# Boat Building & Repair with Marine Epoxy Resin



## I Introduction

Greetings and welcome to the second part of our Epoxy Pro Series of Guides designed to provide information about the myriad applications of epoxy resin. We want to be more than just a provider of this premium polymer – we also want to be your go-to resource for all things epoxy resin.

Our first guide, 'The Artisans Guide to Epoxy Resin Crafts,' is available for download on our website HERE. Upcoming publications will include insight on Auto Body Restoration, Furniture Creation and Refinishing, Home Repairs and Maintenance and more. And of course, we're open to your suggestions, comments and ideas on topics you'd like to see covered, so please feel free to contact us!

## II What is Marine Grade Epoxy Resin?


Marine Grade Epoxy Resin is a two-part thermosetting polymer consisting of the adhesive (the epoxy itself) and a hardening agent that when combined, create a heated chemical reaction (hence the thermosetting part) – that provides superior bonding and strength. Formulated for structural strength for boat construction, maintenance and repair; this polymer provides a waterproof seal and excellent resistance to elements such as salt water, chemicals and other corrosive materials.

Some of the many qualities that set marine epoxy resin apart from other adhesive polymers is its ability to cure under water and retain its physical properties under prolonged water immersion. This polymer performs well under varying temperatures – resisting cracking and thermal expansion and contraction. Marine grade epoxy resin bonds to and reinforces a wide variety of substrate materials including aluminum, copper, steel, wood, metal alloys, fiberglass and most plastics.

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**III Benefits to Using Epoxy Resin for Boat Building, Restoration & Repair**

Versatile epoxy resin is a valuable tool in the marine industry as it can be used for a variety of applications; for everything from small repairs, to molding brand new hulls and decks. Unlike its predecessor, polyester resin, epoxy resin provides a much better material for today's lighter weight, thinner and more flexible hulls.

In his piece, 'Polyester or Epoxy Resin,' boat care expert Don Casey explains, "Polyester is an adequate adhesive but not as good as epoxy. As a general rule, the tensile strength of a polyester bond will be around 20 percent weaker than the same bond made with epoxy. That makes epoxy resin usually the best choice for fiberglass repair work."

Epoxy resins differ from other adhesives in other important ways as well. For instance, they feature hardeners of different speeds – an important quality for marine use. In warmer conditions, a slow hardener may be employed, giving a longer 'working time' to handle and shape the material. Conversely, a fast hardener resin may be applied in colder temperatures when a repair needs to be cured quickly.

As boat building shifted away from wooden hulls to fiberglass construction, the major components such as hulls, decks and liners were produced as fiberglass modules, that were joined once molded. Where the epoxy resin comes into play as the binding and sealing agent into which the fibers (traditionally glass or one of a variety of synthetic plastics, but more recently carbon or Kevlar fiber – see below) are laid into in the mold – which when cured become the boat components.

Technological advances in chemical engineering have led to the development of stronger and lighter composites for the construction of marine components. Materials such as carbon fiber and Kevlar have made it possible to develop lighter yet stronger hulls – a boon to the marine racing industry. The processes behind these advances may also be employed in the pleasure craft industry to great advantage as well. As the saying goes, 'a rising tide raises all boats!'

**IV Advanced Technology – Epoxy Resin Infusion**

Aside from the new materials incorporated with epoxy resin, another technological advance has been in the component production process itself. A state-of-the-art technique called 'Epoxy Resin Infusion' or 'Vacuum Resin Infusion' is being employed by boating manufacturers to craft even stronger and lighter components – and in even less time.

Traditionally, layers of glass-reinforced fiber (GRF) are soaked in resin and hand-laminated into a mold. The process is repeated until the

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desired component thickness is achieved – and once dry (cured) a solid hull, deck, or other piece is complete. In the vacuum resin infusion process, another material – foam core – is added to the process. The foam matting is cut down into small squares (but not cut apart), added to the initial layers of GRP, then covered with additional layers as well.

Then the entire mold is wrapped in an airtight bag or thick foil. Tubing is attached to facilitate air extraction thereby creating a vacuum. Epoxy resin is inserted into the mold in various locations, and due to the vacuum - proceeds to infiltrate the entire mold. This efficient process is much quicker than traditional construction methods – and ensures that the entire component is saturated – completely bonded and sealed to better ensure component integrity and strength.

The application of the vacuum resin infusion process and advanced composites to boat construction has dramatically increased the quality and durability of hulls; while at the same time decreasing weight and increasing strength. Infused epoxy provides significant performance advantages and is environmentally sound – good for boat owners – and us all! Bon Voyage!