



TORNOS SWISS ST TURNING CENTER HELPS PUNCH MANUFACTURER REDUCE OVERHEAD COSTS BY 66 %

For almost twenty years, Boise, Idaho company, Performance Design has designed and manufactured paper punching machines used by Staples, Kinkos and in-house printing departments of large corporations.



Left to right: Emmett Nixon, programmer; Randy Stewart, President; Steven Parker, engineer.

Today, they've got a 20,000 sq ft facility with 25 employees where they manufacture and sell over 20 different product lines including their Rhin-O-Tuff™ brand punches, tools, binding machines, and accessories used to bind paper with plastic combs, crimped wire, and spiral plastic coils.

Until late 2012, though, they were outsourcing a key component in their equipment... the round, oval, square and rectangular metal pins used to punch the paper. The pins are between 1/8" and 5/16" diameter and about 2" in length which includes a 1/8" head gripped by the punch machine. Approximately an inch of the pin punches through the paper. The pins fit into a punch die which is interchangeable within the punch. The shape of the pin dictates the

shape of the hole punched. As part of a company-wide "Go Lean" initiative that began in 2007, they decided that they needed to bring the pin manufacturing in-house, starting with their oval shaped pins.

Steven Parker, Project Engineer for Performance Design, explains the situation: *"Before the Tornos, we were having our pins made by outside vendors. But we wanted to reduce costs and get control so we could make what we wanted when we wanted it."*

US Manufacturers feeling the pinch

A blog post on the company website reveals additional detail. *"Since Performance Design is the only remaining USA manufacturer in the paper punch*

and bindery industry, they felt a responsibility to save manufacturing jobs in the US. Most of the company's competitors are based in China, Taiwan, Vietnam, and Portugal where their labor costs and overhead are lower. The company realized that in order to remain competitive in equipment pricing, their manufacturing processes needed to be changed dramatically.

"Rather than sending our production offshore, we decided to bring in Lean manufacturing experts to totally reinvent the way we manufacture our products. This impacted a lot of things, from the way we ordered raw materials to the actual manufacturing processes of our heavy duty punches and binding equipment," said John Lugviel Vice President of Business Development for Rhin-O-Tuff. (<http://rhin-o-tuff.com/blog/rhin-o-tuffs-go-lean-initiative-led-to-dramatic-results-in-punch-binding-equipment-manufacturing/>).

In order to accomplish their Go Lean goals, they had to investigate a new type of machine tool to add to their mix of horizontal and vertical mills. They needed to investigate turning centers.

IMTS 2012... the first stop

Like many manufacturers, Performance Design began their search for their new machine tool at IMTS. "We went to IMTS and looked at four other turning machines," says Parker. "But we didn't get around to looking at the Tornos. We had a full plate and ran out of time. A big reason for us to go to IMTS was to figure out what we were looking at in person for the first time."

"Actually, we were just about ready to pull the trigger on purchasing a different machine right after the show; but then we met with our local Tornos salesman, Fred Huth, and he presented the specs on the Tornos Swiss ST 26 "Starter" machine. The Tornos looked like a great option and we were really surprised by the price that he was quoting. Comparing it to similar machines in the market, we were expecting it to be another 100K more than what he was saying. When we saw the features that the Tornos had for the price, we put the brakes on buying anything else. We had to start looking at that one real seriously."

As they investigated the Tornos capabilities, they realized they could not only make their oval pins; but that they could make their square and rectangular pins too – and make them out of the same round stock material they were going to use for the ovals.

Tornos US – the last stop

"Since we didn't get to see the machine at IMTS," explains Parker. "We wound up going to Lombard near Chicago to see the machine in person, to get a demonstration, and see the Tornos facility. They were able to run one of our rectangular pins for us so we got to see exactly what we would be getting."

"The way we used to make our square pins (and the way we were planning to make them when we decided to bring the work in-house), was with a square or rectangular raw material. We would make a couple extra features and then the final shape of the pin was based on the raw material that we got in. We had a lot of problems with out-of-tolerance dimensions due to varying raw material; but since the material had to come in such huge orders, sometimes we had to deal with it because we didn't have time to make a new order."

Once they determined that the Tornos could use round material to make rectangular pins, they were hooked. "We went back to the other manufacturers to see if they could match the Tornos and their only answer would be jumping up to a \$200,000-300,000 machine. They had nothing in the Tornos Swiss ST price range. They had a couple options with polygon turning; but for our application those weren't going to be viable."

