CHAROULA KOUSIATZA, Ph.D.

Mechanical & Aeronautical Engineer

EDUCATION

PhD in Manufacturing Engineering, University of Piraeus Apr 2014 – Jul 2019

- Dissertation: "In-Situ Real-Time Monitoring of Additively Manufactured Polymeric and Composite Structures Using Fiber Bragg Grating Sensors"

MSc in Computational Mechanics, National Technical University of Athens Oct 2016 – Oct 2019

- MSc Thesis: "3D Printing of Innovative Orthopedic Devices using Topology Optimization"

Diploma (MEng) in Mechanical Engineering & Aeronautics, University of Patras Oct 2008 – Oct 2013

- Diploma Thesis: "Experimental and Analytical Investigation of Similar and Dissimilar Single Lap Joints"

RESEARCH INTERESTS

- Additive Manufacturing (AM – 3D printing) technologies for metallic, polymeric, composite, and shape memory materials
- Design and optimization of additively manufactured structures using Topology Optimization (TO)
- Products design using CAD/CAE
- Biomechanics, Design and Additive Manufacturing of medical devices
- Quality Control in Additive Manufacturing processes and products
- Computational Mechanics and Finite Element Analysis (FEA)
- Experimental Mechanics
- Applied Mechanics
- Technology of Materials

PROFESSIONAL EXPERIENCE

Operations Manager / Engineering Manager Mar 2023 – Aug 2025 / Mar 2022 – Aug 2025

3-PSI Ltd., Dafni, Greece

- Additive Manufacturing of patient-specific prototype implants for total hip arthroplasty, as well as of other products.
- Development of standardized operating protocols for AM production workflows, aligned with ISO/ASTM specifications, aiming at ensuring product quality, process repeatability and certification of patient-specific AM hip implants.
- Design testing and optimization of hip implant models.
- Comprehensive characterization of AM hip implants to assess and validate their mechanical performance.
- Responsible for AM equipment's operation, troubleshooting, calibration and maintenance, as well as for processes' optimization.
- Responsible for procurement and suppliers' management.
- Writing of technical reports and research proposals.

Additive Manufacturing Engineer Nov 2020 – Feb 2022

Conify, Laurium, Greece

- Optimization of AM process parameters for various different metal materials to achieve integrity and enhanced performance on the final 3D printed structures.
- Production of mold inserts for a Master Die Unit Injection Molding machine via DED technology.
- Characterization of fabricated parts for defects' detection and mechanical properties' assessment.
- Metal powder feedstock characterization and tuning of properties/quality.
- Developed an AM metal powder procurement database based on EU market.
- Conducted and reported research within the framework of European research projects.

Doctoral Researcher Apr 2014 – Jul 2019

Lab. of Advanced Manufacturing Technologies & Testing, Dept. of Industrial Management & Technology, University of Piraeus, Greece

- Developed a sophisticated sensing methodology, predominantly involving single-point and multiplexed fiber Bragg gratings (FBGs) for in-situ and in real-time monitoring of residual strain fields and temperature profiles built-up in polymeric and continuous fiber reinforced composite structures fabricated through FDM technology.

Visiting Researcher Oct 2017 – Jul 2018
Dept. of Industrial & Systems Engineering and Dept. of Aerospace Engineering, Texas A&M University, TX, USA
- Implemented smart/active material systems (Shape Memory Polymers – SMPs) in FDM technology for the design and development of novel customized 3D printed medical devices, namely stents for endovascular repair of the ascending aorta.
- Conducted experimental characterization (thermal, mechanical and shape memory effect testing) to calibrate and validate a previously developed constitutive model implemented as a UMAT subroutine in Abaqus and modeled the 3D printed SMP material's response.

Graduate Teaching Assistant
Medical School, National and Kapodistrian University of Athens, Greece 2021 – 2022
- Delivered lectures and conducted laboratory sessions for the course "3D printing and manufacturing technologies" in the framework of the post-graduate MSc Program entitled "Applied Biomechanics and Biomaterials in Orthopaedics".

