Raw Data Based Image Processing Algorithm for Fast Detection of Surface Breaking Cracks Using In-Line Laser Thermography

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The aim of this work is to illustrate the contribution of signal processing techniques in the field of Non-Destructive Evaluation. A component’s life evaluation is inevitably related to the presence of flaws in it. The detection and characterization of cracks prior to damage is a technologically and economically significant task and is of very importance when it comes to safety-relevant measures. The Laser Thermography is the most effective and advanced thermography method for Non-Destructive Evaluation. High capability for the detection of surface cracks and for the characterization of the geometry of artificial surface flaws in metallic samples of laser thermography is particularly encouraging. This is one of the non-contacting, fast and real time detection method. The presence of a vertical surface breaking crack will disturb the thermal footprint. The data processing method plays vital role in fast detection of the surface and sub-surface cracks. Currently in laser thermographic inspection lacks a compromising data processing algorithm which is necessary for the fast crack detection and also the analysis of data is done as part of post processing. In this work we introduced a raw data based processing algorithm which results precise, better and fast crack detection. The algorithm we developed gives better results in both experimental and modeling data. By applying this algorithm we carried out a detailed investigation variation of thermal contrast with crack parameters like depth and width. The algorithm we developed is applied for various surface temperature data from the 2D scanning model. Also validated the credibility of the algorithm with experimental data.

Figure 1. Processed image showing the presence of the crack

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References: