

Boom Construction and Materials

Process – Closed-Molded Filament Winding

In filament winding, continuous filaments, called rovings, are saturated with catalyzed liquid resin and helically wound around mandrels. Typically, the fibers are fed through a mechanical device that moves up and down the length of the rotating mandrels. The resin is then cured at elevated temperatures and the finished part removed from the mandrel.

Filament winding, coupled with Waco Boom's external molding process, results in a high fiber-to-resin ratio which corresponds to an excellent strength-to weight ratio. Waco Boom's multi-axis filament winders feature CNC technology so that there is precise control over the orientation of the fibers in the boom throughout the laminate. Each boom is optimized during winding for its specific end use application to best meet the customer's specifications.

Waco Boom's unique molding technology, coupled with the mandrel, controls the internal and external dimensions of the part so that there is no need to "grind to size" afterward. Grinding the boom to meet dimensional requirements creates an inferior laminate, since the filaments have been cut and are no longer continuous. It also increases potential locations for moisture ingress into the laminate, which could become an electrical hazard over time.

Resin Matrix – Anhydride cured Epoxy

Waco Boom uses Bis-A Epoxy resin. It is coupled with an anhydride curing agent. After the boom is wound and externally molded it is cured in an oven at an elevated temperature. Epoxies typically offer much better mechanical properties over cheaper styrenated alternatives like vinylester and polyester resin systems. It is also much more environmentally friendly. Epoxy can break down with prolonged exposure to UV light, so a coating such as gelcoat or polyurethane paint must be used to protect the part.

Fiber Reinforcement – Electrical Grade Fiberglass

Electrical grade fiberglass (called E-glass for short) is a high strength, corrosion resistant, glass fiber with excellent electrical resistance. It is coated with a proprietary binder that bonds with the resin system to create the composite laminate. Tensile strengths for today's modern, boron-free fibers can surpass 300,000 psi. Fibers diameters are typically around 20 microns

Surface Coating – Gelcoat

Waco Boom uses premium marine-grade gelcoat to protect our booms from environmental degradation. Each boom is coated twice to provide the very best possible exterior surface. Our gelcoated booms can be assembled and used in the field as is, or with proper surface preparation it can be painted if desired.