

DIGITAL TWINS OF LASER PROCESSING

FOR MULTI-CAPABILITY MANUFACTURING OF COMPLEX COMPONENTS AND DIGITAL CERTIFICATION

DILAPRO has successfully developed an end-to-end digital twin and in-situ certification framework for laser-based manufacturing.

By bridging the gap between pre-build simulation, real-time sensing, and automated quality scoring, DILAPRO minimizes the need for costly post-processing testing and paves the way for on-site digital qualification of complex and critical components.

KEY RESULTS

DILAFACT and **DILACERT** softwares

dilafact

Digital Laser Factory Platform

- Predictive pre-build simulation and parameter optimization for PBF-LB, DED-LB and Laser Surface Texturing.
- Multi-sensor data acquisition during production.

dilacert

Digital Certification & Risk Engine

- Automated evaluation of in-situ sensor data.
- Risk assessment and digital certification scoring, reducing post-production quality testing.

DEMONSTRATED IN DEMANDING SECTORS

INDUSTRIAL USE CASES
Oil&Gas, Automotive, Space, Mining, Pharmaceutical, Nuclear

MATERIALS
316L, IN625, IN718

LASER TECHNOLOGY
PBF, laser texturing, DED

IMPACT & ACHIEVEMENTS



ECONOMIC

- Demonstrated potential to **reduce certification lead times** from months to days in select validation use cases.

ECONOMIC/TECHNOLOGICAL

- **Lower defect rates, machine downtime and overall manufacturing cost due** to first-time-right production.
- Significantly reduces the reliance on costly and time consuming post-process testing.
- **Scalable Digital Twin Architecture:** Validated in industrially relevant environments, laying the foundation for full scale industrial deployment.

ENVIRONMENTAL

- **Lower climate impact** by contribution to reducing waste and energy consumption during manufacturing through reduced trial-and-error build iterations and less post-process testing.

SCIENTIFIC

- **Advanced data driven and physics informed models** for laser-material interaction.
- New framework for digital qualification and in-situ monitoring in additive manufacturing.

SOCIETAL

- Supported AM technicians and engineers with **actionable digital tools and training frameworks for Industry 4.0 environments.**
- Provided inputs and methodologies contributing to the future standardization of digital qualification and in-situ monitoring in AM.

PARTNERS

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