-0071	83 Bedroom	No plan, Update Hours	10/25						In Production Process		

LONG PRESS ANY ITEM TO ENTER MULTIPLE SELECTION MODE



With Site Manager, installers can track job progress (top) and view shop drawings.

Innergy upgrades with Site Manager app

By Jennifer Hicks

Innergy, a provider of Enterprise Resource Planning (ERP) software for custom woodworking and millwork shops, has recently added Site Manager as an upgrade to its platform.

Developed as a downloadable app for tablets and smartphones of existing Innergy customers, the new resource will help end-users better manage and control the installation aspects of a jobsite.

"Site Manager is designed to track issues and problems that happen in our industry. As custom woodworkers, installation tends to be one of the larger problems that we face because there are so many elements that are out of our control. There's the schedule from the general contractor or customer, and there are other trades that come in, and typically we're one of the last trades at the jobsite. This program can help them get a little power back," says Cole Eklund, a customer success advocate for Innergy.

With Site Manager, installers can take photos of jobsite conditions, track notes and tasks, and oversee timing of other trades room by room, as well as view shop drawings and make annotations in the field as needed. All of this information can be communicated in real time with the office, according to Eklund.

Site Manager fees are based on a company's install crew size and included as part of its existing Innergy ERP package.

For more, visit innergy.com. **W**

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Milwaukee introduces new M18 Fuel finish nailers

By Jennifer Hicks

Milwaukee Tools has added second-generation 15-gauge and angled 16-gauge finish nailers to its M18 Fuel cordless lineup.

"After listening to the concerns voiced by our end users with our previous generation, we got to work rebuilding our old design," Sean Kelley, senior product manager at Milwaukee, said in a statement.

"This year we're proud to launch the second

generation of our 15-gauge and 16-gauge angled cordless finish nailers. With no gas cartridges necessary, the power to sink nails in the most demanding materials, and the fire rate to keep users productive throughout their day, these new finish nailers were worth the wait."

Both tools are fully compatible with the company's entire M18 Fuel line. Each has a compact design and weighs approximately 6.5 lbs. without the battery, according to the company.

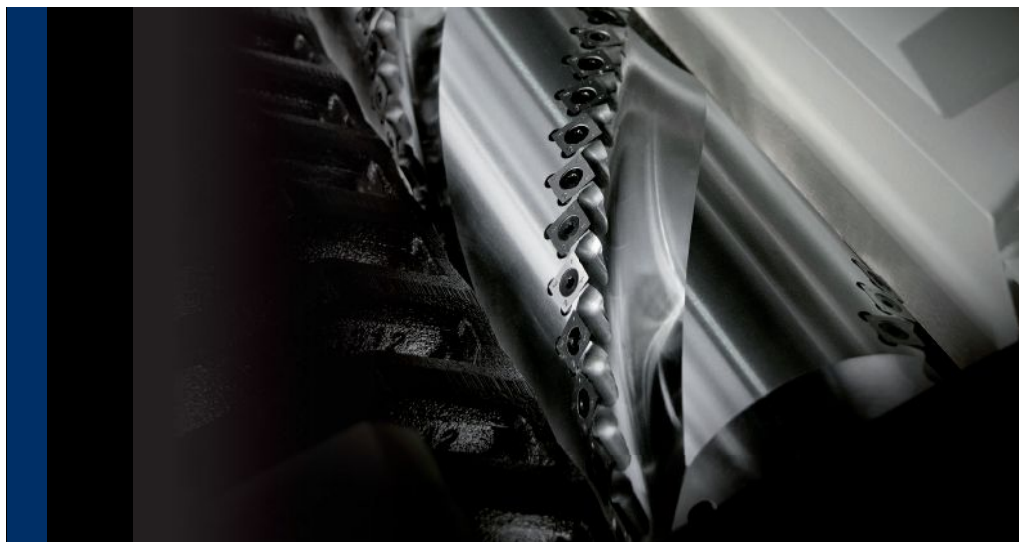


The new 15-gauge finish nailer, model 2839-20.

The tools feature an LED work light, reversible belt clip, tool-free jam clearing and depth adjustment, and a user interface with power and firing mode buttons.

Each nailer is sold as a kit for \$399, which includes the tool, one M18 RedLithium CP 2.0Ah battery pack, charger and contractor bag, or as a bare tool for \$329.

For more, visit milwaukeetool.com. 



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AMERICAN WOODSHOP BEGINS SEASON 29

Co-hosts Scott and Suzy Phillips returned to PBS in January with 13 new episodes of The American Woodshop based on the theme, "Recycle & Reclaim!"

"Every episode of Season 29 shares a path to successful expression in wood," Scott Phillips said in a statement. "You can smell the sawdust. You can hear the success of a project coming to life. You can experience the reward of using recycled wood. You can feel the satisfaction and pride that can't be bought in a store."

For broadcast information, visit wbgtv.org/americanwoodshop.

GLOBAL SHOP SOLUTIONS LAUNCHES NEW WEBSITE

Global Shop Solutions, a developer of ERP software, presents a new corporate website focusing on the needs of manufacturers wanting to learn how ERP software can simplify their businesses.

"Purchasing ERP software is one of the most important decisions a manufacturer can make for their future," Ashley Calderon, the company's senior communications specialist, said in a statement. "Our new website simplifies the research and educates manufacturers about the entire process – from that first question to implementation to continuous improvement – and all supported by success stories so they can make the best decision for their company."

For more, visit globalshopsolutions.com.

Oneida offers gated tee joint with magnetic lock

By Jennifer Hicks

Oneida Air Systems has recently added the Quick-Clamp Gated Tee Joint Kit to its line of dust collection innovations.

Built specifically for use with high-pressure systems such as Oneida's Supercell Dust Collector, and compatible with Quick-Clamp ductwork, the tee joint fitting has a magnetic feature that allows end-users to split off from their main duct line to nearby tools quickly, easily and safely, according to the company.

"What's exciting about the tee joint itself is it has a magnetic locking brake for holding the gate open or closed. Thumbscrews on traditional blast gates are a pain. With this magnetic blast gate, just move the gate to where you want it, and it stays in position automatically," says Michelle Kelley, Oneida's public relations manager.

The components are made from static dissipative polyethylene, a resin which enhances safety by reducing the risk of shock. Made of one solid molded piece, it also eliminates the potential for air leaks from seams and welds that could result with the powerful air force of a high-pressure system, according to Kelly.

The kit includes one Gated Tee Joint, one 4" to 2.5" reducer, and one 4" to 1.5" reducer. It sells for \$139.

For more, visit oneida-air.com. 



The Quick-Clamp Gated Tee Joint Kit includes two 4" port reducers.

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THE CUTTING EDGE

with TED BRUNING

Looking for signs of unusual wear

As a CNC instructor, I get some interesting questions. A few months ago, a former student asked if I could evaluate a “horrible noise” that a CNC router at his company was making. Another asked for help when “the threads for the collet keep breaking

and the bearings might be going bad.” After some investigation, it appeared that both situations involved tool holding.

While every CNC router requires that a tool be secured in the spindle, the knowledge and instructions for doing are not so ubiquitous.

CNC collets have several common elements.

There is a tapered collet pocket in the shaft, spindle or tool holder. The collet fits into that pocket and is secured and tightened with a collet nut. The collet also has an extractor groove that allows it to be extracted in the process of removing the nut. And collets come in a range of internal diameters, to enable use of an extensive array of tool shank diameters.

When I visited the company with the horrible noise, I learned they were using a CNC to surface both sides of live-edge slabs. They had worked out a method for securing the rough slabs on the bed of the CNC, and they had developed a clever approach for programming the surfacing process. It was being done with a spoil-board surfacing bit that was 2-1/2” in diameter with a 1/2” diameter shank. The 3-hp spindle was liquid cooled and had a manual ER25 collet system.

The operator noted that on some occasions there had been crashes where the bit had been driven into a slab so deeply that it had stalled out the spindle and the CNC drive motors. He had been concerned that the bit was bent, so he replaced it. Based on his description, I was suspicious that other parts of the system had been compromised, too.

The operator spun up the large bit to 12,000 rpm. Sure enough, there was a horrible noise. We varied the speed to see if there were any indications of operating at resonant frequencies but did not notice any. So, we shut off the power to the CNC and then loosened the collet nut. After rotating the bit 90 degrees in the collet and re-tightening the nut, we repeated the spin-up test, and the noise was significantly less.

That led us to explore the possibility of run-out. Following a procedure described on the Precise Bits website (precisebits.com), we used a dial test indicator and found that the shank run-out was 0.0008”. We replaced the bit with a calibration blank (a precisely ground 1/2” steel dowel) and found the run-out to be on the order of 0.0005”. Those values were barely acceptable for this application, but they would have been awful for tiny bits. The larger spoil-board bit wouldn’t break due to this runout, but the vibration would reduce the life of the spindle. The experiment with rotating the tool had indicated that there was run-out in both the bit and tool-holding system. The noise was at a maximum when these were in phase with one another but was minimized when they were out of phase and somewhat offset each other.

It appeared that the slab flattening workload was a heavy and stressful workload for this spindle and machine, and the occasional crashes only exacerbated that. The likely outcome would be that the spindle would need to be replaced every year or so.

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Sound advice

The ISO 30 tool-holders used in our school shop are marked "G2.5 30000 RPM". G2.5 refers to a balancing quality level defined in an ISO standard that determines the maximum permissible residual unbalance at a specified rpm. It is the balance quality level generally used for machine tool drives.

While it's important to use carefully balanced tool-holders, that alone will not be sufficient to assure that your CNC router drive is operating well. A combination of multiple factors involving the concentricity and balance of the spindle, the tool-holding hardware, and the tool itself all add up to determine the dynamic balance of the drive. While the machine tool manufacturers have sophisticated instrumentation to measure and correct dynamic balance, we can use our ears.

Our ears are well developed to judge vibration that creates sound. This is probably obvious to most woodworkers: if it sounds bad, there is probably a problem. A good spindle going through a warm-up procedure with a small tool can be so quiet that it is necessary to let anyone in the area know that it's spinning. A soft hum under those conditions is a good sign. In comparison, an unbalanced tool can make quite a racket.

When it came to consider the second

student's comments, I struggled to imagine what was meant by the phrase "collet threads were breaking". When I spoke to the owner of that CNC router, he said that the collet nut would become progressively more difficult to turn, and that the threads would begin to show bits of metal breaking out. He described that he would file off those bits of metal with a needle file to provide a short-term fix. He also said that the original spindle had to be replaced after less than two years of operation – it had simply worn out.

