



P R E S S R E L E A S E

AQUEOUS CLEANING SYSTEM REMOVES WAX FROM PLATED COMPONENTS

Dewaxing components that have been plated is normally a messy job involving removal of the wax in a tank of heated water, followed by further cleaning and degreasing, traditionally in hot trichloroethylene (trike).

Industrial washing system supplier, Turbex, in collaboration with one of its customers, aerospace overhaul and repair specialist, AEM, has developed a much cleaner, faster and more ecologically friendly alternative.

In what is believed to be a world first, an aqueous washing machine has been adapted and installed at one of AEM's centres to remove the masking wax and then clean and degrease components thoroughly in a continuous, 30-minute process. The secret to its success lies in the system's ability to keep the wax molten while it is in the cleaning machine.

This is achieved first while the wax droplets are held in suspension in the hot water / detergent mixture, then as they float to the top to form an oily layer, during subsequent separation from the water and finally as the wax moves through a separation unit before dropping into a container, where it solidifies. There is no need for recourse to expensive bio-chemicals to break down and absorb the wax.

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Benefits of the new technique, which in December 2009 replaced AEM's former dewax and trike tanks, include not having to shovel wax by hand into sacks and significantly less mess in the working environment. The potential for hazardous trike emissions into the work place and the atmosphere are eliminated, and there is no longer any need to remove masking wax that used to end up in the trike tank.

Other advantages of the Turbex system are a reduction in the electrical energy used, resulting in a saving in running costs, a 50 per cent reduction in floor space occupied by the cleaning plant, and the potential to reclaim the wax and use it again once it has been returned to the supplier to be reconstituted.

AEM is currently working with a wax supplier to investigate the feasibility of re-blending the reclaimed wax back to its original state. Initial trials have proved successful and could result in lower expenditure on the consumable, as well as further cost savings by avoiding sending used wax to landfill.

A further benefit to AEM is the uptime of its cleaning plant. It used to have to limit the use of the trike tank to a couple of times per day to keep below the one-tonne annual limit for open systems stipulated by the Solvent Emissions Directive (SED). By contrast, there are no restrictions on the use of the Turbex water and detergent system. Even the rinse water can

be recirculated by use of a closed loop system. In addition, a filter mist unit condenses water from the vented steam back into the aqueous cleaner.

AEM, a member of the Ametek group, is one of the largest independent overhaul and repair facilities in Europe, operating out of three UK sites – Stansted Airport, Luton Airport and Ramsgate, where the Turbex machine is installed.

Its service to airlines, helicopter operators and airframe manufacturers involves repairing and/or refurbishing a wide range of aircraft parts including electrical, hydraulic, engine and undercarriage items. Chrome or nickel electroplating often forms part of the refurbishment. All areas of the component that are not to be plated are masked with wax.

The company is renowned for rapid turnaround times, especially when responding to AOG (aircraft on ground) requests, a reputation that the new Turbex cleaning system can only help to enhance. It is based on the supplier's standard AC-series machine, to which various changes have been made, principally to manage the wax within the system.

For example, an additional manifold was installed at the back of the wash chamber to facilitate precision internal de-wax and cleaning via adjustable nozzles.

A further modification was to elevate the temperature of the recirculating water above that required for normal applications. Dave Nicholas, responsible for facilities management at AEM, said, "Trials at Turbex's technical centre in Alton showed the higher temperature to be effective at removing the wax from our components and keeping it at a manageable consistency, similar to that of crude oil."

The AC machine is a three-tank model, one for dewaxing and a second for degreasing, both of which use detergent, while the third tank accomplishes a demineralised water rinse.

The suction unit in the first tank has been increased in size to cope with the large amount of molten wax flowing through the system, while in place of the normal diaphragm pump, a continuously running vaned pump has been fitted.

The molten wax is skimmed off the surface of the water and is routed through pipework into a specially insulated wax separation unit, which has an extra heater element inside to keep the wax at temperature. The temperature is maintained right up to the point where the molten wax exits the system.

Paul Ruprecht, operations manager at AEM's Ramsgate facility, commented, "The environmental benefits of the system are many,

including minimal wastage of water, which stays in the tank and is only topped up to keep the pH level within a predetermined band.

“It means that water loss is restricted to somewhere in the region of half a cubic metre per month.

“There is no efficiency reduction with this water-based system. We are finding that the cleaning results are on a par with those achieved using solvents, and demineralised water rinsing tends to leave a clean, film-free surface.

“Moreover, circulation of water by the rotating spray jets and dedicated nozzles into awkward areas such as deep, blind bores is better than the action of trike in a static tank, so cleaning is more thorough.”

To increase cleaning effectiveness, Turbex has fitted a modified rotating spray bar at the top of the work chamber to complement the standard spray bar that rotates underneath the work table. The top spray bar has its two arms extended down at right angles and have been fitted with extra nozzles that direct hot water inwards at the components. The arms can be shortened by screwing off the lower sections so that loads approaching the full width of the chamber can be accommodated.

Hundreds of different line items are processed in the system, ranging in size from nuts and bolts to inner and outer cylinders for undercarriages. Dewax in tank 1 takes 18 minutes, while the full 3-tank process is 28 minutes. In addition to components masked with wax, other parts are routinely cleaned, such as those that have been non-destructively tested using dye penetrants. General degreasing such as removal of rust-prevention oils is also carried out.

Mr Ruprecht concluded, "Like many plating shops, since our company was formed in 1959 we used up to 12 tonnes of trike annually.

"After the SED came into force, we considered other solvent-based cleaning systems conforming with the Directive. However, we were concerned that their future use might also be restricted, like that of trike is today, whereas with the aqueous system we have a cleaning process that is truly future-proof and highly effective."

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Release no: 1013(CS)



A wax masked inner cylinder for the landing gear of a Boeing 737 being removed from a nickel plating tank at AEM's Ramsgate facility.



The previous dewaxing tank (left) and trike tank (right) at AEM, Ramsgate, which would have been used to remove the wax and clean the cylinder.





The modified Turbex AC-series aqueous washing machine that now performs the same job in a single cycle. Dewaxed and cleaned components on the table are the Boeing 737 inner cylinder and a jig that held the turning tube for the landing gear of a Tornado.



A view of the wax separation unit fitted to the left side of the Turbex machine.



Close-up of the tank where the oily wax is separated from the top of the water by allowing it to fall into a receptacle and on through tubes, heated by the hot water itself, to the bottom of the unit.



From there the wax is routed through a separation unit and drops into a bucket below. Water is returned to the system.



Close-up of the wax solidifying in the bucket.



A view inside the wash chamber, showing the additional manifold for internal de-wax and cleaning installed in the back wall and the modified upper spray arms.



One of the standard upper spray arms has had the lower section removed so that a small spray nozzle can be fitted. If both arms are shortened, loads approaching the full width of the chamber can be cleaned.