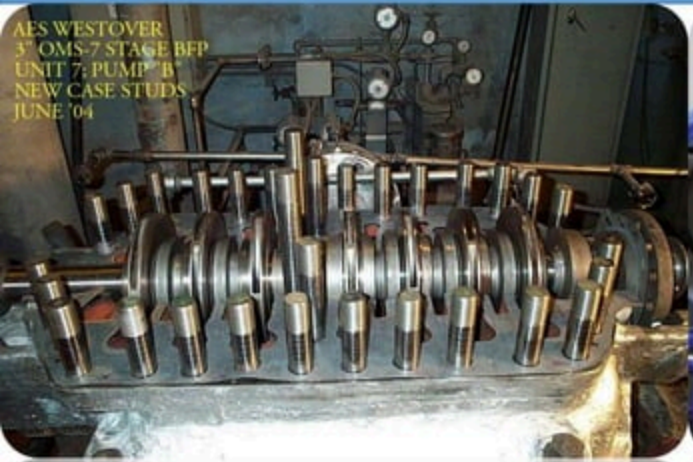
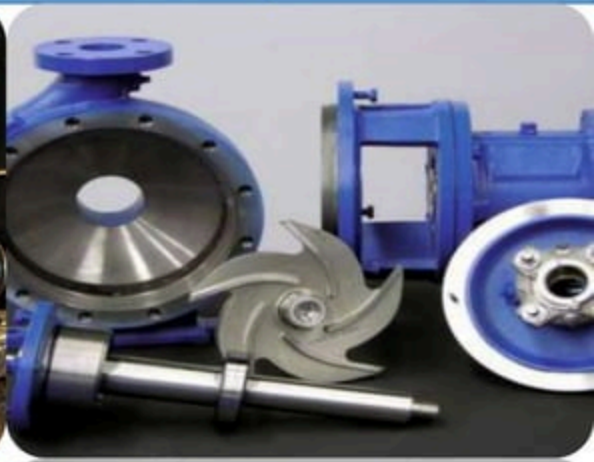
Maintenance Of Pumps





Hammad Akber
GTE

Introduction:

- Pump*: is a machine that converts mechanical energy into fluid energy, the fluid being incompressible.*

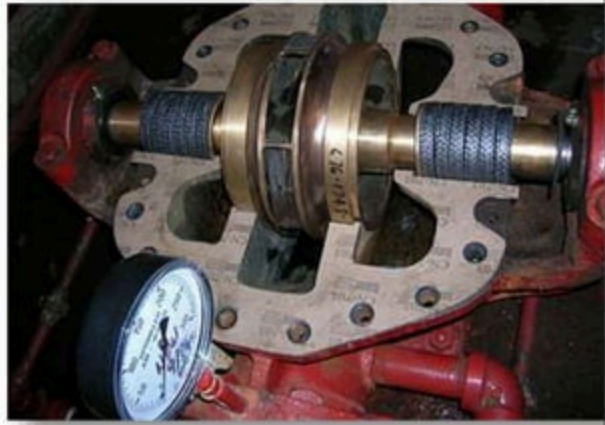
- Types: Following are the 2 basic types.
- Dynamic: Centrifugal , Axial.
- Displacement: Reciprocating & Rotary.

MAINTENANCE PHOILOSOPHY:

- Maintenance is done on to the machine in order to improve system reliability. Maintenance may be :
- Preventive
- ✓Predictive (Conditional Monitoring)
- ✓Periodic
- Break down
- RCM

PUMP MAJOR COMPONENTS:

- Shaft
- Impeller
- Wear Rings
- Stuffing Box
- Diffuser Casing
- Bearings



Shaft Run Out

- Runout checks are made to determine out of roundness conditions (eccentricity) in a shaft. Whether shaft is concentric or not ?
- Runout occurs due to:

a) Machining Process

b) Dents from handling.

c) Rust patches.

d) Rotor bow / sag due to thermal effects, gravity, or other influences/loads.

e) Defective or worn bearings in the machine or lathe supports

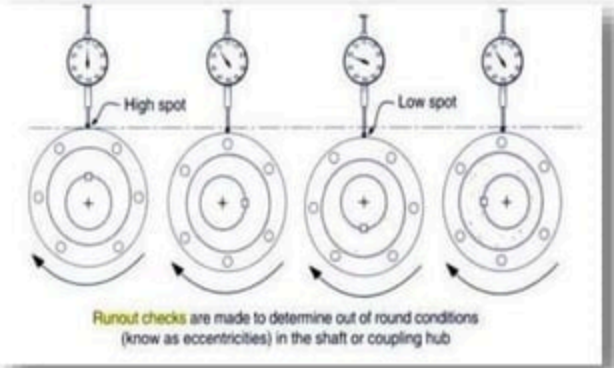
Cont'd

- Moderate to excessive run out will create moderate to excessive vibration within a pump
  (may cause rubbing).
- Firstly shaft itself is checked and then along with its attached components (wear ring , impeller etc.)
- Dial Indicator is attached on axially given points. Variation in readings indicates:

Balancing & Float Check

- Balancing of a rotor is carried out to eliminate the vibration.
- Balancing correction weights may eliminate the dynamic forces but they will not resolve the eccentricity issue.
- Correction weights may added or material may remove for the balancing.
- FLOAT