University of Piraeus, Greece 2015 – 2017, 2018 – 2019
- Delivered supplementary lectures to classrooms and conducted laboratory sessions for the undergraduate courses: 1) Introduction to Engineering Mechanics and 2) Introduction to Mechanics of Materials.

SKILLS

Languages: English (Fluent), French (Pre-Intermediate), Spanish (Elementary)
Finite Element Analysis (FEA) Software: Abaqus, HyperWorks, COMSOL Multiphysics
CAD/CAE/CAM Software: FreeCad, SolidWorks, PTC Creo, Netfabb, MeshMixer, Rhino, Geomagic Design X, AutoCAD
Other Software: Microsoft Office Suite, Origin

NATIONAL / EUROPEAN PROGRAMS

- "Topology Optimization of 3D-Printed, Patient-Specific Spinal Braces – OrThOP3Dics," Research – Create – Innovate, Greece 2.0 – Recovery and Resilience Fund – National Resources, 2022-2025.
- "Harmonisation of EU-wide nanomechanics protocols and relevant data exchange procedures, across representative cases; standardisation, interoperability, data workflow – nanoMECommons", Horizon 2020, European Commission, 2021-2025.
- "Injection Moulding Repurposing for Medical Supplies enabled by Additive Manufacturing – imPURE", Horizon 2020, European Commission, 2020-2022.
- "Customised hip resurfacing arthroplasty implant – CustomHip", Competitiveness, Entrepreneurship and Innovation, 2014-2020.
- "In Situ Monitoring Additive Rapid Manufacturing – SMART", ARISTEIA II, Ministry of Education – General Secretariat for Research and Technology, 2014–2016.

PUBLICATIONS

Publications in Peer-Reviewed Journals (with over 450 citations)

- G. Banis, **C. Kousiatza**, M. Sarkiri, K. Touloupas, A. Spiliotopoulos, P. Kontopoulos, S. Stergiadou, et al., (2025). "Does the ratio of stem-to-femur length matter? A validated finite element analysis", *Journal of Experimental Orthopaedics*, vol. 12, e70484. https://doi.org/10.1002/jeo2.70484
- S. Voulgaris, **C. Kousiatza**, G. Kazakis, K.-I. Ypsilantis, D. Galanis, C.-C. Mitropoulou, M. Gkara, et al., (2025). "Upper limb orthoses: integrating topology optimization and 3D printing for custom fit and function", *Applied Sciences*, vol. 15, pp. 827. https://doi.org/10.3390/app15020827
- C. Matsika-Klossa, N. Chatzidai, **C. Kousiatza**, D. Karalekas, (2024). "Characterization of thermal expansion coefficient of 3D printing polymeric materials using fiber Bragg grating sensors", *Materials*, vol. 17, pp. 4668. https://doi.org/10.3390/ma17184668
- M. Karna, C. Kakalis, N. Chatzidai, **C. Kousiatza**, T. Tambouratzis, D. Karalekas, (2023). "A combined experimental and artificial neural networks study of distortion in 3D printed beam specimens", *Materials Today: Proceedings*, vol. 93, pp. 589–593. https://doi.org/10.1016/j.matpr.2023.03.094

- **C. Kousiatza** and D. Karalekas, (2020). "Experimental study of fabrication-induced residual strains and distortions in polymeric square plates built using fused deposition modeling process", Material Design & Processing Communications, e149. https://doi.org/10.1002/mdp2.149
- A. Koualiarella, A. Arvanitidis, A. Argyros, **C. Kousiatza**, A. Karakalas, D. Lagoudas, N. Michailidis, (2020). "Tuning of shape memory polymer properties by controlling 3D printing strategy", *CIRP Annals*, vol. 69, pp. 213–216. https://doi.org/10.1016/j.cirp.2020.04.070
- **C. Kousiatza**, D. Tzetzis, D. Karalekas, (2019). "In-situ characterization of 3D printed continuous fiber reinforced composites: A methodological study using fiber Bragg grating sensors", *Composites Science and Technology*, vol. 174, pp. 134–141. https://doi.org/10.1016/j.compscitech.2019.02.008
- **C. Kousiatza**, N. Chatzidai, D. Karalekas, (2017). "Temperature mapping of 3D printed polymer plates: Experimental and numerical study", *Sensors*, vol. 7, pp. 456 (1–14). https://doi.org/10.3390/s17030456
- **C. Kousiatza** and D. Karalekas, (2016). "In-situ monitoring of strain and temperature distributions during fused deposition modeling process", *Materials & Design*, vol. 97, pp. 400–406. https://doi.org/10.1016/j.matdes.2016.02.099

