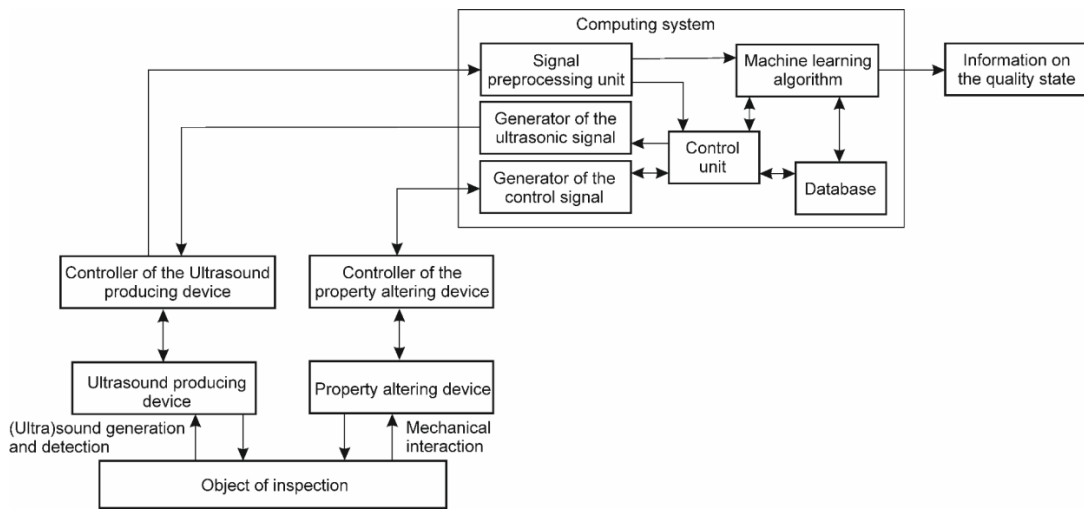


Reconfigurable devices for ultrasound signal interpretation



Ref. Nr

TE 6.2321.1

Keywords

Ultrasonic quality control
 Internal damage inspection
 Machine learning
 Robust neural networks
 Diversified training dataset

Intellectual Property

PCT/IB2022/06190

Publications

None

Date

01/12/2022

Description

The invention relates to a reconfigurable device used to generate large diversified datasets relevant for the quality inspection and opens the possibility to interpret complex ultrasonic signals.

Its first variant is a phantom with similar properties than an industrial product to be inspected, with a difference that specific (mechanical) properties can be varied. Its second variant is a device, which can be applied on the industrial product in order to make it reconfigurable (e.g. on its surface to achieve the change of its geometry or stiffness). Alternatively, a part of the industrial product can be exchanged by the reconfigurable device (e.g. critical joint, link).

Advantages

The reconfigurable ultrasonic device provides an advantage that large and diverse training datasets can be obtained using a single specimen. In comparison to numerically generated training datasets, the ultrasonic signals obtained on the reconfigurable device are much closer to the real inspection scenario, which

otherwise cannot be numerically modeled precisely enough.

The method provides integral quality information by fast measurements of ultrasonic responses at only a few locations on the test objects and opens the possibility for inspection of parts with complex geometry.

Applications

- Extraction of parameters from ultrasonic signals, which are indicators for the presence of damage
- Differentiation between the disturbing parameters and the target inspected (geometric or material) properties
- Validation and optimization of the architecture of machine learning algorithms for the ultrasonic signal interpretation
- Applicable for any ultrasound-based inspection tasks, including but not limited to the additive manufacturing, precision engineering, energy sector, aeronautics, automotive industry, healthcare, and certification of safety-critical infrastructures