Stressed out

This was a far more stressed tool-holding system than the slab flattening application. In this case, the spindle was a 5-hp, air-cooled spindle. While the load might have been light because the machine was being used to cut foam, the tools were unusually long at nearly 10". Cutting forces were being transmitted via this long lever arm to the bearings of the spindle via the tool-holding system, resulting in unusually large forces on the holder and bearings. The same magnification of forces happens with any imbalance due to run-out or build-up of material on the tool.

Just as in the slab flattening application, the tool holding system was a manual system

with the collets seated in the tapered collet pocket of the spindle. However, in this application the tools were changed frequently. A typical job was roughed out with an end mill, and then finished with a ball-end mill. As a result, this tool-holding system was subjected to a high rate of wear from constant tightening and loosening.

At a microscopic level, under high pressure and rubbing, steel can cold-weld, fracture, and experience several phenomena generally classified as wear. What starts out looking very smooth to the naked eye has microscopic roughness in the form of asperities. The hard steel is nevertheless elastic (that's why it's used for making springs). In tooling, under the dynamic loads of cutting and rotating, the steel moves, albeit microscopically. Each time the tool rotates, the mating surfaces rub back and forth against each other. At 20,000 rpm there are more than one million cycles per hour. Combine this with frequent tool changes and it becomes easier to believe that collet threads are breaking.

Following a manufacturer's recommendations and good industry practices can help avert downtime.

If you're hearing horrible noises, or seeing bits of metallic waste, act quickly to save your spindle. **W**

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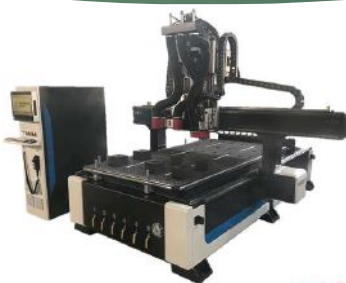
◀ **DURA SUPREME CABINETRY** announces the Curved Modern Wood Hood and Curved Canopy Independent Wood Hood. Modern Hoods are sleek and simple, with a streamlined design, well suited for transitional and soft contemporary looks, according to the company. Independent Hoods are stand-alone pieces, well suited for any style. For more, visit durasupreme.com.


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▲ **DREMEL** introduces the model 8260 cordless rotary tool, featuring a brushless motor and double the runtime of the brand's previous cordless model, according to the company. It's sold in a kit for \$169.99. For more, visit dremel.com.



▲ **GRASS AMERICA** presents the Kinvaro lifter series, including the L-80 Parallel Lifter (pictured) for opening a single door parallel to the cabinet; F-20 Bi-fold Lifter that moves two horizontal doors together; T-Series Lifter (T-57, T-65, T-71, T-76) for pivoting a single door to the top of a cabinet, and D Flap, a drop-down flap system. For more, visit grassusa.com.



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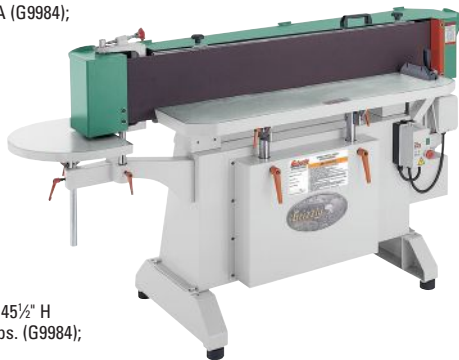
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9" X 138 1/2" INDUSTRIAL OSCILLATING EDGE SANDERS

- Motor: 3 HP, 220V, single-phase, 15A (G9984); 3-phase, 9.5A (G9985)
- Sanding belt size: 9" x 138 1/2"
- Sanding belt speed: 4120 FPM
- Oscillations: 1/4"
- Platen: graphite coated, 47 1/2" x 9 1/2"
- Main table size: 11 1/4" x 47 1/4"
- Main table vertical travel: 8"
- Main table tilt: 0-45°
- End table size: 18" x 13"
- End table travel: 8"
- Number of dust ports: 2
- Dust port size: 4"
- Footprint: 42" x 24 1/2"
- Overall dimensions: 82" W x 24" D x 45 1/2" H
- Approximate shipping weight: 873 lbs. (G9984); 827 lbs. (G9985)



WARNING! †

SINGLE PHASE MOTOR

G9984 ONLY \$4895⁰⁰

MADE IN TAIWAN ISO 9001 FACTORY

\$289⁰⁰ SHIPPING

WARNING! †

3-PHASE MOTOR

G9985 ONLY \$4895⁰⁰

MADE IN TAIWAN ISO 9001 FACTORY

\$289⁰⁰ SHIPPING

24" 7 1/2 HP INDUSTRIAL-DUTY RESAW BANDSAW

- Motor: 7 1/2 HP, 220V/440V*, 3-phase, 20A/10A
- Max. cutting width left of blade: 24 3/8"
- Max. cutting height (resaw capacity): 16"
- Table size: 23 3/8" x 33 1/2"
- Table tilt: 5° L-45° R
- Floor-to-table height: 33"
- Blade guides: Ball-bearing, upper & lower with thrust bearings
- Blade size: 181" (1/4"-1 1/2" wide)
- Blade speed: 5300 FPM
- Footprint: 23 1/2" x 41 1/2"
- Overall dimensions: 48" W x 32" D x 83 1/2" H
- Approximate shipping weight: 948 lbs.



WARNING! †

SB1123 ONLY \$4735⁰⁰

MADE IN TAIWAN ISO 9001 FACTORY

\$289⁰⁰ SHIPPING

15" DRILL PRESS WITH AUTO DOWNFEED

- Motor: 2 HP, 220V, single-phase, 8.6A
- Swing: 15"
- Spindle taper: R-8
- Spindle travel: 5 1/4"
- Number of spindle speeds: 12
- Spindle speed range: 140-2436 RPM
- Max distance spindle-to-table: 28 1/4"
- Drill chuck: 1/4"-1 1/2"
- Drilling capacity: 1 1/8" mild steel
- Table size: 14" W x 15" L
- Table swing: 360°
- Table tilt: 60° left and right
- Table T-slots: 1/2" (2)
- Vertical table travel: 23 1/2"
- Column diameter: 4 1/2"
- Footprint: 26" L x 18" W
- Overall dimensions: 23" W x 35 1/2" D x 67" H
- Approximate shipping weight: 772 lb.



WARNING! †

G0823 ONLY \$3040⁰⁰

\$239⁰⁰ SHIPPING

MADE IN TAIWAN ISO 9001 FACTORY

16 1/2" EXTREME SERIES DOVETAIL MACHINE

- Motor: 1 HP, 110V/220V* (prewired 220V), single-phase, 10A/5A
- Number of spindles: 1
- Spindle speed: 18,500 RPM
- Dovetail bit: 10° angle x 5/8" long
- Dovetail shank: 1/2"
- Maximum dovetail height: 3/4"
- Minimum dovetail height: 3/16"
- Maximum thickness: 2 1/4"
- Minimum thickness: 1 1/2"
- Maximum stock size: 59" long x 16 1/2" wide
- Minimum stock size: 7 1/4" long x 2 1/4" wide
- Table size: 24" x 7 3/4"
- Floor to table height: 46 1/16"
- Overall size: 38 3/8" W x 26 1/2" x 56 7/8" H
- Approximate shipping weight: 539 lbs.



WARNING! †

G0611X ONLY \$4995⁰⁰

MADE IN TAIWAN

\$239⁰⁰ SHIPPING

19" 5 HP ULTIMATE BANDSAW

- Motor: 5 HP, 230V, single-phase, 22A
- Guide post motor: Universal DC, 40W
- Cutting capacity/throat: 18 3/8"
- Maximum cutting height: 19 1/2"
- Table size: 28" x 24"
- Table tilt: 5° left, 45° right
- Floor to table height: 35 1/4"
- Blade size: 166 - 168" long
- Blade width range: 3/8" - 1 1/8"
- Blade speed: 4975 FPM
- Footprint: 31" x 23 1/2"
- Overall size: 86 1/2" H x 36 3/8" W x 33" D
- Approximate shipping weight: 810 lbs.



WARNING! †

G0701 ONLY \$4995⁰⁰

MADE IN TAIWAN ISO 9001 FACTORY

\$289⁰⁰ SHIPPING

*To maintain machine warranty, 440V operation requires additional conversion time and a \$250 fee. Please contact technical service for complete information before ordering.

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10" 5 HP SLIDING TABLE SAW

- Motor: 5 HP, 230V, single-phase, 19A
- Rip capacity: 33"
- Crosscut capacity: 63"
- Blade tilt: 0-45°
- Max. depth of cut @ 90°: 3 1/8"
- Max. depth of cut @ 45°: 2 1/4"
- Main table size with extensions: 14 3/8" x 27"
- Sliding table size: 12 1/4" x 63"
- Floor-to-table height: 33 3/8"
- Main blade size: 10"
- Main blade arbor: 5/8"
- Main blade speed: 4000 RPM
- Scoring blade size: 3 1/8" (80mm)
- Scoring blade arbor: 22mm
- Scoring blade speed: 8000 RPM
- Max. width of dado: 1 1/16"
- Dust port sizes: 2 1/2", 4"
- Footprint: 25 1/2" L x 28" W
- Overall dimensions: 76" W x 125" D x 46" H
- Approximate shipping weight: 688 lbs.



⚠ WARNING! †

G0623X ONLY \$4940⁰⁰



MADE IN TAIWAN

12" 7 1/2 HP 3-PHASE COMPACT SLIDING TABLE SAW

- Motor: 7 1/2 HP, 220V/440V* (prewired for 220V), 3-phase, 20A/10A
- Rip capacity: 33"
- Crosscut capacity: 63"
- Blade tilt: 0 - 45°
- Max. depth of cut @ 90°: 3 5/16"
- Max. depth of cut @ 45°: 2 3/8"
- Main table size with extensions: 35 1/4" x 21 1/2"
- Sliding table size: 63" x 12 1/4"
- Floor-to-table height: 34 1/4"
- Main blade size: 12"
- Main blade arbor: 1"
- Main blade speed: 4000 RPM
- Scoring blade size: 4 3/4" (120mm)
- Scoring blade arbor: 20mm
- Scoring blade speed: 8000 RPM
- Number of dust ports: 2
- Dust port size: 2 1/2", 5"
- Footprint: 35" W x 45" L
- Overall dimensions: 118" W x 90" D x 45" H
- Approx. shipping weight: 996 lbs.



