Here's a clear method statement for vessel propeller installation (covers both Fixed Pitch Propeller (FPP) and Controllable Pitch Propeller (CPP) in a practical, shipyard/repair style):

⚙️ Method Statement: Vessel Propeller Installation

1. Scope

This procedure covers removal and installation of:

Fixed Pitch Propeller (FPP)

Controllable Pitch Propeller (CPP)

Applicable for dry dock / afloat (if conditions allow).

2. Safety Precautions

Lock- Obtain Permit to Work (PTW)

out / Tag-out (LOTO) main engine

Ensure shaft cannot rotate (shaft locking device engaged)

Use proper PPE:

Helmet, gloves, safety shoes

Eye protection

Lifting tools must be certified

Ensure clear communication during lifting

3. Tools & Equipment

Hydraulic jacks / pullers

Chain blocks / crane

Torque wrench

Dial gauge (for runout)

Feeler gauges

Propeller nut spanner / hydraulic nut tool

Dry ice or heating equipment (for shrink fit)

Marking tools

4. Pre-Installation Checks

Inspect:

Shaft taper condition (no scoring/damage)

Key and keyway condition

Propeller bore

Clean:

Remove rope guard and clean sticky vernicle, oil, debris

Check matching marks (shaft & propeller)

Verify dimensions and tolerances

5. Installation Procedure (FPP)

Step 1: Preparation

Apply thin layer of oil or approved compound on taper

Insert key into shaft keyway

Step 2: Propeller Mounting

Lift propeller using crane

Align keyway with shaft key

Slowly push propeller onto shaft

Step 3: Fitting Method

Two methods:

A. Hydraulic Push Method

Use hydraulic jack to push propellers

Monitor axial movement

B. Heating Method

Heat propeller hub (if required)

Install quickly onto shaft

Step 4: Nut Installation

Install propeller nut

Tightening to specified torque

Lock nut (locking plate / pin)

Step 5: Final Checks

Measure propeller position (forward/aft)

Check runout using dial gauge

Ensure no gap between hub and shaft

6. Installation Procedure (CPP)

Step 1: Preparation

Check internal mechanism (blade system)

Ensure hydraulic oil passages are clean

Step 2: Hub Installation

Mount hub onto shaft taper (like FPP)

Install key (if applicable)

Step 3: Hydraulic Connections

Connect oil distribution system

Ensure seals and O-rings are properly fitted

Step 4: Blade Installation

Install blades one by one

Secure bolts with correct torque

Step 5: Pitch Testing

Operate pitch control system

Check:

Smooth movement

Full ahead / astern pitch

No leakage

7. Alignment & Measurements

Check:

Shaft alignment

Propeller clearance

Measure:

Axial position

Runout (radial & axial)

8. Testing & Commissioning

Rotate shaft manually

Check for abnormal noise

Perform:

Harbour trial

Sea trial

Monitor:

Vibration

Temperature

Oil pressure (CPP)

9. Documentation

Record:

Torque values

Measurements

Test results

Obtain class/inspection approval

10. Common Mistakes to Avoid

Improper taper cleaning

Wrong key fitting

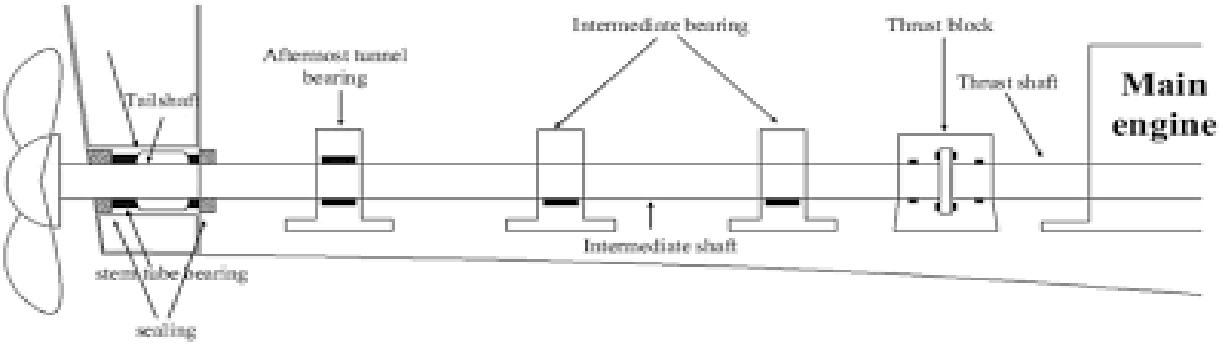
Uneven tightening

Skipping runout check

Poor hydraulic sealing (CPP)

1. THRUST SHAFT & THRUST BLOCK

1. TYPES OF PROPELLER SHAFT



The ship engine is connected to the propeller via different shafts connected, which can be named as:

