

What's cooking at Hawker de Havilland

Take it from Bob Raverty head of operations on 787 program at Hawker de Havilland, when you're looking for an oven to cook huge pieces of composites, you have to look further than Smeg or Gaggenau, and the choice of colour doesn't even come into it!

One of the benefits of the technique that Hawker de Havilland has developed in working with composite materials is when it comes to "cooking" the composite, rather than needing expensive autoclaves, they can use really big ovens.

As simple as that may sound, these aren't just any type of oven. In Australia, Furnace Engineering is one of the leading manufacturers of heat processing equipment for industry, and the firm chosen by Hawker de Havilland to design and build its five large ovens for skins and spars and three smaller ovens for the rib components.

Bob Raverty is full of praise for Furnace Engineering's approach to problem solving and finding the best manufacturing methods. "They were extremely flexible in their thinking and their approach to delivering what we wanted, and they did it within a pretty tight timeframe – from design through manufacture in just six months," he says.

Brian Gooden, from Furnace Engineering in Melbourne takes up the story: "There is a tendency to regard an oven as a scaled up version of an oven at home, but they are very different.

"When you're cooking a roast, it's not too serious if the temperature in the oven is not the same all over and the lamb cooks faster on the top than in the middle. These ovens transfer substantial energy by means of hot air flow to the heated wing components and their support structure, while being constrained by the top temperature as well as the low temperature differentials across the various component shapes and support structure at any time. This presents a bit of a challenge. We have to do a lot more than blow a bit of hot air around," he says.

"We began by designing an initial pre-production oven with Bob, Michael Loh and Peter Pendergast from Hawker de Havilland. This was really helpful for all parties as it showed which requirements and specifications were really necessary. It clarified choices as to what was essential, what would be nice to have and what could actually be achieved within the allocated budget.

"We then worked with Marand Engineering on the subsequent ovens. Jerry Kops from Marand has a strong aerospace background and continually challenged and questioned the initial designs, pushing for an elegant solution in spite of the confined space and other constraints," he says.

Computational fluid dynamic (CFD) studies were used to verify and refine the "first principals" engineering design from Furnace Engineering. These were used to confirm the velocities and heat transfers within the different ovens and different work-pieces in order to ensure that the right temperature heat up specifications would be met.

The furnaces were manufactured at the Notting Hill factory and delivered by road in as near complete state as possible in order to minimise site assembly. Due to the tight delivery schedule, Furnace Engineering sub-contracted and supervised the electrical site installation to Sphere Industries, and specialized PLC (programmable logic controller) and SCADA (supervision control and data acquisition) programming to BJH Controls of Melbourne. They also worked with Morse Air Systems who designed and purpose built the large fans for the ovens.

"It has been a team effort. We are proud of the results achieved so far and for Furnace Engineering to have been a part of the new Dreamliner," says Brian Gooden.

First oven commissioned for curing 787 skins.