⚠ WARNING! †

G0820 ONLY \$6690⁰⁰



MADE IN TAIWAN

16" X 99" Z SERIES JOINTER WITH SPIRAL CUTTERHEAD

- Motor: 5 HP, 220V, single-phase, 25A
- Maximum width of cut: 16"
- Maximum depth of cut: 5/16"
- Minimum stock length: 18"
- Minimum stock thickness: 1/2"
- Cutterhead diameter: 4"
- Cutterhead type: 6-row spiral with 120 inserts
- Insert size, type: 14 x 14 x 2mm, indexable carbide
- Cutterhead speed: 5000 RPM
- Bevel jointing: 0-45°
- Table size: 99 1/4" x 16 1/4"
- Fence size: 43 1/4" L x 6 5/8" H
- Dust port size: 4"
- Footprint: 23" x 57"
- Overall dimensions: 99 1/4" W x 45 1/2" D x 32" H
- Approx. shipping weight: 1719 lbs.



⚠ WARNING! †

G9953ZX ONLY \$8995⁰⁰

MADE IN TAIWAN



100W 23" X 35" CNC LASER CUTTER/ENGRAVER

- Power requirement: 110V, single-phase, 20A
- X-Axis motor: Stepper, 5.8A
- Y-Axis motor: Stepper, 5.8A
- Z-Axis motor: Stepper, 4.2A
- Laser type: Sealed CO2 laser tube
- Laser power: 100W
- Wavelength: 1064nm
- Laser focus: Automatic
- Cutting speed: 0-1200 in./min.
- Minimum shaping character: 0.04" x 0.04"
- Resetting position accuracy: ±0.002"
- Maximum cutting height: 7"
- Cutting accuracy: 0.05mm
- Table dimensions: 23 1/2" x 35 1/2"
- Worktable adjustment: motorized up and down table
- Overall dimensions: 54" W x 43" D x 43 1/2" H
- Approximate shipping weight: 705 lbs.



⚠ WARNING! †

G0873 ONLY \$9375⁰⁰



MADE IN TAIWAN

24" X 36" CNC ROUTER

- Motor: 3 HP, 220V
- Power requirement: Single-phase
- Collet Type: ER20
- Collet Sizes: 1/8", 1/4" & 1/2"
- Cutting Area: 23" x 35"
- Cutting Accuracy: ±0.005"
- Spindle Speed: 0-24,000 RPM
- X & Y Travel Speeds: 32 FPM
- Z Travel Speeds: 16 FPM
- Overall dimensions: 60" L x 54" W x 70" H
- Approximate shipping weight: 882 lbs.



⚠ WARNING! †

G0894 ONLY \$7575⁰⁰



4' X 8' CNC ROUTER

- Spindle motor: 6 HP, 220V
- Power requirement: single-phase
- X-, Y- and Z-axis motors: AC Servo, 7.1A
- Cutting area: 51" x 98 1/2"
- Z-axis travel: 11"
- X- and Y- travel Speed: 1500 IPM
- Z- travel speed: 400 IPM
- Spindle speed: 0-18000 RPM
- Collet Size: 1/4", 1/2"
- Collet Type: ER32
- Footprint: 122 1/2" L x 56 1/2" W
- Overall dimensions: 85" W x 124" D x 72" H
- Approximate shipping weight: 2535 lbs.



Due to product size, this item must be delivered to a loading dock or unloaded with a forklift. Liftgate not available.

G0895 ONLY \$20,595⁰⁰



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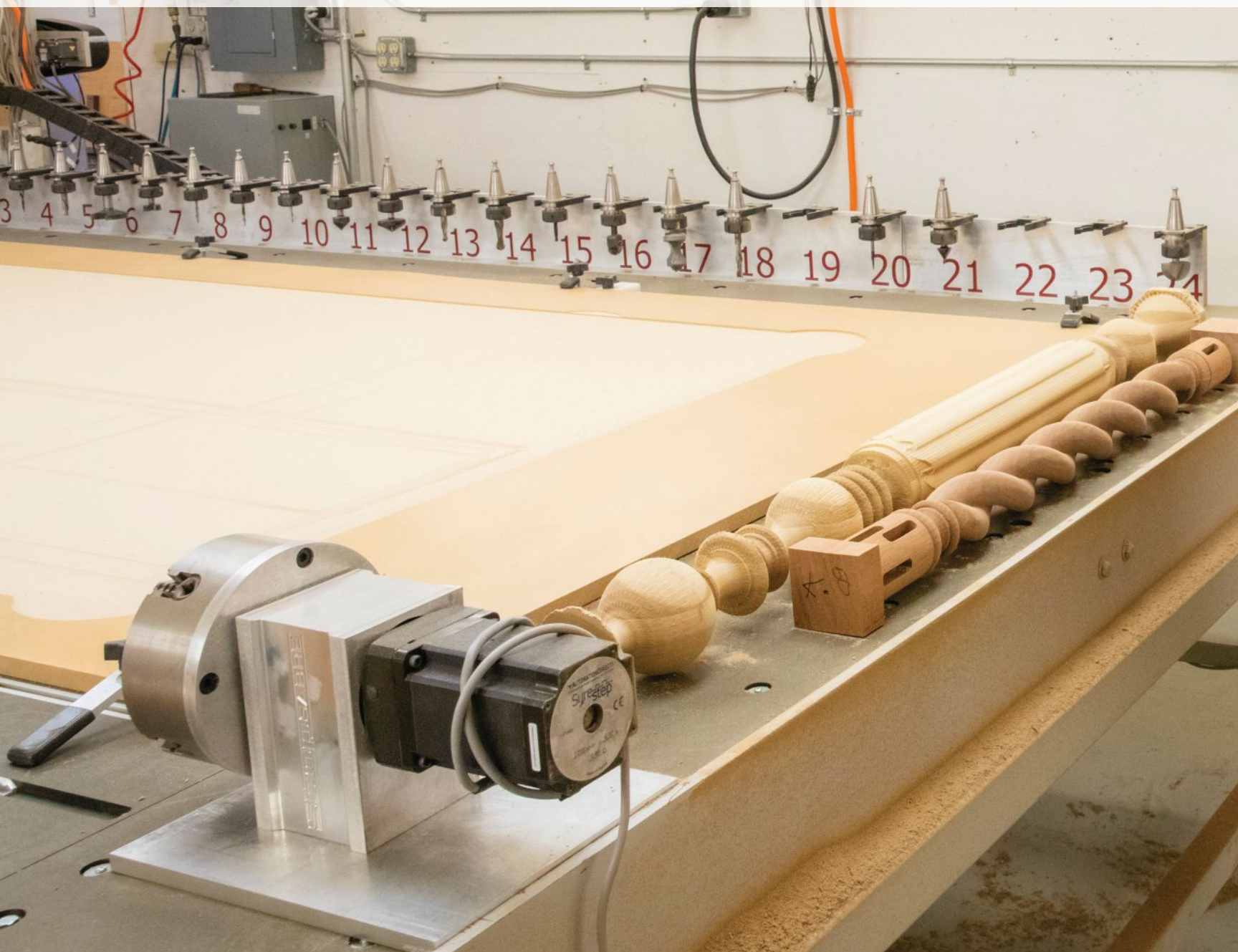
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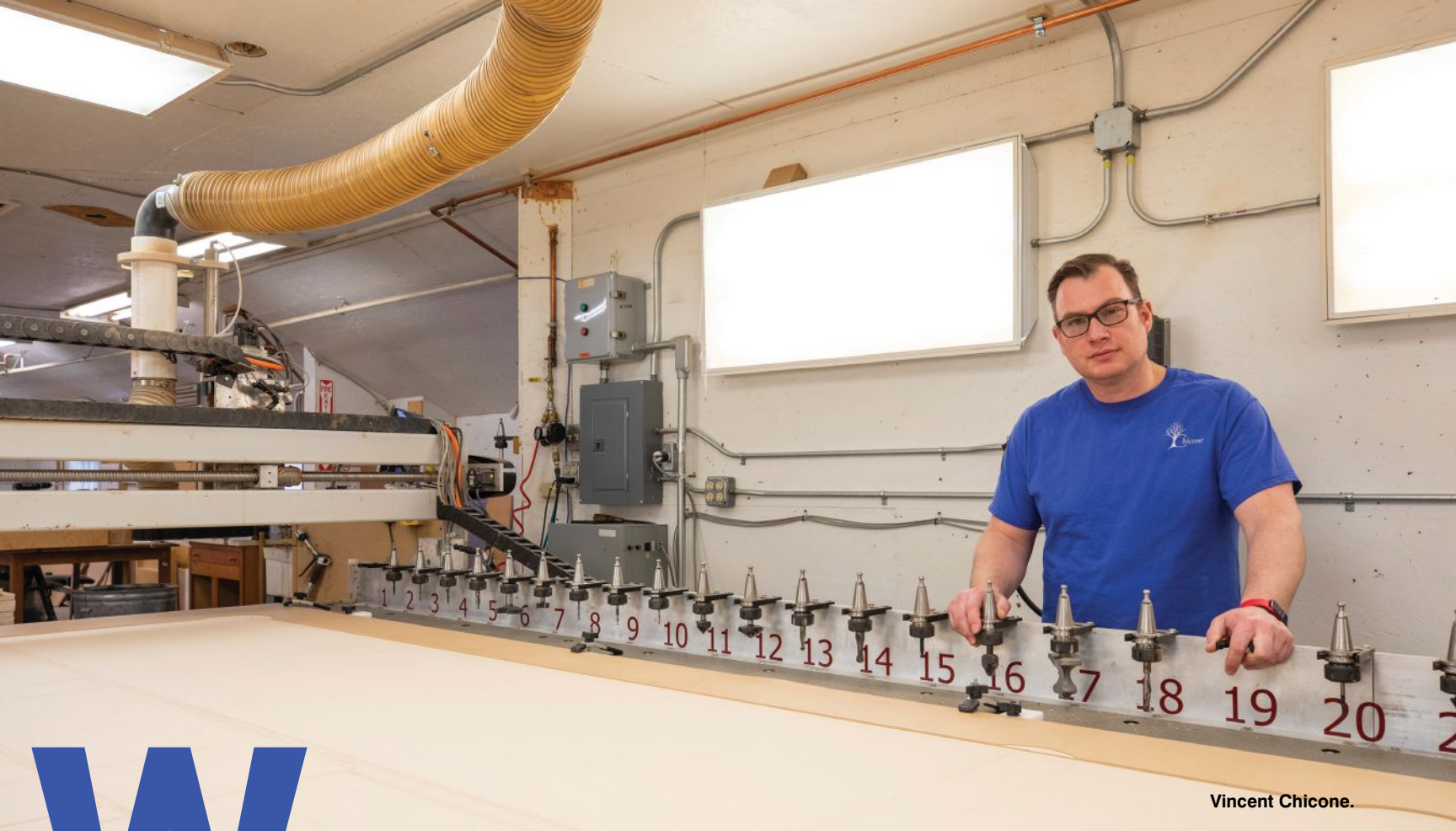
ALL FOR ONE

A talented team embraces complex, challenging work at
Chicone Cabinetmakers in Montour Falls, N.Y.

