ELNAEEM ABDALLA

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SUMMARY

PhD Researcher in Industrial Engineering and Mechanical Engineer with research interests in reverse engineering, 3D scanning technologies, manufacturing metrology, and digitalization of manufacturing processes. Current research focuses on the application of advanced 3D scanning systems for industrial reverse engineering, dimensional verification, and geometric reconstruction in manufacturing environments. Experience spans academic research and industrial applications involving quality control, non-destructive testing, and metrology-driven workflows for steam turbine components and shipbuilding-related applications.

EDUCATION

University of Messina Messina, Italy

Ph.D. in Industrial Engineering, Supervisors: Prof. Guido Di Bella, Prof. Filippo Cucinotta, Industrial Partner: CONAV S.r.l., Italy, Research Topic: Integration of 3D Scan Techniques in Manufacturing Processes, Research focuses on the application of 3D scanning technologies for reverse engineering and manufacturing applications, including scan quality assessment, dimensional verification, geometric reconstruction, and industrial digitalization workflows. *Dec 2024 – Dec 2027*

University of Calabria Rende, Italy

M.Sc. in Mechanical Engineering, Master's Thesis: Crack Propagation Analysis of NiTi Alloy Using Digital Image Correlation, Supervisors: Prof. Carmine Maletta, Prof. Emanuele Sgambitterra, The research investigated crack propagation behavior in NiTi shape memory alloys using Digital Image Correlation (DIC) techniques. *June 2023*

Sudan University of Science and Technology Sudan

B.Sc. in Mechanical Engineering, Bachelor's degree in Mechanical Engineering. *Oct 2009*

EXPERIENCE

PhD Researcher – Reverse Engineering and Industrial Metrology Jan 2025 – Present

University of Messina / CONAV S.r.l. *Italy*

Industrial Supervisor: Ing. Dionigi Pugliesi, Head of Reverse Engineering and Quality Control, CONAV S.r.l.

- Reverse engineering of mechanical components used in steam turbine maintenance and spare-part manufacturing.
- Dimensional inspection using a Hexagon articulated measuring arm equipped with a tactile probing system.
- Point cloud processing, inspection, and dimensional analysis using PolyWorks.
- CAD reconstruction and surface modeling from scanned and measured datasets.
- Quality control and geometric verification of manufactured and refurbished components.
- Application of non-destructive testing techniques, including liquid penetrant inspection and radiographic testing.
- Support of industrial digitalization initiatives through the integration of advanced metrology and reverse engineering workflows.

Academic Laboratory Activities

University of Messina *Italy*

- Conducted reverse engineering and 3D scanning activities using structured-light scanning systems.
- Performed geometric reconstruction and comparative analyses for manufacturing and metrology research applications.

MEP Site Engineer Oct 2018 – Oct 2019

Alwissam Alarabi Holding Company *Saudi Arabia*

Responsible for supervision and coordination of HVAC, plumbing, and firefighting systems, including technical documentation, site management, and project execution.

Production Engineer Sep 2013 – Sep 2018

Saudi Marble and Granite Company *Saudi Arabia*

Managed production planning, machining operations, quality control activities, and manufacturing workflow optimization.

TECHNICAL SKILLS

Reverse Engineering Workflows
Manufacturing Processes
Quality Control and Dimensional Verification
Mechanical Design
Product Development
Digital Image Correlation (DIC)
Structured-Light Scanning
Industrial Metrology and Inspection Point Cloud Processing
CAD Reconstruction
PolyWorks
Revo Scan
QuickSurface
SolidWorks
AutoCAD
CloudCompare
MeshLab

RESEARCH INTERESTS

Reverse Engineering for Manufacturing; 3D Scanning Technologies; Manufacturing Metrology; Dimensional Inspection and Quality Control; Geometric Reconstruction and CAD Modeling; Digital Manufacturing; Industrial Digitalization; Shipbuilding Engineering Applications; Additive Manufacturing

PUBLICATIONS

Journal Articles:

1) Abdalla, E., Panfiglio, S., Parisi, M., & Di Bella, G. (2026). A Review on Reverse Engineering for Sustainable Metal Manufacturing: From 3D Scans to Simulation-Ready Models. Applied Sciences, 16(3), 1229. DOI: 10.3390/app16031229.

2) Freni, F., Panfiglio, S., Abdalla, E., Cannuli, A., Di Bella, G., & Montanini, R. (2026). A Quantitative Method for 3D Scan Quality Assessment Under Different Surface Conditions for Reverse Engineering of Shipyard Components. Sensors, 26(5), 1581. DOI: 10.3390/s26051581.

Conference Proceedings:

1) Barberi, E., Abdalla, E., Cucinotta, F., Freni, F., Panfiglio, S., Salmeri, F., & Di Bella, G. (2025). Assessment of 3D Scanners for Dimensional Verification of Boat Molds. IEEE International Workshop on Metrology for Green Technologies, Renewable Energy and Ecological Sustainability (MetroGREENST 2025). DOI: 10.1109/metrogreenst67435.2025.11428970.

2) Di Bella, G., Panfiglio, S., Abdalla, E., Freni, F., Cannuli, A., & Montanini, R. (2025). Reverse Engineering and Additive Manufacturing Metrological Evaluation for Sustainable Digitalization in Shipyard Environments. IEEE International Workshop on Metrology for Green Technologies, Renewable Energy and Ecological Sustainability (MetroGREENST 2025). DOI: 10.1109/metrogreenst67435.2025.11428923.

3) Panfiglio, S., Abdalla, E., Borsellino, C., Chairi, M., Denaro, A., Marabello, G., & Di Bella, G. (2025). Implementation of Innovative Strategies in Shipbuilding Production: The Experience of SHIPLEARNING on Friction Stir Welding and Reverse Engineering. Progress in Marine Science and Technology. DOI: 10.3233/PMST250036.

SCHOLARSHIP AND FUNDING

PhD Scholarship (Borsa DM 630/2024 – CONAV S.r.l.), University of Messina, Italy (2024–2027). Industry-funded doctoral scholarship supporting research activities in reverse engineering and advanced manufacturing technologies.

PROFESSIONAL MEMBERSHIPS

Sudan Engineering Council (Active)

Saudi Council of Engineers (Member, 2013-2019)

LANGUAGES

Arabic: Native; English: B2; Italian: Intermediate Proficiency (B1–B2)