



Pierre AUMJAUD

Institution: School of Materials & Mechanical Engineering, University College Dublin

Academic Mentor: Dr Philip Cardiff

Commercial Partners: ENBIO LTD and ROSERO LTD

Commercial Mentor: Joseph Mohan (ENBIO) and David McAuliffe (RESERO)

Pierre is a postdoctoral research fellow in the School of Mechanical and Materials Engineering at University College Dublin. His research interests include optimisation methods, numerical modelling, composite materials and data science.

During his Msc in Mechanical Engineering at ENSMM - a renowned French engineering school, Pierre worked as an intern at Airbus, Toulouse and at the University of Exeter, UK on the modelling of fretting wear in Rolls Royce's gas turbines. He then completed his PhD at the University of Exeter on vibration damping of lightweight sandwich structures and evolutionary optimisation.

In 2017, Pierre joined as a postdoctoral research fellow at the School of Mechanical and Materials Engineering, UCD, working on the finite element modelling and design optimisation of composite components in collaboration with Dr Philip Cardiff. He is currently working on the modelling of composite surface treatment using a machine learning approach. *See case study overleaf*

Dr Philip Cardiff

Dr Cardiff is Bekaert Lecturer of Materials Processing at the School of Mechanical & Materials Engineering, UCD. His PhD is in computational biomechanics, developing contact methodologies based on the finite-volume method in OpenFOAM for hip joint simulations. He conducted post-doctoral research on computational models at UCD and the University of Texas in Austin.

Joseph Mohan - ENBIO LTD

Joseph is lead research and development engineer at ENBIO where he is in charge of the composite mould release activity of the company. He has worked in KCMG composites in a similar role; and has collaborated with Bombardier Aerospace and Henkel.

David McAuliffe - RESERO LTD

After his PhD at UCD, David joined Rockwell Collins as a research and development engineer where he developed composite technologies for aircraft interiors. He has since founded consultancy, Resero, to provide machine learning expertise and analysis of manufacturing data.

School of Materials & Mechanical Engineering, University College Dublin

The UCD School of Mechanical & Materials Engineering is the largest of its kind in Ireland and a world player in both research and education.

ENBIO LTD

ENBIO is the inventor CoBlast, a unique technology with the potential to redefine the performance, function and value of metals across all sectors. The company has state-of-the-art manufacturing and testing facilities, an R&D laboratory and a Space Technologies Centre.

ROSERO LTD

Resero provides services to the manufacturing industry including valuable insights based on analysis of manufacturing data combined with engineering expertise.

Pierre's project

Machine learning is a set of computer algorithms that have the ability to autonomously learn and recognise patterns based on real-world data. They are typically used for modelling complex systems and predict future and unknown responses accurately.

Examples of machine learning application include self-driving cars, recommender systems, cognitive medical assistant, speech and image recognition. However, machine learning models for engineering application remain scarce, in particular in the field of surface treatment processes.

This project focuses on developing a data-driven model of the CoBlast technology - an innovative surface treatment process for enhanced composite mould release and adhesion performance - and optimising the process.

The objective is to develop a novel and generalised methodology for modelling manufacturing systems by exploiting machine and deep learning techniques.
