LMAC Avoidance

Liquid Metal Assisted Cracking is a phenomenon which causes cracks to appear in metal during Galvanizing. It has been known about for nearly 100 years but recently there appears to have been an increase in reported incidents due to various factors. There are around 14 items which are believed to contribute to increased reported LMAC failures ranging from the bath temperature to the speed of dipping but the key items appear to be - 1. Control of the Tin content in the bath and other trace elements. 2. The grade of Steelwork. 3. The sub-grade of steelwork. 4. Notching quality of the beams. 5. An increased awareness of LMAC and better inspection has resulted in more cracks being spotted.

Fig 1 – A Major LMAC Failure

Fig 2 - Bad Notch Detail

Key Points:-

1. Material Control - The Tin content in the bath should be less than 0.1%.
2. High grade steels are more prone to cracking i.e. S355 vs. S275.
3. Consider higher sub-grades such as JO or J2 on key elements.
4. Notching in the 'K' zone (route where web meets flange) is a major cause as this is the area of most residual stress due to rolling. The larger the notch radius the less chance that LMAC will occur (See Fig 2).
5. Ensure that the Galvaniser you choose is fully aware of LMAC problems and has a suitable inspection procedure in place.
6. Some failures are so fine that they are hard to spot at first glance. The crack shown in fig 2 is less than 0.5mm wide and only 20mm long.
7. In addition to the Galvaniser checking have your own QA inspectors check for LMAC. A missed crack could have major consequences for a key element within a structure!

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