- Thrust Shaft
- Intermediate Shaft
- Tail Shaft

2. THRUST SHAFT

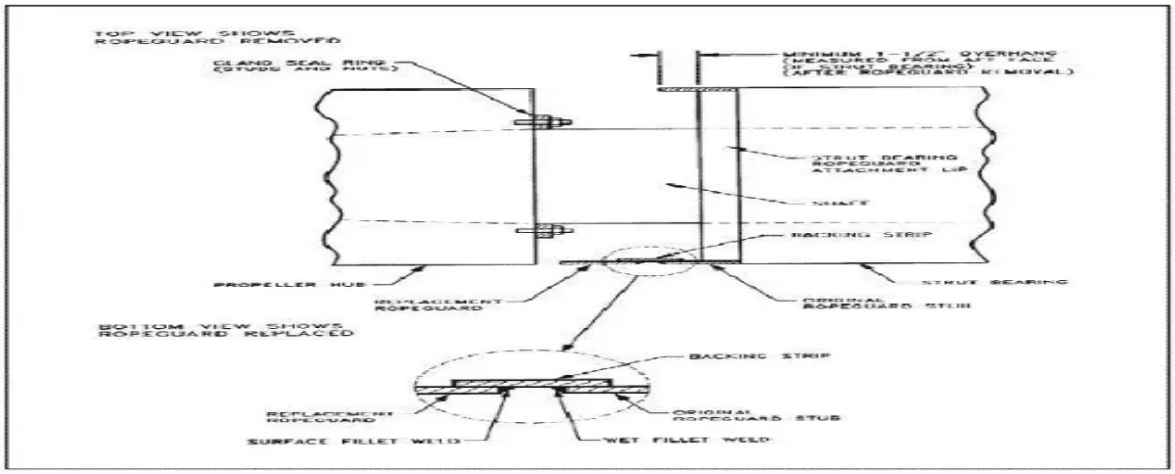
The crankshaft of the engine is first connected to the thrust shaft which passes through the thrust bearing whose main function is to transfer the thrust to the ship's structure. The casing of the thrust bearing is similar in construction to that of main engine bedplate and the bearing is lubricated by main engine lubrication system oil. The material of the thrust shaft is usually solid forged ingot steel.

Propeller Removal & Installation

During a propeller replacement, the fairwater system must be removed and reinstalled. Tasks include taking accurate measurements, checking preservatives, and removing and replacing components.

Welded Rope Guard Removal.

The preferred method of removal can be accomplished if sufficient space exists between the forward face of the propeller hub and the aft face of the strut bearing to leave a 1-1/2 inch overhanging stub from the existing rope guard while still having access to the propeller gland seal ring studs and nuts. If the entire existing rope guard must be removed, then material sampling of the strut bearing is required to determine weld rod requirements for reattachment.



Mooring winches

Mooring winches secure the shipboard end of mooring lines, provide for adjustment of the mooring line length and compensate for changes in draft and tide. General requirements for shipboard mooring winches are dealt with within ISO Standards 3730 and 7825.

Winches can be categorized by their control type (automatic or manual tensioning), drive type (steam, hydraulic or electric), by the number of drums associated with each drive, by the type of drums (split, undivided) and by their brake type and brake application (band, disc, mechanical screw, spring applied).

- **Automatic tension mooring winch**, self-tension winch – Winches designed to heave-in automatically whenever the line tension falls below a certain pre-set value. Likewise, they pay out if the line tension exceeds a pre-set value. The use of the self-tension winches is not recommended except for mooring deployed at 90° to the ship axis.

- **Manual tension mooring winch** – Manual winch always requires a person to handle the controls for heaving or rendering.

- **Non-split drum mooring winch** – The undivided drum winches are commonly found on smaller ships. It is often difficult to spoil and stow the wire on such a drum satisfactorily; when wires are handled directly off the drum, the final turns of the outer layer when under tension tend to bite into the lower layer. This could result in possible wire damage and difficulties when releasing the line. To reduce this problem, the winch with non-split drum should be placed at a sufficient distance from the fairlead to ensure that the wire can be properly spooled.

- **Split drum mooring winch** – A winch with a drum divided by a notched flange into a tension line storage section.

