



## BONDING ADHESIVES ID, HOMOGENEITY AND THICKNESS



Joining materials together via adhesive bonding is an important element of manufacturing for many products with a wide range of material compositions including metals, composites, plastics and polymers. With respect to both metal and composite bonding, the choice and selection of the correct bonding material as well as the correct bonding primer is paramount to the overall durability of the final manufactured product. It is absolutely crucial that two surfaces that are to be bonded are properly prepared, that the correct primer and bonding adhesive is selected and then actually implemented.

With the availability of the Exoscan system, it is now possible to ID bonding primer and adhesive right where the bonding process is carried out. In this manner, personnel can be assured that the correct materials were chosen for the application. Moreover, by analyzing different spots on the bonding surfaces, the uniformity of application can be ensured. A spectral library of specific bonding adhesives and primers that a manufacturing site uses can be developed and saved on the Exoscan system. Thus, when a bonding process is carried out, the technician can use the Exoscan system to ensure that the correct material was chosen, that it was not contaminated or mislabeled and that the correct amount (thickness and uniformity) is present.

In recent work carried out in this laboratory, bonding primer on titanium coupons used in aerospace applications was analyzed. Both the composition and thickness of the primer showed significant variation over the surface of titanium coupon as evidenced by shifts in the IR spectral bands as well as differences in spectral band heights and ratios. Figure 1 shows representative spectra of ideal, thick and thin layers of

bonding primer on titanium. Average band areas for the primer band near 1060  $\text{cm}^{-1}$  are shown in Table 1. A quantitative method can be built within the Exoscan software to monitor primer thickness, thus predicting the suitability for bonding.

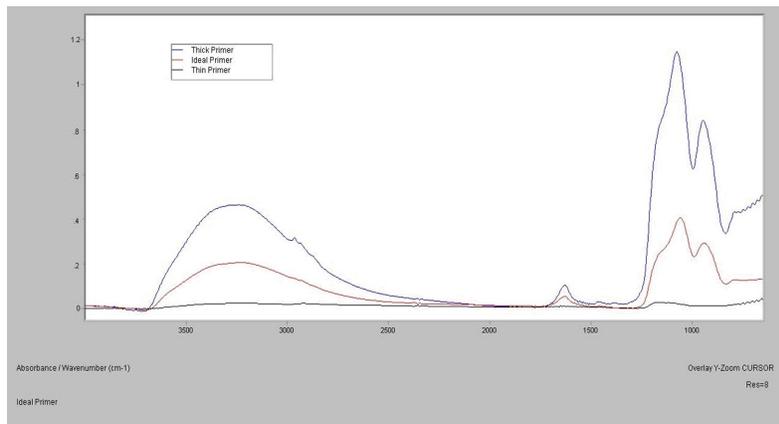


Figure 1 – Spectra collected on the Exoscan showing ideal (red), thick (blue) and thin (black) bonding primer layers.

Layer Thickness	Average Primer Peak Area
Ideal	56.8
Thick	215
Thin	1.2

Table 1 – Average peak area of primer band near 1060  $\text{cm}^{-1}$  for optimal, thick and thin samples of bonding primer on titanium measured with the Exoscan.



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