



LIGO Laboratory / LIGO Scientific Collaboration

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Procedure to expose possible cracks in aluminum welds

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We developed a procedure to study possible cracks in the welds.

As a dry run we sawed a 19 mm diameter aluminum bar with an Al₂O₃ abrasive blade and made photos of the cut before and after etching with undiluted Protex aluminum Etching solution.

The etch lasted for 30-40 sec, and we observed abundant bubble production.

The photos of the results are below.

Small details are visible, see for example figure 2 bottom or figure 3; we expect that if any crack weld or porosity had been present it would have been either visible or become visible after etching (we can expect that the etching solution would penetrate any crack and porosity and expose it by enlarging it).

The etching applied was ~30 s. In future we should consider 2 to 4 times longer etching times.

We expect to use this technique to test the weld tests samples produced by Tecnoinox.

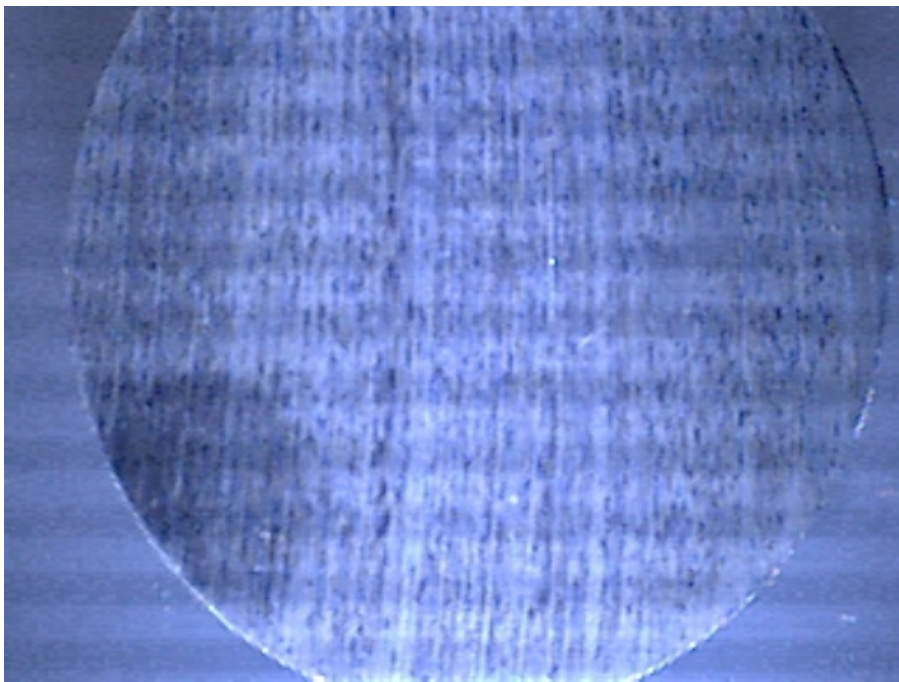
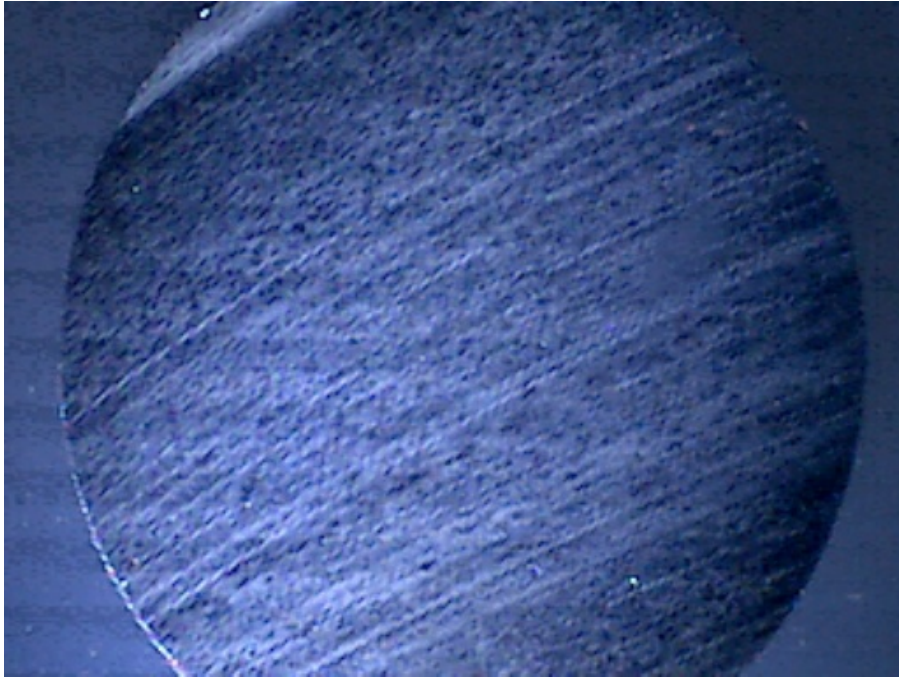


Fig: 1 As cut sample, top, and after etching, bottom, x10 lens.
The images are 20 mm across.