By Jennifer Hicks







Vincent Chicone.

W

hether designing an elegant kitchen, creating heirloom furniture or historic reproductions, Chicone Cabinetmakers in Montour Falls, N.Y. strives for the highest quality work through meticulous craftsmanship.

Formed in 2002, it's part of Chicone Builders, a home construction and remodeling firm founded in the early 1950's by the late Salvatore Chicone. The operation is now run by Vincent Chicone, Salvatore's grandson, who says the current backlog extends beyond one year, which is beyond his belief after a previous lull.

"Six months ago, it came unhinged. It's crazy how many people started talking about not only domestically made furniture but then they spent so much time in their houses they started wanting improvements and to change things," says Chicone.

Chicone credits the company's international success to his skilled and dedicated team ready to address any project, often learning as they go. There are five employees in the cabinetry division plus office help, and three to five employees in the construction division.

"It's really the staff we have. The staff we've had and been able to hold through the last 20 years that haven't gone anywhere and it's just one big family on both sides of the business.

We do things the hard way. I'm not interested in cutting corners and oftentimes that's not economical."

Boston and back

Chicone grew up in Montour Falls watching his father, David Chicone, work alongside his grandfather on homes throughout the Finger Lakes region. While he helped around the shop and learned how to work with tools, he never imagined a career there and went off to college at High Point University in High Point, N.C. for a business degree. He went to work in Boston where he found the corporate sector was not too appealing, so he returned to his hometown in 2002.

"I was balancing portfolios and sitting in office lights. It was horrible so I thought the snowball's already rolling, this is something I might be interested in," says Chicone.

"My wife (Sarah) and I came back, and the company was in the process of building a ridiculously huge house with six or seven bedrooms. The client, and it was a wonderful client, asked if we might be interested in creating all the furniture in this space. We did each room in a different period style, and because of that, it allowed me to have a pretty broad stroke in the furniture world in the kind of furniture that we can produce out of the shop."

The shop added a website (chicone.com), which immediately attracted leads on a national scale, including work for Monticello, the historic plantation of Thomas Jefferson in the Piedmont region of central Virginia. "In 2005, we acquired Monticello as a client. We are authorized to reproduce and recreate their furniture. We started off with five pieces and we're at eleven now," says Chicone.

Broad exposure

Expansion outside of the company's local market was paramount to its sustainability, according to Chicone.

"We're in upstate New York. It's not populous. We have a lake (Seneca) that basically insulates us for doing housework and some architectural millwork, but the furniture, it started off slow and now its international where we're sending things."

After the first Monticello pieces were completed, Chicone experienced fallback from the Great Recession and his concerns led to the creation of more solutions to deal with the ebbs and flows of the market. Diversifying product offerings was key, so the company began high-end custom cabinetry and architectural millwork leading to a plethora of work within a five-hour radius, and random jobs in other locations.

The production breakdown of the cabinet



shop is about 50 percent kitchens and the rest split between furniture and millwork.

"We are in Washington, D.C., New York City, we travel. I look at my crew in the shop and I'm jealous, I want to be there building things on a day to day, but in real life I'm hustling to put out client fires. I'm going and finding new work. I'm drawing and designing three-dimensionally for the next job coming up," says Chicone.

The company is currently wrapping up another historical reproduction project, a large commission for the University of Houston which is recreating Independence Hall on its campus and has contracted 70 chairs, including the Rising Sun Chair, used by George Washington at the 1987 Constitutional Convention.

Jobs are as unique as they get from one another, but that doesn't stop any progress. Chicone says the company mantra is to find a way to make it happen.

"We don't know anything about rice paper, so why would we be making a shoji? But we had a client come who wanted to do all of these screens. I said, 'Let's figure it out. How hard can it be?' Well, it was really hard, but you just dive into it. That's the way it's always been."

A charming setup

The facility layout is a series of buildings on several blocks at the entrance of Montour Falls, across from the Shequaga Falls and minutes from Lake Seneca. The two-floor shop is about 7,000 sq. ft. with handwork, machining and assembly downstairs and a ShopSabre CNC machining center upstairs. This building, along with a smaller office building next to it, has an aesthetic matching the historical homes in the area.

Across the way is a modern, 10,000-sq.ft. warehouse built in 2017 which is adjoined by the construction firm operation. This spacious, climate-controlled building houses a Cantek straight-line rip saw,

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The shop offers the Founding Fathers Collection, including the Rising Sun Chair (left,) and Windsor pieces.

Kentwood six-head molder and other tooling, as well as a wood inventory of 50,000 bf.

Chicone says automated machinery is crucial to his bottom line and particularly values his CNC for its ability to do fourth-axis turnings for bed parts and table legs.

"In today's world you need to be able to operate CAD and CAM software and you need to have a CNC. The world of being able to pick up a hand plane and produce furniture and feed a family is no longer. It's a weird place that we're in right now."

Chicone's father still helps wherever he can, whether it's painting for the construction company or doing errands for the cabinetry shop. His mother, Jennifer, works in the office. While he'd prefer additional craftspeople on the shop floor, Chicone, unsurprisingly, says they're difficult to find.

"With the workload coming through we could use three to four more. In upstate New York, it's a rarity to find somebody that wants to stick around, and you do everything you can to hold onto them. Finding young blood that wants to do this its hard right now."

Learning opportunities

One solution to his employee shortage is a five-year apprenticeship program Chicone started about six years ago.

"This is a five-year grind for you to come through and when you're done, you'll know how to run everything in this shop. You'll know how to run CNC equipment. You'll know how to get on the CAD programming and design a kitchen and such," says Chicone, who recently graduated his second journeyman and will welcome a third participant in the spring.

One of the issues Chicone faces is young, emerging woodworkers believing the trade is easy. He has to explain the reality.

"As you talk with parents and their 18-year-old boys and girls that come through, everything they've seen so far is a romance and we need to get over that. In the beginning, you're going to have blisters, you're going to sand until you can't even believe you're still sanding."

He also runs a Windsor chair making program that attracts international students.

"In the spring it's usually Japanese or South Korean students that are flying through. We'll

shut the shop down for a couple of weeks to hold it. Covid really put a ding in that and I really haven't opened it back up yet."

A labor of love

Throughout his 20 years of experience, Chicone has seen countless scenarios with the direction of the business due to wavering economic circumstances. He says having the right attitude and taking things day by day helps manage the stresses that accompany tough times.

"In 2019, we had a horrible year. It was worse than Covid for us. Everything dried up. Then Covid happened and it was literally my father and I in the shop just playing. It took that time for us to wrap our heads around that we've been over 70 years in the works, and all of this can fold. We decided to just take it day by day. There's no sense in getting worked up about anything, and that helps a lot."

Chicone makes it a priority to give his team room for growth and ensure that work is varied enough that they don't feel they're doing the same things repeatedly.

"I don't want things to be stagnant for anyone. You hold on to your employees because you don't know what's going to happen. Tomorrow a huge contract could come through and I need all these guys, and they have amazing skillsets. Where would I go and find somebody like that?"

Interestingly, he also says his college business degree did not help him get the company to where it is today. Instead, it would have folded had he followed the model of putting economics first.

"As an employer, you're the last to feed the family in a business like this. You put your employees first and with any luck, they'll produce for you. I learned that from my grandfather and father. Make sure everybody else is happy first. At the end of the year, everything will work out, but there's going to be some scary moments in between, and most employees don't even know you're just making sure to give them what they need." **W**



A kitchen by Chicone Cabinetmakers featuring fumed white oak cabinets.

HARDWARE SOLUTIONS

SOURCING THOSE HARD-TO-FIND SPECIALTY HINGES AND DRAWER SLIDES BY JOHN ENGLISH

It can be frustrating. A client needs a door to swing a certain way, or drawers to carry an unusual load, and the local warehouse or big box store simply doesn't have a solution. Fortunately, most off-beat problems have been encountered before and somewhere, somebody has already come up with an ingenious solution. The only challenge is finding them, so here's a quick run-down on possible candidates who supply specialty hinges and slides.

Accuride International (accuride.com) is based in Santa Fe Springs, Calif. and offers a host of movement solutions beyond standard drawer slides. There are double extension slides that provide two-sided access where, for example, a cabinet serves two rooms through a wall (think clinics, retail and so on). The company makes linear track systems with aluminum tracks and re-circulating ball carriages that can be used for sliding screens, panels, or partitions. Accuride's flipper and pocket door slides have steel ball bearings and load ratings up to 75 lbs., and they're easy to install.

Accuride's catalog also includes media access slides that move vertically instead of horizontally, to hide and reveal TVs, monitors and the wiring that goes with them. There are keyboard slides for built-in offices, and a Tilt-Track System where a drawer slides out and then tilts down for easy viewing and retrieval of stored contents. Several of Accuride's slides support pocket-and-bayonet mounting, including the light-duty 3820

and heavy-duty 9328E. And slides are available with stainless steel and aluminum finishes for applications in harsh environments.

Cabinetmakers are familiar with the four families of hinges from **Blum** (blum.com), which include CLIP and compact units in both standard and Blumotion (soft closing, silent) versions. Blumotion adapts to the dynamics of every door so that all doors close smoothly, regardless of size, weight, or the force used by the client. The feature can be deactivated on one or both hinges to ensure that doors close at the right speed. A woodworker can also snap the doors on and off with CLIP technology and make easy three-dimensional and cam adjustments.

Rev-A-Shelf (rev-a-shelf.com) has taken Blum's drawer slides to the next level by using them to create its Glideware product line. This is a series of pullouts that can include hooks for clothing, kitchen pots and pans, cleaning mops and brushes and pretty much anything that can be suspended in a tall, thin cabinet.

Fulterer USA in High Point, N.C. (fultererusa.com) has Austrian roots and has been solving hinge and slide problems for half a century. The catalog includes flipper door mechanisms; slides with capacities up to 1,100 lbs.; Progressive slides that have a smoother action than standard two-step telescoping versions; a large selection of stainless-steel slides; multiple drawer-locking systems; and slide-out swivel bases for televisions and store fixtures.

