



Weld ready

Matthew J. Fagan, president of FastCAM Inc., explains how weld prep technology has evolved

FFJournal: What needs sparked the development of weld preparation technology?

Fagan: To weld steel plate, you have to prepare the edge by shaping it. The idea is to make the weld joint between plates as strong and ductile as if the plate were one piece. Around the world, steel plate is largely cut with oxy-fuel torches. But since the 1970s, more and more steel has been cut with plasma torches because of their faster piercing times.

Plate edge preparation heads for oxy-fuel cutting also have been around since the 1970s. These large NC machines hold three oxy-fuel torches and cost millions even then, but the savings generated by the equipment justified the costs. Since the 1980s, major manufacturers such as ESAB, Messer Griesheim, Koike and Tanaka have sought to make plasma equivalents. This was aimed at the single-pass market for shipbuilding. However, the machines were handicapped by the plasma stream's inaccuracy. Earlier torch bodies also were larger than they are today and were limited in how far they could be tilted. The real interest was in materials that could not be oxy-torch cut, such as stainless steel, aluminum and hardfaced steels. Plasma bevellers, despite their often high cost, were unsatisfactory in practice. Accuracy, height control and NC programming were the biggest problems.

Especially in Europe and the Americas, high wages and the lack of skilled labor have driven the need for weld preparation

technology. Automated weld preparation during plate cutting provides savings by removing double handling, labor costs and the need for reworks. But even the most cost-effective welded plate is useless and the exercise a waste if the cutting isn't accurate.

Q: How can fabricators justify the investment for 3-D weld prep?

There is little additional investment compared to a normal NC plasma machine. The lightweight (under 100 pounds) modular bevel head will connect to any plasma torch and all the software is included. A new NC control is needed, but it is ultimately just a PC. The bevel head is a completely self-contained 240 V digital device. It contains three motors, digital amplifiers and is connected by a network cable.

To justify this is not difficult as it is a huge savings for companies. One Caterpillar site, for example, completely eliminated the weld preparation step. This eliminates not only the double handling and labor but also reduces the production timetable. This provides an immediate jump in productivity, which is the key to profitability.

There are more than 200,000 existing plate cutting oxy-fuel and plasma NC machines in use today. These can be converted cheaply and almost overnight to plasma weld preparation using PCs and the FastCAM bevel head with a new high definition plasma torch, dramatically changing the fabrication industry. As a typical machine cuts \$2 million to \$3 million of plate each year, it is easily justified.

Q: How are heavy fabrication industries benefiting from weld prep beveling software?

This is a revolutionary development for the fabrication industry. FastCAM has researched the 32 reasons plasma weld preparation fails and has solved all of them. For the United States and Western countries, it allows a struggling heavy fabrication industry to compete again, removing the last barrier to full automation of plate weld preparation and the elimination of grinders, milling machines and plate edge torch crawlers. There are scores of strength-equivalent ways two plates can be welded and this is decided by the fabricator and not the NC programmer or service center.

The FastCAM idea is to make weld preparation as affordable as straight cutting, for both new and existing machines. To do this, FastCAM has worked with Linatrol to release a new generation of standard PC-based NC controls, which can be fitted to any machine, run in any existing NC language and use purely digital electronics and over-the-counter PCs with almost no wiring. This means the end of limited 2- to 3-axis bespoke NC controls. It also means the elimination of 95 percent of the wiring and electronics associated with existing NC profile machines.

Of course there is resistance to change, but the core labor problem will provide the drive for fabricators to adopt new solutions quickly. They will drive this change.

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