

◆ MetalLife NEWS ◆

Volume 5 Issue 2 **Compressive Stress v/s Cracking Part 2** March 1998

Badger Metal Tech, Inc. N60 W15088 Bobolink Ave. Menomonee Falls, WI 53051 414-252-3804 FAX 414-252-3956
TOLL FREE in the US and Canada - 800-366-1973 — **WEBSITE - badgermetal.com** - published 03/06/98

We are being told that the economy is rolling along at an all time high, and die casters are enjoying increased market share.

Compressive Stress

compressive stress texturing extremely beneficial in stopping existing heat checking and is only surface treatment that

Expedited production requirements place heavy demands on producing die cast parts, and some die casters feel they have no time for well known preventative measure (PM) procedures. We also understand that the end users of die castings, in general, do not see die cast tooling as a perishable item. They are usually not taught to realize the cost benefits of a structured PM program. This makes it extremely difficult for the die caster to add on any cost to tooling without running the risk of placing the job in a non-competitive position.

closes up most of the heat checks that already exist. These cracks are closed in compression, and since we know cracks cannot propagate into or through this layer unless the increased yield strength is exceeded, the cracks tend to stay closed for an extended period. Cracks that do not close due to size or depth, are still prevented from propagating since the entire surface of the die is encapsulated in compressive stress.

Bypassing these validated and important care maintenance steps, however, will not realize the optimum life and performance from tooling. This type of thinking exposes tooling to serious risk even if superior tool steel, proper machining and EDM procedures, and correct heat treat procedures are used.

It is important to appreciate that cracks or areas that have metal missing, more commonly known as breakout, cannot be corrected completely with MetalLife. This breakout condition may still be visible even though the planar deformation that occurs during processing may somewhat smooth these areas.

Knowing all this, dies continue to run without concern for the consequences. Heat checking starts to develop, the end user starts rejecting castings, parts become more difficult to produce due to sticking and soldering, and in some cases the offending dies are pulled and taken over by another die caster. This new die caster must then contend with

To afford true protection against cracking and crack propagation, the compressive stress layer must be substantial in value and depth. Our previous February Newsletter (Vol 5 Issue 1) shows compressive stress values that are close to 1000Mpa (145KSI) maintained to a depth of 254-508 microns (.010-.021 inches). The process must also be controlled with a means to determine repeat expected values. We use both proprietary computer modelling and conventional air strip evaluation for this purpose.



tooling that is already in sad shape and in need of some type of rework. Without this he cannot produce acceptable parts and make expected profits. This is an all too familiar scenario and fact that we have seen many times during our 15 years of processing tooling. We expect this to continue even though validated PM is a superior and proven course of action.



The MetalLife compressive stress layer should not be confused with the much shallower (20-30 microns)

superficial amount (~500Mpa) that may be produced during some machining and finishing operations. It takes only a few dozen shots before this thin layer returns to



residual tensile condition. This is comparable to the thickness of one dollar bill to a stack of them.

What needs to be addressed then is how can we help the original die caster to continue to produce good parts so the die is not pulled or how can we assist the new die caster in the same area. Admittedly, MetalLife Compressive Stress

Our NEXT issue will discuss maintenance denominations and their relationship to surface stresses. 777-2211-1111

Residual Stress Part 2

Texturing is not an all inclusive panacea for accomplishing this, however, heat stress tempering in conjunction with

and their relationship to surface stress. We will also be an introduction to testing being done by NADCA to study residual stress and surface softening in production tools

[This is an archived page and cannot be changed](#)