

Cleaning the plasma table while simultaneously cutting?

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A metal fabricator recognized the amount of downtime associated with cleaning its tables and designed a better way

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By: Dan Davis

SALSCO Inc. is a product manufacturer that has a lot in common with job shops: At any one time it has 250 line items of different components on its shop floor for its 38 different products. To stay on top of production demands, it needs all of its plasma cutting capacity. That's why it hurt when tables were taken offline for routine cleaning or fetching of parts that fell between the grates. Company President Salvatore J. Rizzo thought there could be a better way and designed a modular base that allows the plasma cutting table to cut while parts and debris are constantly removed from the bottom of the table.



Figure 1

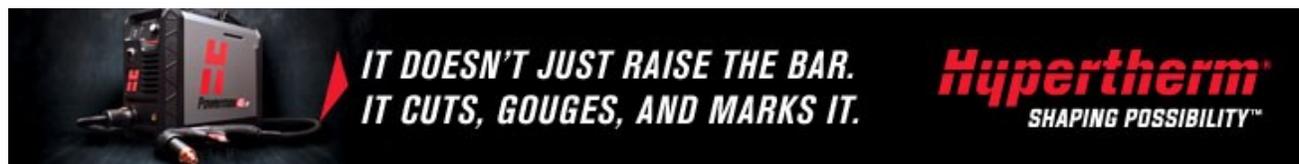
The conveyor that sits in the bed of the Konstant Cut & Kleen system catches parts that fall through the slats of the plasma cutting table and delivers them to a parts chute, which can be seen in the picture inset.

SALSCO Inc., Cheshire, Conn., is a manufacturer of equipment for the construction, farming, golf course maintenance, lawn care, paving, tree care, and wood processing industries. In total, it makes 38 different models of machines for all of those end-user markets.

In a way, the end-product manufacturer is like a job shop.

"It's insanity here," said Salvatore "Sal" Rizzo, the company's president. "At any one time there are 250 line items of different components going through the building. Somehow or another, they end up in the assembly area and get assembled."

To keep up with customer demand for certain products and parts, SALSCO keeps a healthy inventory. For the most part, however, the equipment fabricator is building strictly to fulfill orders. In fact, SALSCO typically requires several weeks to deliver machinery from the time the order is received. (For example, as of mid-August, the lead time for delivery of gas-powered greens rollers was about four to six weeks.)



With the shop floor trying to juggle the production of multiple units from different product lines, machine uptime is critical. Unexpected downtime from unscheduled maintenance or lost parts causes not only one operation to halt, but also downstream activities that are reliant on parts to complete assemblies. It's a major production pain.

Rizzo witnessed this with his company's plasma cutting tables. As he was shopping for a new plasma cutting table in 2015, he realized that there had to be a better way of cleaning the plasma cutting machine and retrieving parts from the table bed when they fell through. Basically, he was looking for a way to ensure the plasma table was cutting parts, not waiting to cut parts.

"I love designing products, and I love building products," Rizzo said. "That's what gets us into all of these different industries."

Rizzo was about to solve his own production dilemma and jump into the industrial equipment market at the same time.

Understanding What's at Stake

To more fully appreciate the motivation for improving the plasma cutting operation, Rizzo said he considered the two main scenarios that kept the table from cutting parts.

1. Cleaning the Table. Rizzo said that the company's plasma cutting machines need to be cleaned every eight weeks or six to seven times per year. The process typically takes two men two full days to remove slats and chipping slag from the frame; remove slag from the tank; sort parts that might have fallen through while cutting; clean and grind those parts; and install new slats. That's about 260 labor-hours per year (40 hours per cleaning x 6.5 times per year = 260). If Rizzo's suggested labor rate of \$130 per hour is applied, that's \$33,800 per year invested in cleaning each table.

Rizzo added that lost billing time on the plasma cutting machine should not be forgotten. If that table is not cutting for 130 hours (6.5 times per year x 20 labor-hours), that's a considerable amount of lost revenue. SALSCO estimated it lost at least \$29,250 in billings when a table went offline for cleaning (130 hours x \$225 per hour = \$29,250).

