



machining

plant facts

**Audio Innovations,
a division of Rockford Corp.**

Stillwater, Okla.

- ☛ **Employees:** 130
- ☛ **Annual sales:** \$169 million
(entire corporation)
- ☛ **Plant size:** 45,000 square feet —
manufacturing space; 89,000 total
square feet
- ☛ **Product:** Automobile speaker
cabinets

Automation boosts production 65 percent

Replacing an older manufacturing method with a highly automated system increases output with the same number of employees.

by Linda Ohm
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Two years ago Audio Innovations, Stillwater, Okla., was building 12,000 speaker cabinets per month with 130 employees in a labor-intensive manufacturing process. Company engineers estimated that increasing production to 16,000 cabinets per month with existing production methods would require an additional 100 employees and a doubling of the plant's 45,000 square feet of manufacturing space.

Audio Innovations makes speaker cabinets for cars. The company sells to national customers like Circuit City and Best Buy. It is also a supplier for

other companies. In July 2001 the company was purchased by the Rockford Corp., a company primarily involved with speaker and sound equipment. The new owners wanted to find a way to increase production.

"We spent three months looking at different options," says Tom Smith, manager of operations. Smith traveled all over the world studying different approaches and machinery.

In January 2002, all the facts were in, and the company decided to buy an Auto V-Grooving fully computerized v-grooving lineal line along with a North-

wood CNC router. The router arrived at the plant in May 2002 and the v-grooving line in August. In December 2002, the final machine needed for the new production setup, a Midwest Automation laminating line, was purchased.

Although the router was operational within a couple of weeks, the lineal line was a prototype and required a bit more tweaking. All the new manufacturing equipment was in place and completely operational by February 2003. Three months later the plant is producing 20,000 cabinets per month, with the same 130 employees.



At the finish, an operator takes the piece, trims off edges, makes sure the piece is cut right and stacks it on a conveyor to go to the CNC router for further machining.

Doing it the old way

Two years ago, the way Audio Innovations built speaker boxes was very labor intensive. Assembling the individual pieces and applying automotive-style carpet — which covers the boxes instead of a conventional finish — to the MDF were the cause of a huge bottleneck, says Smith.

Parts were cut efficiently on a Holzma beam saw and individually machined using a C.R. Onsrud inverted pin router and a double-end tenoner. The parts coming into assembly consisted of MDF with circles routed, and angles and dados cut. Assemblers

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took what was then four individual pieces of wood, laid them out on a table, sprayed adhesive on them, cut a piece of carpet to the correct size and sprayed adhesive on the carpet. The pieces were then placed on the carpet in the proper configuration so the carpet could adhere. The pieces were sprayed again along the edge so the

carpet could be hand rolled over to provide a smooth carpeted edge. Finally, a razor knife was used to trim out all the dadoes and grooves and to trim the carpet from the holes.

Doing it a new way

Everything changed with the new machines. The process now begins with laminating the carpet to the MDF. At first the company used an outside vendor for that process, because the company wasn't using a large enough quantity to justify buying the equipment.

"It wasn't until the V-grooving line was up and operational that we really started consuming laminated panels," he says. "It turned out we could do it in house for a fraction of what we were paying. We also eliminated quality control issues."

The Midwest Automation laminating line was purchased in December 2002. It uses a Wilsonart adhesive to laminate the 3/32-inch-thick carpet to the 5/8-inch MDF sheets. Smith says the machine does a great job and allows the company to laminate what's needed as it's needed.

Laminated panels are cut into strips on the Holzma beam saw. Panels are then fed into the v-grooving lineal line, carpet side down. The v-groover has 11 cutterheads on it, seven fences and a roller system on each side. Smith says manual setup could take 6 to 10 hours.

When the v-groover cuts the grooves, the tool goes through the MDF but not

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Parts are placed on the Northwood CNC router after they've been v-grooved and the dadoes cut. The company can stack multiple parts with the blue holddown rollers. This setup also allows the company to use less precise fixtures and jigs.



