

The Company:

Enerflex Ltd
Calgary, Alberta
Canada

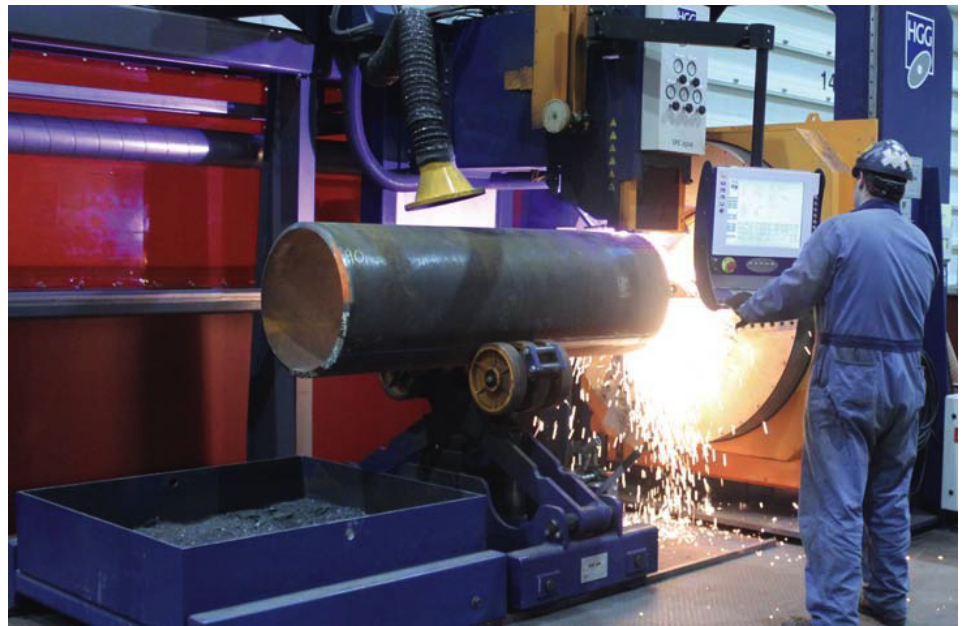
The Problems:

- Hard-To-Find Highly Skilled Tradesmen
- Manually Cutting
- Quality Issues
- Accuracy Issues
- Safety Issues
- Fit-Up Issues
- Long Lead Times
- Production Delays
- Outsourcing Pressure Vessel Cutting & Fabrication

The Solution:

HGG SPC 2500
Profile Cutting
Equipment

Profiles *in* Automation



The SPC 2500 has automated and simplified the way Enerflex lays out pressure vessel hole locations and cuts the beveled holes. It used to take about 8 – 10 hours to prepare a typical shell to weld in the nozzles. Now the entire process takes about one hour.

Pressure Vessels Put The Pressure On Enerflex

Enerflex Ltd, an international company headquartered in Calgary, provides products, services and integrated solutions around the world, focusing on customers that process and move energy between the wellhead and the market. The company supplies solutions for natural gas compression, oil and gas processing, refrigeration systems and power generation equipment. Enerflex is focused on field production facilities, compression and natural gas processing plants. More specifically, Enerflex specializes in integrated turnkey natural gas processing facilities and compression plants in any operating environment.

A common core of the Enerflex product line is a substructure called modules (or skids). These module/skid assemblies incorporate a series of pressure vessel tanks.

Once gas is withdrawn from the ground, and before it is available for transport, the gas must go through a series of cleaning processes, being compressed and processed several times through scrubbers. Pressure vessel tanks are used for compressing and scrubbing (or cleaning) the gases. Enerflex customers range from small local oil and gas companies to the world's biggest names in oil and gas delivery, including Shell and Imperial Oil. With such a wide range of customers, Enerflex routinely delivers an equally wide range of equipment, from 40 HP to 9,000 HP, customized to each customer application so that each order satisfies specific country of origin requirements, local code requirements, as well as individual metallurgical specifications.

But regardless of the final destination, there is one common thread. Each substructure integrates a series of pressure vessels, which in-turn requires a highly skilled and hard-to-find labor force. And that was just one of the problems.



specialists
in 3D profiling

Profiles *in* Automation

Highly Skilled Hard-To-Find Labor

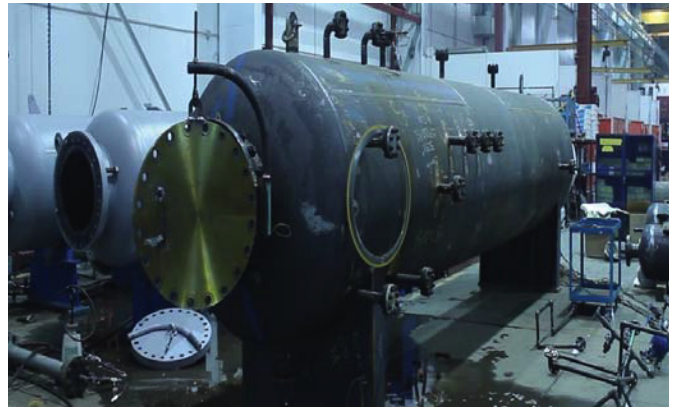
§According to Kurt Schaerer, General Manager, “The average age of an experienced pressure vessel welder and fitter is somewhere around fiftyfive years old. Finding and hiring new pressure vessel welders with experience to match is next to impossible, even though they are some of our highest paid tradesmen. The reason, these welders might have the toughest job in the plant.”

