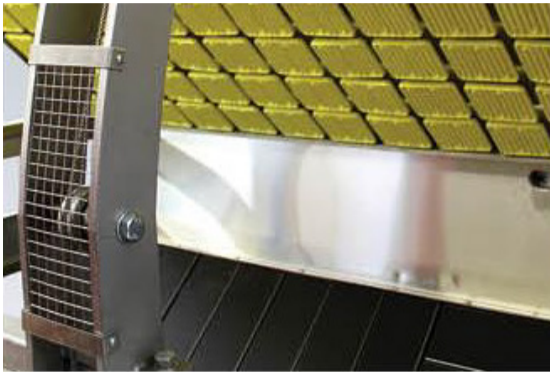


Surface heating of a post cure carbon fibre composite

2 OCT 2018

Ceramicx introduces a process to heat the surface of a post cure carbon fibre composite to 235°C in approximately 15 seconds using various infrared emitters.

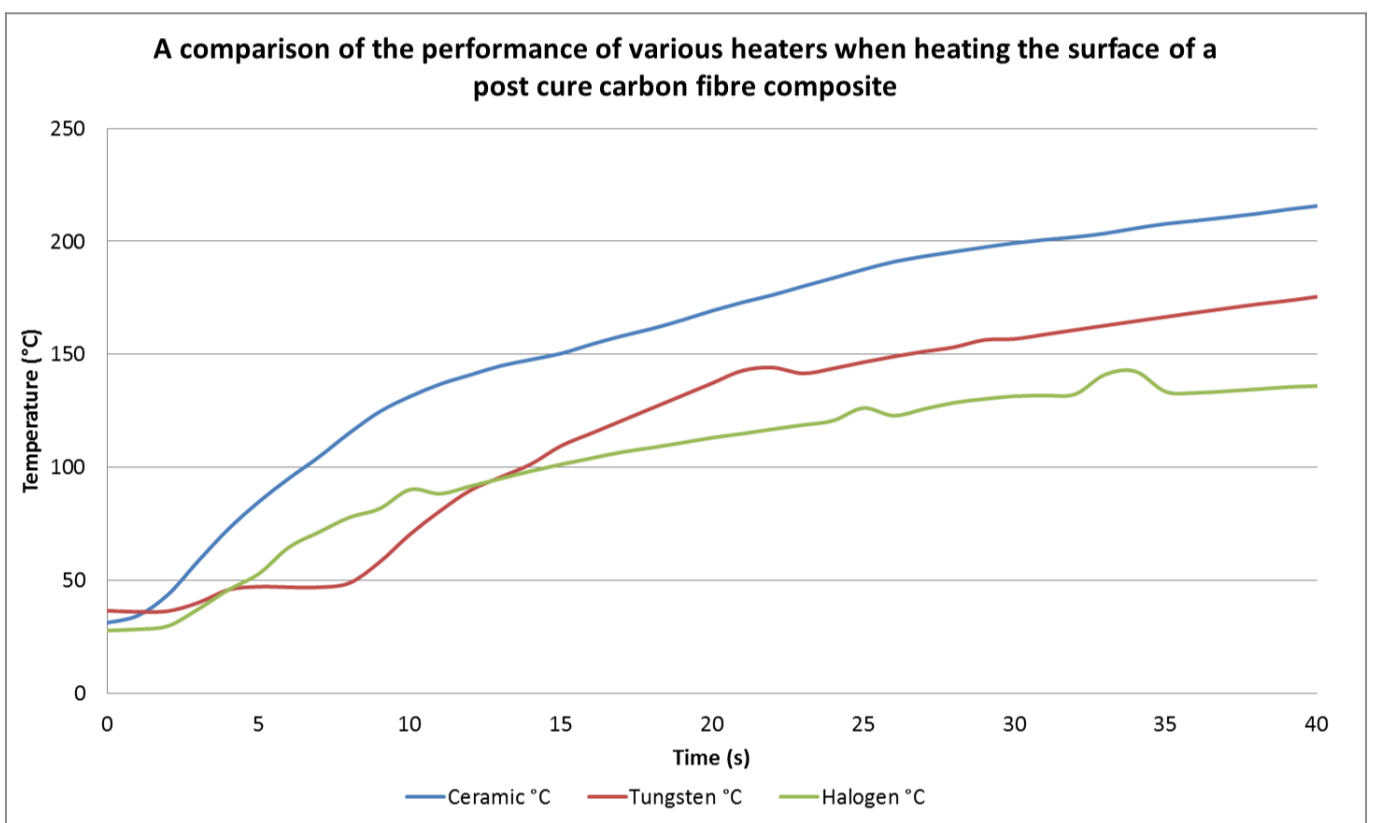


Enquiry

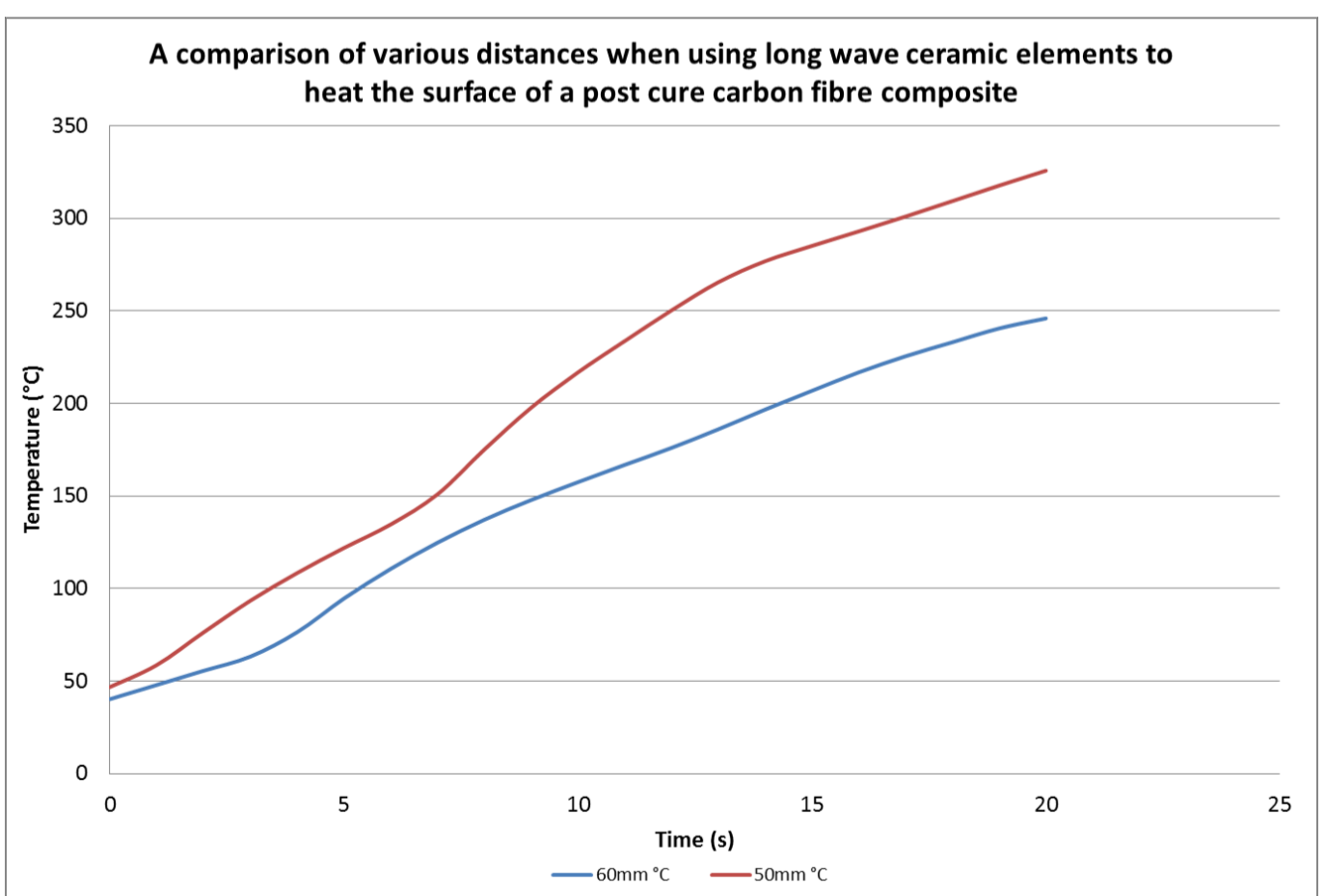
A tier 1 aerospace manufacturer requested a report detailing the ability of various Ceramicx infrared emitters to heat the surface of a unique post cure carbon fibre composite. The target was to bring the top surface of the composite to 235°C in approximately 15 seconds. The epoxy resin within the composite is a thermoset plastic, therefore, should the temperature get too high it would permanently burn and deform

Solution

As with most material tests within the C²I² test room, the initial tests were to find out which type of emitter (long, medium or short wave) was most suited to the job. At a fixed element to target distance of 100mm, it was found that the long wave ceramic elements outperformed the medium wave tungsten and the short wave halogen tubes.



Based on the results, the heating element arrangement used was 6 x 800W black SFEH elements arranged in a 3 x 2 array. Following this decision, the distance between the elements and the target material would need to be reduced in order to reach the temperature target. As 100mm was clearly too large of a distance, this was reduced to 60mm, and in turn 50mm, and the results were noted.



Result

For the heating element arrangement in question (watt density of 44.8 kN/m²), a distance of 50mm was suitable for the surface of the composite to reach the required temperature of 235°C in approximately 11 seconds, well within the time restriction of 15 seconds.

The ability of a surface to absorb thermal radiation and convert it to heat varies between materials, particularly between composites. To maximise efficiency, it is crucial that the most suitable emitter for a specific material is determined before developing a project.