Mixing G/flex® epoxy with other WEST SYSTEM® epoxies

By Jeff Wright

WEST SYSTEM 105 Resin-based epoxy is a very versatile system. For years, experienced users have been blending the various products in countless ways. For example, users may blend 205 Fast Hardener and 206 Slow Hardener to make a hardener with a modified cure speed. Different uses of 410 Microlight™ Filler provide a further example. Many customers assume that the only use of 410 is to make a fairing compound—it is added to thicken epoxy to a peanut butter consistency to create a light, easily-sanded filler. However, 410 Microlight can be used in other ways. Jon Staudacher in *Epoxyworks* 22 described how he applied a "runny" mixture of epoxy and 410 to fill the weave on a composite part and reduce the amount of fairing required. *Epoxyworks* 25 described how 410 was added to make a flexible epoxy that would allow hardware to be removed easily and yet would seal out water; this was needed for installing a removable hatch. As these examples illustrate, experienced customers know that by understanding the fundamental characteristics of WEST SYSTEM fillers, hardeners, and additives, they can combine and use them in unique ways for their specific application.

G/flex further expands the versatility of WEST SYSTEM 105 Resin-based epoxies. G/flex can be used with 105 Resin and one of its four standard hardeners (205 Fast, 206 Slow, 207 Special Clear or 209 Extra Slow) to modify its cured properties. For example, you may want the tough and flexible properties of a G/flex laminate, but G/flex 650 will not easily wet out the heavier fabric being used. Adding a 105 Resin-based epoxy mixture to a G/flex epoxy mixture will greatly improve the G/flex epoxy's ability to wet out thicker fabrics.

When G/flex is mixed with 105 Resin-based epoxy, the properties will reflect the characteristics of both systems. As G/flex is added to a 105 Resin combination, the resulting cured epoxy will be more flexible and able to deflect more before cracking, but it will also have slightly lower strength. With G/flex, the decrease in strength is not nearly as much as when a low-density filler is used, but the change in flexibility does affect ultimate strength. The table describes how properties will be affected when G/flex is blended with a WEST SYSTEM 105 Resin-based epoxy.

We have tested several mixtures of G/flex and 105 Resin-based epoxy in a wide range of physical tests. The blended systems have properties that are proportional to the ratio of each product in the final mixture. Experienced WEST SYSTEM users can follow their intuition to decide what ratio of each system they would like to blend together, much as they do when adding fillers. **Remember however, you must follow the correct ratio for each system when mixing any of the WEST SYSTEM resins and hardeners.**(G/flex is 1:1, 105/205 or 206 is 5:1, 105/207 or 209 is 3:1). If the ratios are correct, it's not necessary to mix each system separately before mixing the two systems together.

The same principle applies to blending G/flex with G/5 Five-Minute Adhesive. In this case you will trade flexibility and strength for cure speed in proportion to the percent of each in the mixture.

Call or email our Technical Advisors with questions or to discuss your specific application. ■

Cured characteristics of blended G/flex 650 epoxy and 105 Resin-based epoxy

More G/flex epoxy	More 105 Resin-based epoxy
More Flexibility	Less Flexibility
Less Strength	More Strength
More Elongation	Less Elongation
More Toughness	Less Toughness
More Viscosity	Less Viscosity

Definitions of the terms used in the table

See "Understanding Flexible Properties" in *Epoxyworks* 25 for a more complete discussion. *Visit epoxyworks.com to read and download past Epoxyworks articles.*

Flexibility—The flexibility of a material is described by its Modulus of Elasticity. The larger the value, the stiffer the material. It is important to remember that the stiffness is not related to the strength of the material. Stiffness is the physical property that determines how much a component will deflect when loaded.

Strength—The amount of stress a material can sustain without failing.

Elongation—How much a material stretches when loaded and is often written as a percentage of its original length. The ultimate elongation is the amount it has stretched when it fails.

Toughness—How well a material resists fracturing when it is stressed. A tough, strong material resists fracturing and is able to absorb energy. A very strong material may be brittle and unable to absorb energy while an extremely flexible material will not absorb energy because it will deform instead of carrying the applied load.

Viscosity—The resistance a liquid has to flow. This property does not affect the cured properties, but is important for application. A lower viscosity material will generally wet out a fabric easily, but will not fill a gap well in a bonding application.

