Now That's What I Call Burning!

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Dear Advice & Counsel,

I am a Supplier Engineer with a Midwest manufacturer. You were referred to me as a person that might be able to answer our question. It might be helpful to review my report of a limited experiment that I conducted involving hard coat anodizing MIC-6 (Alcoa) series 7000 cast aluminum tooling plates and two series 5000 cast aluminum tooling plate materials.

One test coupon out of 54 "burned." The burning is a localized eating away of the material as if it was sitting in acid. The burned test coupon was the MIC-6 material. The remaining pieces showed no signs of burning. These results are consistent with results of hard coat anodizing our MIC-6 parts. Only a limited percentage of the parts burn, the rest are OK.

The industry seems to be very aware that MIC-6 has problems with anodizing. The problem is that nobody seems to know for sure why. Can you shed light on this mystery?

Signed,
Mick Six

Dear Mick,

We asked for and received a sample of your problem parts along with test coupons made from other aluminum alloys (K-100 and C250) that you were anodizing successfully. We cross-sectioned the submitted samples. The MIC-6 sample you provided was totally burned through, so we cross-sectioned the anodized part near the burn, but far enough away to see some of the remaining anodic coating.

Shown in Figs 1, 2 and 3 are the submitted samples. Figures 4, 5 and 6 are cross-sections of the samples.

The MIC-6 part had a very porous microstructure with large portions of the aluminum evidencing what appeared to be dendritic silicon inclusions. Since silicon does not conduct electricity, large amounts of secondary phase silicon may be expected to produce significant localized heating, which combined with the high level of porosity will cause rapid attack of the aluminum by the anodizing acid. This attack follows the dendrites of silicon in a tunneling fashion, eventually perforating the aluminum. The alloys that do not exhibit this problem have a significantly different microstructure with no large silicon dendrites; nor do they have a high level of porosity.

In this particular case, there is nothing that you as the anodizer can do to solve this problem as it appears that a significant percentage of your parts have a flawed microstructure. I might also add that our laboratory has received other samples from other anodizers that were experiencing anodizing problems with MIC-6 alloy, so it appears this may be a problematical material for anodizing. *P&SF*

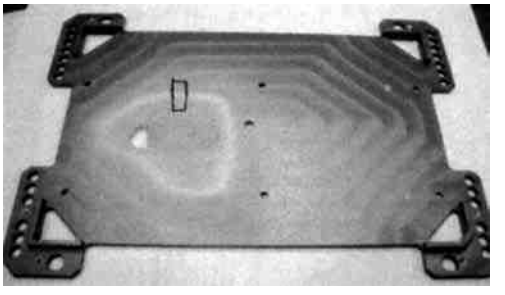


Figure 1—MIC-6.

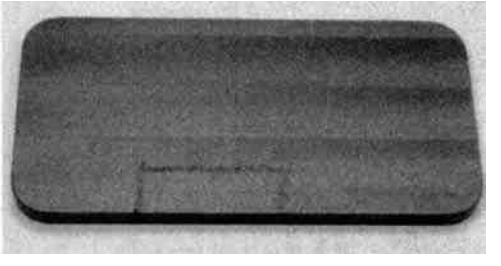


Figure 2—C-250.

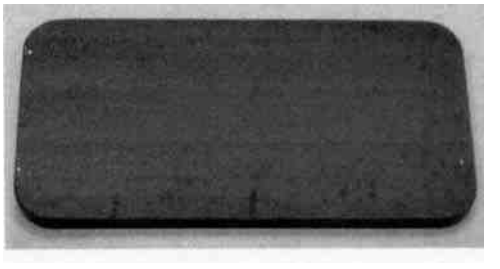


Figure 3—K-100.

