

## ENVIRONMENTAL ISSUES

# Clean and green

KLM Engineering & Maintenance has developed its own engine washing system to give it operational flexibility, environmental protection and employee safety

**P**ratt & Whitney's EcoPower engine wash system is available at Amsterdam Schiphol Airport, (see *MRO Management*, December 2006) but KLM Engineering & Maintenance (KLM E&M) has decided to develop its own system.

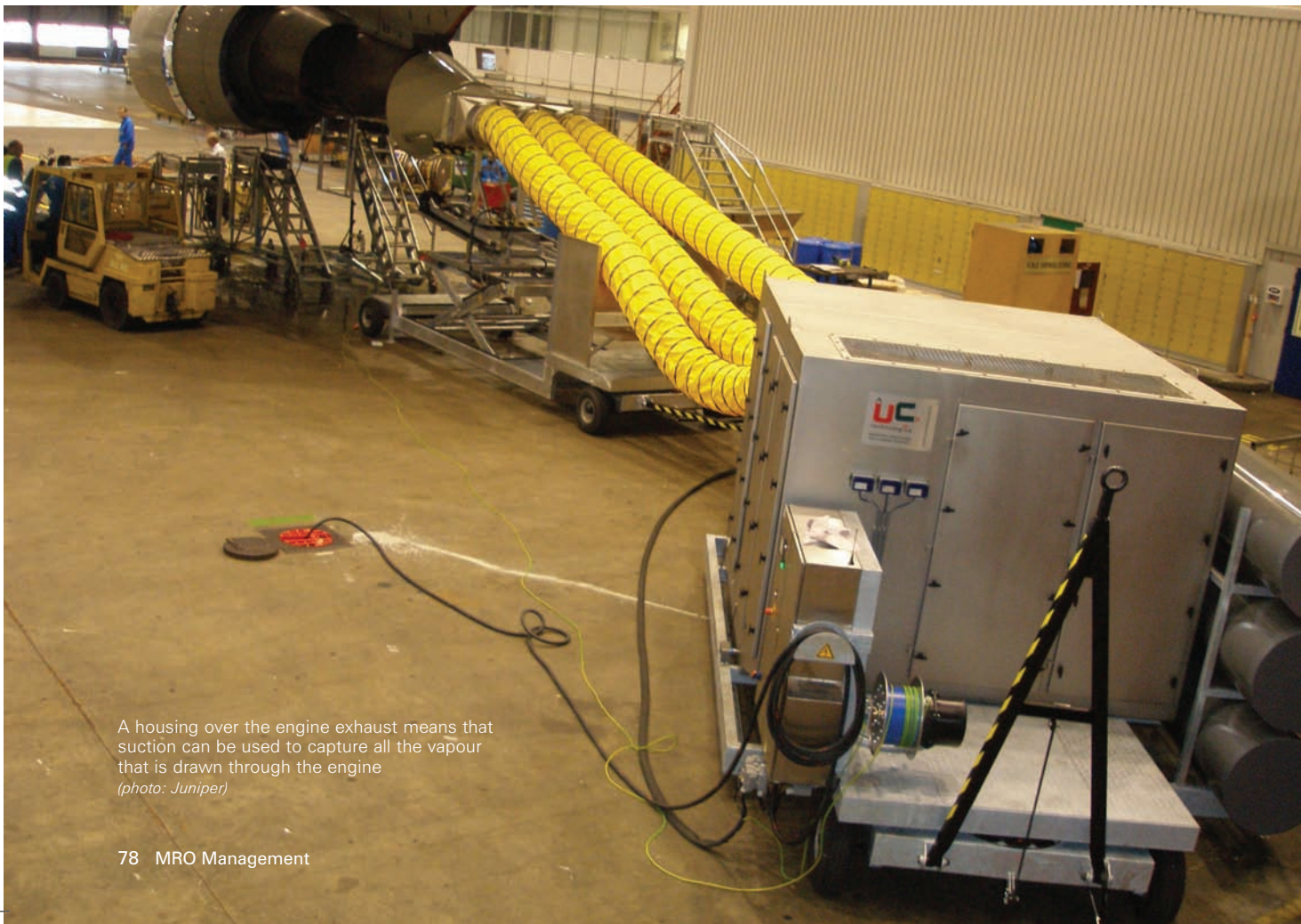
Corné van Rooij, Manager Powerplant On Wing Engineering KLM E&M, explains that, while EcoPower has its merits, it did not meet all the operational and environmental requirements for his organisation when it was evaluated. KLM E&M decided to acquire a commercially available water spray system from A T Juniper (Liverpool) and develop its own water and vapour collection system.