Grass (grassusa.com) in Kernersville, N.C. offers a



Progressive slides from Fulterer USA (left); Blumotion CLIP hinge (top), and Glideware from Rev-A-Shelf (below).

full catalog of cabinet hardware including institutional hinges with zinc, die-cast construction. The system is designed for frameless cabinetry and offers high loadbearing capabilities, tool-free snap on mounting, and opening angles from 180 to 270 degrees. The company offers half a dozen metal drawer-box/slide options, including Nova Pro, Nova Pro Scala, Vionaro, DWD-XP, Zargen and ZBox. The latter combines the strength of ball bearing slides with the Zargen's steel construction, to create a drawer solution designed to save time and money with quick construction and simple assembly. The new ZBox offers standard drawer and deep drawer heights, a railing system, and Pendaflex filing systems.

Among the latest specialty hinge and slide offerings from **Häfele America** (*hafele.com*) is a chrome-plated wire shelf pull-out (item 549.37.200) that is full extension with a soft closing mechanism. Designed for 5-7/8" wide base cabinets, it can carry 26 lbs. and includes the frame, baskets, top and bottom runners, and the front brackets. Häfele has also introduced new sliding door hardware (Slido F-Line21 12D, item 402.33.037) with two glass retaining profiles at the top and bottom plus a concealed guide, or else with a glass retaining profile at the top and a visible guide at the bottom.

Kits and combinations

Located in Bossier City, La., **Hardware Resources** (*hardwareresources.com*) has been designing, engineering, and manufacturing products for the kitchen, bath, and closet industries since 1990. The company sells its own - and only its own - products and delivers direct to its customers. Among the newest items in its catalog are 100 lb., full extension, undermount slides (item USE58-KIT) that now come in a kit that includes the clips, rear brackets, and screws. There's a comprehensive online comparison guide to all of HR's hinges, which makes choosing the right one a lot easier. They have done the same thing for all the drawer slides, including the new 303-200 push-to-open slides that can handle 100 lb. loads and come in 14" to 22" lengths.

Combining both specialty hinges and tracks, **Hettich America** (*hettich.com*) offers the WingLine L folding/sliding door system includes a new feature that opens the doors as wide as possible and gives clients a panorama view of the contents of closets, cabinets, and specialty storage such as under stairs. The company says that "WingLine L lets you produce folding sliding doors in a completely new dimension of convenience. The revolutionary Push/Pull to move opening mechanism provides access to everything inside the cabinet with just one movement





The Samet Supreme hinge, available from Knap & Vogt.

new Solo Mech soft close hingeless door lifting system is available in four colors, and the Flowbox premium thin double-wall drawer box system has synchronized full extension and a soft close adaptive damper. Shops looking for a soft-close, low profile, by-pass door track system might want to check out the SMT 75T, and KV is also offering Jetfix expandable dowel and Samfix cam fittings for store fixture and furniture assembly.

When it comes to tricky applications such as installing thin-framed glass doors on frameless casework, **Salice America** (salice.com) has a smartly designed specialty hinge. Called the Air Push, this is a concealed hinge with a special spring designed to open handle-free doors. It's inserted into the top and bottom of the cabinet and the door, and it's practically invisible. Its small size means that the applications for Air include kitchens, bathrooms, living room and bedroom furniture, or display cabinets. It will handle doors up to 84" tall and 24" wide that weigh up to 44 lbs. Air Push is designed for doors with a minimum thickness of 3/4" in wood or aluminum.

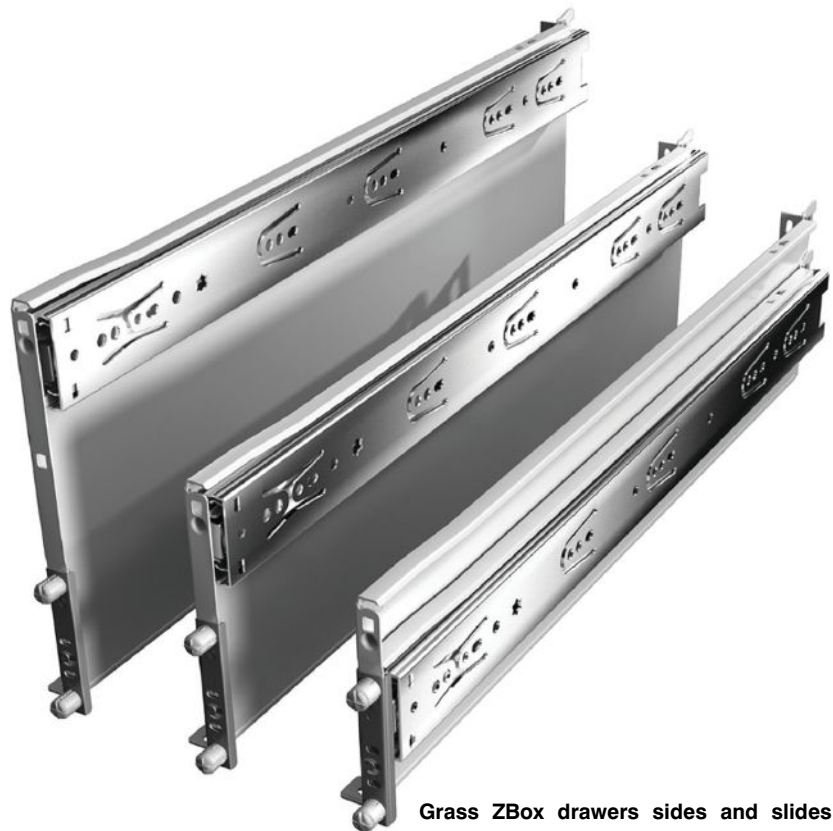
Slides for doors

A new sliding door system from Sugatsune

of the hand." It has optimized running performance, soft opening and closing, tool-less installation and minimal door protrusion, which helps clients to efficiently organize the space inside. The doors can weigh up to 55 lbs. and measure up to 94-1/2" in height.

Klingspor's Woodworking Shop (woodworkingshop.com) carries barrel, drop-leaf and no-mortise surface mount hinges as well as jewelry/humidor box hinges, lots of decorative brass and antique options, and some thick butt hinges in different metallic finishes. There is also a surface mount (non-mortise) chest hinge for 3/4" thick lift lids on projects such as stereos, toy chests, piano benches and headboard storage compartments. It has a brass finish, and it opens to 195 degrees.

In the spring of 2021, **Knap & Vogt** (knapandvogt.com) expanded its product offering to include Samet hinge, lift and drawer box systems, and to expand its sliding door hardware and undermount drawer slide offerings. Knap & Vogt is headquartered in Grand Rapids, Mich. and Samet is based in Istanbul, Turkey. The result of this alliance is a new category of KV powered by Samet products. The low-profile Samet Supreme soft close face frame hinge system has a one-of-a-kind, tool-free, track-Lock system that saves time during upper cabinetry installations. The



Grass ZBox drawers sides and slides in one assembly.



The Air Push concealed hinge from Salice America.

America (item MFU1200-40-L in the online catalog at sugatsune.com) features a two-way damper to avoid slamming open or closed. It's easy to install and is designed to close flush against surrounding walls for a clean appearance. The slide has a unique movement where it first recesses in and then slides sideways. There are no floor tracks, which can be aesthetically pleasing, and no handle is needed on the door front for opening. The sliding system is intended for use with 1-3/16" to 1-9/16" (30-40 mm) thick doors, and it requires a space behind the adjacent wall for the door to slide into.

One of the more innovative specialty slide systems comes from **Lockdowel** (lockdowel.com), where the hardware is installed using the company's signature green plastic barbed dowels. Simply pop the slides in place. Lockdowel says its customers can reduce both labor and shipping costs while doubling their assembly capacity, with no additional capital investment.

Wood Technology in Pittsboro, N.C. (woodtechnology.com) carries specialty tie, scarf, and clothing slides.

Sometimes a shop needs to see two or more manufacturer's hinge and slide lines to compare products and give a client some choices. Resellers such as Cabinet Parts (cabinetparts.com) or drawer suppliers such as **Decore-Active Specialties** (decore.com).

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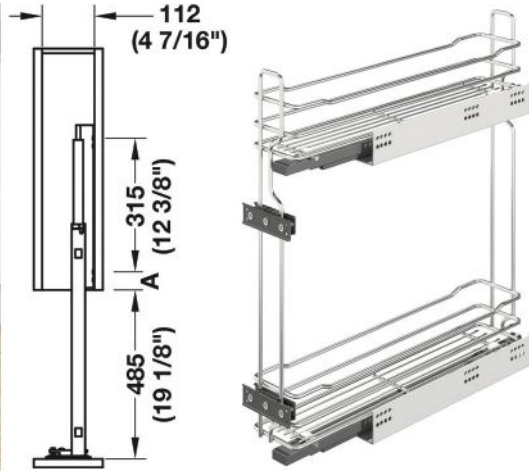


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Hettich's WingLine L (above); Hafele wire shelf pull-out.

com) may offer such an opportunity. If a specialty item isn't in their catalog, they can usually find it.

Of course, some clients ask for specific brands, and most of those have been mentioned above. However, they may not always offer a specialty solution. For example, Amerock (amerock.com) has about 30 different hinges, many of which are available in up to six finishes, but they're designed to address the needs of most mainstream customers rather than those who might have specialty hinge or slide needs. www.w

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THINK IT THROUGH

Investing in a 5-axis machine is a quantum leap for most woodshops, but the rewards include faster production, cleaner parts, more accuracy, and the ability to innovate

By John English

Woodshop owners who are considering the purchase or lease of a 5-axis CNC already have a pretty good idea of the machine's abilities. This is by no means a small investment and most of the available options are very high-quality machines, so the choice isn't as simple as choosing the 'best' one. It's going to be about deciding which machine is best suited to the tasks that it will be asked to perform.

A 5-axis machining center can move a tool or a part in five different axes simultaneously. That's a loaded sentence. Note that it can move either the work or the tool, or both, and also have more than one motion occur at the same time.

Small- and medium-sized shops that already operate a 3-axis

machine are very aware of the limits of basic CNC operation. The process involves fixturing a part so it cannot move, and then having the machine move a single tool along one of the three fundamental axes – left/right (X), back/forth (Y), and up-down (Z). Machines with automatic toolholders still only chuck one tool at a time in the spindle. And 3-axis machines equipped with aggregate heads still operate by moving a tool to stationary work, even though aggregates do allow more angles for contact.

Do you need 5 axes?

