



HOW CLEAN IS YOUR AIRCRAFT FUSELAGE

SUMMARY

Due to the nature and make up of aircraft paint, cleaning of the aircraft to maintain the original paint colour is not always achieved. This study looks at the various parameters involved and how to monitor paint degradation.

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Introduction

Aircraft cleaning is an important part of the maintenance procedure of an aircraft for a multitude of reasons.

- Appearance
- Drag reduction / fuel saving
- Reducing corrosion
- Prolonging paint life
- Inspection

However, cleaning has become a difficult task when considering current environmental trends whereby wet washing is being prohibited due to waste water disposal. Current trends are moving rapidly to dry washing where the dirt is removed from the aircraft surface manually onto a cloth which is then disposed of offsite. In the majority of cases, a liquid based detergent is used to solubilise the dirt, oil etc ready for wiping off. However, this method is effective if aircraft are cleaned on a regular basis. When cleaning is irregular, oil (Skydrol) will etch or stain into the paint layer which regular water based cleaners does not remove. Over time the paint will become darker. The only way to restore the paint to its original colour is to use a mild abrasive compound which removes an extremely thin layer of the paint together with the oil stains.

In the image below, the upper part of the panel has been compounded to remove the oil staining. The lower part of the panel clearly shows the paint with oil stains despite being washed with a strong approved aircraft cleaner.

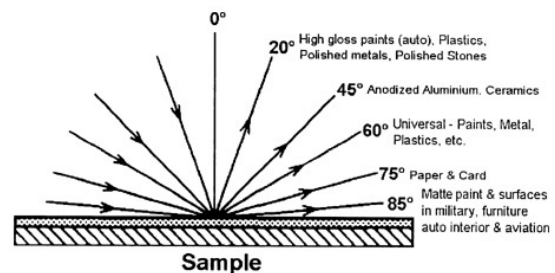


The issue now becomes, how clean is clean! Now we have to look deeper into how we determine how clean the aircraft paint is, not only surface dirt and soil, now we must include paint staining.

Generally speaking, when an aircraft is clean, the paint appears 'shiny' which is one measure, unfortunately, this will not take into account what staining has taken place. For this, we need to use a spectrophotometer which is capable of reading colour on surfaces. This will allow us to measure

the actual staining of the paint seen as discolouring. We can now look deeper into how both these properties are measured and how it can determine with more accuracy, a numerical number representing the degree of cleanliness present.

Importance of Gloss & Measurement



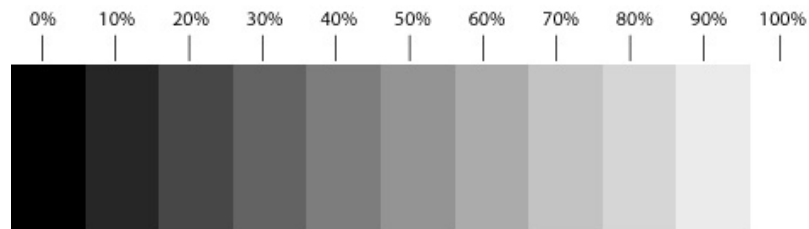
Dirt on the surface of the paint will have a dulling effect which can be measured using a standard gloss measuring device. Dirty aircraft will have a low gloss reading whereas a clean aircraft will have a higher gloss reading. There is a downside to this method, especially when working with older aircraft where the paint has become faded. The measurement of gloss of the paint surface, after a normal clean, will give an indication how faded or oxidised the paint film is which is indicative of the age of the aircraft. This must not be confused with cleaning as it is a natural process where the sunlight will cause the gloss to reduce in time.

Dirt / Oil Impregnation & Measurement

The easiest method of measuring oil staining is by measuring the colour of the paint. For this, we use a colour spectrophotometer which can read colour in Lab colour space. There are many commercially available spectrophotometers in the market, ideally a portable unit which measures the colour on a surface should be used.



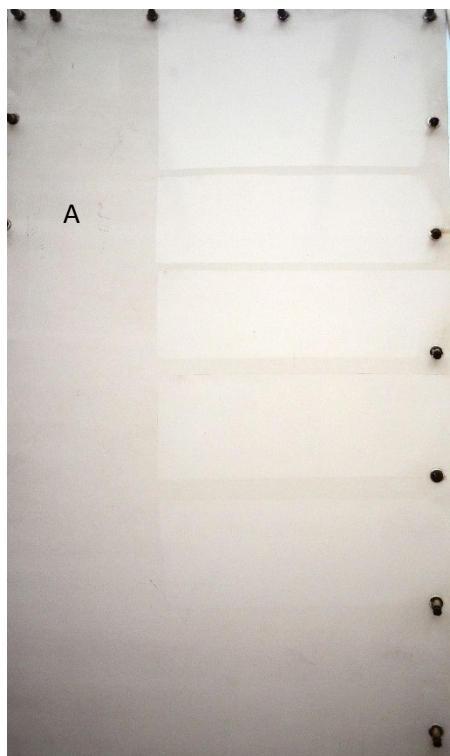
With this instrument, we can measure the lightness or darkness of the paint surface using Lab colour settings. A 'L' value only measures the brightness / darkness of the surface. A value of 100% is pure white and a value of 0% is pure black.



In time, oil (Skydrol) and dirt begin to stain the paint coating changing the actual colour. This colour change is measured. The greater the change, the more staining has occurred to the aircraft paint.

