

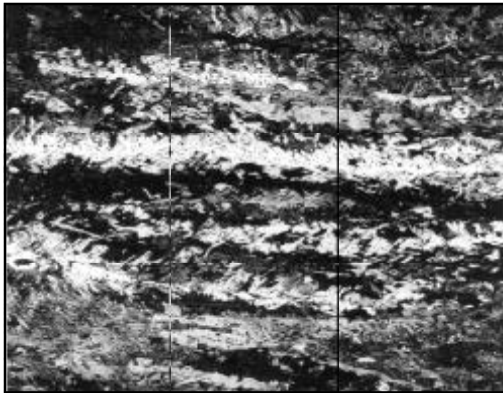
FATIGUE LIFE IMPROVEMENT META-LAX® "WELD CONDITIONING"

Generally the weakest area of a weldment is in the weld joint. Improving the quality of this area will improve the quality of the entire weldment in terms of fatigue.

Meta-Lax processing when used during the actual welding, "Meta-Lax Weld Conditioning", will generally do **three** things to the weld joint:

1. Generate a finer, more uniform weld grain structure.

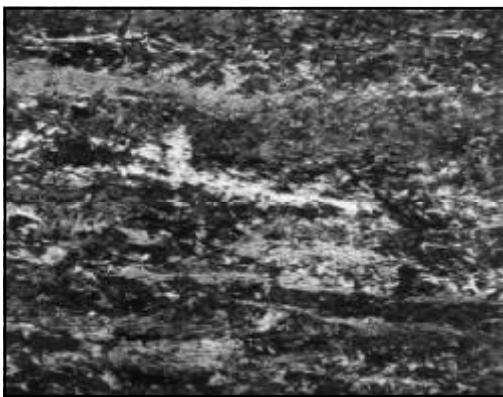
This is a clear indication of the weld metal being more "crack resistant" than a non-treated weldment.



Normal weld metal photomicrograph.

2. Produce less distortion and/or a smoother, slightly smaller looking weld bead.

What occurs is that Meta-Lax Weld Conditioning allows the molten weld metal to solidify from the root to the face at a slightly slower rate than normal welding. This allows the weld metal to "pack down" as it



META-LAX Weld Conditioned weld metal.

solidifies. Less distortion means less pull on the adjacent base metal. Less pull on the base metal means less residual stress in the HAZ. Less residual stress on the HAZ means a more "crack resistant" HAZ.

3. Stress relieves the base metal of the structure being welded.

Most often the welding takes more time than the time needed for a post weld Meta-Lax stress relief. Therefore, Meta-Lax weld conditioning, as a stress relief treatment, enables the base metal to be "crack resistant" and be able to perform close to its design capability.

Fatigue Life Improvement: Examples:

Example 1. 400% fatigue life improvement occurred following Meta-Lax Weld Conditioning of "Hough Buckets" for National Steel, Great Lakes, Div. Normally the abrasion resistant tool steel edge would break off within two months of service. The same edge wears out in 10 months minimum without any cracking.



400% fatigue life improvement.

Example 2. The skin of the Gentry Eagle Challenger racing yacht, 5083 aluminum, would develop cracks between the skin plates and the structure each time the boat was brought up to high speeds. In an attempt to race across the Atlantic Ocean numerous cracks developed. The attempt was stopped. In repairing the skin Meta-Lax Weld Conditioning was used. Weld cracks did not re-occur in their next race attempt nor in and of the weld conditioned areas in four years to follow. They shattered the record by over 18 hours!



No cracking for over four years.

Example 3. A ripper shank mining component was repaired at Weber Machine using the normal weld repair procedure.

It lasted three hours in service before cracking. The ripper shank was returned for repair. This time Meta-Lax Weld Conditioning was added to the weld procedure. It wore out in service without any cracking.



Wears out before cracking.

FATIGUE LIFE IMPROVEMENT META-LAX® "STRESS RELIEVING"

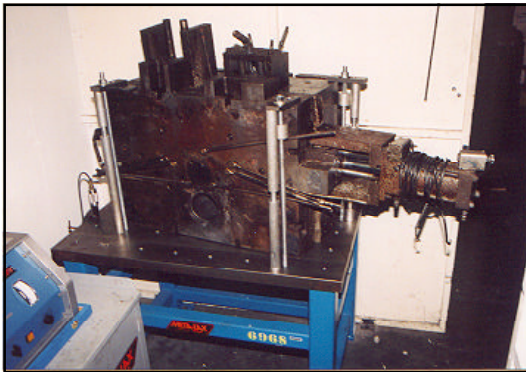
A sharp temperature drop induces "thermal" residual stress on metal components. This adversely affects fatigue life by causing premature cracking. Stress relieving will improve the fatigue life of the metal component by reducing premature cracking tendencies thereby helping it perform up to its designed capability.

Unlike heat treat stress relief, "Meta-Lax" stress relieving maintains the mechanical properties of the metal ($\pm 4\%$) and does not cause treatment distortion.

Fatigue Life Improvement Examples:

Example 1. Aluminum is brutal on most die cast tooling particularly on intricate shaped die inserts. At Airtex, Inc. one such die set would last only 70,000 shots before replacement.

Meta-Lax was applied to a new set of dies and again every 10,000 to 15,000 shots. The inserts lasted over 200,000 shots before the first repair for already a 200% fatigue life improvement. 350,000 shots are expected.



200% more life before repair.

Example 2. Each component of Corrosion Engineering's Vibrating Screen Deck was Meta-Lax stress relieved after welding in place of thermal stress relief. The assembled deck was also Meta-Lax treated before shipment. Cracking has been nearly eliminated on all 100+ decks which used Meta-Lax.



Vibration Screen Deck fatigue nearly eliminated.

Example 3. Normally Allison Aircraft engines, modified to operate in a hydroplane race boat would only go 80 miles of racing before a major engine overhaul would be required.

After Meta-Lax stress relief was applied to the entire set of eight engines at the beginning of one season, the Miss Madison race team reported that all of the engines went the entire season without any mechanical failure. Some of the engines had over 240 miles on them (200% improvement) at the end of the season. During the off season they overhauled the engines and found minimum wear.

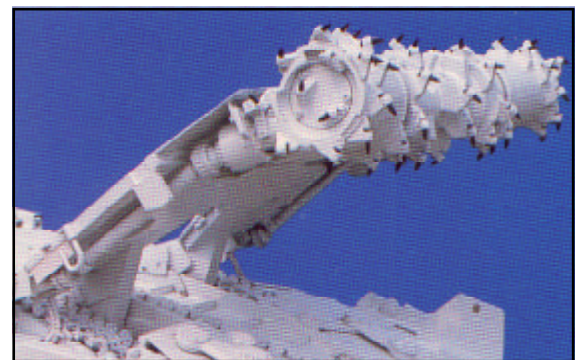


200% more life before overhauling.

Example 4. Coal Strip Mining Equipment experience tremendous transverse force which causes frequent and expensive breakdowns. In some instances the breakage rate topped 20% despite using furnace stress relief. When Jeffery Mining switched to Meta-Lax stress relief they reduced this breakage rate to 3%!

Example 5.

Cutter Drums for EIMCO coal mining machinery consist of 80-90 steel holders welded in place that hold the hardened bits. Meta-Lax stress relief was applied before shipment. The traditional problem of bit holders breaking off in service has been nearly eliminated.



Bit Holder fatigue nearly eliminated.