The correct way to wash an aircraft

Before we start with how to wash an aircraft correctly and successfully, maybe we should first ask; why should we wash it?

Is this a trick question? Not really.

Of course we wash aircraft to make them clean again after service. Why do they need to be clean?

Is it purely for aesthetic reasons or is there a more important agenda behind this time-consuming task?

The primary purpose of washing is to reduce the amount of corrosion occurring in the airframe. Or if the process is done correctly, using the right cleaning product will arrest existing corrosion and prevent new corrosion from occurring. Washing, when done correctly, is the first step in the aircraft's CPCP (Corrosion Prevention & Control Programme). It has been estimated that 80% of maintenance costs during an aircraft's life span are attributable to corrosion, so anything that can be done to reduce this figure is of significant benefit.

Other reasons for washing are safety-related; being able to see through windows clearly, not slipping when boarding or disembarking on oil and exhaust fouling etc. Surprisingly to most people, aerodynamics and fuel burn are on the bottom of the list of reasons for washing.

Another most important, but often overlooked, safety aspect is that of an opportunity for a thorough inspection. While washing, one can carefully inspect the airframe for impact damage, degradation to seals and plastic components, loose fittings and fastenings and other potential problems.

Now that we have ascertained why we are going to wash the aircraft, let’s get ready to do it. The equipment required for the job usually includes:

➢ cleaning fluid
➢ buckets
➢ mop/brush/sponge
➢ chamois
➢ A hose with fine spray nozzle
➢ other items of personal preference.

If you are really fortunate, you may have access to a foam applicator for applying the cleaning fluid. This is always the preferred method of applying any cleaning fluid to an aircraft. It saves time and reduces product usage and it has been proven that foam application of correct cleaning products provides the greatest defence against corrosion.

Notice that a pressure-washing device IS NOT INCLUDED in this list! Pressure washers have no place in aircraft cleaning! High pressure water will drive dirt and contaminants deep into lap joints and cavities, causing long-term degradation and damage to the airframe, along with the sand-blasting effect that is created with the particles of grime. Water applied under pressure can also damage and penetrate seals, exacerbate paint loss, and damage the adhesive bonds found on aircraft structures.

Another literally potentially fatal mistake that even professional operators make, is to use cleaning products not specified or intended for aircraft use. On any aircraft type, whether it be ultralight, gyro, GA, RPT or heavy commercial, ONLY use products that have been formulated and approved for use on airframes. Truck and car cleaners undoubtedly do a very good job of cleaning, but they often contain highly corrosive ingredients that may damage the aircraft. The average person does
not realise that truck wash usually contains predominantly caustic soda, not something which is compatible with aluminium and other aircraft substrates. Just as alarmingly, many household cleaners and detergents contain high levels of salt. Yes, sodium chloride. Probably the very stuff we are wanting to clean off our aircraft exterior. Certified aircraft cleaners have been thoroughly tested on materials found in airframes, to demonstrate that they will not damage or degrade any part of an aircraft's structure. Careful evaluation of cleaners available will even turn up products that have been scientifically proven to successfully arrest corrosion in airframes. Alarmingly, there are a number of cleaners on today's market that are being promoted as suitable for aircraft use but have undergone no suitability testing. As a minimum, any aircraft cleaner should have been tested for conformance to AMS 1526B and Boeing D6-17487 REVISION P by an independent testing laboratory.

Even if you have a composite aircraft your choice of cleaning product is of equal importance as to that of a metal airframe. Many constituents of commercial and household cleaners will irreversibly damage composite substrates, acrylics, rubber and synthetic seal materials, and even two-pack paint. The wrong choice of cleaner may even damage electrical wiring and terminations. When cleaning products are evaluated for military usage, they are specifically tested on wiring and electrical components.

Above all, never use cleaners containing solvents. These may, as well as damaging the substrate, remove grease from inside bushes and penetrate or otherwise damage seals on rod ends and similar components.

Now let us begin:

1. If your aircraft's manual requires it, tape up doors with the correct “low stick” masking tape.
2. Cover pitot tubes, AOA sensors etc. with either the same “low stick” masking tape, the fabric covers supplied with the aircraft, or as the aircraft's manual dictates.
3. Follow any other procedure outlined in your aircraft's maintenance manual.
4. Lightly rinse the entire aircraft to remove loose material and dust/dirt that might scratch the surface.
5. Dilute a small quantity of cleaning fluid to the manufacturer's recommended strength for 'heavy duty' or 'badly soiled' (i.e. strong). With this concentrated solution, wash all badly fouled areas of the aircraft including brakes and wheels, oleos, exhaust trails, oil streaks and deposits around static wicks.

Most people use a sponge to apply the liquid. Purpose-made soft bristle brushes designed for washing cars are readily available and lend themselves to aircraft washing. A recommended alternative is to spray this strong solution on to these areas with a pressurised sprayer. These are easily found in hardware stores in the gardening section.

