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The Benefits of FRP Composites versus PVC

FRP Composites	PVC
Thermoset composites do not yield. Wear is minimized around fasteners and attachments.	Low Yield (3%) for PVC leads to rapid wear around fasteners, holes and clamping areas. Often, wear bushings are required for holes.
Reinforced FRP composites provide far greater strength for the thinner sections. Tensile strength up to 40,000 psi, and compressive strengths in excess of 32,000 psi.	Low material strengths for PVC often require much thicker and heavier parts. Tensile strength of 7,000 psi, and compressive strength of only 10,800 psi.
FRP composites are rated excellent for exposures to hydrocarbons. They are typically used for fuel lines, transportation of crude, jet fuels, etc.	PVC's poor resistance to hydrocarbons can cause rapid deterioration when used is raw river water - where spillages and exhausts from boats can provide significant levels of hydrocarbons.
FRP composites are easy to repair, reinforce, build-up or modify using proven adhesive and laminate techniques.	PVC materials are difficult to repair if damaged, or cracked during service. Damage or wear typically requires the part to be completely replaced.
FRP composites are abrasive to machine. But, with diamond and carbide tools can hold very precise and close tolerances.	PVC materials are difficult to machine, especially if close tolerances must be held. Tends to "gum-up" cutting tools. And, if cutting speeds are not correct, will burn and degrade the material.
Because of the reinforcements and availability of high impact resins, excellent impact strengths are available with FRP composites. Notched IZOD values of 20.	PVC has very low impact strength. Catastrophic failures have occurred when hit by dropped tools, impact, external loads etc. Notched IZOD value of 0.8.
Fiberglass reinforced composites are not a "favorite" food of varmints and rodents. Attacks are rare.	Varmint and rodent attacks have been extensively reported. Rats particularly seem to like to "gnaw" on HDPE and PVC.
Microbial induced corrosion of thermoset reenforced composites does not occur. See our technical paper on MIC corrosion attack.	Microbial induced corrosion of PVC is suspect, and needs further research.
FRP composites resist marine growth. The hard thermoset laminates do not provide a base that these mechanisms readily attach to. This is one of the reasons that FRP composites have captured such a large portion of the marine, boat, and yacht markets.	PVC equipment is susceptible to barnacle, mussels, and other marine life attachments.

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FRP composites retain their strength up to the heat deflection temperature of the resin. There are composite laminates in service at temperatures in excess of 400 to 600 deg. F.	PVC's physical strengths rapidly decrease at temperatures above 70 deg. F. At 100 degrees, PVC materials have lost almost 35% of their strength.
Glass reinforced composites provide excellent non-conductive properties. This is why they are used for circuit boards, electrical boxes, aerial truck booms, and as electrical insulators. Dielectric constant = 3.3. Dissipation factor = .0113	PVC materials have good electrical insulating properties at ambient temperatures. Under arc discharge environments, PVC materials will break down and degrade. Dielectric constant = 2.9. Dissipation factor = 0.18.
FRP composite laminates create fewer thermal problems at supports, fasteners, and sharp edges. The typical coefficient of thermal expansion for 60% glass reinforced composites is $6.4x10^{-6}$.	PVC has very high levels of thermal expansion which can cause failures of supports, fasteners, and machined stress points. Typical thermal expansion = $29.5x10^{-6}$.
While appearances may be affected, FRP composite laminates, after initial weathering, maintains its full structural strength and service capabilities.	PVC materials are subject to accelerated weathering and stress cracking in UV exposures.
Thermoset reinforced plastic composites have proven to provide many years of trouble-free service life; and to provide the end user's "best buy". Over 60 years of successful installations provides risk-free comfort to the end user.	What is the cost of replacement - if the PVC construction proves not to be the correct material for the service environment, application, and strength requirements? Even though it may have the lowest initial cost - will PVC provide the end user their lowest cost per year of service life?