Armed with tape measures, jigs, chalk lines, and acetylene torches, pressure vessel welders and fitters typically layout their work by hand, and manually perform a job as critical to the success of the sub-assembly as it is difficult to perform. Working in, on, and all around the circumference of large cylinders in awkward positions, sometimes even on their backs, these welders are responsible for positioning extremely accurate hole locations and then cutting exact hole sizes with critical tolerances. Even small errors can result in fit-up issues, creating production delays and then quality issues and scrapped pressure vessels down the line. Worse yet, if even the slightest of mistakes makes its way into a final assembly, it can easily impact product performance dramatically, hurting customers drastically. At best, Enerflex managers found themselves dealing with long lead times, which often caused production delays. At worst, the company found itself outsourcing pressure vessel cutting and fabricating to the local labor force, which was already saturated with work from a booming oil sands economy.

Automated Profile Cutting Machinery

Enerflex had been speculating at automated profile cutting machinery for pressure vessels for almost 10 years, but nothing met the company’s expectations. First, most of the machines they reviewed were roller-driven, which created a host of problems. Product had a tendency to bounce over the long seam. Plus, those machines utilized sensors on top requiring constant attention. Someone needed to lift or neutralize the sensors as they passed over. Accuracy was always an issue. Other machines were ruled out because the companies did not offer adequate support, either on-line or through local distributors.

When a local distributor, All Fabrication Machinery Ltd, introduced Enerflex to the HGG SPC 2500 Profile Cutting Machine all of their questions and concerns were addressed.



Pressure vessel layout and cutting is no longer so manually intensive. Quality and productivity have increased. Plant safety has improved.

First, the SPC 2500 is chuck-driven, providing stable, secure and most important, precision cutting with repeatability. A multi-head cutter enables Enerflex to cut with various torches and gases, (plasma or oxyfuel). This was especially important because Enerflex typically cuts different types of material, including carbon steel from 3/8 inches to several inches thick as well as stainless steel. The machine included embedded software to manage exact cuts and hole locations, to nest profiles, and offered Enerflex the ability (at some point) to fully integrate their CAD system. In addition, pre-programmed componentry not only eliminated the need to manually cut and fabricate pressure vessels, it also eliminated the need to manually cut other products such as exhaust systems, elbows, mixing boxes, and air intakes.

According to Shawn Johnston, Enerflex Production Manager, “The SPC 2500 provided a single machine solution. With other supplier solutions, we would have needed as many as three machines to achieve the same cutting capabilities.” Today, Enerflex uses the same SPC 2500 machine to cut pipe ranging from six to ninety-eight diameter inches (152 mm to 2,500 mm). The machine also incorporates built-in marking tools for drawing lines and positioning holes prior to cutting for quality assurance and accuracy checks.

Custom Machine Solutions

When Enerflex visited the HGG plant in the Netherlands, company representatives discovered a major synergistic difference from other machine suppliers. They discovered that HGG is not just a machine manufacturer that sells machines.



The common core of the Enerflex product line is a substructure or module/skid assembly, incorporating a series of pressure vessel tanks. With the SPC 2500 now in full operation, vessel department capacity has increased by 25% to 30%

By maintaining on-site subcontracting services, HGG provided a sense of confidence because the company is also a working shop that uses this same machinery every day to fill customer orders. (HGG Profiling Contractors BV offers cut-to-size services including weld preparation for pipes and hollow sections, as well as for HEA, HEB and IPE beams, and special profiles.)

Enerflex purchased two SPC 2500 machines from HGG, one machine for their facility in Alberta, Canada, and another machine for their facility in Casper, Wyoming. Each machine was customized to fit right and left hand plant situations, special exhaust requirements, specific power and cutting requirements and local code specifics.

When the two containers and installer arrived in our Alberta plant, Enerflex managers thought that set-up would take several weeks to several months. Instead, the machine was fully operational within several days. And on day four machine operators were already in training and cutting product. Within two weeks, the same welders who were more comfortable cutting pressure vessel holes manually, and who were skeptical of the new machine, were only cutting with the machine. The intuitive SPC 2500 controller with easy-to-use software was just one of the reasons.