A true 5-axis machine can rotate the work or the tool in two additional axes (A and B – more on these later). There is also the option



of a 3+2 axis machine (also known as a 5-axis positioning machine), which offers standard 3-axis machining along with the ability to hold and rotate parts to a new stationary position between cuts. A 5-axis machine can work on moving parts. It can eliminate several clock-eating setups and can run a very complex cut on every area of a fixtured part except the bottom, and it can do so without stopping for parts adjustments. No matter how carefully and precisely a woodworker resets a part to provide access to new facets

on a 3-axis machine, there will always be some minimal shifting. A 5-axis machine can deliver incredibly precise parts because each part is locked in place and is never moved.

A 5-axis machine can make some very complex parts such as curved stair bannisters or gently bowed automobile dashboards. And its complex ability to reach means that the cutter can almost always be perpendicular to the surface being milled, which of course reduces stress on the tool and allows for slightly deeper cuts and fewer time-consuming passes. That flexible reach can also let the machine use a shorter tool, which reduces vibration and drag, and delivers a more accurate and finished part that requires less sanding.

All of this adds up to a few basic questions that need to be asked before a shop even considers the various 5-axis machines available. Most importantly, if the woodshop is only building traditional casework, is there enough justification for the investment? A high quality 3-axis machine that is supported by knowledgeable staff and smart software can mill almost any part required in the manufacture of one or five-part doors and rectangular casework. For an occasional shaped part such as a decorative range hood or perhaps an island corbel, an aggregate head may be all that's required. If the 5-axis machine is being considered based on volume and the ability to use a certain type of mechanical connection, would two 3-axis machines with aggregates be able to handle the work? That's a valid question if demand ebbs and surges, where at times only one of the two machines has enough work to stay busy. It's also a timely consideration if the industry doesn't move past the current supply chain problems, where at least one machine might be kept alive when parts are in short supply. But if a shop is making complex parts, and lots of them, it awfully hard to argue against upgrading to five axes.

For shops that decide to upgrade, there are some basic concerns. The machine needs to be bulky and massive enough to handle hardwoods, MDF and plywood. Some 5-axis machines are built for delicate work such as making aluminum parts for planes, or plastic parts for signs and 3D advertising. A CNC that is making furniture or casework has to have a very robust spindle and toolholder, be dense and massive enough to dampen vibration, be powerful enough to maintain travel speed, and be smart enough to process data quickly and accurately. It should be compatible with the shop's existing CAM and CAD software, or the shop needs to factor in new learning curves and costs there.

In-house maintenance is going to be a big concern. On most 3-axis machines, glitches can

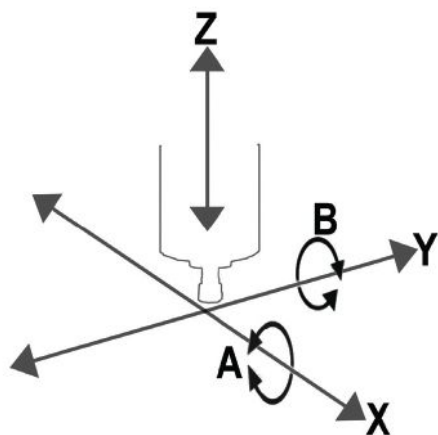
often be ironed out using phone calls, emails and Zoom. As the machine becomes far more complex, easy solutions are going to be more evasive. The employees who will perform maintenance and repair tasks are going to need more training. The manufacturer needs to offer 24/7 support because of time zone changes and second or third shifts in the woodshop that lie outside standard office hours. This is an all your eggs in one basket investment, and if it goes down it takes almost every aspect of production with it. The manufacturer should have distributors across the country with well-stocked spare part inventories, and a network of other customers nearby who can help in a pinch.

Getting up to speed

There is, of course, a learning curve once the decision has been made to upgrade, and that doesn't just involve the machine operator. Designers are going to need to master some simulation software and build parts virtually before committing to a physical run. There are quite a few accidents in 5-axis machining where parts and tools and fixtures and even gantries collide because it was too difficult to visualize all the simultaneous movements. A computerized simulation can find these before they happen. Designers are also going to discover that many operations still only require 3-axis processing, and they'll need to learn how to mesh those into sequences that take advantage of the machine's 5-axis abilities. That will usually come down to running cost-analysis software that considers time as one of the primary integers. The other side of that coin is that one needs to consider when the 5-axis machine can eliminate setups, clamps, time spent handling parts, and time spent changing tools. Is it possible to keep the 3-axis CNC when the new machine arrives, rather than replacing it, at least through a transition period that provides an opportunity to quantify the benefits and costs?

When a shop invests in a 5-axis machine, the parts that it was purchased to make may need to be re-engineered. The fundamentals of the woodshop's manufacturing process are going to be changed, so perhaps the geometry of the parts can also change. Nowhere it is written that a subassembly that previously had four or five parts still needs to be constituted that way. Now, that same subassembly might benefit from being milled as just one or two parts, because the new machine can reach into the work in different ways and at new angles and depths.

Enhanced abilities may also make it possible to create new variables for parts such as dimensional changes, or the locations of elements. For example, it may be easier to adapt an RV's dashboard design



Potential movements in a 5-axis CNC.

to accommodate more dial options, or new electronics, or perhaps optional audio-visual elements without having to create a whole new design every time there's an update from the client. That flexibility may also lead to a reduction in inventory and the static costs associated with stockpiling completed and raw parts. Because they're so flexible, and require less setup and time, 5-axis machines can be quite adept at supplying just-in-time parts to a client who issues change orders.

Upgrading to five axes will also require a shift in tooling. Most machine upgrades

will involve increased speed and torque, and consequently the shop will need to purchase a higher grade of tooling that is intentionally made for 5-axis machining.

Fourth and fifth axes

The heart and soul of a 5-axis upgrade is the addition of two new axes of rotation. One (called A) is around the X axis and the other (B) is around the Y. The machine can rotate either the tool or the part/table to access these two new abilities. Some machines swivel the tool and leave the part stationary (fixed table, moving gantry), which is a good idea when the parts are large. Other machines move the table (and the part that's attached to it). In this case, the table might move left or right along the X axis, and then swivel toward the front of the machine on its A axis to reveal a different area/facet of the part that needs to be machined at a specific angle. Because the tool moves too, and constantly changes position so that it can address the part in the most perpendicular fashion, this much faster type of 5-axis action is known as continuous machining. Here it's very important that the part is first made virtually in simulation software because the machine moves very fast, so collisions can be quick and catastrophic. But if the programming is done right, and the part is fixtured properly,

and the tool is strong enough, and the operator has crossed his/her fingers correctly, this is the fastest way to manufacture multiple complex parts. There are few or no adjustments and interim setups to make, so the net result is better, more accurate parts made in less time.

If only one of these new axes will be required, it's a good idea to contact the manufacturer of a shop's existing 3-axis machine and ask whether a fourth axis can be added. There are also some 4-axis machines available on the market that essentially turn the X axis into a CNC wood lathe. They tend to be a bit smaller, but they can be surprisingly affordable compared to a true 5-axis machine.

One of the core values in 5-axis machining is technical support. It's essential to research customer reviews, contact shops that already own the machine, and visit online user groups to get an accurate assessment of how well the manufacturer stands behind the machine. This isn't about product support where failed parts are serviced or repaired. With machines this complex and expensive, that's rarely a problem. This concern is about how the manufacturer will work with the woodshop during the initial learning curve, and what intellectual resources are going to be available as new uses are found for the machine. Keep in mind that CNCs



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serve a lot of industries, so it's important that the manufacturer of the machine that is being considered by a woodshop has specialized expertise and experience in the woodworking field. Plastics and metal don't behave like solid wood and sheet stock.

Another aspect of support is integration. Depending on the CNC manufacturer, the machine could be part of a larger management software environment that includes machine maintenance and performance monitoring. It may also be linked to other work cells such as edge-banding or coating, or perhaps to automatic loading and unloading. Some of the software can cross platforms or integrate into even larger management software packages that monitor shop workflow, inventory, personnel, and other aspects of the business. Those programs have acronyms such as ERP, PIM, MDM and PCM. Depending on how automated the woodshop is now, and also what's planned for the near future, it may be critical to find out how well a new 5-axis CNC will play with the other children in the shop.

Some questions to ask

Technology is moving fast. How adaptable will the machine be to future advances in the mechanics of spindles such as better cooling and dust collection, or to technology leaps in concepts such as the Industry 4.0 envelope or lean manufacturing? Can it grow as the shop's demands grow?

Can all five axes on a potential new machine be moved simultaneously? Sometimes there are controller or software issues, rather than hardware restrictions, that prevent this. And does the shop actually need all five motions simultaneously?

Another core consideration is the nature and physical size of the products being made in the woodshop. The Z axis travel can be more critical than the machine's table dimensions for 3D parts. Some manufacturers offer the option of increasing the Z clearance (a taller gantry), and this can be worth exploring.

Depending on the spindle size, the nature of the tooling and the dimensions of the parts, it may be possible to reorient projects that have traditionally been made on a 3-axis machine so that they present to the new and nimbler 5-axis spindle in a way that doesn't require as much height, or that requires more height for faster processing. Keep in mind that less massive machines may have an issue with stability or vibration as the gantry gets taller.

Does the shop need a full-scale 5-axis machine? If the intent is to add the ability to make complex parts rather than to increase the rate of production, there are several small and affordable 5-axis machines on the market that may be able to bridge that gap. Be aware that many smaller machines are intended for sign-making in foam or ABS, so they may not have the rigidity to machine hardwoods. If possible,

a shop could have the machine manufacturer mill some parts before a purchase is finalized, while the woodworker watches and evaluates the process.

The bottom line here is growth. Technology-based businesses such as high-end production woodshops are like some species of sharks: if they don't keep swimming forward, they die. Investing in a 5-axis machine is a quantum leap for most woodshops. Whether it's new equipment or used, and bought or leased, the time commitment and the learning curve are as big a consideration as the monthly payments.

After the cost-benefit analysis is done, the decision is made and the machine is selected, there's one more aspect of purchasing that might require a little more thought right now than it used to. Inflation has been creeping back into the general economy, and that usually goes hand-in-hand with higher

interest rates. Variable rate loans are never a great option for purchasing plant and machinery, and the slightly unsettled nature of the world economy with issues such as Covid and supply chain problems suggests that this might be an opportune time to explore leasing as an option.

