

Keeping it Clean

Enclosures make it possible to weld titanium and other reactive alloys effectively

By ROBER BROOKS, Editor

There's not much that's new about flexible welding enclosures. For more than a generation they have been a cost-effective way for welders to maintain an atmosphere that's entirely inert, which is necessary for fabricating products from sensitive materials that are used in many high-tech or safety-critical applications.

Metal enclosures have been the most common choice for fabricators, even though such equipment has always been very expensive to produce and operate. Now, as the demand for products fabricated



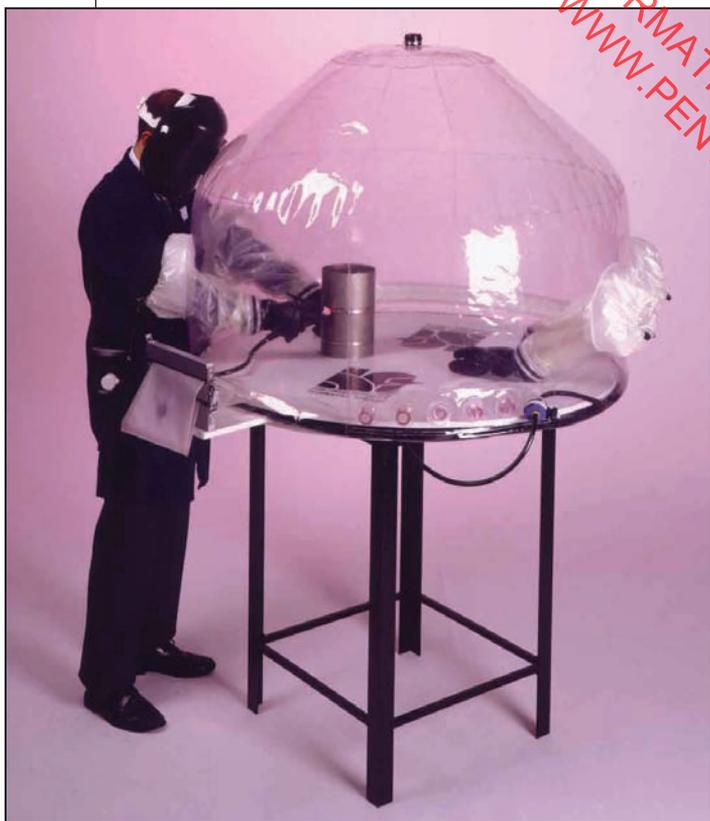
Experts recommend a specifically designated area for welding reactive metals, like titanium

from sensitive or reactive materials increases, the demand is rising for new designs to enclose welding processes. An increasing number of companies that fabricate products in titanium are recognizing the benefits of the flexible welding enclosures.

To begin, welding titanium demands more care than usual. It's not impossible, but it's a particular skill. Titanium is highly reactive. It will form compounds with undesirable elements. If the metal is heated in air, the surface of the part will contain carbides, nitrides, and oxides that may reduce the weld's fatigue resistance and notch toughness, as well as that of the heated zone.

According to titanium manufacturer Timet Corp., the techniques and equipment used to weld titanium are similar to those required for other high-performance materials (e.g., stainless steels or Ni-base alloys.) By contrast, titanium demands greater attention to cleanliness and to the use of auxiliary inert-gas shielding than those materials. "Molten titanium weld metal must be totally protected from contamination by air," according to Timet, and "hot heat-affected zones and root sides of titanium welds must be shielded until temperatures drop below 800°F."

Timet recommends welding of titanium be done in a separate, specifically designated area. This area should be kept clean and isolated from dirt-producing operations like grinding, torch cutting, and painting that may produce dust or other particulates. It should also be draft-free and humidity should be controlled.



Welding titanium successfully requires an entirely clean and draft free work area.



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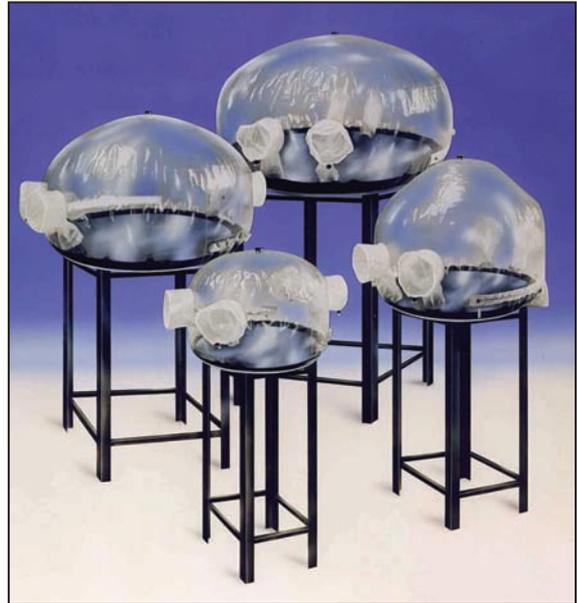
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The PVC enclosures are offered with two or more pairs of glove ports, an exhaust valve, and a fitted entry lock.

Huntingdon Fusion Techniques Ltd. (www.huntingdonfusion.com), a British welding equipment supplier, reports that its sales of flexible enclosures to the global aerospace manufacturing industry have increased significantly, notably to those companies producing components and structures for helicopters, bellows, spacecrafts and fluid handling systems.

"We have been taken by surprise at the surge in demand from these highly demanding fabricators although we have promoted our enclosures for these very applications for many years," Managing Director Darren Sewell observes. Other industries that fabricate titanium, performance car building, for example, will benefit from these enclosures, too, according to the supplier.

HFT's enclosures are manufactured from UV-resistant polyvinyl chloride (PVC), and users have discovered them to be a highly effective device for welding with oxygen levels down to 10 ppm. The supplier says aerospace companies are placing orders for up to six enclosures at a time, in order to be sure they're equipped to meet production demands.

The enclosures are manufactured with two sets of glove ports as a standard, but extra sets of ports can be specified. The upper half of the enclosure is optically clear and "provides excellent welding vision," according to HFT. A fitted entry lock makes it possible to take small parts in or out of the enclosure without affecting purge quality. An exhaust valve allows continuous purging, so impurities can be expelled during welding. ■