Preheating and Welding Steel

A simple and effective way to preheat thick heavy steel objects to reduce weld failures

Application Note

Application

When TIG welding thick steel materials, cracking and weld failures can occur due to the extreme thermal stresses imposed by rapid cooling at the weld point. Preheating prior to welding is done to slow the cooling process and reduce the potential for weld failure. As a result there is less rework required and the finished piece performs better. Welders know, and ASME codes reinforce the need to preheat many ferrous metals prior to welding.

Recently a submarine manufacturer was welding large steel beams to reinforce a nuclear reactor chamber within a nuclear submarine. The steel beams were 6" thick x 12" wide x 120" long (152mm thick x 305mm wide x 3048mm long). Due to the large size and thickness of the beams, preheating to 360°F (182°C) before welding was critical to ensure a slow enough cooling rate to avoid failure.

Preheat temperatures can vary from metal to metal depending on carbon/alloy content and thickness, but are generally 175°F to 500°F (79°C to 260°C). To be truly effective, preheating must be uniform across the entire weld area. Depending upon the size and shape of the materials being welded, hours of manpower and large amounts of fuel could be wasted preheating with a torch. Hotspots and uneven heating are likely to occur when preheating with a torch.

Solution

BriskHeat BWH heavy insulated fiberglass heating tapes are capable of delivering heat up to 1400°F (760°C). They have a high watt density of 13.1 W/in² (0.020 W/mm²) which ensures a rapid thermal response and even distribution of heat. BWH fiberglass heating tapes are a safer, more efficient, and even-heat alternative for preheating. They are exceptionally flexible and easily conform to complex shapes making them ideal for a variety of difficult preheating applications.

For precise and accurate temperature control, an SDC digital programmable temperature controller can be used to regulate the heat output of the heating tape. The SDC controller can be programmed to specify exactly how much heat is applied to meet the needs of the application.

Additional Uses

BWH heavy Insulated fiberglass heating tapes can also be used to preheat and expand metals for the insertion or removal of components within an assemby or to remove moisture for testing, and more.

Industries

- Electric Power Industry
- Tool & Die
- Construction
- Metal Fabrication
- Marine Shipbuilding
- Defense
- Mining
- Food Processing
- Oil & Gas
- Waste Water Treatment

Types of Users

- Welding Technicians
- Production Managers
- Design Engineers
- Fabricators and Builders

For examples of customers, see Customer Reference section (page A) in the *Application Book*.