

# Advanced Fibre Placement (AFP) Capability

## Machine Specification (Automated Dynamics AFP)

- 7 axis system (6 axis robot, plus spindle)
- 4 heads for different applications:
- 4 x 1/4" tow, slit tape thermoset prepreg (material on head, bi-directional)
- 1 x 3" tape, slit tape thermoset prepreg (material on head, bi-directional)
- 1 x 1/4" or 1/2", slit tape thermoplastic prepreg (in situ melt & compact)
- 12 x 1/8" tow, slit tape thermoset prepreg (material on standalone creel)
- Part envelope up to 1.2m diameter, 2.75m long & 2000kg
- Compaction force up to 90kg (for tack & debulk)
- Independent feed, add and cut of each prepreg tow
- Add / cut accuracy  $\pm 0.5\text{mm}$ . Trajectory repeatability  $\pm 0.3\text{mm}$
- ADC (native) & MAJESTIC (3rd party) programming

## Advanced Fibre Placement Research

AFP developed from a combination of technology used for tape placement and filament winding, essentially moving tape placement onto a rotary axis to extend the range of parts which could be manufactured. Robotic AFP systems were developed in the last 10 to 15 years as a higher flexibility, lower cost solution compared to traditional machine tool setups and are now becoming more common place in the UK supply chain.

Much of the research at AMRC has focused on building a deep understanding of the process, from the programming through to the final product, with a combination of experimentation & demonstration on industrial scale components. The key areas are:

- Part geometry & design for manufacture
- Key data for programming & materials database
- Defect characterisation (gaps, overlaps, wrinkles etc.)
- Effect of process parameters on quality & properties
- Heating systems for tack control
- Structural analysis of 'as deposited' structure
- Models for selection of placement strategy
- Innovative tooling

