

Fundamental Composites Processing Issues and Challenges – an Industrial View from
a Returning Academic

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In the 3 decades of the Flow Processes in Composite Materials conference series, the research community has carried out much scientific work on fundamental polymeric composites processing mechanisms, though much remains to be done. Industry has made giant strides in processing of various composite structures and parts in the meantime. 3rd generation thermoset prepreg tapes are being automatically fibre-steered and tape-laid for large aerospace civilian aircraft fuselages and wings (Boeing Dreamliner, Airbus A350). Resin transfer moulding has seen the advent of High Pressure RTM (BMW i-series cars). Resin infusion of aircraft wings has become commercial (Bombardier CSeries) and large resin-infused wind turbine blades have reached over 80 metres in length in single-shot mouldings. Press-forming and welding of thermoplastic composites have reached production in aircraft primary structure (Airbus A350 fuselage clips, Gulfstream G650 empennage). Nevertheless, fundamental understanding of the flow processes involved has often lagged behind the industrial applications, or has not been taken into account by industry. This abstract will discuss the fundamental composite processing issues that, in the author's opinion, have still not been solved and in some cases not even tackled. The author will also discuss how the industrial development of automated composite material deposition processes (the original form of additive manufacturing) and the global developments in out-of-autoclave manufacturing processes and tooling have created a need for new materials that are specifically tailored for the new processing conditions, rather than using materials developed for autoclave processing. New fibres, polymers and fibre/matrix interface treatments have all proliferated, creating a plethora of interesting and challenging research questions for the composites flow processing academic community.