

**NDE PATENTS*****Dr. Shyamsunder Mandayam***

Through this feature every quarter, we intend to provide you a snapshot of some latest and important patents in the world of NDE. We also intend to use this feature to encourage the Indian NDE community to file more patents based on your innovations. We will be happy to provide guidance and assistance in different ways – Answering queries, Conducting Tutorials and webinars, One-on-one discussions, Networking with Intellectual property experts, etc.

Need help understanding, What are Patents? Why to Patent? When to Patent? What is the Patenting Process? ..... Please feel free to reach out to me by email at [mandayam.shyamsunder@gmail.com](mailto:mandayam.shyamsunder@gmail.com)

Here we list below a few interesting patents related to a mix of different modalities in ***NDE and Inspection***.

**United States Patent 2023/0152278 A1*****In-Process Quality Assessment for Additive Manufacturing*****Inventors:** Neil J. Goldfine, Todd M. Dunford**Assignee:** JENTEK Sensors, Inc., Marlborough, USA

Disclose is a system and method for real-time measurement and feedback of metrology and metallurgical data during additive manufacturing (AM) part fabrication. This solution promises to provide higher performance, lower cost AM parts. A sensor is placed either in the rake/roller or following the rake/roller so that it has no impact on the process efficiency and can be used to provide real-time feedback and an archived digital map of the entire part volume. The solution provides non-contact sensing of AM layer's electrical conductivity in a high-temperature environment, metallurgical property verification, porosity imaging, local defect detection and sizing, local material temperature monitoring, and grain anisotropy imaging. Part geometry, the AM powder, and the laser/material interface are monitored in real-time. Dual mode sensing using magnetoquasistatic and optical sensors enhance results. Real-time nonlinear control of the AM fabrication process is performed based on the sensor data.

**United States Patent 11650183*****System and method for real-time degree of cure evaluation in a material*****Inventors:** David A Jack, TX, USA**Assignee:** VERIFI Technologies LLC, TX, USA

The present disclosure provides a system and method for real-time visualization of a material during ultrasonic non-destructive testing. The system includes a graphical user interface (GUI) capable of showing a three-dimensional (3-D) image of a composite laminate constructed of a series of two-dimensional (2-D) cross sections. The GUI is capable of displaying the 3-D image as each additional 2-D cross section is scanned by an ultrasonic testing apparatus in real time or near real time, including probable defect regions that contain a flaw such as a hole, crack, wrinkle, or foreign object within the composite. Furthermore, in one embodiment, the system includes an artificial intelligence capable of highlighting defect areas within the 3-D image in real time or near real time and providing data regarding each defect area, such as the depth, size, and/or type of each defect.

**United States Patent 11,573,192*****Enhanced guided wave thermography inspection systems and methods of using the same***

**Inventors:** James F. Landy, Paul J. Zombo, Cody J. Borigo, Joseph L. Rose, Steven E. Owens

**Assignees:** Siemens Energy, Inc., Orlando, FL (US); FBS, Inc., State College, PA (US)

Non-destructive inspection systems and methods for inspecting structural flaws that may be in a structure based on guided wave thermography. The method may include sweeping a frequency-phase space to maximize ultrasonic energy distribution across the structure while minimizing input energy, e.g., via a plurality of actuators. The system may include transducer elements configured to predominantly generate shear horizontal-type guided waves in the structure to maximize thermal response from any flaws.

**United States Patent 11,480,517*****Heat exchanger fouling determination using thermography combined with machine learning methods***

**Inventors:** Ali Al Shehri, Vincent Cunningham, Ayman Amer, Wei Xu, Faisal Melibari

**Assignee:** Saudi Arabian Oil Company, Dhahran (SA)

Disclosed is a methodology for determination and prediction of heat exchanger fouling, such as polymer fouling in the circulation loop that forms part of the heat exchanger system. The buildup of a polymer or other undesired material deposit in the heat exchanger provides a distinctive temperature signature (thermal gradient) on the surface of the heat exchanger asset, which is visualized using a thermographic camera. Coupling images (thermograms) from the camera with a machine learning algorithm identifies fouling and, with knowledge of the historical data of the asset and operating and ambient conditions, enables prediction of future fouling. The thermal images provide several types, or orders, of temperature information that are indicative of locations vulnerable to fouling. In one case, the method uses machine learning applied to time-based temperature change/gradient information to detect hidden polymer fouling in areas that form part of the heat exchanger.

**United States Patent 11,603,593*****Systems and methods for automatic detection of coating defects***

**Inventors:** Venkata Vijayaraghava Nalladega, Bernard Patrick Bewlay, Majid Nayeri, Michael Howard Rucker

**Assignee:** General Electric Company, Schenectady, NY (US)

Systems and methods for automatic detection of defects in a coating of a component are provided. In one aspect, a coating inspection system is provided. The coating inspection system includes a heating element operable to impart heat to the component as it traverses relative thereto. An imaging device of the system captures images of the component as the heating element traverses relative to the component and applies heat thereto. The images indicate the transient thermal response of the component. The system can generate a single observation image using the captured images. The system can detect and analyze defects using the generated single observation image.