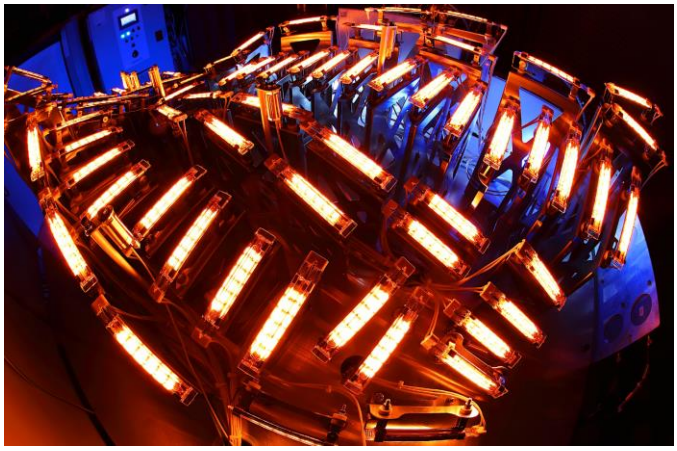
Advanced CAE Technology for Infrared Solution at National Composites Center

The National Composites Centre (NCC) in Bristol, UK, is using sophisticated Computer Aided Engineering (CAE) technology from Heraeus Noblelight to optimize the thermal input and control, necessary for selected composite pre-preg lay-up operations. CAE has been extensively employed to determine the precise positioning of infrared modules during laying up of pre-preg material.
The NCC is a world-leading authority on composites, bringing together and developing the best minds and the best technologies. Through innovation and collaboration, its purpose is to accelerate the commercial adoption of high impact, sustainable engineering solutions in composites. For selected composite applications it is important to maintain uniform and precise application of heat to the pre-preg layers – this enables optimized deposition that is necessary for high integrity composite structures. The NCC has engaged Heraeus, who use simulation and CAE, featuring ray tracing and Computational Fluid to describe and understand the behavior of complex systems using mathematical models.
First Heraeus carried out a reflection measurement of the composite to establish the material property for the subsequent optical simulation. The product CAD files were then imported with a wireframe representation of the desired heating zones. Infrared emitter models were placed in the simulation model and irradiance detectors assigned to the different facets. The optical material properties of all objects in the model were established, including reflection, transmission, absorption and surface scattering. The irradiance at all points on the product surface was then simulated by ray tracing. Optimization was carried out by varying the heated length, location and orientation of the emitters, to achieve the required homogeneity throughout the target area with the minimum of emitters. Following the CAE work at Heraeus, an infrared system using fast response medium wave emitters was installed in a specially built tool at the NCC. This consists of six separate zones, where each zone is PID-controlled and the local surface temperature is measured by a pyrometer.
The IR system is currently being used at the Centre. As Richard Entwistle, the project leader, explains, “We were impressed with the work carried out by Heraeus, both in their CAE expertise and the quality of the emitters supplied.”



Features

- Homogeneous heating or pre-preg layers for optimized deposition
- CAE simulation to achieve required homogeneity with a minimum of emitters

Technical Data

- Fast response medium wave emitters in six separate zones
- Tailor made, specially built tool
- Optical Pyrometer
- PID controls

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