Dramatic Productivity Gains

After several months of machine cutting at the Calgary plant, Schaerer estimated that the SPC 2500 had already improved overall department capacity somewhere between 25% and 30%.

To begin with, the SPC 2500 ink jet marking tools dramatically improved layout time. Prior to the machine, it took approximately 2–3 hours to add marking lines on a virgin cylinder shell of 48 inches (1200 mm) diameter vessel, plus an additional 1-2 hours for a quality insurance man to confirm all of the marking lines were correct before a single cut was made. Afterwards, it took another 3-5 hours to cut the holes manually and then shape the holes by grinding in the proper bevels, insuring a proper fit-up to weld the corresponding nozzle. On average and in total, it took about 8–10 hours to prepare a typical shell to weld-in the nozzles. Now the entire process takes about one hour. Shearer said, “Larger vessels that might have taken as many as 40 man-hours are now cut and ready for weld in as little as four hours.”

Some of the more difficult holes in a pressure vessel that the Enerflex design group must face are known as “hillside holes,” or lift holes. “They’re difficult to cut, difficult to fit, weld, and the accuracy is troubling,” said Johnston. “Now they are no longer avoided, which dramatically improves and cleans up our layouts and the flexibility of where we can run our pipes.” It also eliminates additional grinding that is required for fit-up after the holes are cut, which in-turn saves on consumables such as grinding wheels. “Now all that’s required is a quick buffing which reduces welding time even more.”

Enerflex welders have also realized that the SPC 2500 can do a lot more than just cut pressure vessels. Anything round can now be cut by the machine, including air intakes, exhausts, and large diameter spooled piping, which used to present accuracy issues because of exact alignment requirements. Plus, all perforations and beveling, previously cut manually are now cut by the SPC machine. “Our welders now look at just about anything that is round and say... what can we cut next?” The company feels that it has only begun to scratch the productivity surface.

After only eight weeks of SPC 2500 cutting, Enerflex was able to reduce labor cost estimates by 10% on every fabricated pressure vessel and every order. “Think about it,” Schaerer added, “The production group was able to tell marketing and sales to reduce quotes by 10%, not vice versa. That’s something.”

HGG SPC 2500 Profile Cutting Equipment



Enerflex Application Solution Benefits:

- Quality & Productivity have improved
- Plant Safety has improved
- Department capacity has increased 25-30%
- Vessels that took 8-10 hours to cut now take about one hour
- Labor estimates have been reduced
- Enerflex now moving towards full system automation integration

Safety Improvements

According to Johnston, "We have a motto at our Calgary plant... Safety protects people and quality protects jobs. We think that the SPC 2500 does both." He added, "Productivity aside, the single biggest and most unanticipated benefit of the machine (so far) has been its ability to improve plant safety."

One reason why the job of pressure vessel cutting is so difficult is because of how the cutting used to have to be performed. Welders were routinely required to handle large equipment while working on large and heavy shells with long lengths, which often required them to stand on ladders or hang over the edges. From Schaerer's perspective, "The probability and potential for injury has been reduced dramatically. And while it was not the selling point to management when we initially presented the reasons to purchase the machines, going forward, it will be an integral part of our justification for additional machines."

"It's literally changed the way they do things, and allowed us to make better use of our pressure vessel welders, using them for their welding and fitting talents."

Programming An Integrated Future

The SPC 2500 gives Enerflex the option of either designing part profiles and holes at the machine site or at an off-line center. Currently, about 10% of all part programming is performed at the machine while about 90% is programmed off-line.

More specifically, once the part is drawn, parameters are filled in manually to fit seams correctly, correct for proper orientation, elevation, etc. Then the part is processed at the machine, where the post processor converts information into language that the controller and machine requires to make the final cut. With the capabilities the machine offers, Schaerer now has his sites set on full integration. "As we move forward, we want to fully integrate the SPC 2500 with our CAD system at the highest level. It is our intention to be able to produce a 3-D parametric drawing, which easily translates into a fabrication drawing, bill of material and 3-D cut file." With full integration, Enerflex will be able to incorporate input from the designer and the engineer, as well as include complete cutting instructions, and even staging and full product planning and scheduling in each file. The SPC 2500 will be more than just a profile equipment solution. It will change the entire material handling process.

Summing it up, Schaerer said, "The SPC 2500 has already moved Enerflex 30 years into the future of automation and automated cutting. It's changed the way we do business and will continue to change the way we do business."



While Enerflex purchased the SPC 2500 to cut holes in pressure vessels, the company is now realizing dramatic productivity on other parts as well. The black piping (or lobster back) shown on the right used to take 10 hours to cut and fabricate. It now takes around an hour.

For more information, contact HGG Profiling Equipment or visit www.hgg-group.com.

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