Pinch milling was the game-changer for Performance Design

"What we had to do is take the raw material from a round shape down to a square cross-section. If you do it normally with just one end mill, by the time you get down to your third or fourth flat, you have nothing supporting the cut from the other side. It causes all sorts of problems."

"The biggest thing that drew us to the Tornos was the ability for pinch milling. Every other machine we looked at in this price range only had one tool platen. Pinch milling took what would have been about six or seven raw materials down to just two."

"With the Tornos Swiss ST, we're able to have two identical end mills pinching the material and basically supporting it against themselves. They hold it nice and straight so we're not only able to get the raw material benefits – right now we're doing all thirteen of our different pin shapes out of just two raw materials, 1/4" and 3/8" round 12L14 steel – that helped us a lot right there. But we have also eliminated manual labor on pin head assembly."





Swiss ST 26 with parts carousel shown.

Before the Tornos, Performance Design square pins had a gripper head that required manual labor to assemble. Parker explains. *“When we were using the square material, we had to drill a cross hole and then hammer in a roll pin to act as that head. So it was additional labor for our assembly guys to have to do that on every one. Now, we actually leave a round head at the end of the square pins. It looks a lot better and it saves us a lot of labor time.”*

The new pin head required just minor design changes to the punch design; and it was worth the effort. *“The retainer is the part that directly interfaces with that head, it had to be changed up a little bit and we had to do a series of in-house tests to verify that it was going to be as strong as the old one. The new design, in all the tests, blew away the old design. It was easily twice as strong as the previous design that took a lot more labor.”*

Less raw material and less manual labor takes “Tuff” to a new level.

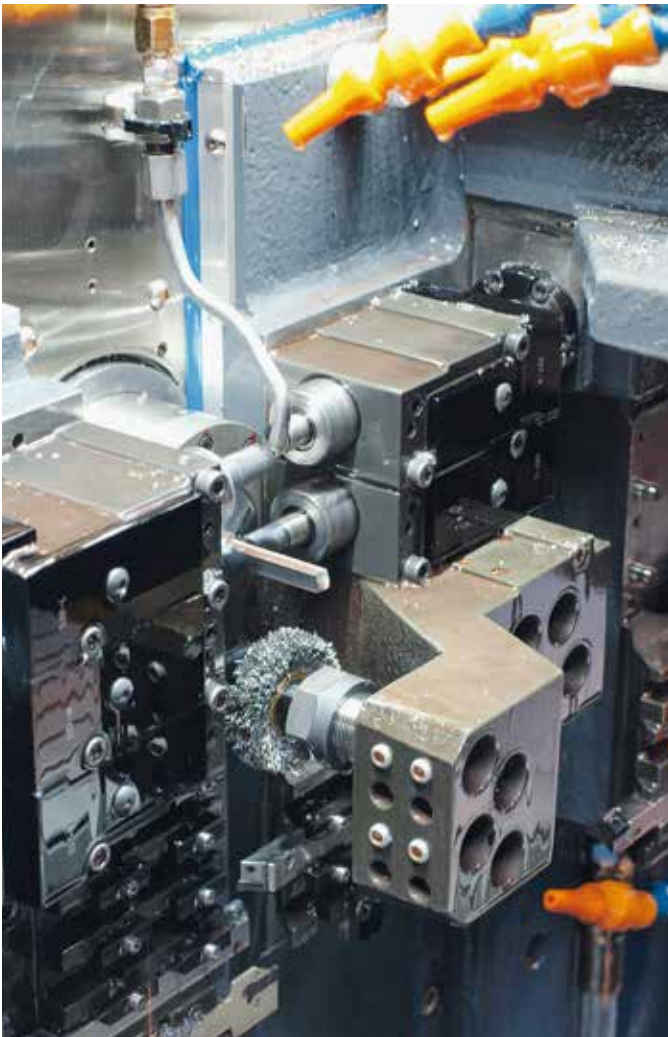
Plus... Performance Design saves at least 21 hours a month on changeovers.

“With this being our first screw machine we were worried about the changeover times (changing out collets and guidebushings and everything) for each pin. But now that we only have the two raw materials, the changeover is really minimal. We’re still pretty new to it... but the changeovers probably take us a good three hours. Right now, we’re only having to do that full changeover... if we plan it right... once a month (vs. 7-8 times a month without the Tornos).”

Performance Design makes the pins one at a time and the average cycle time is around 60 seconds, unmanned. *“The simple round ones are actually quite a bit faster, right around 36 seconds. But the more complex, square ones are about 70 seconds. We accepted that the cycle times would be longer on the square pins; but it’s unmanned and it’s replacing the manual labor of pounding in the roll pins.”*



Performance Design's parts carousel with fifteen bins holds a complete Rhin-o-Tuff pin set (a pin set is the same pin in fifteen lengths).



