Boeing 747 Trial in Conjunction with Advance Fumigation & Pest Control Ltd

With the demise of Methyl Bromide world wide as an effective method for pest eradication and disinfestation, the airline industry has to resource an acceptable, effective alternative. This had not only to deal with the varying infestation types, but to comply fully with the fundamental and stringent requirements of all aircraft manufacturers and operators alike.

The Dryair system not only offers that solution, but does so in an Eco-friendly and cost effective manner.

The problem

Aircraft are as susceptible to pest infestation as buildings, civil engineering structures and other modes of transport. Rodents and insects gain access onto aircraft whilst parked on the ground or are carried onboard by unwitting passengers in their luggage, and also in freight transported in the holds. These pests have to be controlled in order to maintain hygiene standards, but also to comply with air safety regulations enforced throughout the world.

Controlled heat and humidity is an excellent chemical free alternative, however, aircraft contain sensitive electrical equipment and a myriad of components that are sensitive to extremes of heat, all of which have to be considered whilst providing an effective solution.

Dryair was asked to assist in a trail to clearly indicate that heat could be used effectively as a chemical replacement, with added benefits.

- The Dryair system can be configured to suit all types of aircraft, both in size and internal configurations.

- The programmable Dryair system is at all times in total control of all elements of the process. Giving live online readings to interested personnel located remotely.

The solution

Dryair heat is all encompassing; the evenly distributed hot air penetrates every air space, even the narrowest recesses in the structural fabric of the aircraft. This raises surface and air temperatures and reduces humidity levels to create an environment throughout the aircraft that allows successful disinfestations to be completed in the shortest possible time.

The 747 in question was an ideal aircraft, being both large and exposed in all the relevant areas. This allowed full thermal inspection and data compilation to show our total control and understanding of events as they occurred.

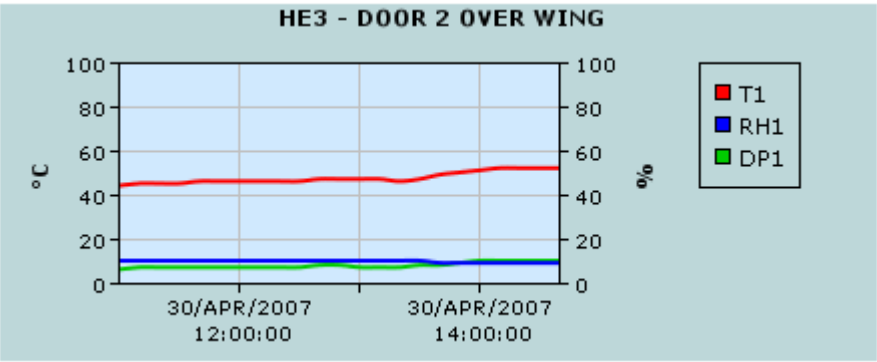
The Dryair system was used to deliver the hot, dry air directly to the main cabin, flight deck and freight bays. The air was forced down into the holds using ducting inserted through the inspection hatch and pressure equalisation panels, thus driving and assisting the natural convection and ensuring even heat distribution. The existing aircraft insulation was sufficient to maintain the heat within the structure.

Temperatures were monitored throughout the project using Dryair incorporated RMS. Confirmation was provided by the Impact IVN 770-P programmable digital imaging camera, giving temperature readings of all components and surfaces.

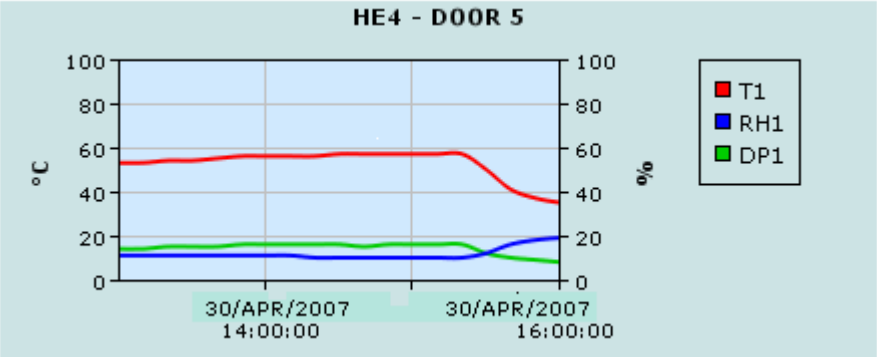
Heat Exchangers on the main deck, with and without air ducting attached

The RMS sensors and software record the temperature and humidity (RH) in different locations within the aircraft. The system also allows pre-programming of both heat and RH for improved controllability. Data is live, whilst at the same time been accessible for up to 5 years via Dryair software. Graphs, charts and other data is available for reporting and monitoring processes and of course traceability

The RMS Graphs



Graph showing an increase in temperature at 13:30, this being a clear indicator that the components have reached a plateau.



Graph showing the maintenance of a constant air temperature for over 3 ½ hours, the fall of at around 15:30 indicates shut down.

