

## Onto SB1050 for adhesion promotion

Oxford Advanced Surfaces (OAS) has developed Onto™ SB1050 – a functional surface treatment that improves the adhesive bond strength in bonded systems containing engineering polymers, high performance plastic composites and other advanced materials. The treatment is designed to promote adhesion of polyurethane and epoxy adhesives. It is a practical solution to surface preparation that is simple to use and requires no specialist coating equipment.

Adhesives	Substrates
Cationic epoxy ✓	PP ✓
Anionic epoxy ✓	UHMWPE ✓
Two part PU ✓	PET ✓
Solvent-based TPU ✓	PEN ✓
	PEEK ✓
	PI ✓
	PEI ✓
	Aluminium ✓

### Adhesion promotion of polyurethane and epoxy adhesives

Onto™ SB1050 provides adhesion promotion for two-part polyurethanes (2K PU) as well as for cationic and anionic epoxy systems because its functionality is suitable for covalent bonding with epoxide and isocyanate components. Bonding via a secondary mechanism also provides adhesion promotion to thermoplastic polyurethanes. It is fully compatible with solvent borne or waterborne PU/epoxy formulations.

### Material compatibility

In many high performance products, engineering plastics, composites and metals like aluminium are increasingly being used as replacements for traditional materials like steel because they provide favourable properties including light weight, flexibility and chemical resistance. Semi-crystalline materials have excellent solvent and heat resistance and whilst these features are often advantageous it also means that these materials are extremely difficult to bond to. The problem is further compounded with manufacturers opting for greener solutions and moving to non-solvent based adhesives. If the compatibility between the adhesive and the substrate is poor, some kind of surface preparation is usually required to provide adequate bond strength in bonded assemblies.

## Onto™ SB1050: Adhesion Promotion of Polyurethane and Epoxy Adhesives

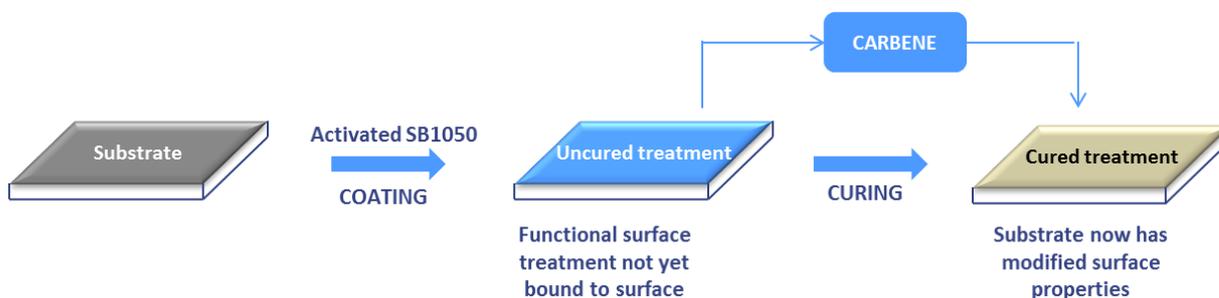
Surface preparation methods can range from hand sanding of CFRP (carbon fibre reinforced plastic) through to etching of aluminium and plasma treatment of semi-crystalline thermoplastics. All these various treatments bring different challenges into the production line such as significant investment in manual labour, high levels of capital investment and slow processes that create bottlenecks.

Onto™ SB1050 is a simple and effective wet chemistry that requires no specialist processing equipment. It can replace hand sanding, do away with aromatic hydrocarbons and speed up production.

## Processing the treatment

All Onto™ materials are precursors to highly reactive carbenes. In the unactivated form they are stable to heat and light, and therefore Onto™ SB1050 can be shipped and stored in this stable form.

Once activated, the treatment is applied using a brush. SB1050 is an alcohol/water-based formulation, but the active part is compatible with a variety of solvents, so modified formulations can be designed for integration into a particular manufacturing process if required.



A curing stage is required to generate the highly reactive carbene species, which then reacts and forms a bond to the substrate surface. This functional layer is now permanently bound to the surface, and the next stage of the process can be completed offline. This is in stark contrast to corona or plasma treatment and even some wet primer treatments, where longevity can be an issue and it is often necessary to bond the substrate within minutes or hours of treatment.

## Demonstration of Onto™ SB1050

OAS has demonstrated that Onto™ SB1050 improves adhesion to a range of advanced materials bonded with epoxy and PU adhesives.

### Processing the treatment

Sample plaques of various materials (see table) were degreased with acetone. Onto™ SB1050 was applied to the substrate using a brush to produce a coating of around 100-200nm in thickness. The curing stage was carried out using a laboratory convection oven at 115-130°C. The processing temperature can be varied to suit application and manufacturing capabilities, but for lower curing temperatures longer cure times may be required. The cure time is dependent on several factors including heating efficiency and substrate.

### Lap shear testing

Two plaques of material were bonded together with an adhesive for lap shear testing. In all cases adhesive bond failure



occurred when no surface preparation was carried out, but when Onto™ was used to treat the surface of the plaque the bond was improved to such an extent that the substrate snapped before the bond could fail.

Plaque material	Adhesive	Lap Shear/MPa No surface treatment	Lap Shear/MPa Treated with SB1050	Substrate thickness/mm
ABS	A-stage epoxy	0.6 (A)	2.7 (S)	3.0
Nylon 6,6	A-stage epoxy	2.2 (A)	6.1 (S)	6.0
HDPE	2K PU	1.0 (A)	2.7 (S)	1.6
HDPE	A-stage epoxy	0.5 (A)	2.7 (S)	1.6
CFRP	B-stage epoxy	7.9* (A)	11.4 (S)	0.8

\*Double lap shear result; (A) – adhesive failure; (S) – substrate failure

## Summary

We have demonstrated how Onto™ SB1050 promotes adhesion to various materials, and how it improves bonding of systems that are joined with PU and epoxy adhesives. It is also suitable for use on other high performance plastics and reinforced plastic composites such as PI, PEEK, PEI, PET, PEN as well as on various metals like aluminium. This treatment offers practical solutions to multiple industrial bonding challenges.

***Onto™ SB1050 is available for evaluation. To try the product or to request more information please [contact us](#).***

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