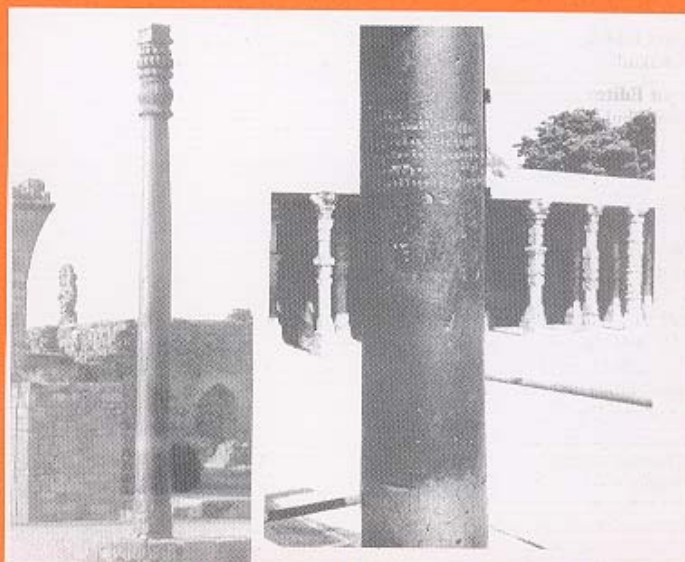


Vol. 38, No. 3

ISSN 0019-5235

September 2003

INDIAN JOURNAL OF HISTORY OF SCIENCE



Delhi Iron Pillar (early 5th century AD) installed by Chandragupta
Vikramaditya II, as per Sanskrit inscription on the surface



INDIAN NATIONAL SCIENCE ACADEMY
NEW DELHI

INFLUENCE OF MANUFACTURING METHODOLOGY ON THE CORROSION RESISTANCE OF THE DELHI IRON PILLAR

R. BALASUBRAMANIAM*

(Received 21 November, 2002)

The influence of manufacturing methodology on the corrosion resistance of the Delhi iron pillar has been addressed. The effect of horizontal forge welding on the distribution of entrapped slag particles, surface stress state, surface finish and local surface compositions has been discussed. The presence of elongated slags in the microstructure and compressive stresses on the surface are beneficial for the adherence of the protective passive film. The benefits of phosphorus enrichment that occurs on the surface due to the relatively high temperatures employed to soak and then forge-weld the phosphoric iron have been described. The favourable material structures and compositions in the surface regions, imparted by the manufacturing, enhances the corrosion resistance of the Delhi iron pillar.

Keywords: Corrosion resistance, Decarburization, Delhi iron pillar, Elongated slag inclusion, Forge welding.

INTRODUCTION

The iron pillar located in the courtyard of the Quwwat-ul-Islam mosque, adjacent to the Qutub Minar, in New Delhi is world famous for its exceptional resistance to atmospheric corrosion. Moreover, the pillar's exquisite artistic construction continues to marvel present-day visitors. Metallurgists, corrosion scientists and archaeologists have evinced great interest in the pillar, keen on unraveling the hidden mysteries of the pillar^{1,2}. The pillar was built during the reign of Chandragupta II Vikramaditya (375-413 AD) of the Imperial Gupta dynasty and it was originally installed in front of a Vishnu temple in Udayagiri in Central India³. It was moved to its current location in Delhi sometime in the 13th Century AD by Iltutmish⁴.

* Department of Materials and Metallurgical Engineering, Indian Institute of Technology, Kanpur 208016, India