Punch pins being cut on Performance Design's Swiss ST 26.

Fifteen is another magic number

On a normal book – an 8-1/2" x 11" stack of paper that requires binding – there would be between 30-40 holes along the bound length. The pins are in a series of fifteen lengths to spread out the punching force so punching is easier and the acoustics are better. Says Parker, *"If you were to punch all fifteen in one shot, you would have a loud 'bang!'"*.

To eliminate the noise and make it easier for customers to use the punches, Rhin-O-Tuff pin sets come in a fifteen pin stagger, which is the exact same pin in fifteen lengths. The length of the shaft of the pin changes just a little bit from pin to pin in the set. The pin sets were perfect for automation; so Performance Design investigated and purchased a parts carousel with fifteen bins on it. *"Our pins were already in a fifteen pin stagger and we found one that had exactly fifteen in it,"* remarks Parker.

"Tornos helped us set it up and they helped us out with a macro. So now we just program in how many we want of each pin; for example, we enter '200 of each length'. And it will make that length and then the macro built into each program will switch to the next length and index the carousel. It keeps the pins organized for us as it makes the different lengths."

"We're planning to be able to eventually run this lights out... get all of our pin production done during the night time and during the day we'll hopefully have some available machine time to switch to other parts that take a little more surveillance."

The company took delivery of their new Tornos Swiss ST 26 the last couple days of 2012 as an end of the year tax break rush. And already they project that they'll be making about 110,000 pins per year on their new machine. They are currently running 100 bars/month.

Lean on Tornos

"The accessibility of the machine was a real strong point when we were looking at it," says Parker. *"We definitely noticed a difference between the other machines we were looking at during IMTS and this one. There is WAY more room to see what you're doing. During set up and tool touch off especially, having access from both sides was a big plus because certain things you just can't reach too well from the one side. And I noticed in some of the other machines it was just kind of a small hatch and you'd have to reach in and contort yourself around to be able to see anything. So that was actually a pretty big selling point for us was being able to see what was going on and to lean in there and get a good picture of everything."*

Another thing they liked was all the tool slots. They can fit all the tooling for all the pins made from each size raw material in the machine at once – with spots still available. *“The different pins we make use different types of tools – most use five tools. There were enough available tool slots on the Tornos that we’re able to leave pretty much all the tools in the machine for all our different pins. That means we’re just changing the program and the pickoff collet when we go from one pin to another. Very rarely will we have to change out a tool. We only have to change out the guidebushings and collets, etc. when we switch to a pin that’s a different material.”*

Room to grow on the Tornos

“We’re still new to the Swiss machine and we’re still trying to figure out how to run the simple parts we have now, but the plan is to eventually be able to do some more parts. We are still outsourcing some parts that we’re just not ready to do ourselves yet. But according to our numbers on all the runtimes, we should be able to do all the pins and only use about

70% of this machine’s runtime capabilities. So there will be some open machine time once we’re fully up to speed on running it ourselves.”

The Tornos is helping Performance Design make parts so fast and efficiently that eventually, open machine time could allow Performance Design to become an outsource partner from the other side of the table.

“We’re open to the idea of doing parts for other manufacturers someday and we’ve had a local business ask if we could build some parts for them. But at the moment, we’re only doing our own parts.”

In summary

The Tornos Swiss ST 26 Starter configuration was a linchpin for Performance Design’s Go Lean initiative. The Tornos was a great fit on price and capabilities and helped them transform the way they manufacture a key component in their product line. The Blog from their website ticks off a few other benefits of their new lean approach:



Square and rectangular Rhin-o-Tuff punch pins: old style shown left, new style shown right.

Dossier

Performance Design's three-year process realized significant improvements in manufacturing and supply chain practices including:

- A drastic drop in the company's inventory needs. Their finished goods and raw materials inventory saw a 60 percent decrease with work-in-progress inventory cut in half.
- Improved quality control and less reengineering work.
- Faster order fulfillment time from 10 down to 4 days.
- Manufacturing processes made to be reactive to new orders which in turn reduces the need to rework products that have already been boxed up and placed into finished goods inventory.
- Implementing the use of Single Minute Exchange Dies, reducing machine set-up time, labor hours and costs.

The final result of the changes implemented was dramatic, with an overall reduction of 66 percent lower overhead costs. Because of improved engineering, the company is now able to increase the warranty of its equipment to an unparalleled three years, up from one year.



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