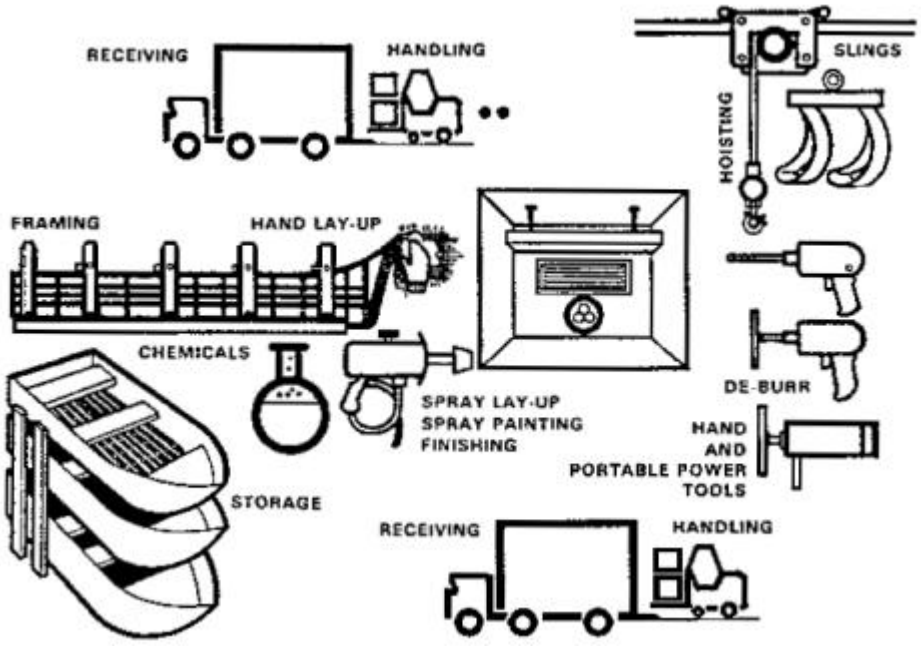
	NORTH CAROLINA DEPARTMENT OF LABOR	**No. 37-2**
	OSH DIVISION	**Date: 10/2009**
	OSHNC INDUSTRIAL DATA REPORT	**Pages: 4**

Industry: **Transportation Equipment**	Sub-Group: **Boat Building and Repairing**
SIC: **3732**	NAICS: **336612**

PROCESS DESCRIPTION: Most boats are built and repaired with fiberglass reinforced plastics. The simplest and most popular production methods employ a single cavity female mold. Layers of fiberglass mat or cloth are impregnated with a liquid polyester resin and cured to hard structural forms without pressure at room temperature. The two methods used are called HAND-LAY and SPRAY-UP. In HAND-LAY UP liquid polyester resin is combined with glass fibers. A chemical reaction initiated by a catalytic agency hardens the resin into a strong, light final part with the resin serving as the substrate and the fibers reinforcement. This is similar to pouring concrete over steel rods. In fabrication, an open or positive mold is made. The fiberglass and resin are placed in or on the mold and entrapped air is removed by use of squeeges or rollers. Layers of resin and fiberglass mat or cloth are added to build up to the design thickness. If a high quality surface is desired a gel-coat surfacing resin is applied on the mold prior to Lay-Up. Lay-Up normally cures at room temperature but heat may be used to accelerate the cure. The exposed side is generally rough. It can be made smoother by wiping on cellophane or other suitable films (mylar or polyvinyl alcohol).

In the SPRAY-UP process fiberglass and catalyzed resin are simultaneously deposited in a mold from special spraying equipment. roving, a loose fiberglass cord, is fed through a chopper and into a resin-catalyst stream for deposit in or on a mold. Resin-Catalyst may be combined in a single spray gun or from two guns with streams which intercept. Glass resin mix is then rolled with a hand roller to remove the entrapped air, lay down fibers and smooth the surface. The part is then air cured which can be accelerated with heat. One surface is smooth, the other rough. Fiber patters is visible on both sides unless gel coat is employed. The last stage of production is to finish the boat or hull. This consists of removing any flash, raised fibers, sharp edges and corners; painting; adding boat trim and preparing for shipping. Involved are grinding, sawing, spraying or hand touch up, and drilling and buffing as required to meet builders' specifications.

PROCESS FLOW:



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Hazards Analysis

Major Hazards			Other Hazards		
Location	**Item**	**Hazard**	**Location**	**Item**	**Hazard**
Storage and mixing areas	Catalysts	Highly flammable and explosive	Throughout	Buckets and pails	Vapors and concentrations of catalysts, accelerators and styrenes
	Accelerators	Toxic			
	Styrene	Toxic vapors, flammable and explosive when mixed with air; explosive limits:		Drills, saws, grinders and buffers	Fire and explosions
				Hoists carts and dollies	Spark source
				Fans and ventilation equipment	Spark source, enclosed belts placed so that no residue can accumulate from spraying or grinding
				Electrical equipment	Electrical shock, electrocution
Process or manufacturing area	Styrene monomers	Same as listed in storage except open exposure or spraying increases the danger			
	Equipment spray guns	Heavy amounts of flock and spray creating eye, skin and inhalation hazards			

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Key OSHNC Standards

Reference	29 CFR 1910 — General Industry Standards
ANSI B30.6	Overhead underhung hoists
Subpart D	Walking and working surfaces
Subpart E	Means of egress
Subpart I	Personal protective equipment
Subpart S	Electrical
1910.94	Ventilation
1910.106	Flammable and combustible liquids handling and storage
1910.107	Spray finishing with flammable and combustible liquids
1910.151	Eyewash and emergency showers
1910.176	Handling materials
1910.178	Powered industrial trucks
1910.179	Overhead and gantry cranes
1910.1000	Air contaminants
1910.1200	Hazard communication

Inspection Analysis

The inspection should begin in the receiving area by noting chemical storage. Catalysts and accelerators must be separated. No mixing may take place in the storage area. The storage are must be well ventilated and with proper electrical equipment installed. The catalysts must be stored and handled correctly to avoid explosion from impact. Employees must wear the proper respirator and must wear protective clothing. Work areas must be kept free from residue build up. All tools must be non spark producing. Wiring must be installed in accordance with Subpart S - Electrical. Walls and ceilings must be of noncombustible or nonflammable construction. Electrical grounds must be checked throughout the plant. Water flushing facilities for the eyes and skin must be available. Open cans, pots and containers must not be larger than required for immediate use.

Other Pertinent Comments: The inspector must be familiar with the terms used in the boat building industry. Employee training about the hazards involved in fiberglass products must be stressed.