

Railway Crane Accident: A Comparative Metallographic Test on Pins Fractured during Operation

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Abstract : Eventually train accidents occur on railways and for some specific cases it is necessary to use a train rescue with a crane positioned under a platform wagon. These tumbled machines are collected and sent to the machine shop or scrap yard. In one of these cranes that were being used to rescue a wagon, occurred a fall of hoist due to fracture of two large pins. The two pins were collected and sent for failure analysis. This work investigates the main cause and the secondary causes for the initiation of the fatigue crack. All standard failure analysis procedures were applied, with careful evaluation of the characteristics of the material, fractured surfaces and, mainly, metallographic tests using an optical microscope to compare the geometry of the peaks and valleys of the thread of the pins and their respective seats. By metallographic analysis, it was concluded that the fatigue cracks were started from a notch (stress concentration) in the valley of the threads of the pin applied to the right side of the crane (pin 1). In this, it was verified that the peaks of the threads of the pin seat did not have proper geometry, with sharp edges being present that caused such notches. The visual analysis showed that fracture of the pin on the left side of the crane (pin 2) was brittle type, being a consequence of the fracture of the first one. Recommendations for this and other railway cranes have been made, such as nondestructive testing, stress calculation, design review, quality control and suitability of the mechanical forming process of the seat threads and pin threads.

Keywords : crane, fracture, pin, railway

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