

RELEST® Air

Wingdur Cool Heat Reflective Primer and Top Coat

Features

- IR management top coat
- IR reflective primer
- Increased surface reflectance
- Reduced surface heat build-up
- >10% reduction in interior temperature
- Lower energy usage through lower cooling requirements
- Any color shade available
- Dark shades include Jet Black
- Longer lifetimes for coatings through reduced temperature strain

Benefits

- Reduced surface heat build-up
- >10% reduction in interior temperature
- Lower energy usage
- Longer lifetimes for coatings through reduced temperature strain

Aircraft are subjected to strong solar irradiance across the spectrum (Fig. 1). This can lead to dramatic heat build-up particularly when operating in hot climates. This effect is particularly



Image 1: Sikorsky CH-53. A perfect candidate for BASF's RELEST® Air Wingdur IR Reflective Primer/Topcoat.

undesirable in aircraft built on composite airframes as the higher temperature may contribute to accelerated aging of the matrix material and thus shorten the composite long term stability.

Surfaces pigmented with white colors reflect more of the incoming energy (Fig. 2) whereas dark surfaces heat up very strongly.

Additionally, the sun emits 58% of its energy in the form of non-visible IR radiation. This part of the spectrum, in particular the near IR range, does not affect the color of a coating. It does however contribute significantly to the heat built up of a surface if it is not reflected by pigments incorporated in the coating. Carbon black, the standard black pigment used in most color shades that are non-white,

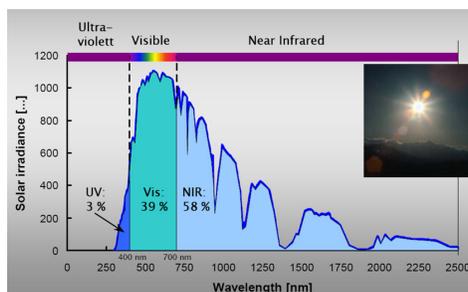


Fig. 1: Spectral solar irradiance according to ASTM G 159 (1998), air mass 1.5

absorbs energy fully and across the entire spectrum of the solar irradiance (Fig. 2).

RELEST® Air Heat Reflective Coating in Aerospace Applications

The BASF RELEST® Air Wingdur cool coating system consists of an IR Reflective Primer in combination with an IR Management Topcoat. This heat reflective coating technology with optimized spectral behaviors makes it possible to formulate dark colors that reduce the heating effect in sunlight by reflecting the near infrared (NIR) portion of the spectrum.

The system has been designed to maximize reflection of total heat from the coated surface. The key is in the combination of pigments some of which are transparent to IR radiation; others effectively reflect the IR. RELEST® Air Wingdur Cool Top Coat and Primer is the perfect solution to keep your air cabin cool.

RELEST® Air Heat Reflective Coating and Primer Features

- Increased NIR surface reflectivity means reduced surface heat build-up.
- In use on rotorcraft showed a reduction in cabin temperature by 10% (Fig. 3).
- Significant reduction in energy use through lower cooling requirement.
- Extended lifetime of coating due to reduced temperature strain.

BASF Corporation
Aerospace Team
100 Campus Drive
Florham Park, NJ 07932
E-mail: aerospace.materials@basf.com

www.aerospace.basf.com

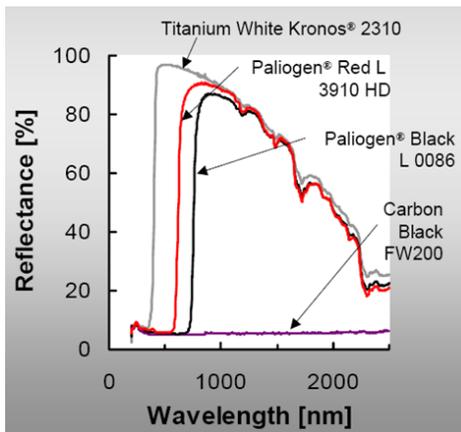


Fig. 2: BASF 'cool' pigments absorb in the visible spectrum, reflect in the NIR region: Measured in the Suntest apparatus.

NIR Reflective Pigments

BASF's IR management pigments are dark pigments that offer dramatic heat-reducing benefits. In contrast to carbon black, the standard black pigment which reflects less than 5% of the total incident solar energy, pigments used by BASF achieve total solar reflectance (TSR) values between 30% and 45% (Fig. 4).

Freedom to Custom Formulate Color Shades

The use of BASF NIR management pigments enables formulation of jet black shades. Other shades are available and can be custom formulated by the BASF Aircraft Coatings laboratory.

For optimum performance, NIR management pigments must be applied in the proper fashion to achieve maximum solar reflectance.

BASF has developed software to engineer the optimal pigment composition with the highest possible TSR for each desired color shade – an enormous advantage for our customers who save valuable time on color shade development.

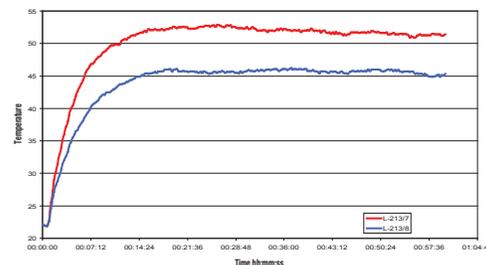


Fig. 3: Heat build-up comparison between 2 helicopters: Temperature as a function of time measured inside the air cabin. Helicopter with standard exterior coating (red line), Helicopter with BASF's RELEST® Air Wingdur IR Reflective Primer/Topcoat (blue line).

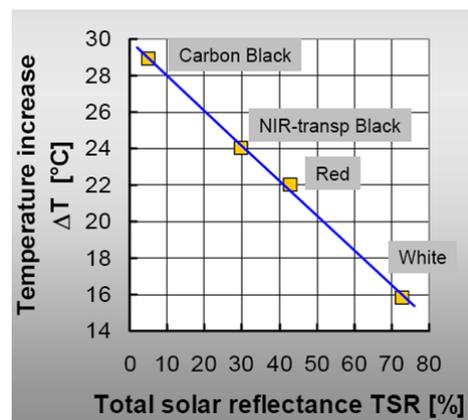


Fig. 4: BASF 'cool' black in comparison to standard pigments: Measured in Suntest Apparatus. Temperature measured by thermo element on the back of coated panel.

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