NON-DESTRUCTIVE INSPECTION SERVICES FOR DIGITALLY ENHANCED ZERO WASTE MANUFACTURING

PILOT 5

Lithography-Based eHealth parts production

OBJECTIVE

Integration of **sub-surface anomaly detection tools and artificial intelligence algorithms** into a **Lithography-based Ceramics Manufacturing** (LCM) equipment for **monitoring**, **quality control**, and **defect identification.**

PARTNERS INVOLVED

airCode — END-USER

NORBLIS — Nordic Broadband Light Solutions

Universitat Politècnica de València

LITHOZ

DTU

CONTEXT

Additive manufacturing of ceramic materials

Additive-manufactured parts present the drawback of a lack of quality assurance.

Complexity and material quality requirements of the AIR ceramic antenna module used for medical applications **demand large-volume LCM with in-situ process control.**

Problems & needs

- **Human-dependent visual** defect quality **inspection** → ↑ cost and ↓ efficiency
- **Detection of** LCM building **defects after post-thermal treatment** → ↑ energy & material consumption.

NON-DESTRUCTIVE INSPECTION TECHNIQUES

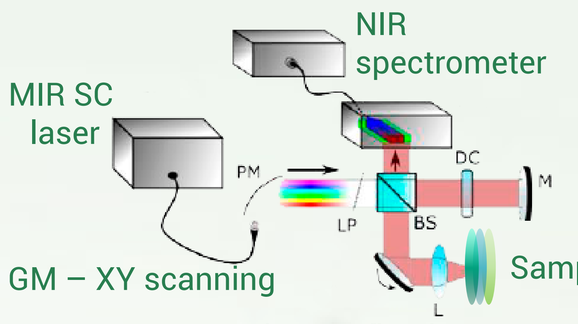
1. **Monitoring & quality control** during the LCM production **using MIR-OCT system and AI algorithms.**
2. **Real-time adjustment of** printing parameters to improve the production quality parts production.
3. 100% **produced parts** are **inspected**

ZDZW solution — INTEGRITY INSPECTION SUITE

EXPECTED SCENARIO

Integration of MIR-OCT into Lithography-based ceramic equipment

Sub-surface anomaly detection ZDZW solution is designed to introduce **advanced quality control and inspection systems**, based on the **integration of the MIR-OCT system,** together **with** the developed **AI algorithms, into the Lithography-based ceramic equipment** for the **real-time in-process defect detection**.

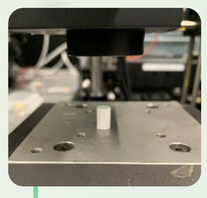


Mirror-reflecting source (LED)
Transmitting observation wavelength

Mid-Infrared OCT System

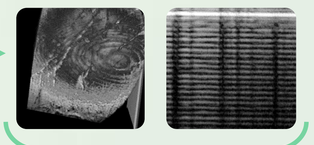
AI algorithms

Integration into the Lithography-based ceramic equipment



In-line sub-surface imaging

Cross-section and 3D images



Convolutional network for defect recognition

Real-time process optimization and quality control

EXPECTED IMPACT ON KPIs

Reduction of Scrap Antenna Modules

30% (About 3.000.000 parts/year)

Part Energy Consumption

↓13kWh/1.000 antenna modules

Productivity

↑360 antenna modules/hour (savings of about 9M€/year)

Reduction of material waste

30% (About 1.500kg/year)

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