

1.2.14. FLEXIBLE AND ARRAY EDDY CURRENT PROBES FOR THE INSPECTION OF COMPLEX PARTS

Marchand B., Decitre J., Zorni C., Casula O., CEA LIST, Gif-sur-Yvette, France

Eddy Current (EC) is a powerful mean of detection of defects located in conductive parts. This technique has already proved great performances and brought solutions to different industrial issues in nuclear or aeronautics domains for instance. EC Probes used in Non Destructive Testing (NDT) are mainly based on winding coils. This technology has shown good efficiency and gave good results in a lot of applications. Nonetheless, it reveals some limits in some cases. First, this technology is not adapted for the design of probes that require both flexibility and high spatial resolution. Therefore the inspection of complex parts turns out to be difficult or unfeasible. Second, winding coils lose sensitivity when frequency decreases. Thus, detection of deep buried defects, which requires low frequency use, is hardly achievable.

To bring solutions and improve non destructive techniques, other technologies have been investigated at CEA LIST. In the aim of detecting small surface flaws, an original scheme optimized using the NDT platform CIVA, led to the development of a 32-elements probe, based on micro-coils. Thanks to a special packaging using a Kapton film, flexibility is achieved and complex parts can be efficiently inspected. The design of the probe is given and experimental testing reveals its performances in the inspection of non planar components. Another way to solve this classical problem is the use of magnetic sensors. A very large array, composed with 96 Anisotropic Magneto-Resistance (AMR) has been specially designed for this need. Its spatial resolution is 100 μ m and the scanned strip width is almost 10mm.

In other hand, the deep buried defects issue finds a solution by the use of magnetic sensors. Indeed, contrary to winding coils, their sensitivity remains constant at low frequency. In this purpose, a flexible probe based on a Giant-Magneto-Resistance (GMR) sensor has been developed at CEA LIST. Experimental results are given and show on Inconel mock-up.