

SURFASOLVE™ PREP-WIPES

ADVANCED SURFACE PREPARATION FOR IMPROVED
ADHESION OF COMPOSITE SUBSTRATES

(Over Saturation the future of failures)

Abstract

Surface Preparation is the essential pretreatment of a composite substrate before successful long term bonds can be established. Bond performance is significantly influenced by the ability to properly adhere to the polymer substrate. It is well established that correct surface preparation is the most important factor affecting the success of surface adherence. The presence of even small amounts of surface contaminants i.e., oil, grease, dust particles etc. can physically impair and reduce bonding adhesion to a composite substrate by affecting the surface contact angle. As a general rule, acceptable bonding adhesion is achieved when the surface energy of a substrate is greater than the surface tension of the liquid being applied. In this situation, the liquid (Resin) is said to “wet out” or adhere to the surface.

The everyday challenge is to consistently and efficiently remove contaminants that are usually invisible to the naked eye. Chemical contaminants that are not readily visible inhibit the ability of a polymer to properly wet the surface because of interference to the substrate's free surface energy. SURFASOLVE Prep-Wipes use a proprietary organic non-hazardous solvent precisely impregnated on a melt blown poly propylene wiper to greatly enhance surface preparation procedures and increase surface energy.

In summary, it is very important to chemically clean a composite substrate to provide the best possible contact surface angle for bonding and increase the surface energy approximately 10 dynes/cm above the surface tension of the polymeric material being applied. SURFASOLVE Prep-Wipes represent a novel method for Surface Preparation not achievable with current solvent and rag cleaning methods.

Introduction

A common practice currently employed in the composites manufacturing industry is to apply a solvent such as acetone to a rag and wipe the surface to be cleaned.

While this has been the normal procedure for many years it is wasteful, unhealthy and very dangerous. This technique of cleaning is also very ineffective at removing dust particles and surface contaminants on composite surfaces as our research has discovered.

To better understand the best method for cleaning composite surfaces 21st Century Chemical conducted a study to determine the cleaning effectiveness of the different processes for preparing surfaces prior to bonding, adhering, coatings etc. We tested three of the most commonly used solvents in composite surface preparation, Acetone, Methyl Ethyl Ketone and Isopropyl Alcohol against SURFASOLVE Prep-Wipes.

Research Completed

From our research we gathered some very interesting information: first, the level of saturation of solvent has a significant impact on the efficacy and cleanliness of the wiped surface. The results clearly showed that when a rag was over saturated there was a direct correlation to the amount of contaminants left behind. This was further exacerbated by the fact when hand applying the solvent to rags there was no consistency in the level of saturation and the left over contamination on the surface would greatly vary.

We learned there is a very specific saturation level which offers the most efficient surface cleaning without re-depositing dirt particles; however we found it impossible to consistently re-create the same results with hand application of the solvent to the rag. Our theory on this is when the wipe is over saturated the particles are picked up in the solvent and not able to absorb into the rag. The dirt particles then get re-deposited back onto the surface being wiped because the solvent evaporates too quickly.

Another interesting revelation borne from the study was that Surf solve Prep-Wipes greatly affect the bonding surface wettability conditions of a polymer composite substrate. We noticed the Prep-Wipes were affecting its surface chemical functionality, in figure 1 we can

quickly see that the contact angle is very important for surface wetting and the lower the angle the better the wet out and spread ability of the liquid polymer to the composite substrate for bonding.

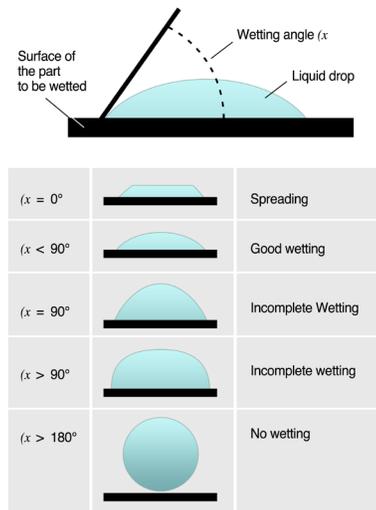


Figure 1

In the study we recorded no difference in surface energy for each of the three solvents tested after wiping. However we did see a significant difference after using the Surfaskolve Prep-Wipes.

Surfaskolve Prep-Wipes are highly oleophilic (oil loving) which allows the wipe itself to attract particles like dirt, grease, fiberglass particles, etc. Because there is a charge relationship between the wiper itself and the particles, they will not re-deposit once attracted into the wiper which holds them similar to the way north and south poles of a magnet are attracted to each other. Cellulosic rags which are typically used do not have nearly the same oleophilic behavior that Melt-Blown Polypropylene has.

Because Surfaskolve Prep-Wipes are melt-blown they do not leave fibers behind like shop rags will do see Figure 2. Notice the fibers on the left are melted together which prevents them from being broken off and depositing fibers on the surface. The fibers on the right are knitted cotton which will easily break off and deposit on the surface causing many issues.

Experiment

To show how well Surfaskolve Pre-Wipes work we conducted an experiment with traditional acetone wiping with a standard cotton rag on a freshly sanded black gel coated surface. In the experiment we used 320 grit sand

paper to simulate a typical repair.

After sanding we wiped the left side of the part with acetone on the cotton rag for 10 seconds. Then the right side was wiped with a Surfaskolve Prep-Wipe for 10 seconds also. Clearly from the pictures in figure 3 you can see the acetone still left behind gel coat dust on the left side while the Surfaskolve Prep-Wipe completely cleaned the surface of all dust and contaminants on the right side.

To prove how much dust and particulates the acetone left behind we then re-wiped each side with a new Surfaskolve Prep-Wipe with amazing results. In figure 3 you can see the second wipe on the left side used to clean after the acetone is clearly dirty with what the acetone was unable to clean. On the right side the second wipe had no particulates!

This is conclusive evidence of just how well Surfaskolve Prep-Wipes outperform acetone and rags in cleaning composites surfaces.

Conclusion

The studies unmistakably indicate the superior advantages when using Surfaskolve Prep-Wipes in preparing composite substrates prior to bonding.

Surfaskolve Prep-Wipes offer:

- Unsurpassed costs savings over any other cleaning method
- Eliminate hazardous waste rag disposal costs
- Increase worker Productivity
- Help Eliminate Bond failures due to poor surface prep
- Does not deposit lint
- Cleans almost anything from surfaces without leaving any residue when properly used
- Are very convenient
- Non-Hazardous and Non-Toxic
- Zero HAPS and Virtually no VOC's