



Aswani KUMAR BANDARU

Institution: Irish Composites Centre (IComp), UL

Academic Mentor: Dr Ronan O'Higgins

Commercial Partner: Taconic

Commercial Mentor: Cyril Stockil

Aswani is a postdoctoral researcher at the Irish Composites Centre at the University of Limerick. He received his Bachelor degree in Mechanical Engineering from Andhra University, Visakhapatnam, India in 2006 and his Master's degree in Mechanical Engineering from Indian Institute of Technology Roorkee, India in 2009.

Aswani's Ph.D, Impact Studies on Thermoplastic Composites Reinforced with 2D/3D Fabrics, is from the Indian Institute of Technology Delhi, under the guidance of Professor Suhail Ahmad. Aswani received best industry-related Ph.D award and IITD Alumni Research Innovation Award from IIT Delhi. He has published 17 peer reviewed journals and 13 conference papers.

Currently, he is working on the optimisation of automatic tape placement systems on laser-assisted tape placement technique. His research interests include development of lightweight composites, impact response of composites (low and ballistic), static and dynamic characterisation of composites, manufacturing of composites and failure analysis. See case study overleaf

Dr Ronan O'Higgins

Dr O'Higgins, who lectures at University of Limerick has over 10 years' experience working in the field of composite materials research. He has extensive knowledge of processing and characterisation of composite materials. Dr O'Higgins has published 16 peer-reviewed journal papers and received over €800,000 in funding. He is the primary academic contact for the Automatic Tape Placement (ATP) unit at the University of Limerick and has led three research projects relating to the characterisation and development of laser assisted ATP in-situ consolidation of carbon fibre-reinforced thermoplastic composites.

Cyril Stockil

Cyril Stockil has worked for 17 years at Taconic variously as Quality Manager, New Product Development Manager. He is currently Technical Manager. His responsibilities cover new product development, QA laboratory, complaint analysis and Process development. His role also includes R&D projects on a regional and global basis in conjunction with Taconic's other sites.

Irish Composites Centre (IComp), UL

Composites researchers at University of Limerick have worked with almost every major aerospace company in Europe on more than 35 research projects, including 14 funded by the EU. IComp has a full suite of testing and characterisation equipment.

Taconic

Taconic is a market-leader in PTFE-coated glass fabrics, belts, tapes and silicone elastomers. Their high-performance products are ideal for demanding applications and processes including lamination, thermoforming, wind blade and aviation composite moulding.

Aswani's project

Fibre-reinforced composite materials are finding increasing use in weight-critical applications due to their superior specific properties relative to traditional engineering materials. However, some current processing techniques require a relatively high level of manual labour, which is an impediment to the more widespread adoption of composite materials.

Automated lay-up systems have the potential to increase the level of efficiency of composite manufacturing processes, particularly for thermoplastic-based material systems, where in-situ consolidation can be used in conjunction with automated tape placement (ATP) to produce a final laminated structure without the need for a secondary processing step.

Currently, there is no production of ATP machine that can process all the different types of composite tapes available (ie thermoplastic, thermoset and dry-fibre systems) using one tape laying head. In addition, material suppliers have been slow to develop specialist tapes for use with automated tape-laying systems, particularly for in-situ consolidation.

This project will address these issues by developing a multi-functional ATP head capable of processing dry-fibre, thermoset and thermoplastic fibre reinforced tapes. This will involve design and development of tape handling and heating systems for each type of material system to be processed.

Trials will be conducted to optimise the processing parameters for each distinct category of material system. The multi-functional head will also be further developed to provide specialist capability not currently available on production ATP machines, such as fibre steering, tow/prepreg tape spreading and tape laydown monitoring/adjustment. This increased functionality to the head will allow the processing of more advanced, highly optimised structural laminates, unlocking the true potential of composite structures.