The biggest advantage from an operational point of view is being able to use the system in the hangar with the engine turning over on pneumatic power. The only safeguard is that nearby personnel wear ear protectors. This means that a wash is possible even if there is a very short time between completion of maintenance and the aircraft going back into service. In contrast, EcoPower requires the aircraft to be moved to an engine run-up area, although it can also be used at the gate. The KLM E&M system also needs a drying out run but the company has worked closely with GE Aviation to get approval for this to be carried out within 24 hours, which often precludes the

necessity of an extra run before the aircraft is departing as scheduled. He feels that washing at the gate can often conflict with other ground services preparing the aircraft for departure.

The Juniper part of the system consists of two 25-gallon (114-litre) stainless steel pressure vessels mounted on a rigid steel chassis. The water is pressurised by two nitrogen cylinders. A variety of engine washing probes are available to suit engines from the CFM56-3 to the GE90-115, including long probes that allow the engine to be washed without opening the thrust reverser doors.

If a wash is missed, it is much easier to reschedule, even after a simple A check,



A housing over the engine exhaust means that suction can be used to capture all the vapour that is drawn through the engine  
(photo: Juniper)

## ENVIRONMENTAL ISSUES

All Nippon Airways (ANA) is another customer of A T Juniper (Liverpool), having ordered nine systems – six two-by-25-gallon rigs and three two-by-50-gallon rigs – with most having been installed in purpose-built water wash vehicles.

It is a proven fact that water washing restores engine efficiency through EGT margin recovery and reduced fuel consumption, which, in turn, equates to lower repair bills when the engine is finally removed for servicing and reduced greenhouse gas emissions throughout the life of the engine. However, ANA's requirements were based on something a little more geopolitical.



(photo: Juniper)

The International Agreement on Climate Change, or 'The Kyoto Protocol', was negotiated in 1997 based on principles set out in a framework convention signed in 1992. Each country

agreed to its own specific target. Japan's target was to reduce the amount of greenhouse gas emissions to 5% below 1990 levels by 2008 to 2012. The protocol came into force on 16 February 2005.

ANA decided that its contribution to the country's effort to comply with the Protocol was to set up an Engine Water Wash Initiative with a target of carrying out compressor washing on 1,500 engines during 2007.

The water wash vehicles have been deployed to all the major hubs (Fukuoka, Kansai, Chubu, Tokyo Haneda, Narita and Naha) and can be used all year round. If the weather is unsuitable for washing in the north because of low temperatures, then the aircraft will be planned for treatment in the south where the weather is warmer, maximising the investment.

Such was the success of the programme that All Nippon Airways Trading signed an MoU to become Juniper's exclusive agent in Japan. ■

as the equipment is always on hand. Another disadvantage for van Rooij's organisation is that EcoPower is a commercial service and has to be pre-booked. Last-minute changes of schedule would result in cancellation fees, while conflicting customer requirements could also mean an opportunity for an engine wash was missed. By having its own system, explains van Rooij, KLM E&M can carry out a wash whenever it is needed.

Environmental concerns were raised when an analysis of the vapour after it passed through an engine indicated traces of heavy metals that could pose potential health problems for staff. As these would also be present in any water that was collected, KLM E&M decided that a highly efficient collection system was required. While KLM E&M drew up the technical specification in consultation with GE

*“While EcoPower has its merits, it did not meet all the operational and environmental requirements for this organisation when it was evaluated”*



The biggest advantage of the system is that it can be used inside the hangar (photo: KLM E&M)

Aviation, it put the manufacture out to tender and eventually selected a non-aviation engineering company for production. The unit completely shrouds the engine exhaust and uses suction to ensure that all the vapour is drawn through the engine and collected. The air has been tested and shown to be clean. As some water can leak from other parts of the engine, a collection unit under the nacelle is also used to ensure maximum retrieval. All waste water is then transferred to the KLM Environmental Center for treatment.

Given the low cost of development and the number of aircraft in the KLM fleet that have to be washed, van Rooij reckons it will take about a year to break even against EcoPower costs. ■