ABSTRACTS

Structural Health monitoring of overhead cranes bridges by the traditional inspection system with wired and bulky instrumental technologies face many challenges during the harsh environment and under working condition. This paper proposes a portable wireless and efficient NDT method using the GMR sensor array technique for the identification of fatigue cracks in the bridges of travelling overhead cranes. In order to enhance the efficiency of overhead cranes by minimizing the inspection time, a portable wireless robot combined with GMR (Giant Magnetoresistivity) sensor and NDT technique is presented. This novel solution offers mobility, high accuracy and low power consumption. For the detection of cracks and defects in overhead crane bridge eight GMR (Giant Magneto Resistive) sensors of NVE (AA006-02) placed linearly on a PCB board with equal distance. Two magnetic wheel of neodymium N42 located on both side of the GMR sensor array to magnetize the steel surface for accurate defect reorganization. Unlike MPI (Magnetic Particle Inspection) where a global magnetization require for further inspection, this automated detection system only magnetize the surface area under the vicinity of GMR sensor array. The instrumentation circuit including eight high speed multiplexer, Operational amplifier, and one 8 bit analog to digital converter. A PIC 877A microcontroller and raspberry pie was used to perform local data storage, data processing and controlling. This presented testing solution is quick and offers a step towards automated testing of overhead crane bridges. However it improves the work efficiency and can meet the serious challenges within the inspection of overhead crane bridges.

KEYWORDS

GMR | Sensor Array | Non-destructive testing | Overhead crane bridges | Crack Inspection |