2. Looking for Lost Parts. Rizzo said that any fabrication operation can identify with this struggle. Parts fall through the slats and need to be fished out. He estimated that during an eight-hour shift at SALSCO, an operator spends 30 to 60 minutes looking for the 10 to 15 parts that fell to the bottom of the bed, resulting in three to four hours of lost cutting time on the plasma table per week. That's almost \$800 per week in lost billings (\$225 per hour x 3.5 hours = \$787). Over 50 workweeks in a calendar year, that's \$39,375 in lost billing, according to Rizzo.

That's just the money side of the lost parts. There is also the disruption to the production schedule. If the parts have to be retrieved from the bottom of the table, they have to be sent to be cleaned in the grinding department before they are sent on to the machine shop and then the welders. Both departments have to stop what they are doing to finish up the jobs that were put on hold because of the missing pieces. If the parts can't be found at the bottom of the table or are unusable, engineering has to pull the part from a nesting file, send the files to the plasma cutting machine, and interrupt the schedule to have the lost parts recut. The interruptions continue in machining and welding as everyone else has moved on to other projects.

Fixing the Problem

Before purchasing the new plasma cutting table, Rizzo wanted to design a part removal system on which the plasma table could sit. His idea was to combine the use of a water and a downdraft table, two distinct approaches when it comes to conventional plasma cutting table designs.

The Konstant Cut & Kleen plasma table consists of a shallow water tray and a conveyor belt system that runs underwater (see Figure 1). Rizzo said the conveyor belt is made of the same material that Walt Disney World in Florida uses on its amusement rides like "It's a Small World." It has a considerable life expectancy, and the material can grip and transport even the smallest of metal parts from the bottom of the water tank to the part-dispensing area.

"If you broke the lead off of a pencil—that's how small of a piece that the conveyor would be able to pull out of there," Rizzo said.

When parts fall into the water, they are protected from spatter that normally would cover them in a dry downdraft table.

Between the bottom of the torch head and the top of the water, zoned dual-side suction chambers surround the cutting table. The air chambers open and close depending on where the plasma torch is cutting. The table's vacuum is engaged only in the area of the table where the cutting takes place.

SALSCO runs its new plasma machine from Hornet Cutting Systems with the Konstant Cut & Kleen four and a half days per week, 10 hours per shift, and Rizzo said his production team has not lost a part over the past year of running the Konstant Cut & Kleen system.

"This is self-cleaning too," he said. "We have opened it up a couple of times so that we can make sure that the components weren't getting worn. I didn't want to be surprised if we were going to start selling something similar to a customer. But we have found that there is no reason to take it apart."

For those fabricators that might suggest that SALSCO look at a power rake, which scrapes the bottom of the table to remove any loose parts that fell through the grating, SALSCO has. Actually, the company owns a plasma cutting table with the power rake design attached to it.

"What happens is you still have to turn the machine off [with a power rake]," Rizzo said. "The operator removes the slats, and the bulldozer blade pushes the material out. But it bounces over some of the material, and it doesn't get everything. Then the operator has to go in and get everything else."

After fishing the parts out, the operator then has to go through the slag pile that was pushed out. He has to look for lost parts, which when found have to be cleaned of spatter.

"It's still a day-and-a-half project," he added.

The Konstant Cut & Kleen table is designed to be modular, so it can work with any manufacturer's plasma cutting equipment. Also, because it is modular, the part removal system can be shipped on pallets using common carriers. No special trucking permits are needed for what otherwise might be considered an oversized load, which is typical for delivery of fabricating machine tools.

Rizzo said that he has plans to add his new table to his two other plasma cutting tables. It's just a matter of finding the time. SALSCO has parts to cut, and downtime is a luxury that the fabricator can't afford.

SALSCO Inc., 203-271-1682, www.salsco.com

Dan Davis

Editor in Chief
FMA Communications Inc.

833 Featherstone Road
Rockford, IL 61107

Phone: 815-227-8281

