



## **Topic Hub: Ship Building & Repair    Subsection : Operations**

Common shipyard processes and operations include abrasive blasting, coating application, oil transfer operations, bilge and tank cleaning, operation of diesel and gasoline engines, boiler operation, fiberglass lay-up and service of refrigeration units. These processes are described in further detail below and have been highlighted because they have the ability to impact the surrounding environment.

### **Abrasive Blasting**

Abrasive blasting is a mechanical surface preparation method performed to remove surface contaminants to provide enhanced coating adhesion on surface substrates. Common contaminants that blast operations are trying to remove include mill scale, rust, salt, dirt, oxidization, and/or flaked coatings. Common blasting materials used in shipbuilding and repair are: copper slag, coal slag, steel grit and shot, aluminum oxide, garnet, walnut shells, and silica sand.

### **Marine Coating Application**

Applying coatings for protective and aesthetic purposes is another main operation at shipyards. Coatings are applied to certain specifications to achieve desired protection. Anti-fouling coatings are among the types of coatings used to finish the hulls of boats. These anti-foulants typically have high levels of heavy metals and other organic growth inhibitors.

### **Bilge and Tank Cleaning**

The ship repair industry usually has to empty bilge tanks prior to conducting repairs. The oily bilge water must be handled properly.

### **Internal Combustion Engines**

Ships have massive internal combustion engines. Typically, engines are not viewed as "process" that generates waste. However, scientific data concerning global warming and the role of NO<sub>x</sub>, SO<sub>x</sub> and fine particle emissions from engine combustion has made this component of a ship something to consider when identifying environmental concerns at a shipyard.

### **Fiberglass Lay-Up**

Some shipyards use fiberglass lay-up techniques to create fiberglass reinforced plastic parts for the ship. For more information on this topic, go to the [Fiberglass Topic Hub](#).

### **Refrigeration Service**

Ships typically have extensive refrigerated distribution systems. Refrigeration systems often contain chlorofluorocarbons, which can react to stratospheric ozone to reduce protection from ultraviolet radiation.

### **Metal Working Operations**

Many shipyards across the U.S. have their own, on-site metal fabrication and machining shops. These facilities are responsible for manufacturing the sub-assemblies and steel plate that are required in building and repairing a ship. For more information on this topic, go to the [Metal Fabrication and Machining Topic Hub](#).

## **Pollution Pathways**

Due to the fact that shipyards are located at the meeting of land, air and water, there are multiple pathways for pollutants to enter the surrounding environment. This makes the identification of pollution pathways in the shipyard important because materials and waste can move quickly via multiple routes to the various environmental media where they can result in pollution.

Shipyards pollutants may have both direct and indirect pathways to air, land or water. A direct pathway is a pathway from the source of the pollutant to the media without an intervening media. For example, dust from abrasive blasting operations going directly in to the air at the point of generation is a direct pathway. An indirect pathway is a pathway that involves one or more additional steps to reach an environmental media. For example, the dust from abrasive blasting operations falls out onto the land where it settles. A rainfall then washes the dust down a storm drain to the water where it is deposited in the sediment next to the shipyard. In this example, the pollutant (dust) went by way of



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the land before arriving in the water and ultimately settling in the sediment.

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