TWI’s novel induction heating technique:

- For the first time, induction heating can be precisely controlled through the thickness of carbon fibre reinforced thermoplastic composites.
- During lay-up of the composite components to be joined, thin electrically insulating layers (gauze) are inserted between prepreg plies where induction heating is not required.
- This prevents alternating electrical currents from being generated in these plies during induction heating.
- Electric current is generated between plies where no insulating layers (gauze) are present, to heat and melt the material in the usual way for welding or curing.
- In this way, the concentration of induction heating through the thickness of the material can be precisely controlled.
- This approach avoids any overheating of the outer surface of the components and improves the quality of the joints manufactured.

Conclusions:

- The gauze induction welding technique offers industry a method to control the depth of focus for induction heating of both thermoplastic and thermoset composites for a variety of uses.

Recommendations:

- The technique may be considered as a candidate welding process that offers advantages over the current state-of-the-art processes, especially where thick parts are involved (greater than 2mm thick). Tooling costs are minimised compared to the state-of-the-art.
- Wider application of the technique should be considered as a focussed heating process for applications such as adhesively bonding thermoset composites.