

CASE STUDY 3 Weld failure investigation

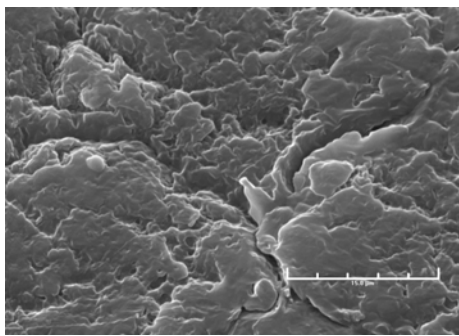
Brief

ARTIS were presented with two welded samples from two different material suppliers

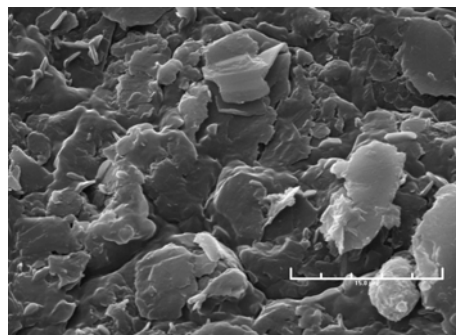
- Supplier A produced a material, which gave good welds
- Supplier B produced a material, which gave intermittent weak welds

Investigation

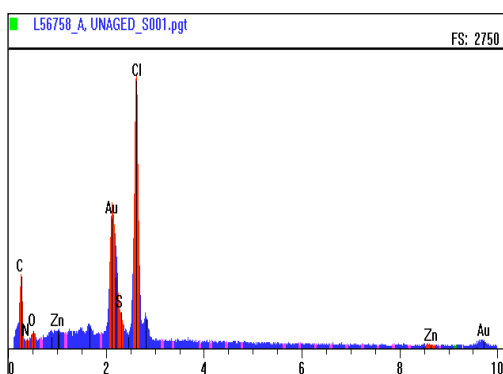
The samples were visually inspected using first an optical microscope and then a scanning electron microscope. It was immediately apparent that the topographical nature of the two materials was different as shown below. Energy dispersive X-ray analysis (EDX) was used to elementally compare the two surfaces and significant differences were found. Material from supplier A being more rich in chlorine and material from supplier B also showing evidence of relatively high concentrations of magnesium, silicon and oxygen.



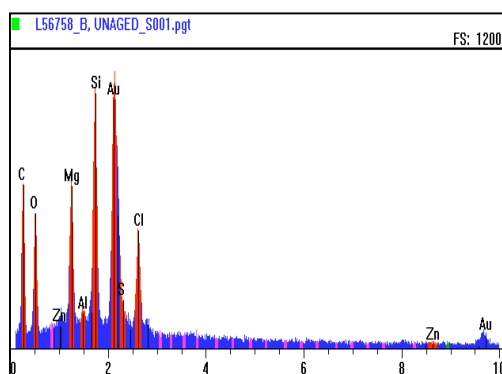
Supplier A surface



Supplier B surface

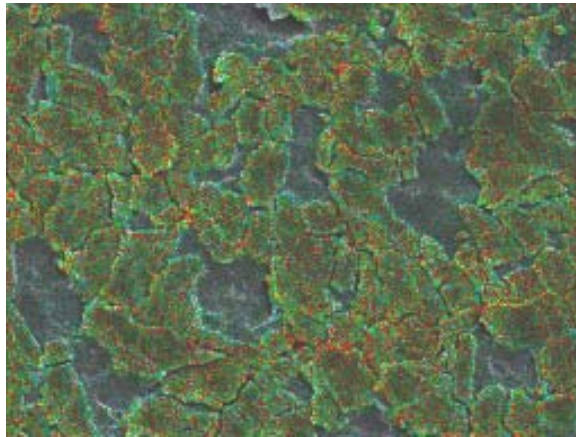


Supplier A EDX analysis



Supplier B EDX analysis

FTIR analysis of the surface suggested a good match with internal standards for Talc and an elemental map was used to confirm that this was in the region of the platy deposits seen on the SEM.



Elemental map of talc deposits on surface

A review of both supplier processes was conducted and it was discovered that supplier B used talc prior to surface chlorination to help handling of the product. Supplier A did not.

Conclusion

It was concluded that in the case of supplier B residual talc deposits were forming a mechanical barrier to chlorination of the surface and preventing adequate adhesion. The supplier changed his process and weld strength results came into line with those from supplier A. Since supplier B was a lower cost supplier this was eventually selected as a preferred supplier.