Over-Activation

This bulletin is derived from years of experience with the technology at Dymax and working with customers and not from actual test data. This is because each company's process is unique to them and cannot be reproduced at Dymax.

Let us start off by saying, assuming the substrates remain constant and the adhesive/activator are applied using good manufacturing processes resulting in well-cured adhesive, the bond strength should remain statistically similar to the original results. The bond strength should not change statistically, unless it is subjected to conditions not originally tested or detailed to us by our customers.

Over-activated bonds are a plasticizing effect that occurs to the adhesive when it is exposed to excessive activator.

Over-activated bonds can best be observed by a number of factors:

1. Poor adhesive coverage or large air pockets void of adhesive (which could trap activator).
2. Brown adhesive in the bond area (which is caused by excessive activator in the adhesive; activator is sensitive to air and will oxidize over time and turn brown).
3. Gummy or soft adhesive (adhesive becomes plasticized from over exposure to activator resulting in an adhesive that has little to no cohesive strength).

To use an analogy to explain over-activation, if we take a plastic paint brush handle and place it into a container of oil, nothing will happen to the paint brush handle in an hour or six hours. However, over a few days that handle will become very pliable or plasticized. The same effect can be observed with our adhesives. Please keep in mind the analogy uses a container of oil versus a much smaller quantity of activator. The actual effects on the adhesive may be a day, few days, or two weeks, and is directly related to the amount of activator and adhesive, the clamping force, the adhesive coverage, the process used to apply both materials, etc.

Once the over-activated bond is experienced, there is no reversing these effects. Depending on the amount of over-activated adhesive that exists in the bond area, this may or may not have a significant impact on the overall performance. The only way to determine the actual effect would be destructive-testing the assembly, which includes recording the load it took to push out the magnet and the type of failure that occurred, i.e. substrate, cohesive, adhesive, or a combination thereof.

Determining the effects of over-activation is a challenging phenomena to answer since it depends on so many factors such as the amount of adhesive and activator, the adhesive coverage, the clamping force, the process used to apply both materials, etc. There are further subsets from each of the ones already mentioned depending on how they are answered.

Hypothetically, if the curing material was exposed, or in danger of being exposed, to excess activator, the migration of the excessive activator penetrates into the adhesive only a very small distance. Our experience and customer feedback has demonstrated that when there is complete coverage, there is a reduced risk of over-activation. On the other hand, our experience and customer feedback demonstrates that where poor adhesive coverage or trapped pools of activator in the adhesive are found, there is a greater risk of over-activation.

To avoid over-activated adhesive, please use the following good manufacturing processes:

1. Adhesive should be applied a drop, bead, or series of beads or drops to achieve 95-98% adhesive coverage. (This method of application will encourage a number of positive attributes for the resulting mixture and assembly. It will promote a good mixing action to occur between the adhesive and activator, fill any gaps that may exist, and force any contaminants or excessive activator out of the bond area.)

2. Activator should be applied to the opposite, non-porous, substrate as a thin, even film. (Typically, Dymax recommends ratios of 15-30 parts adhesive to 1 part activator).

3. Parts are pressed and clamped together to the natural (tolerances) fit of the mating pieces. The introduction of larger gaps than what was originally designed can detrimentally affect the performance and quality of the finished assembly.

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