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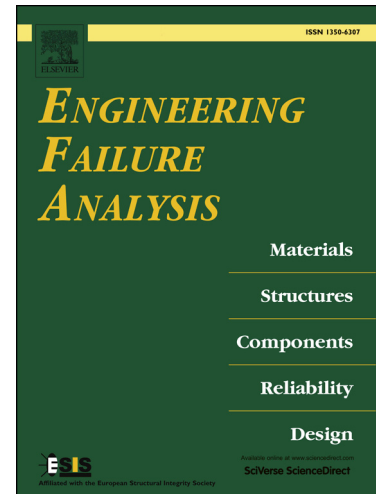
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Case study –Analysis of greyish stick type Sliver in Cold Rolled Strips

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Abstract. The samples of cold-rolled sheets have been analysed with the condition of greyish stick sliver defects appeared in IF steel. In this work, this type of sliver is occurred due to the presence of non-metallic inclusion in the steel. In case of Sample #1 the slag entrapment of the mold fluxes in sub-surface of the strands are the main origin of the sliver defects. Whereas in case of sample #2 alumina formed is deposited in tundish nozzle which get stripped from nozzle to moulds and thus gets entrapped during solidification. These entrapped inclusions translate into long streaks of defects called slivers during cold rolling.

Key words: Mold Flux; Sliver; Tundish; Cold Rolling.

1. Introduction:

The quality of finished steel products is often compromised by the presence of ‘surface’ defects such as slivers, cracks, laps, etc. and/or ‘internal’ defects like porosity, inclusions, segregation etc. Defects in finished steel products may arise from poor steel quality (high non-metallic inclusion content) at steel making stages or may be caused during subsequent downstream operations such as casting, reheating, hot or cold rolling. As a kind of ultra-deep-drawing steels, the interstitial free (IF) steel is widely used in the automobile and household appliances [1-2]. To avoid the cracking under deep-drawing, IF steel sheets must free from surface crack and faint-sliver defect. Such defects may remain unobserved in transitional stages and ultimately reveal in the finished product during final inspection. Line defects appear on the surface of finished strip product, with several tens of micrometers to millimetre in width and 0.1 - 1.0 m in length slivers are irregular, flatly formed laminations of varying size and shape that occur in longitudinal direction of the strip and are distributed irregularly over the strip width (OKOF, 1996). This surface defect is believed to result from non-metallic inclusions caught near the surface of the slab (<15 mm from the surface), coupled with elongated bubbles. The inclusions can be oxide particles, casting powder, alumina clusters, refractory, etc [3-4]. When the sliver defects are examined, it is found that there are different causes for an identical macroscopic form. There are other slivers, which have Fe-oxide (scale) present along the lamination with an alloy enriched internal oxidation (IO) in the substrate. These solid state re-oxidation products typically are about few microns in diameter and are formed as a result of oxygen diffusion ahead of a scale front where they precipitate from solid solution at elevated temperatures. In carbon steels, they

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