HARDFACE TECHNOLOGIES by POSTLE INDUSTRIES

Hardfacing Newsletter

Edition: Volume 17, October 2019

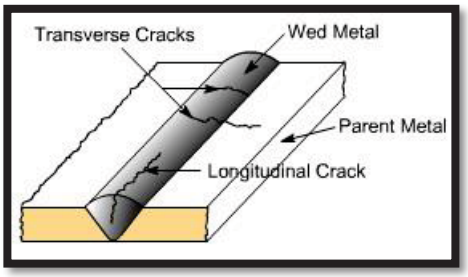
Understanding Stress relief (check) cracking in Hardfacing weld deposits (Spreading the wisdom of Bob Miller)

Did you know? Cracks in hardfacing deposits are quite common, particularly with the alloys known as chromium carbides.
http://www.hardfacetechnologies.com/postle_hft_btsp/pdfs/hfcheckcracking-combo.pdf

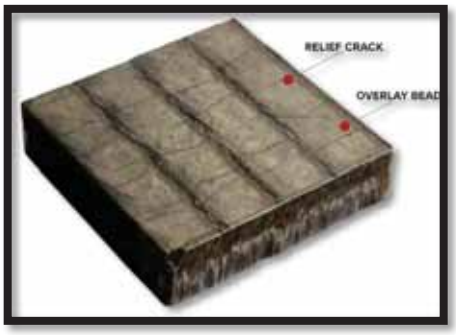
Tips from the weld lab! The old standard "preheat" and "post weld cool down" procedures will control the initiation sites of check cracks. As the preheat is increased in the base material it expands. This expansion reduces disparity between the weld deposit shrinkage and base metal shrinkage, and reduces the shrinkage stresses. In turn, this decreases the number of check cracking initiation sites. But will not totally eliminate them.

Discussion.

Some hardfacing weld deposits crack upon cooling, often referred to as "stress relief cracking" "check cracking" or "cross checking". Essentially all these terms refer to the same surface cracks observed on some hardfacing alloys. Stresses induced by molten weld bead shrinkage become so high that they literally produce a transverse crack that is perpendicular to the weld bead. Once the crack develops, the stresses are reduced or relieved. Thus, the term stress relief cracking.



Which Alloys check crack and why? Check cracking generally occurs in iron-based chromium carbide type alloys, and nickel and cobalt base alloys to a much lesser extent. Molten weld deposits grains form outwardly much like layers of skin on an onion. As each layer is formed, it becomes richer in alloy content. The very last layers are enriched and is where the chromium and carbon combine to form chromium carbides. The last layers to solidify are referred to as "grain boundaries". These are the weakest structure in hardfacing deposits but become extremely sensitive to cracking when chromium carbides form on them during the solidification process. Other iron-base carbide families like titanium carbide or niobium carbide do not encounter check cracking. That is because these alloys contain elements that form carbides in the early stages of solidification and don't usually form on grain boundaries. Alloys containing boron also crack, but more in a random manner for other reasons. Distortion is a result of high stresses that are created during solidification of the weld deposit. Check cracking prevents distortion of the base metal. See more at
http://www.hardfacetechnologies.com/postle_hft_btsp/pdfs/hfcheckcracking-combo.pdf



Hardface Technologies by Postle Industries, Inc.
5500 West 164th
Cleveland, Ohio 44142

216-265-9000
wwww.hardfacetechnologies.com
Contact: Mike Korba: mkorba@postle.com