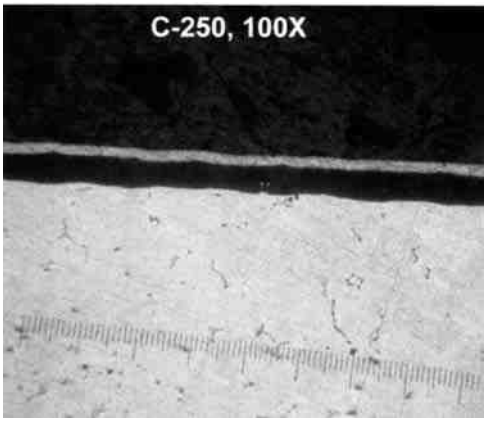


Figure 4—C-250 (100×).

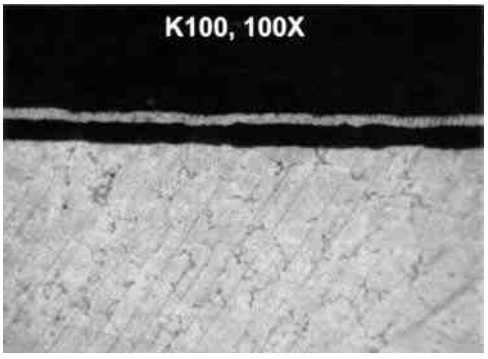
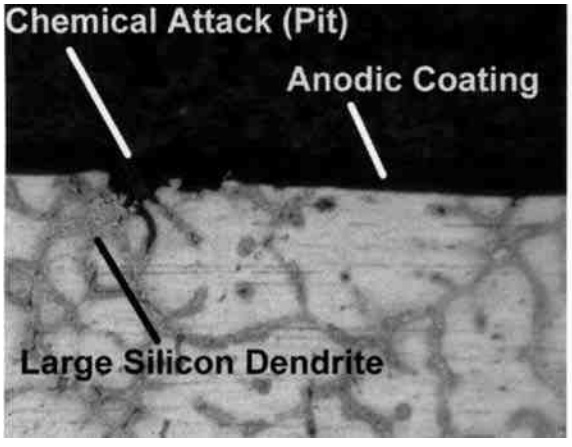


Figure 5—K-100 (100×).



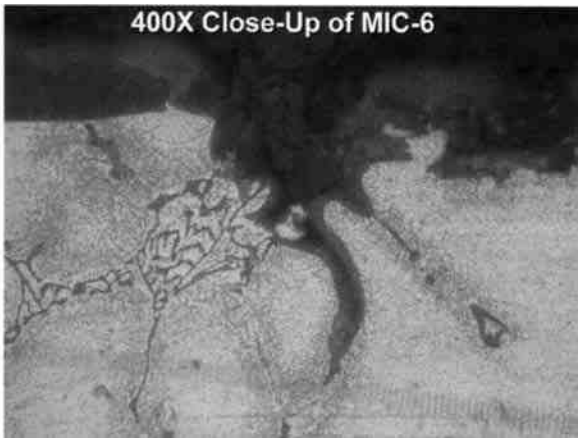
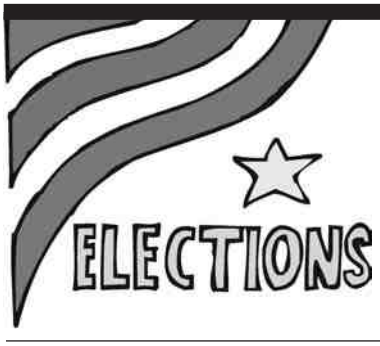


Figure 6—MIC-6 cross-sections at 100 and 400×.



It is not too early to start thinking about your 2007 NASF Election!

TIMELINE FOR 2007 NASF ELECTIONS

July 15	BOD shall determine the number of seats for which each Council shall be entitled to make nominations in the next election
August 13	NASF Annual Board of Directors Meeting in Cleveland
August 20	Slate of nominees to be determined by each Council and approved by BOD
September 15	Slate of nominees (bios, pictures, etc.) to be submitted to *P&SF* for inclusion in the October issue
October 15	Election - mail ballots for voting on the NASF Board to all members with a deadline of returning the ballots by November 15
November 23	Votes tallied and new NASF Board members announced (put in January *P&SF*)