

OVERVIEW OF HYDROGEN EMBRITTLEMENT IN FASTENERS

RAVINDER KUMAR¹ & DEEPAK GAUR²

¹Dy. Manager (R&D), Hero Moto Corp Ltd, New Delhi, India

²Metallurgist (R&D), Hero Moto Corp Ltd, New Delhi, India

ABSTRACT

This paper focused the overview of hydrogen embrittlement in fasteners. Embrittlement is a phenomenon that causes loss of ductility in a material, thus making it brittle. There are two types of hydrogen embrittlement; firstly the environmental type when it is hydrogen assisted failure due to the supply of hydrogen from the environment, i.e. through corrosion. The second is hydrogen embrittlement failure due to the processes during manufacture. Generally in the bolt, fracture is occurred where stress is lesser as compares to yield stress. Embrittlement is occurred where there was no evidence of mechanical deformation. In most of cases hydrogen embrittlement causes fasteners failures in high hardness and high strength fasteners that are electroplated. The hydrogen embrittlement failures observes as a brittle break The bolts, which microstructure was typically that of hardened and tempered steel, had been zinc electroplated and it is well known that hydrogen release concurs with zinc deposition. Moreover, the diffusion and accumulation of the hydrogen in metals is favoured by cold working, as is the case of the head to shank transition region.

KEYWORDS: Embrittlement, Failure Analysis, Hydrogen Phenomenon in Metals