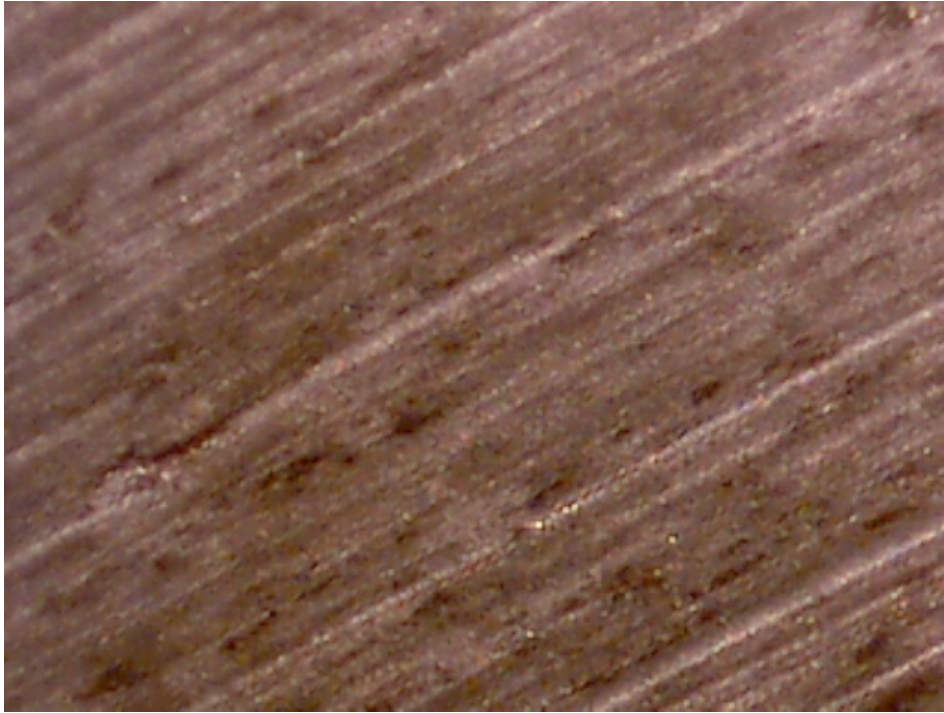


Fig: 2 As cut sample, top, and after etching, bottom, x60 lens.
The images are 3.5 mm across.

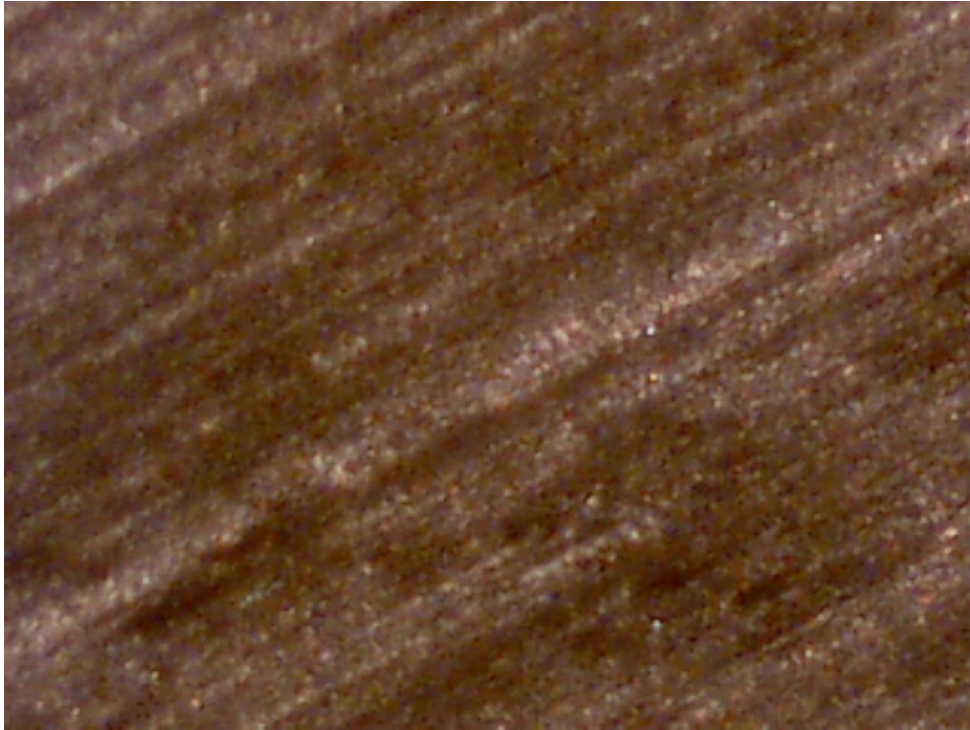


Fig: 3 As cut sample, top, and after etching, bottom, x200 lens.
The images are 1. mm across.