Selected Presentations in International Conferences

- D. Karalekas, N. Chatzidai, **C. Kousiatza**, C. Matsika-Klossa, (2025). "In-situ mechanical and thermal characterization of 3D printed composite polymers for plastics applications", 28th International Conference on Fracture and Structural Integrity & 3rd Mediterranean Conference on Fracture and Structural Integrity, IGF28 - MedFract3, 15-18 Sep, Catania, Italy.
- N. D. Lagaros, **C. Kousiatza**, S. Voulgaris, G. Kazakis, (2023). "Topology optimization-based custom design of 3D printed upper limb orthoses", Proceedings of International Conference on Communication and Computational Technologies – ICCCT 2023, pp. 717–728. https://link.springer.com/chapter/10.1007/978-981-99-3485-0_57
- **C. Kousiatza** and D. Karalekas, (2020). "Process related integrity issues of additively manufactured reinforced polymers", 1st Mediterranean Conference on Fracture and Structural Integrity, MedFract1, 26-28 Feb, Athens, Greece.
- **C. Kousiatza** and D. Karalekas, (2018). "Application of temperature sensors for thermal profiles monitoring in additively manufactured plates", 1st International Conference on Welding & Non Destructive Testing, 1st ICWNDT – 2018, 22-23 Oct, Athens, Greece.
- **C. Kousiatza**, A. Solomou, D. Lagoudas, S. Bukkapatnam, (2018). "3D printing of shape memory polymer stent grafts for endovascular repair of the ascending aorta", ASME International Manufacturing Science and Engineering Conference, ASME 2018 MSEC, 18-22 Jun, College Station, TX, USA.
- **C. Kousiatza**, S. N. Economidou, N. Chatzidai, D. Karalekas, (2016). "On the investigation of temperature profiles generated during the 3D printing process of thin plates", 17th International Conference on Experimental Mechanics, ICEM 17, 3-7 Jul, Rhodes, Greece.
- **C. Kousiatza**, S. N. Economidou, N. Chatzidai, D. Karalekas, (2015). "Investigating additively manufactured parts' performance through the use of fiber optic sensors", International Conference 'Science in Technology', SCinTE 2015, 5-7 Nov, Athens, Greece.
- **C. Kousiatza** and D. Karalekas, (2015). "Real-time process monitoring of 3D printed multilayered structures using optical fiber Bragg grating sensors", 20th International Conference on Composite Materials, ICCM20, 19-24 Jul, Copenhagen, Denmark. (Full paper: 10 pages)
- **C. Kousiatza**, S. N. Economidou, D. Karalekas, (2015). "Evaluation of residual strain field and temperature mapping in 3D printed layered polymer plates", 18th International Conference on Composite Structures, ICCS18, 15-18 Jun, Lisbon, Portugal.
- **C. Kousiatza** and D. Karalekas, (2014). "On the integration of fiber Bragg sensors as an in-process sensing system in additive manufacturing", 5th International Conference on Additive Technologies, iCAT_2014, 15-17 Oct, Vienna, Austria. (Full paper: 6 pages)

VOLUNTEER ACTIVITIES

- Reviewed articles for the Measurement Journal (Elsevier).
- Organizing committee member of the 5th International Conference on Structural Analysis of Advanced Materials (ICSAAM 2013, Island of Kos, Greece).

PARTICIPATION IN SUMMER SCHOOLS & SEMINARS

- AMS 2019, Summer School on "Advanced Material Systems: Processing, Modeling and Commercialization", 26 Jun – 3 Jul 2019, Thessaloniki, Greece.
- IIMEC 2016, Summer School on "Advanced Material Systems: Experimentation & Modeling", 3-9 Jul 2016, Thessaloniki, Greece.
- Dassault Systèmes 3D Experience Event, 2 Dec 2015, Athens, Greece.