Example

In the following image, an actual inspection cover from an aircraft was cleaned with a standard, good quality water based aviation approved cleaner. All surface oil and dirt was removed. However, over time, oil staining has occurred. Using various dry wash products and application machines, the staining was removed consequently rejuvenating the paint to its original condition. Both gloss and whiteness improvements occurred.



B

C

D

E

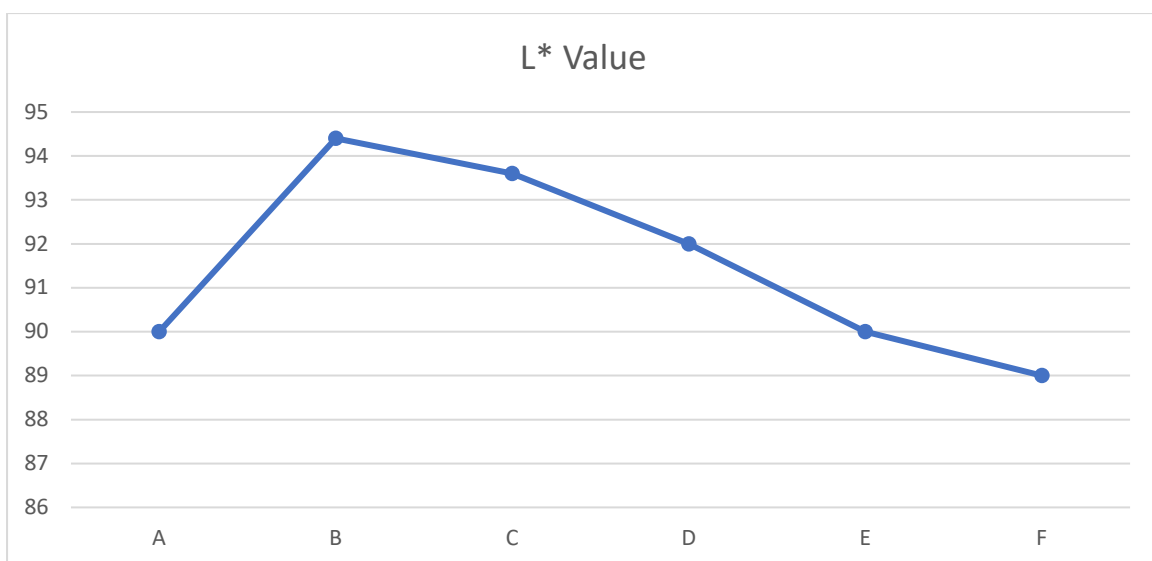
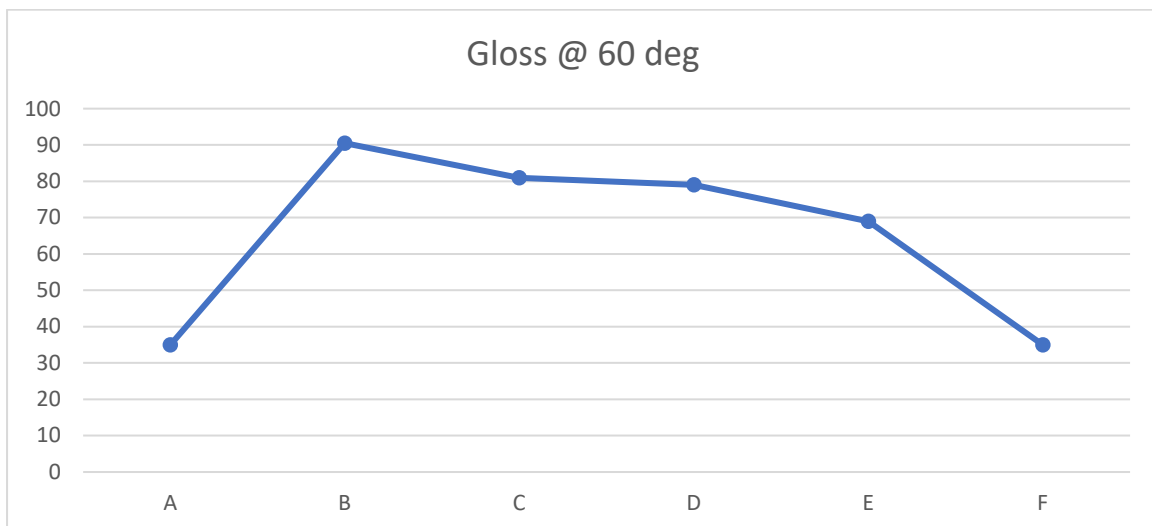
F

(The image may not show the colour variations very well if this document has been printed)

Results

In the tables below, both gloss and colour have been measured on the inspection cover above. It shows clearly that to maintain the appearance of the paint, standard cleaning chemicals are not always sufficient.

	Method	L*	Gloss 60 Deg
A	Standard Wetwash	90	35%
B	Machine Compounded	94.4	90.5%
C	NuPower Machine Compounded	93.6	81%
D	NuPower Hand Applied	93.3	79%
E	Competitor 1	92	69%
F	Competitor 2	90	35%



Note: L* value of 100 = pure white. Value of 0 = black



For further information, contact us at Fraser's Aerospace

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References.

Lab Colour Space: https://en.wikipedia.org/wiki/Lab_color_space