If a woodshop can justify the purchase, the machine will revolutionize the production cycle and impact almost every aspect of the business from personnel to purchasing. The scale of, well, everything in the shop will increase. Some tasks will become more specialized while others will disappear. Upgrading to a 5-axis CNC is an exciting and sometimes anxious leap of faith, but the rewards include faster production, cleaner parts, more accuracy, and the ability to innovate both products and production processes. **W**

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GETTING THE RIGHT FIT

Joinery options for woodshops often come down to a choice between convenience and aesthetics

By John English

A dictionary search for the word ‘joiner’ reveals that in England it still refers to somebody who builds complex objects by joining pieces of wood together. In America, it’s “someone who joins many organizations”.

Most of the familiar joints in furniture and casework originated in boatbuilding, where wooden parts needed to stay together during constant motion and radically changing humidity. Traditional joinery includes the mortise and tenon, where the tenon can be pinned or wedged; tongue and groove joints such as those in five-part door and panel construction; and butt and lap joints, where end grain and cross lamination can present gluing problems. Casework joints evolved after the introduction of plywood and table saws and include dadoes (across the grain), grooves (with the grain) and rabbets or rebates (depending on where you live). Splined joinery can belong in this category too, as many furniture builders use thin plywood splines in grooves for strength. Plywood won’t split along the grain as a solid wood spline might. And when it comes to drawer boxes, the epitome of style is still the half or through dovetail, or sometimes an elegantly executed box or finger joint.

Over the years, the industry has built upon these basics and introduced biscuits and pocket screws to overcome some of the challenges of butt joinery. Biscuits offer vertical alignment where, for example, the faces of two boards can meet in the same plane. However, they are not quite as reliable when it comes to lateral alignment – parts can slide a little sideways during a glue-up. Pocket screws

are strong, fast, and often don’t require glue, but they do leave a large hole. It can be somewhat disguised but is perhaps best located in hidden areas such as the backs of cabinet face frames.

In production shops, joint making is all about hardware. That’s because a CNC router can drill a hole for a metal or plastic connector a lot faster than it can mill the complex facets of, say, a wedged tenon. Virtually all mechanical connectors are hidden, while pure joinery such as dovetailing or through tenons is often revealed and celebrated as a mark of craftsmanship. Indeed, the options for woodshops often come down to a choice between convenience and aesthetics. Both hand-cut joinery and mechanical connectors can offer strong and dependable joints, so the real constraints here are speed and looks. If the joint is to be separable (as in knock-down), then you’re pretty much looking at hardware options.

In small- and medium-sized woodshops, creating joinery such as mortises and dovetails has become a lot easier and more repeatable over the last few years with machines such as the Shaper Origin and PantoRouter.

The Shaper Origin (\$2,599 at shapertools.com) is a hand-held CNC router. The woodworker applies a special tape to the workpiece and the router uses that to locate itself. Then the operator manually follows the cutting line, and the router moves inside its housing to make minor corrections and deliver perfect free-hand results. The company also offers a stationary bench/clamping table called the Workbench that makes it quite easy to create dovetails, mortises, and other fine joinery.



The Shaper Origin and Workbench; making tenons on the Leigh FMT Pro (right).

One doesn't need a degree in computer programming to run it.

The PantoRouter (pantorouter.com, starting at \$1,395) is a manual horizontal routing system that was designed to semi-automate joint making for smaller shops. It's both a prototyping and short-run production workhorse that can create tenons, dovetails, drilling patterns or free-hand contours, among other options. The machine operates in all three axes and brings accurate repeatability to shops that don't own a large CNC. Basically, it's a router that is on its side and mills wood that is locked onto a moving table. The operator can control that movement with handles, stops, and templates that deliver very precise results.

Woodpeckers' Multi-Router (woodpeck.com) works on a similar

principle. There are differences, of course. This is a new generation of the venerable JDS Multi-Router, and after Woodpeckers bought the rights, they added some upgrades such as better dust collection and a sturdier motor mount. It has also re-engineered the stylus, according to Darrel Peart (furnituremaker.com) who has been using a Multi-Router for many years to build his exquisite Arts & Crafts style furniture.

Another inspirational woodworker who is also a renowned toolmaker, John Economaki designed the Jointmaker Pro. Available through Bridge City Tools (bridgecitytools.com), this unusual joinery machine uses a stationary hand saw and moving tables to make controlled cuts. The newest release, the V2, was listed in December 2021 at \$859.

The Festool Domino joining system uses loose tenons to make



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Chopping mortises with a Festool Domino.

furniture joints. It consists of a machine that drills a mortise in each of the two parts to be joined, and prefabricated beech and sipo tenons. The tool has simple indexing features and adjustable mortise sizing. The tenons are rotation-proof and far stronger than either biscuits or dowels. They have a large gluing surface area for extra strength. There's an optional trim and cross stop, and mortise width adjustment with the turn of a dial allows for easier alignment when joining panels. A pivoting fence can be used to create angled mortises from 0-90 degrees with positive stops at 22.5, 45 and 67.5. The company (festoolusa.com) also offers indexing pins for quick alignment against the edge of the workpiece for accurate placement.

Leigh Industries (leightools.com) is familiar because of its wonderfully engineered dovetail jigs, but the company also makes an impressive mortise and tenon jig. The FMT Pro (\$1,299 at Rockler) makes both the mortise and matching tenon with a single setup, guide and bit. It can rout 68 sizes of standard inch joints from 1/16" x 1/8" up to 1/2" x 5", using 21 standard guides and just one or two Leigh bits. Custom joint sizes up to 1/2" x 5" can also be achieved.

Another option for production mortising is the Horizontal Mortiser FD 250 from Felder Group (felder-group.com). This slot mortising machine has a small footprint but the ability to handle large workpieces. The table is extendable in three directions by up to 39" without any tools, and the drilling motor is mounted on roller bearings so it can create custom-sized mortises. The machine offers comfortable



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Woodpeckers' Multi-Router and the Pantarouter (right).



one-handed lever operation and a heavy-duty eccentric clamp that's usable on the left- or right-hand side. The fence has four locking points on the drilling table and there's an optional dowel indexing system and mortising chisel device.

A smaller and extremely affordable version of these mortising and floating tenon solutions is the Beadlock system from Rockler (rockler.com). Here, a woodworker can use a simple jig and a drill bit to create the mortise, and the company supplies tenon stock that looks like three 1/2" dowels or five 1/4" dowels that are edge-glued and stuck together. The new Beadlock Pro 3/8" jig runs \$89.99.

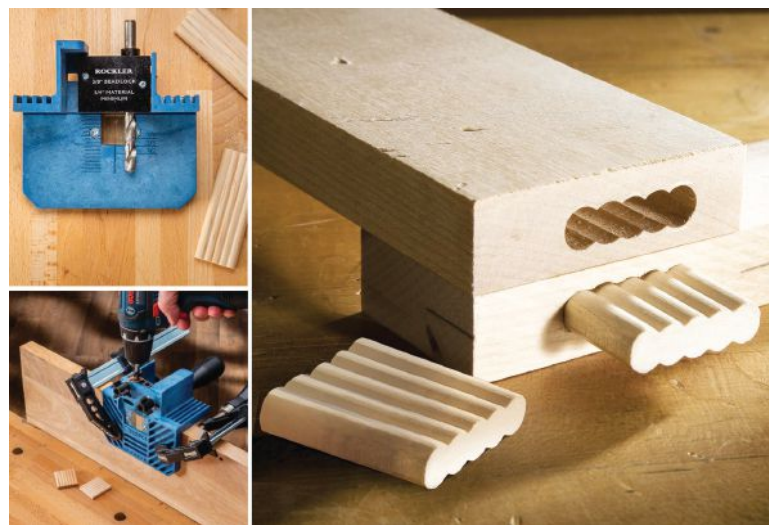
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Jointmaker Pro from Bridge City Tool (left); Rockler's new Beadlock jig.

woodworkers devices that add a high degree of precision to joinery, and among the company's newer jigs is the Inkra I-Box. This is especially useful for drawer joints because it works on either the table saw or a router table to create box or finger joints. It's both fast and easy to use, and it comes with a one-hour instructional DVD that covers everything from basic setup to advanced decorative joinery. The IBox's dual pitch lead screw mechanics let a woodworker micro-adjust the joint tightness, and the jig provide a 1/8" to 3/4" range of pin widths. It's capable of making box joints using any width cutter within that range in lumber from 1/4" to 7/8" thick. The I-Box is made in the U.S.A. by Taylor Design Group.

For shops that already own a CNC or are thinking about investing in one, Laguna Tools has a short but quite informative article on its website titled "Solid wood joinery using a CNC machine" (lagunatools.com).

Digital Wood Carver (digitalwoodcarver.com) offers an accessory for one of their small CNCs which is called the Joint Maker Jig. It gives a user the ability to carve off the end of the DWC2440 machine to mill precision joints on a board while it is secured in a vertical or horizontal position. Those include mortise and tenon, half-blind and through dovetails, finger joints and some unique decorative options.

Woodworkers with some time to spare can visit woodgears.ca to see a large selection of shop-made jigs for all kinds of joinery. Just don't go there if you have work to do because minutes can become hours. **W**



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Three shows return with live events

By Jennifer Hicks

The Western Design Conference Exhibit + Sale took place Sept. 9-12 at the Snow King Events Center in Jackson Hole, Wyo. The annual event showcases Western-inspired, hand-crafted functional art and brings together

craftspeople, collectors, architects, interior and fashion designers with a passion for the West. It operated as a virtual show in 2020.

Allison Merritt, the show's executive director, says the 2021 selection committee accepted a record number of artists eager to unveil new

Table by Lake AntlerWorks at Western Design; work by Paradise City exhibitors Bayley Wharton and Scott Sober.

works and trends in furniture, fashion, jewelry, accessories and interior design.

"We had a great show, back live and in person," says Merritt. "Roughly 40 percent of the show is woodworking or mixed media with wood, metal and other mediums. We limit the show to 100 or less juried exhibitors per year in our 28,000 square foot location at the Snow King Center."

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Three pieces at Western Design — Secret Spirits, Porta De Soul and Wild Blue — from MosArt Furniture in New Market, Md.

The event opened with a preview party on Sept. 9 that included a live runway fashion show where models showcased handmade jackets, wraps, clothing, custom boots and other wares available for purchase. In the following three days, attendees explored five rooms in the Designer Show House while interacting with artists.

The 2022 show is scheduled for Sept. 8-11. For more, visit westerndesignconference.com.

A doubleheader

The Paradise City Arts Festivals resumed with two live shows last fall, Oct. 9-11 at the Three County Fairgrounds in Northampton, Mass., and

Nov. 19-21 at the Royal Plaza Trade Center in Marlborough, Mass.