General Overview of Types of Pumps on Ship

Comprehensive guide to all types of pumps used on vessels for operations

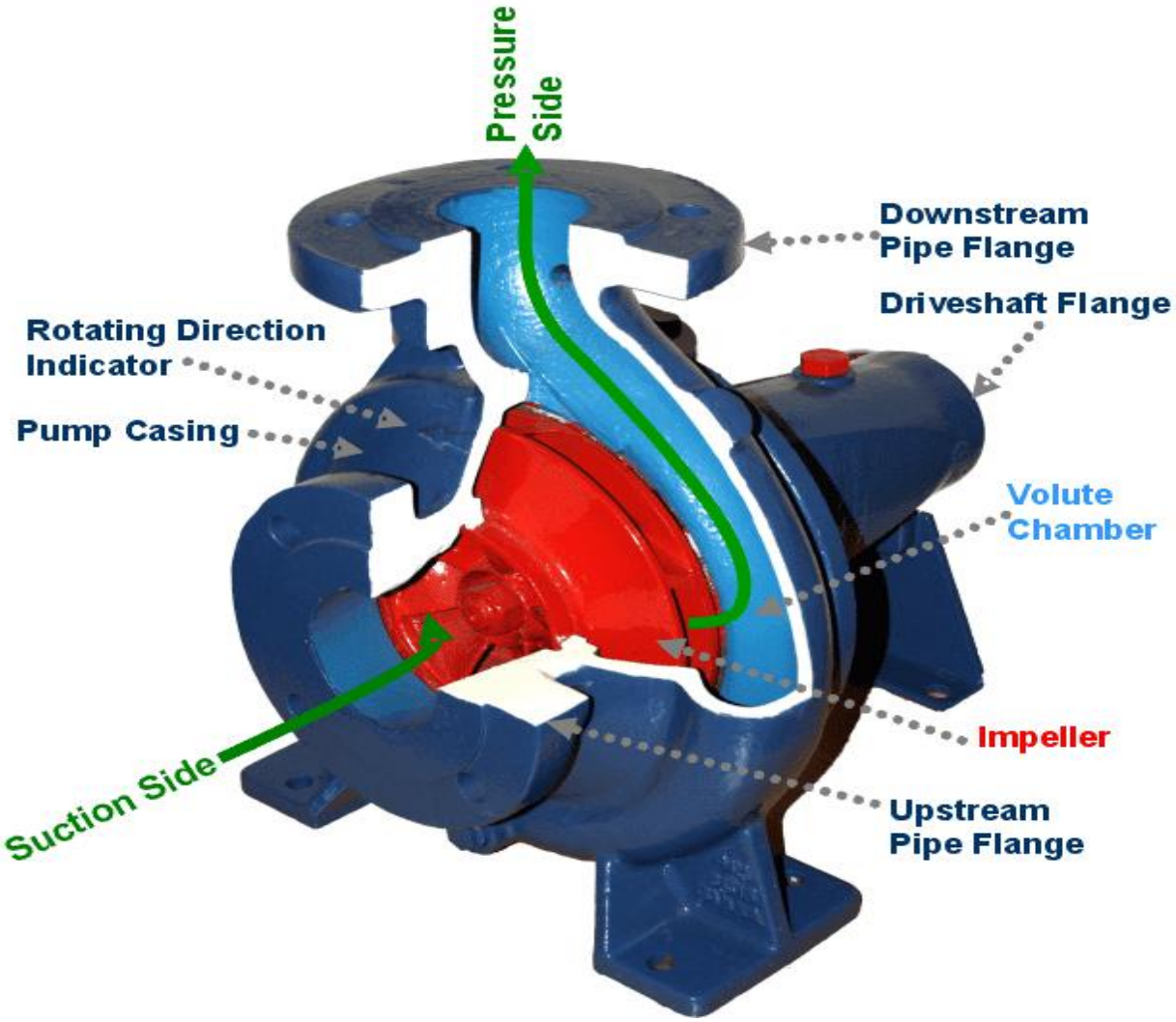
- Introduction: Pumps on Ships.
- Positive Displacement Pumps.
- Centrifugal Pumps.
- Centrifugal Cargo Pumps.
- Hydraulic Motor-Driven Submersible Cargo Pumps.
- Vertical Deep-Well Cargo Pumps.
- Electric-Motor-Driven Submersible Cargo Pumps

Positive Displacement Pump

Positive displacement pumps are self-priming pumps and are normally used as priming devices.

- They consist of one or more chambers, depending upon the construction, and the chambers are alternatively filled and emptied.
- The positive displacement pumps are normally used where the discharge rate is small to medium.
- They are popularly used where the viscosity of the fluid is high.
- They are generally used to produce high pressure in the pumping system.

Dynamic Pressure or Roto-Dynamic Pump.



- In dynamic pressure pump, during pumping action, tangential force is imparted which accelerates the fluid normally by rotation of impeller.
- Some systems which contain dynamic pumps may require positive displacement pumps for priming.

- They are normally used for moderate to high discharge rates.
- The pressure differential range for this type of pumps is in a range of low to moderate.
- They are popularly used in a system where low viscosity fluids are used.

These broad classification of pumps are further differentiated by their constructional properties and popularity of usage onboard ship;

Positive Displacement pump:

- Reciprocating Pump
- Screw pump
- Gear pump
- Piston pump
- Ram type pump
- Vane pump

Dynamic pressure pumps:

- Centrifugal pumps
- Axial flow pumps
- Submersible pump
- Centrifugal-axial (mixed) pump.