Project Summary

June 2022

NWCAM

North West Centre for Advanced Manufacturing

Armstrong Medical Limited

Company overview

Armstrong Medical (based in Coleraine, Northern Ireland) is a specialist manufacturer of innovative respiratory disposables for neonatal, perioperative and critical care. The company's state-of-the-art manufacturing resources include robotic injection moulding, polymer tube extrusion, mould making and medical device assembly. Armstrong Medical currently supplies products to healthcare customers in over 60 countries.

The projects

- Development of insulated medical tubing with controlled gas barrier properties
- Improving the processability and performance of polypropylene parts

Industry focus

Armstrong Medical sought to address the issue of condensation forming in medical tubing (due to patient respiration) and the subsequent requirement for regular tube maintenance by intensive care nursing staff to ensure that the system, which includes a ventilator, functions safely. Such interventions were time-consuming, carried risks, and generated medical waste which was not easily recycled. The company wished to investigate the possibility of enabling water vapour to be released from the tubing without a loss of volume in the gas being delivered to the patient.

Armstrong Medical also wished to examine the effect of pigment additives on polymer processing and properties (in particular shrinkage behaviour) for medical device application.

Research partnership

Armstrong Medical was partnered with Ulster University's Advanced Future Materials & Manufacturing group in the School of Engineering at Jordanstown. The extensive polymers expertise and research experience within Ulster University provided the appropriate partnering arrangement to meet the research challenges set by Armstrong Medical. The research team included three co-investigators, two research assistants, and one PhD researcher.

Project outputs

As a result of the collaborative R&D projects, a novel method of tubing production was developed which led to the creation of a 'breathable' expiratory limb - the AquaVENT®VT breathing circuit. This advanced ventilator circuit manages moisture effectively, reducing the burden on nursing staff to maintain the system. The technology has now been incorporated into several critical care ventilator circuits for adult, paediatric and neonatal patients who require assistance with their breathing. By expanding its range of breathing circuits and electromedical devices Armstrong Medical was able to rapidly respond to increased global demand for critical care respiratory devices required to treat COVID-19 patients.

Dr Ciarán Magee, Armstrong Medical's Technical Director, said, "The NWCAM project has given us access to external teams in Ulster University and Catalyst. Both teams helped us to look in depth at how we applied existing manufacturing processes to specialist polymers and helped us arrive at an end-product which addresses a long-standing limitation of products we marketed for many years."

Reflecting on the development of their new product, Dr Magee added: "The introduction of this superior product will add significant value to Armstrong's expanding portfolio of pioneering products to ensure improved patient outcomes in a critical illness setting. The new product allows us to focus on the area of life-support ventilation for adult, paediatric and neonatal patients. We expect demand to increase in coming months, particularly in emerging markets."

Project benefits

- Development and commercialisation of a new product (with global market opportunities)
- Industry-related skills development of academic researchers
- Increased competitiveness of the life and health sciences sector through innovation
- Knowledge dissemination to the wider life and health sciences sector through academic publications and conference presentations
- Strengthening of the collaborative R&D relationship between Armstrong Medical and Ulster University
- Technology transfer from Ulster University to Armstrong Medical
- Upskilling of Armstrong Medical staff with regards to manufacturing techniques and material handling technologies

Project legacy

Dr Oonagh Lynch, Ulster University, remarked, "The collaboration between Armstrong Medical and Ulster University through NWCAM has created real value and competitive advantage for the company. Armstrong Medical creates products that play a key part in life-saving treatment of very sick patients. It is extremely rewarding for us to see them improving health outcomes and saving lives through their involvement with the NWCAM partnership."