The 27th annual Northampton show featured 220 juried artists exhibiting original works in furniture, painting, decorative fiber, mixed media and more. The Marlborough show featured 175 juried artists and makers.

"There was a total of 21 woodworkers and 17 furniture makers who work in wood counted as individual exhibitors. This doesn't double count artists who participated in both shows. About half of them did both shows," says Linda Post, the shows' founding director.

For more, visit paradisecityarts.com. [W](#)

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Include name, dates, location, description of event and a contact address or telephone number. Calendar items, which should be typed or printed clearly, must be received a minimum of 60 days before the event.

Please note that fees, as listed, might not include materials or shop fees. Check with a specific class for further details.

— Compiled by Jennifer Hicks

ARIZONA

Mar. 21 – Apr. 6 — Fundamentals of Traditional Woodworking 1. Hands-on course

teaches fundamental skills, hand tool use, design and joinery. Fee: \$719. Location: Southwest School of Woodworking in Phoenix. sw-stw.org

BAHAMAS

May 3-6 — Woodworking Industry Conference, presented by the WMMA and WMIA. Location: Atlantis Paradise Island. woodworkingindustryconference.com

CALIFORNIA

Monthly — San Fernando Valley Woodworkers meetings are held on the third Thursday of each month at 7 p.m. at the Balboa Park Sports Complex, Gym Building, in Encino. sfww.org

Monthly — Society of Wood Manufacturing, a chapter of AWFS consisting of educators, manufacturers, hardware and industrial suppliers, and machinery

dealers, meets during the second week of each month. For location and dates, visit awfs.org

FLORIDA

Ongoing — The Dunedin Fine Art Center is offering six-week woodturning classes at its Cottage Campus taught by AAW professional member Tony Marsh for beginners and intermediate-level participants. Full-day classes are held on Thursdays. Call 727-298-3322 or e-mail education@dfac.org.

Monthly — Woodcrafters Club of Tampa meets every third Thursday evening at 3809 W. Broad St. in Tampa. tampawoodcrafters.org

Feb. 8-10 — International Builders' Show hosted by the National Association of Home Builders and coinciding with the Kitchen & Bath Industry Show for Design and Construction Week. Featuring exhibitors specializing in tooling and services for residential construction, educational seminars and more. Location: Orange County Convention Center in Orlando. buildersshow.com

GEORGIA

Aug. 23-26 — IWF 2022, one of the world's top events for the custom and general woodworking industries, bringing together the latest solutions in architectural woodwork, cabinetry, furniture manufacturing, and more. Location: Georgia World Congress Center in Atlanta. iwfatlanta.com

MARYLAND

Monthly — The Howard County Woodworkers Guild meets the first Saturdays of the month at the Bain Senior Center at 5470 Ruth Keeton Way in Columbia from 9 a.m. to 12 p.m. Open to all those working in wood. For information, email Manny Flecker at aaron0641@hotmail.com.

MINNESOTA

Monthly — The Minnesota Woodworkers Guild meets on the second Tuesday of each month at various locations. For more, visit mnwwg.org.

NEW JERSEY

Monthly — The North Jersey Woodworkers Association meets the third Monday of every month in person and via Zoom. njwawoodworkers.org

NEW YORK

Monthly — The Woodworkers of Central New York hold meetings on the first Thursday of each month at 6:30 p.m. at the Belgium Cold Springs Fire Department in Baldwinsville. woodcny.org

Monthly — Northeast Woodworkers Association meetings held on the second Thursday of the month at various locations in the Albany area. woodworker.org

Monthly — The Long Island Woodworkers meet on the first Wednesday of each month at 7 p.m. at the Frank Brush Barn of the Smithtown Historical Society in Smithtown. liwoodworkers.org

NORTH CAROLINA

Monthly — Triangle Woodworkers Association meetings held on the third Tuesday of each month at 7 p.m. at Klingspor's Woodworking Shop in MacGregor Village in Cary. trianglewoodworkers.com

Feb. 18-20 — 35th National Arts & Crafts Conference. A celebration of the historic Art and Crafts movement and its modern-day revival featuring lectures, small group discussions, antiques, special exhibitions and more. Location: Omni Grove Park Inn in Asheville. arts-craftsconference.com

OHIO

Ongoing — Cincinnati Woodworking Club meets the second Saturday in the months of Jan., March, May, Sept. and Nov. from 8:30 a.m. to 12:30 p.m. at the Northminster Presbyterian Church, 703 Compton Road, Cincinnati. cincinnatiwoodworkingclub.org

SOUTH DAKOTA

Monthly — The South Dakota Woodworkers Guild meets the last Thursday of every month (except August) at various members' shops. sdwoodworker.org 



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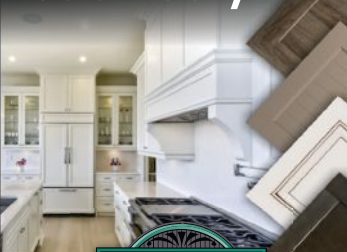
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Top finishers in the Wildest Parts Competition included (clockwise, top left) a keyboard by Gus Bronk; working carousel by Jim Courtney of Erie Community College in Williamsville, N.Y.; Thor's Hammer by Wrindy Houser's team from Grand Rapids Community College, and a domino and dice game cup set by Wes Bruski.

Wildest winners

CNC Software Inc., manufacturer of Mastercam CNC software, conducts a Wildest Parts Competition to encourage student interest and participation in manufacturing. Open to students across the globe at secondary and post-secondary levels, and professionals, entrants are invited to create parts that demonstrate their creativity and technical skills using Mastercam programs.

Usually an annual event, the most recent competition combined entries from 2020 and 2021 due to Covid concerns.

"This year we received over 20 entries, which was amazing considering Covid and how challenging it must have been for students and teachers who might not have had access to the machine shop during this time. We were very impressed by the quantity and quality of parts we received," says company spokesperson Michelle Nemeth.

The contest recognized the top three in four divisions: Secondary, Post-Secondary, Teams, and Professional.

Wes Bruski, a student at Capital High School in Helena, Mont., won Secondary with a domino and dice cup game set. Bruski made the prototypes out of wood then machined the final set.

Gus Bronk, representing Washington State University in Pullman, Wash., won Post-Secondary for a keyboard, machined from a Boeing Surplus forged billet of 2000 series aluminum from the 1970s.

Grand Rapids (Mich.) Community College won Teams with a replica of Thor's Hammer.

Andy Beach, a professor at Grand Rapids Community College, won the Professional division for a metal bust of Ironman, created to test the school's new Haas UMC-500 five-axis mill.

"We always look forward to seeing all the entries we receive for Wildest Parts," Peter Mancini, education product manager at Mastercam, added in a statement. "There are so many talented and dedicated teachers, and the quality and originality of their students work with Mastercam is inspiring."

For contest details, including more photos of winning entries, visit mastercam.com.

-Jennifer Hicks

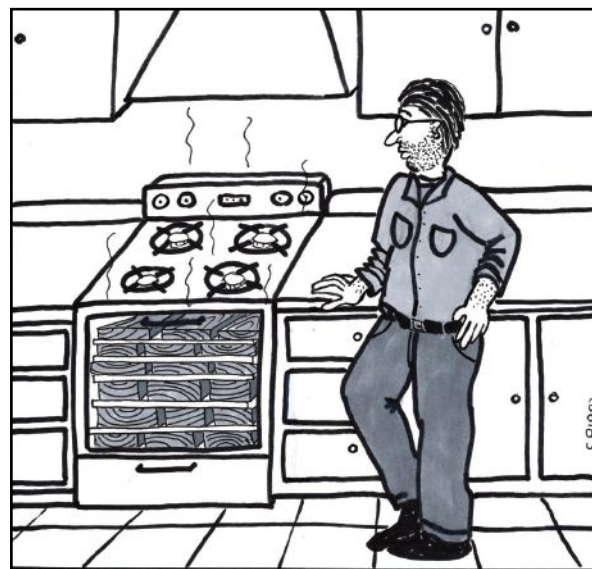


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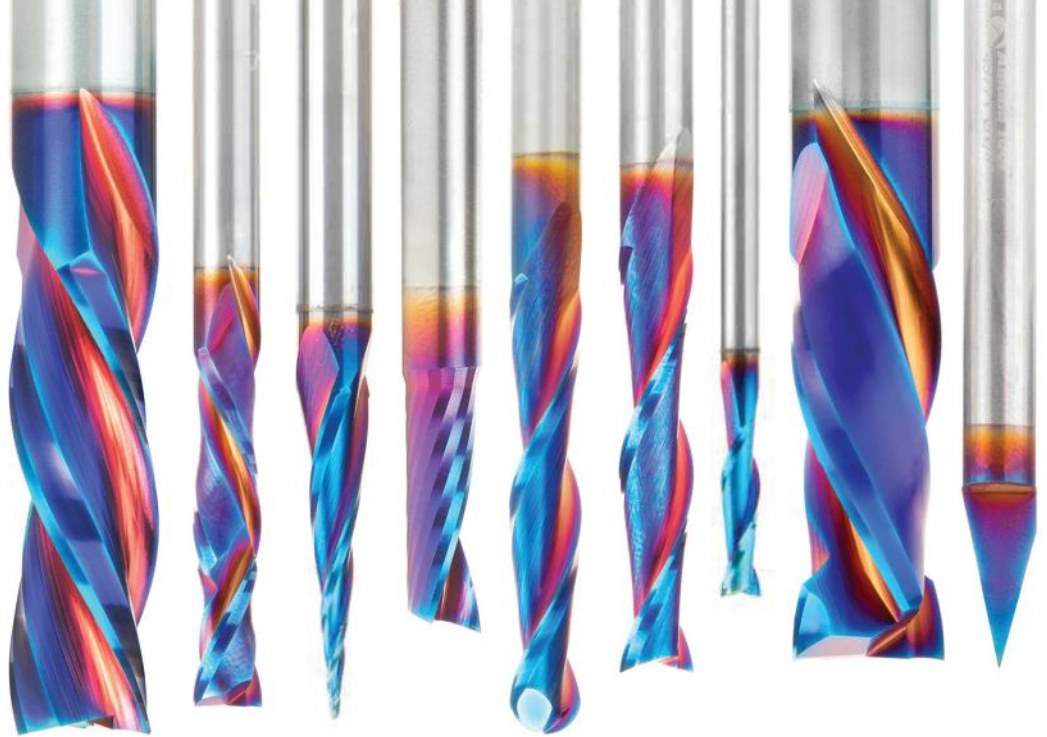
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