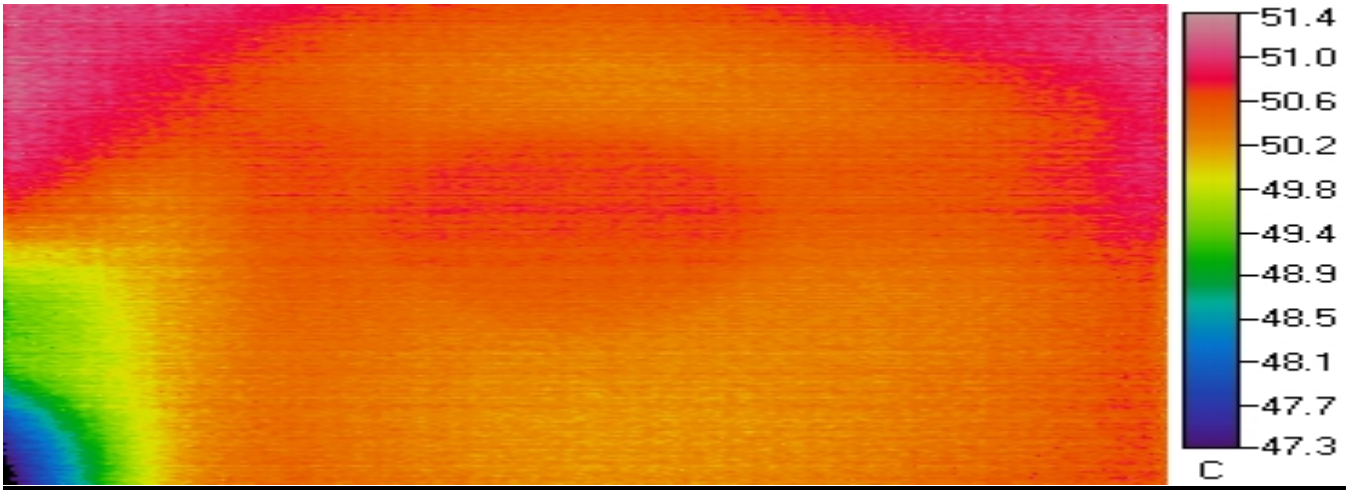
Conclusions

- The RMS data and images from the thermal camera showed that the inside of the aircraft successfully reached an air temperature of 60°C with surface temperatures below 54c, the maximum tolerance limits recommended by the aircraft manufacturer.
- The process was completed in an extremely short period of time in comparison to previous methods, **resulting in additional beneficial options to aircraft operators such as de-humidification**

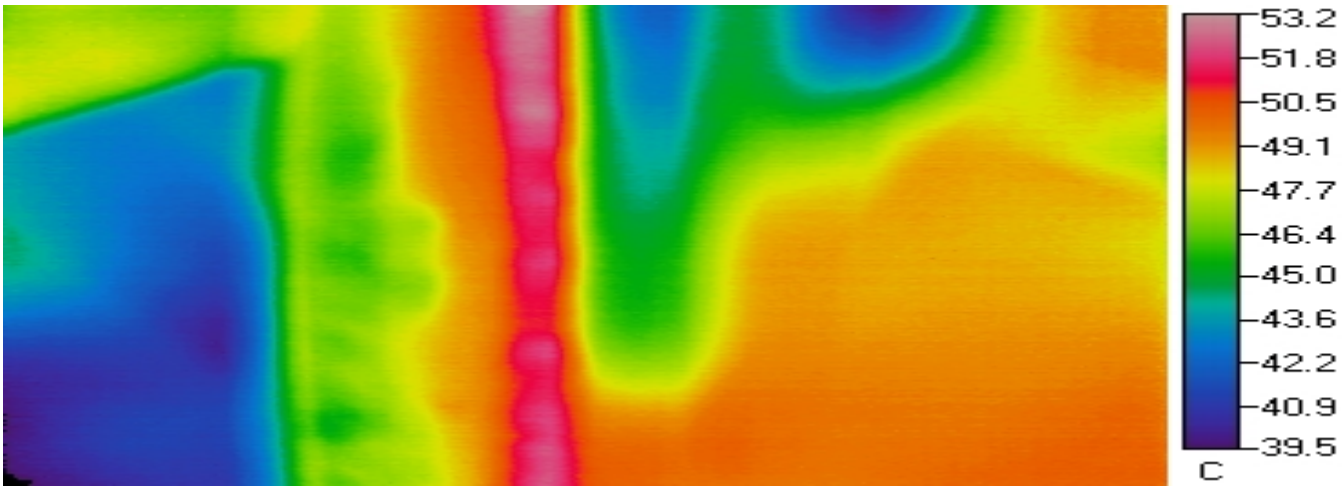
Thermal Imaging data

With a maximum tolerance recommended by the aircraft manufacturer of 54c, it was essential for all concerned, that accurate measurements were taken and recorded. A wide array of plastics, composite materials and metals make up the modern aircraft, all of which have differing thermal properties, the wide number of images taken confirmed our complete understanding of the relationship between air temperature and material energy absorbency.

The images below clearly show the resulting temperature variances, and that no upper limits were breached. It shows a wall panel resting on the floor, this panel was subject to a direct heat overflow within a 2 metre parameter, and 51.4c can be clearly identified as the highest level of heat absorbency within the matrix of the material.



The image that follows shows the galley area, with trolleys and surfaces visible. The high temperature of 53.2c is on the metal protective trim around the trolley outer edge, metals in all instances attain their temperature prior to composite and plastics compounds. All other surfaces are well with in the target temperature limits, confirming clearly out predictions prior to the trials commencement



The image below is of the Dryair insulated distribution pipes running over the carpeted area; you can see that the inner temperature (fluid) is 70.3c, whereas the outer pipe surface is 53.4c. The carpet (blue) is in the 42 to 51c band, indicating clearly the insulation & protective nature of the pipe work in relation to adjoining surfaces.

Essential Overview

The Specialist aviation consultant, Advance Fumigation & Pest Control Ltd (Neil Chitty) provided all the valuable operational knowledge required to undertake the trial within the aircraft, more importantly this company will be providing all aeronautical training and

Licensing with regards to the safety and operational procedures, essential for a critical managed operation, that will be standardized world –wide.