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ABSTRACT

PRESENTATION

PAPER

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BENEFITS OF DIGITAL TWIN OF ROBOTIZED INFRARED FLASH THERMOGRAPHY FOR OFFLINE PROGRAMMING

In order to satisfy industrial requirements, non-destructive testing (NDT) are being more and more automatized. It increases accuracy while reducing inspection time and human factor. Robotization is a complementary step, which additionally allows to reinforce autonomy and versatility of automatized NDT. For complex shape parts, the quality of this robotization is directly related to the simulation and OffLine Programming (OLP) software. There exists a lot of simulation and OLP software, but few are specialized in NDT. In this paper, the implementation and advantages of using a NDT specialized software will be detailed. Flash thermography inspection will be here considered as an industrial use-case.

Firstly, the details of the preparatory phase of the software utilization are explained. It aims at identifying the rules of the inspection process. These rules are often naturally known by the manufacturing engineers but are usually not written. Specifying them allows to increase the quality of the simulation and the trajectory generation, given a specific inspection process. Furthermore, OLP software – with its digital twin – have a lot of information which may be injected into the digital workflow. Its integration is described.

Then, the mandatory tools to be included in a simulation and OLP software will be listed; e.g. excitation source, camera and tooling in the case of infrared inspection cells. Based on these elements, the mathematical concepts used to automatically generate the trajectories for the inspection, avoid collision and optimize robot paths will be briefly described.

Finally, a presentation of practical applications will highlight both the benefits of a NDT specialized OLP software and the opportunity to improve the digital thread in an industrial environment. After presenting different way to program a robotic cell (manual and automatic programming), a comparison of those methods on a flash infrared thermography cell will be discussed.