

Understanding Weld Polarity

With standard welding equipment it is possible to change the polarity of the welding procedure. The polarity will dictate in which direction the electric current will flow while welding. It will also alter the amount of heat that is input into the part that is being welded upon.

Most hardbanding wires are not formulated to be welded in both reverse and straight polarity. Postle's Duraband®NC is unique in the fact that it can be welded in either polarity configurations.

Two Welding Polarities

Reverse Polarity (Electrode Positive) - The electric current is flowing from the electrode to the metal welding surface. There is more heat transferred into the object being welded due to the flow of electric current.

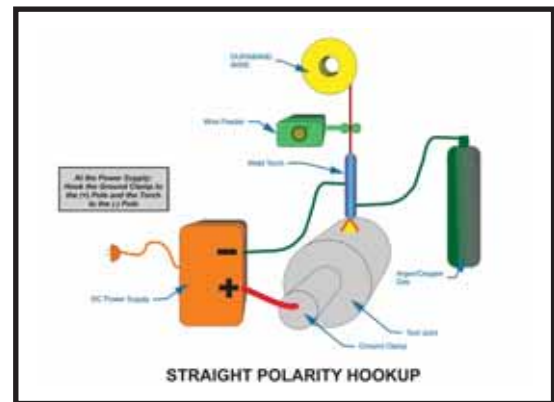
Straight Polarity (Electrode Negative) – The current will flow from the welding surface to the electrode. There is less heat transferred into the object being welded.

Most welding applications (including hardbanding) are performed in reverse polarity. Reverse polarity is ideal for most typical welding applications. However, if you are welding on a component that is thin (work string tubing) or has a heat sensitive coating below the weld (drill pipe IPC coating) welding in reverse polarity could be problematic. For these types of applications, it is possible to reverse the polarity of the welding equipment to weld in straight polarity.

The Advantage of Using Duraband®NC

Depending on the desired transfer of heat along with the welding applications it is very useful to be able to switch the welding polarity to create the desired effect. When using Duraband®NC to hardband work string tubing, it is a Postle requirement to run the wire in straight polarity. Likewise, when using Duraband®NC in Postle's patent pending CoolBanding™ procedure, it is also required to be run in straight polarity which is beneficial in protecting the drill pipe IPC.

There is a myth in welding regarding straight polarity. The myth discusses that the bond strength between the parent material and the welded material in straight polarity can't be strong due to the reduction in heat from the base material. This is simply not the case. By following the proper welding parameters and procedures, it is possible to create a very strong fusion bond strength between the parent material and the applied weld.



Advantages of Welding in Straight Polarity:

- **Lower heat input into the part that is being welded**
Welding in straight polarity creates less heat being input into the welded object. This is beneficial when welding on thin material or welding on connections that have internal plastic coating.
- **Lower dilution of the hardbanding material**
Due to the lower heat input into the object being welded, there is a lower amount of softening or melting of the welded object, so the weld deposit has less opportunity to penetrate into the welding surface. A weld deposit that is purer will create a more wear-resistant hardband with less diluted properties.
- **Less slow cooling time**
Less heat input into the welded object means the temperatures of the welded parts will not be as high as in reverse polarity. Therefore, it will take less time for the finished weld to cool. This could increase productivity of the welding process from start to finish.

Conclusion

Please follow Hardbanding Solutions' procedures when welding on tubulars. The procedures will specify whether the welding equipment is to be set in reverse or straight polarity. One of the many advantages of Duraband®NC is that it can be welded in either polarity configuration. If you have any questions regarding welding procedures or welding polarity please contact Postle for technical support.