Cutting Edge Technology

A New Way to Prevent 50-95% Weld Distortion and Cracking

“Distortion and cracking does NOT have to be a given when welding.”

META-LAX®
Weld Conditioning
Main Source for Distortion and Cracking - Shrinkage
When weld metal solidifies, it undergoes a reduction in volume of 10-12%. This shrinkage could lead to weld distortion and cracking. Material selection, design, welding process, and restraint during welding are considered adequate.

Current Solutions
Various methods have been used to try to overcome weld distortion and cracking. These processes include pre-heating, post weld heat treating, pre-bending, skip and sequential welding, and re-designing components. Despite these attempts weld distortion and cracking problems are still common.

New Solution - Meta-Lax®
Recently there is another process that has become available. The process is called “Meta-Lax Weld Conditioning” and more recently termed as “Pulse Puddle Arc Welding®.” These are developments from Bonal Technologies, Inc. In application, MLWC and PPAW are economical, convenient, and effective in preventing weld distortion and cracking which warrants an introduction to anyone in the welding industry.

Application Examples

Prevent Distortion: General Motors achieved 81% reduction of distortion by using sub-harmonic weld conditioning, on these fixtures, eliminating a straightening process.

Prevent Cracking: Build-A-Mold eliminated persistent cracking on the 10,000 lbs. platen only after sub-harmonic weld conditioning was used during welding.

Extend Service Life: Weber Manufacturing saw over a 500% increase in service life when Meta-Lax weld conditioning was used in the repair of this ripper shank.
How to Prevent 50-95% Weld Distortion and Weld Cracking

Meta-Lax technology involves inducing the weldment to very mild “sub-harmonic” vibrations during welding. The mild vibrations keep the weld metal “liquid” a few seconds longer which allows the weld metal to solidify more uniformly from the root gradually out to the face. Two immediate benefits result.

First, there will be less weld distortion since the contraction that will occur on the face will not have as good a chance to distort the weldment because much of the solidification below the face will have already taken place. Second, more centers of freezing will occur at the exact same time when the freezing temperature is reached. This results in refined weld grains which are crack resistant. Ductility and impact values, in particular, are increased up to 400% and 75% respectively.

Furthermore, the welder can reduce weld amps 3-15% to prevent even more weld distortion, or increase weld amps 3-15% to achieve the highest quality weld possible and the fastest travel speed compared to non-treated weldments.

Other Benefits
In addition, using MLWC or PPAW often leads to other benefits. These benefits include welding faster (up to 25%), reducing rework, reducing pre-heat temperature (up to 300-F), and reducing porosity.
Equipment Introduction
Not just any vibration producing system will be successful. It must be accurate and stay accurate throughout the welding process. Meta-Lax and PPAW equipment have been ideally designed for sub-harmonic weld conditioning. There are three main components that have been specially designed. First is the force inducer (or pulsator) which maintains the desired frequency to within +/- 2%. Second is the transducer (or sensor) which is used to identify the harmonic response of the weldment and does not lose its accuracy during the vibrational process. Third is the control console which monitors the response of the weldment and continually gives feedback of its reaction to the induced vibrational energy.

Conclusion
By adding sub-harmonic energy during welding (Meta-Lax Weld Conditioning or Pulse Puddle Arc Welding) it is possible to prevent normal weld distortion and cracking by 50-95%. In doing so other benefits like welding faster, reducing pre-heat, and reducing porosity may also be realized.

More Information and Testing Equipment
More information can be obtained from www.meta-lax.com and www.pulsepuddle.com web sites or by calling Bonal Technologies at 248-582-0900. For firsthand experience, testing, and research, equipment is available through Bonal Technologies, Inc.