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Off-line Scan Path Planning for Robotic NDT

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Abstract

This work presents computer-aided scan path generation for robotic non-destructive testing of complex shaped test-pieces. Off-line programmed scan path was used to robotically inspect an aluminium fixed leading edge skin panel of an aircraft wing by means of swept frequency eddy currents method. Eddy currents probe was deployed by means of a six-axis robotic arm KUKA KR5 arc. Reverse engineering of the test-piece was carried out to reconstruct CAD model of its surface. Positioning accuracy of the performed continuous scan was measured with a laser tracker in accordance with ISO 9283:1998 and is reported in the paper. The positional uncertainty of the NDT scan calculated as the standard deviation of the measured path coordinates from the command path coordinates does not exceed 0.5 mm which is rather moderate taking in account uncertainties associated with the off-line robot programming.

Keywords. Eddy Current NDT, robotics, off-line path planning, path accuracy, reverse engineering.

1. Introduction

Compared to manual Non-Destructive Testing (NDT) for inspection of engineering components, automated robotic deployment of the same NDT techniques offers an increase in accuracy, precision and speed of inspection while reducing production time and associated labour costs. Traditionally, the robot scan path is either taught or programmed manually. Automation of NDT scan path generation, as presented in this

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