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The lineal line that v-grooves the panels is directly across from the beam saw. The line, along with the CNC router, has increased output by approximately 65 percent with the same number of employees doing the work.

the carpet, since the carpet will act as a hinge. As the panel rolls through the line, hot melt adhesive is applied at specific points after which rollers fold the piece once and then again at the grooves, so a carpeted edge results. The machine then cuts a dado, pushes the piece 90 degrees in a new direction where more v-grooves are cut. At the finish, an operator takes the piece, trims off edges, makes sure the piece is cut right and stacks it on a conveyor to go to the CNC router for further machining.

“With the automated version, all those motors and fences are run off a servo system and it’s computer controlled,” Smith says. “Once the program is in there, it takes 10 seconds for the thing to get lined up.” If a new part has to be programmed, the operator plugs in the numbers and answers

For more information on the products in this article, visit www.fdmonline.com or contact the company directly.

Auto V Grooving, Inc.

Lineal v-grooving line
800/387-5819
www.vgrooving.com

Midwest Automation

Laminating line
612/721-5347
www.midwestautomation.com

Northwood Machine Mfg. Co.

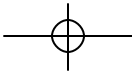
CNC twin-table router
502/267-5504
www.northwoodmachine.com

C.R. Onsrud Inc.

Inverted router
704/528-4528
www.cronsrud.com

Stiles Machinery

Holzma beam saw
704/861-8239
www.stilesmachinery.com



the prompts. The entering of numbers takes about five minutes. The next step is to make sure everything is working correctly with a few test samples. "Typically, within 30 minutes they have a new program," he says.

Unlike many CNC routers that have vacuum holddown systems, the Northwood router is equipped with a roller holddown system. "Everything is actually held against the table by pressure and force rather than vacuum," says Smith. The company can stack multiple parts with this setup. Sometimes the router will cut three parts at a time that are stacked together, something that would not be possible with vacuum holddown, says Smith. The rollers also allow the company to use less precise fixtures and jigs, he adds.

"With the roller holddown we're able to basically throw the parts up on the table and the two fences and rollers hold them down well enough so it cuts down on the time we have building fixtures for that machine. It makes the changeover from one product to another a lot quicker," says Smith.

The biggest change

"While that piece of equipment resides down in the panel processing area, the vast majority of the savings occurred in the final assembly area," says Smith.

The system has taken a lot of labor out of the panel processing area. "Those people are producing a lot more product than they were before, and they do not have to physically put out as much effort," says Smith.

There are now about 50 employees in the assembly area, down from the

100 that were needed prior to the new equipment. The work in assembly is still labor intensive and demanding, says Smith. Whereas adding two employees to the lineal line could produce another 800 cabinets a day, it would take an additional 30 employees in assembly to put those cabinets together, he adds. "For us to grow and

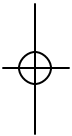
increase that's the area that we need to work in and we are working to change a number of things right now. We're definitely on a growth curve."

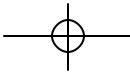
Tracking efficiency

The company tracks employees' efficiency and efficiency in the plant. While *continued*



A close-up of the rollers and v-grooving in action. What starts out as a flat panel ends up with curved edges and dados.





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Oracle software takes care of information such as sales, shipping, order entry, inventory and bill of materials, Excel spreadsheets are used to track data.

“Tracking efficiency really pinpoints where our problems are. From a machinery and process standpoint, it shows us what’s working well and what needs improvement. From a personnel standpoint, it helps us identify who’s doing a great job and who should move on to bigger and better things.”

Employees are encouraged to move up in the ranks. When the new equipment first arrived, Smith says there was some resistance among employees, who were comfortable with the way things had always been done. Now, many employees see the new machines



After panels are laminated with carpet on one side the panels are cut to size with the Holzma beam saw. Cut panels are very close to the finished size of the speaker.



Panels are fed into the v-grooving lineal line, carpet side down. The v-groover has 11 cutterheads on it, seven fences and a roller system on each side.

as an advantage. Employees have the opportunity to operate expensive computer-controlled equipment that gives them a larger sense of self worth in their jobs, he adds. “It also gives us the ability to pay the individual operators more money because now they’re producing so much more product.

Smith says he didn’t want to jump

into buying too many machines. “You have to be careful to keep your core competency within what you want to do. You also run the risk that the more you integrate into your operation, if your process changes or the market trends change, you may be stuck with a piece of equipment that no one puts any value to,” he says. ▲

