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Load system battles nested-based bottlenecks

Problem:
Excess labor needed to load and unload CNC machine, inconsistent production flow.

Solution:
New load/unload system helps control the production pace of the entire shop.

The Linear Flow system used on a Busellato Optima router at Custom Source Woodworking. Fully nested casework or paneling are processed on this machine.

Watch the action:
Go to CabinetMakerFDM.com/linear.aspx to see a video of this product in action.

What sets Linear Flow apart?

Simplicity of design. The loading system is incorporated with the existing tool changer and the incoming material is managed by a stock scissor lift.

Operational speed. When overall cycle time is critical, the machine has a "chip to chip" cycle of 25 seconds.

Emphasis on labor savings. The system vacuums the table during the unload cycle so there is no cleanup between programs. The system is available in standard and hands-free versions, the latter requires only a confirmation by the operator that the unloading area is open.

Reducing labor and bottlenecks are two goals in any manufacturing operation. Linear Flow, an automatic load/unload system developed for Busellato CNC machining centers, is designed to address both. Delmac won a Sequoia Award in the machinery productivity category for the Linear Flow at the recent AWFS Fair.

"This is for any company that is trying to reduce labor," says Bill Blackmon, Busellato Product Manager for Delmac Machinery Group. "For large companies that run the machine two or three shifts, the benefits there are easy to see. However, the small shop that only runs the machine a few hours per day would benefit by allowing the operator to run other machines."

The typical cycle with a nested-based CNC, Blackmon says, is to run it until the parts are all complete. Usually other operators are downstream and taking some of the parts but, in most cases, if the CNC is run without interruption, it will outpace other machines and parts will be stacked up and must wait for other machines.

Usually, the CNC machine is not the bottleneck and so the operator can start the machine, and the Linear Flow system would complete the first nested sheet of parts, unload and load a new sheet and start that nest.

If the operator is still busy on other machines, the machine would then wait with a complete set of parts on the offloading table and another set on the machine. When he returns, he unloads the table and signals the machine to unload/load and the cycle resumes. The operator can control the production pace of the entire shop, not just the CNC, which is one of the principles of lean manufacturing.

At Custom Source Woodworking Inc. in Lacey, Wash., the linear flow

system is used in conjunction with the Busellato Optima router.

"We machine all panels on this system," president Jim Mammina says. "Whether it is a fully nested casework project or a paneling job, all product is processed through this machine. This is much faster and (requires) a lot less movement of parts than the conventional saw-PTP system. We move directly from the Optima to either the Omal borer/inserter, the edgebander or assembly."

Mammina says that the company now does not need two people on the nested machine. The system can be used for any panel up to 4 x 10 for the company's casework, nurse stations, reception desks and other panel products.

System components

In addition to the CNC machine itself, the components that comprise the Linear Flow system are:

- **Loading device** consists of suction cups mounted to the under-beam tool changer. The device has a 200 mm stroke that allows it to reach beyond the machine table to retrieve the staged panel.
- **Panel evacuation device** is mounted to the left side of the beam and strokes down to engage. The device has integrated dust collection that is open only during the evacuation cycle. It cleans the table ahead of the panel being loaded.
- **Scissor lift.** A full bunk of new panels is loaded onto the scissor lift located on the right side of the machine. The lift automatically indexes up to locate the next panel at the correct height.
- **Unloading table.** The table can be provided with the system or the customer can build their own. The design of the machine allows the finished parts to be pushed a safe distance away from the moving machine.

A closer look at the Linear Flow system pulling a panel into the cutting area in the demonstration area at Delmac headquarters in Greensboro, N.C..

Single cycle

A single cycle starts when the machine finishes running a program. Here's how it works:

- The Linear Flow system moves to the right to retrieve a new sheet of material that has already been positioned against reference pins. When the machine is in the loading position, the panel evacuation device engages.
- The machine begins moving to the left, pulling a new sheet onto the table and simultaneously unloading and vacuuming the table of any remaining dust. The new sheet is pulled from a stack of panels on a scissor lift. When the sheet is off the lift, it automatically indexes up to the correct loading height.
- Machine continues to the far left, pausing to drop the new panel at the reference point, then continuing about three feet more, pushing the completed parts to the unloading table. At this point, a new panel is loaded and completed parts are a safe distance from the moving machine.
- The machine automatically engages the vacuum to the new panel and the machine starts the next program.
- The operator unloads the parts. With the standard loading system, the operator stages the next panel to be loaded by sliding it a few inches against reference pins. This can be done before or after unloading the finished parts. He pushes a button to signal the machine that a new panel is ready to be loaded. With the hands-free loading system, the next panel is automatically staged. The operator signals the machine from the unloading area that it is ready for another load/unload cycle.

Custom Source Woodworking's Mammina adds that Keytrix software generates code for the Busellato. "We do not do any programming on the floor, which allows our operator to just operate the machine," he says. "This is the biggest mistake shop owners make. They buy the machine before they have a seamless way to get code to it. We bought the software first, before we owned the machine, so we could create code and e-mail it to a company 40 miles away to run patterns."