NOTE: Implements (Sponges, brushes, etc) used on these badly fouled areas should not be used on the rest of the airframe. Use another set for general airframe cleaning. There is abrasive and potentially damaging material on these areas that you do not want transferred to the rest of the airframe.

6. Next, make up a dilution of the cleaning product at the ratio specified for general (or light) cleaning. With this, go over the entire airframe, starting at the highest point and agitating the solution on the surface with a sponge, broom or rag to loosen dirt and grime. Special brooms are available that are designed for washing trucks and coaches. They are made from materials that will not scratch or damage the surface they are being used on. On an aircraft they save a lot of bending and stretching, not to mention keeping you away from the stuff dripping off the underside of the aircraft.

All cleaning products require a bit of physical effort, despite their manufacturers' claims of miracles! Products that do not require movement or agitation on the surface are much too aggressive for aircraft use and may contain toxic substances that could end up in your liver. Let alone the damage they must be doing to your aircraft.

7. From this point on, depending on the type of airframe, the cleaning process may need to be
broken into sections, with rinsing done at the end of each section.

Again, no matter what the manufacturers claim, most detergents will leave spotting that is difficult to remove if they are allowed to dry on the surface. Non-detergent, or more rightly non-surfactant based cleaners, such as colloidal-based technology, are thankfully available that do not seem to suffer as badly from this problem. Either way move across the airframe as quickly and systematically as possible, using this opportunity to inspect the surface for any damage or defects. To complete the cleaning process re-wash the areas that were pre-cleaned with the concentrated solution. If any parts have been missed go back and reapply solution to them and rewash.

8. Lightly rinse the entire airframe using a fine spray from the hose, and if required finish off with a chamois.

9. ‘To wax or not to wax?’ Some people swear by the application of a wax or polish to their paintwork. Generally, waxing or using wax containing detergents is discouraged on aircraft. However, if you choose to apply a surface finish, be exceedingly careful to ascertain that it is suitable for and certified for aircraft use. Many polishes contain a cocktail of solvents and hydrocarbons that must never be applied to aircraft. Unfortunately in Australia there is documented evidence that the use of automotive waxes and cleaning products having caused severe damage to and have necessitated the grounding of aircraft. Some preparations also build up a film on the surface which can capture and lock in marks and blemishes, making future cleaning more difficult. Even if the product information states that it is safe for use on plastics DO NOT apply it to windscreens, canopies and bubbles, or any other plastic aircraft substrate. Again, we are faced with problems that are not a great concern in other facets of life outside of aviation. Many products can leave a film on the windscreen which will produce optical distortion or a halo effect. Both these can be very dangerous in an aircraft. Haloing causes a circular rainbow image to appear on the solid surface of the windscreen. It can be very annoying and dangerous, as it can obscure vision.

When working on a clear surface, such as the windscreen, there is a method that should not be deviated from. When rubbing with a cloth, sponge or even fingers, ALWAYS rub perpendicular to the horizon. This is extremely important. Should you unwittingly scratch the surface, you will be able to look around the scratch rather than having to try and look through it. Multiple fine scratches can produce a form of optical distortion which fortunately only have minimal effect when viewed vertically. Again, most importantly, only use transparency cleaners that are specifically designed for aviation use. Household or automotive products are not suitable for use on aircraft plastics. Additionally, generally speaking, any product in a pressurised spray can is not suitable for use on aircraft transparencies as they contain hydrocarbons and will slowly degrade the plastic. Remember that pressure pack cans must not be carried on board either.

In closing, consider that many aircraft manuals are sadly deficient in instructions for successfully washing an aircraft without causing damage to it. Likewise, do not assume that engineers or aircraft cleaning contractors have had sufficient, if any training in this area of aircraft maintenance.

Copyright – Charles D. Cheesman 2013 (+61) 412 038 193

The information contained herein is subject to copyright. This document, in whole or in part, may not be used, reproduced, stored in a retrieval system in any form, nor transmitted by any means without the express written permission of the owner.

The operations suggested in this guideline are not airframe specific. These guidelines must be read in conjunction with the relevant operations and/or maintenance manual for the airframe being cleaned. If any inconsistencies between these guidelines and the airframe manufacturers documentation are found, the airframe manufacturers recommendations must always take precedence.

Should it be found that the manufacturers documentation does not correlate with methodologies and products as suggested by this guideline, written approval from the manufacturer must be obtained before deviating from requirements as set out in their documentation.

About the Author:

Charles Cheesman is the Managing Director of Bion Systems, a company that specialises in aerospace wash bay design and wash bay equipment. He is also available as a consultant to the industry for washing procedures and training. Clients include military, RPT operators and MRO's.