Chain-die forming: Fast and effective

Associate Professor Richard Yang and Professor Yang Xiang from the School of Computing, Engineering and Mathematics have partnered with Mr Shipeng Ding from SNS UniCorp Pty Ltd, under a Research Partnerships Program grant. They aim to evaluate a new plastics production process.

'The mass production of straight sheet products is achieved by the widely used “roll forming” process,’ explains Associate Professor Yang. 'This process consists of a strip or coiled sheet of metal which is gradually bent into a desired profile by using a range of rotating rolls. Defects in the product can sometimes be caused by the change of properties of the material being processed – for example, metal can spring back into its previous shape – a process called elastic recovery. In attempt to minimise defects, a new method has been developed by SNS UniCorp Pty Ltd, called the “chain-die forming” process. The chain-die forming process elongates the deformation step – the transformation of something from an existing configuration to the desired configuration - of the material used and can significantly reduce and even eliminate strains in the material. Now we want to find out if the chain-die forming process can be used in the production of fibre reinforced thermoplastics. Fibre reinforced thermoplastics are commonly used in a range of industries due to their light yet strong composition. The drawback of this material is the cost due to the labour involved with its production. The aim of the research will be to develop a cost-effective process for fibre reinforced thermoplastics free of shape defects using the chain-die forming process.'

A systematic and broad approach will be used which relies on both experimental study and numerical modelling. The identification of different strains of the chain-die forming process will take place using a detailed numerical analysis. An experimental study will then take place to observe the effects of strain on the material behaviour. Using the information gathered, a pilot trial experiment will be conducted to produce the fibre reinforced thermoplastic composites into the desired profile.

Findings from this research could result in a better production process to produce complex and high performance structures made of fibre reinforced thermoplastics. In turn, this would be beneficial in industries such as aerospace, automotive, marine and construction where there is an ongoing need for weight reduction in materials.

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