

Airlines Eye Graphics As Sustainable Alternative To Aircraft Paint

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Graphics can typically be applied to an aircraft in a day or less.

Credit: Lufthansa Group

Airlines are increasingly modifying their aircraft liveries by applying custom-designed graphic products as they focus on brand awareness and image projection. These products are a quicker, less expensive and more sustainable alternative to conventional aircraft paint.

"We have observed a growing, albeit measured, trend in the aftermarket for high-quality graphic applications, particularly among corporate operators, charter and fractional ownership models," says Tom Chatfield, CEO of Camber Aviation Management.

Chatfield says several factors are driving this trend, such as complex designs that may be prohibitively expensive or too complex to paint, but which are easily achievable with graphics.

Then there is cost efficiency, especially for temporary or seasonal branding. For those reasons, operators are drawn to the ability to apply unique liveries or event-based designs "quickly and reversibly," Chatfield says.

Others take a more conservative view of graphics demand and applications, citing a more limited market. "We have not seen a noticeable increase in demand for graphics over the past few years, but rather a greater interest in more complex paint designs," says Emmett Moran, head of operations for Europe, Middle East and Africa at International Aerospace Coatings (IAC). "We do find that graphics are used as a short-term solution for a specific promotional campaign, or within a specific geographical region," he says.

MAAS Aviation CCO Richard Marston sees an expanding use of graphics, especially in cases of high design complexity and application precision that applied paint cannot deliver as easily.

“When frequent branding changes occur or advertising or sponsor updates are required, and downtime needs to be minimized, vinyl graphics can often be applied quicker than paint can dry and cure,” he says. According to Moran, graphics typically take a day or less to apply, versus the several days it takes for paint to dry and cure.

Christopher Eyser, product manager for graphic solutions at Lufthansa Technik, is more bullish. He sees growing demand in the airline aftermarket segment for exterior decorative foil applications and technical markings using decals.

“Graphics products are no longer viewed as aesthetic add-ons, but as practical tools in cases where flexibility, speed of application, cost and operational efficiency are priorities,” he says. Use cases range from special liveries to temporary branding, as well as aircraft transitions between airlines or leasing transactions, Eyser says.

Sustainability Perks

Graphics also have a sustainability advantage over paint. Chatfield says clients are increasingly mindful of the environmental impact of traditional painting and paint-stripping processes and are exploring graphics as a lower-emissions alternative.

Graphics produce fewer volatile organic compound emissions during application, Marston says. “Waste is also easier to manage, because they are removed as solid material versus solvent disposal,” he explains. “Unlike paint, there is no need for sanding or priming, which reduces overall environmental impact.” However, Marston notes that achieving full sustainability depends on the disposal method of used films and whether eco-friendly substrates are selected.

Eyser says there is little to no solvent use with graphics and the removal of decals is generally cleaner and faster, producing less hazardous waste. In addition, he says, “avoiding a full repaint helps reduce emissions from paint booths.” While the disposal process of the decals may raise issues with plastic waste, Eyser says that more sustainable materials are becoming available from the decal suppliers.



Since little to no solvent is required to remove decals, they generally produce less hazardous waste. Photo Credit: Lufthansa Technik

Application Considerations

“There is more to applying exterior graphics than simply slapping them on,” Chatfield says. “Graphics can only be applied after a careful assessment of the surfaces on which they are intended to be installed.” As with conventional paint, applying graphics to an aircraft’s surfaces has inherent challenges in which precision is paramount, he says.

“Graphics installation on an aircraft’s complex curves and surfaces presents challenges such as alignment and stretching errors, especially around compound curves, leading edges or engine nacelles,” Chatfield says. “Surface preparation is essential—even minor contamination can compromise adhesion.”

Digital modeling and improved template-guided installations have enhanced accuracy and fit, Chatfield says. He adds that the use of modular panel-based graphics can also simplify alignment and minimize on-site errors.

As is the case with paint, IAC’s Moran notes that the graphics application process must be carried out in a clean, dust-free environment that is temperature and humidity controlled.

Eyser says recent advancements in materials technology and graphic films have improved conformability, allowing them to adhere better to the complex surfaces and curves of the aircraft geometry.

“Innovations in adhesive systems have also simplified application and de-application processes, reducing labor time and ensuring easy removal on demand,” he says. “As a result, we are able to tailor a decorative material’s adhesion to the fuselage precisely to its respective use case, such as the planned projected duration of a temporary marketing campaign. Additionally, digital printing technologies now offer exceptional resolution and color fidelity, which is important for the airlines’ branding departments.”

However, some challenges remain with the graphics installation process, especially when dealing with modern, lightweight aircraft structures that use extensive amounts of carbon fiber, such as the Boeing 787 and Airbus A350. Those structures usually come with applied paint systems, which differ from those used on aluminum surfaces, posing different application issues for decorative foils and placards, Eyser says.

“The graphic solutions team at Lufthansa Technik has already gained experience in this area and developed a process to meet the special requirements for this type of foiling,” he says.

Chatfield stresses that graphics can only be applied “after a careful assessment of the location of the surfaces on which they are intended to be directly installed.” For example, the application of adhesive graphics forward of the engine inlets is limited on aircraft with aft-mounted engines due to the risk of films becoming detached and entering the engines. “Limitations on graphics applications must also be considered when their placement may affect the operation of the aircraft, such as flight controls, flaps and overlaying windows,” he says.

Maintenance And Durability

While graphics are generally intended for short durations, the longevity of their aesthetic quality depends on a proactive maintenance approach. Exterior graphics applications can average five to seven years on wing, depending on the individual aircraft’s operational profile, such as flight hours, temperature deltas and where it is operated, Eyser says. “There are few empirical values for the lifetime, as decals are often only used for limited periods, and therefore usually never reach their lifetime limits,” he says.

Graphics are often inspected during scheduled aircraft maintenance layovers when replacement of damaged sections can be done quickly, he adds.

“Paint still offers longer-term durability than graphics and is often preferred for high-exposure environments,” Marston says. For example, he says graphics are prone to several conditions, including: vulnerability to ultraviolet (UV) degradation, leading to fading or cracking; damage from chemical exposure; edge-lifting, especially on curved or riveted surfaces; and effects of harsh weather.

“Manufacturers now provide UV-resistant coatings, as well as clear installation and cleaning guidelines. Edge sealants and over-laminates are used to improve longevity,” Marston says. “Newer materials and lamination techniques have improved longevity, especially under high-UV or abrasion conditions.”

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