Cont'd

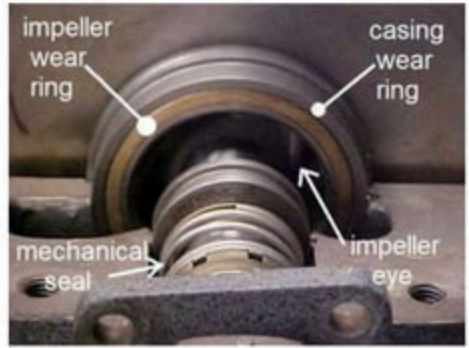


Runout checks are made to determine out of round conditions
(know as eccentricities) in the shaft or coupling hub

BACK

Wear Ring Clearances:

- Wear ring provides close clearances to minimize leakage from the discharge to the suction of the impeller.
- As the wear ring wears with use , leakage will gradually increases , effecting the pump efficiency.
- The gap is destroyed if there is misalignment or shaft deflection.
- Clearances is taken through the Feeler Gauge.
- Material : SS or Bronze



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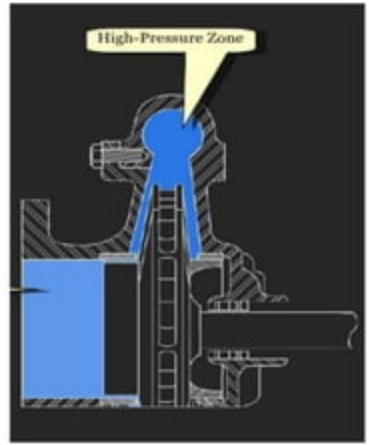
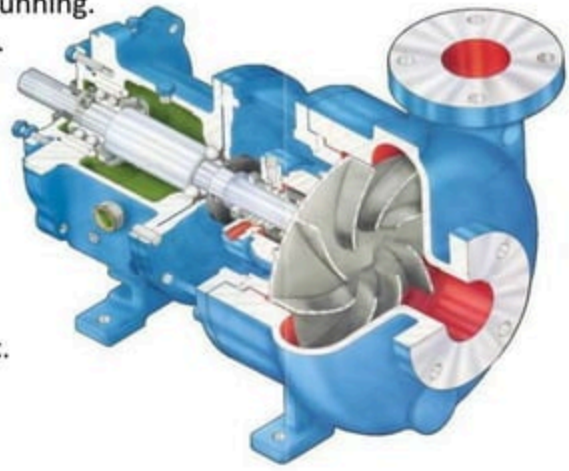


BACK

BEARING

- Providing Support to a shaft for smooth Running.
- Lubrication prevents metal-metal contact.
- Thrust Bearings are used to compensate/bear axial load.



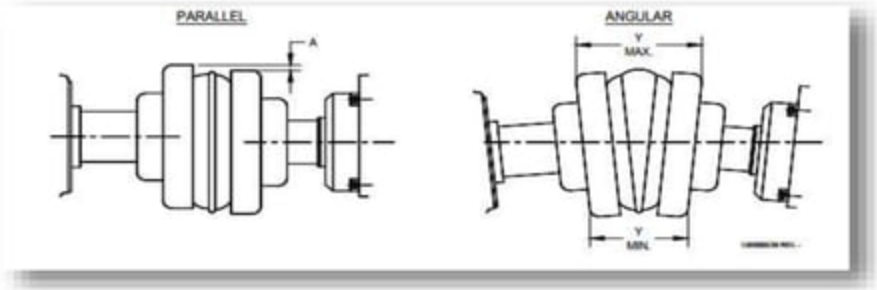
Bearing inspection is very important during Pump maintenance.

Causes of Bearing Failure:

Flaking , Spalling , Rust & Corrosion, wear , Babbit metal remove , loss of lubrication etc.

Shaft Alignment

- **Shaft alignment** is the process to **align** two or more **shafts** with each other to within a tolerated margin. It is an absolute requirement for machinery before the machinery is put in service. Therefore pump and motor shafts are aligned before they put into service.
- Misalignment between the pump and drive can result in premature bearing failure or other damage.



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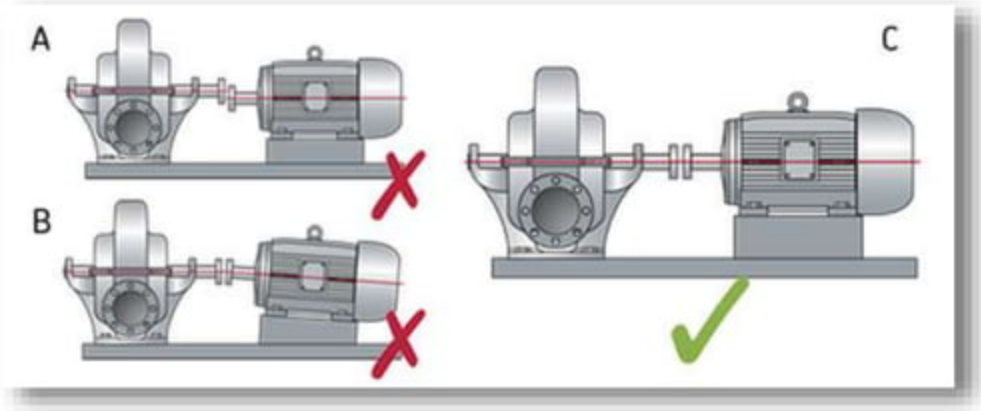
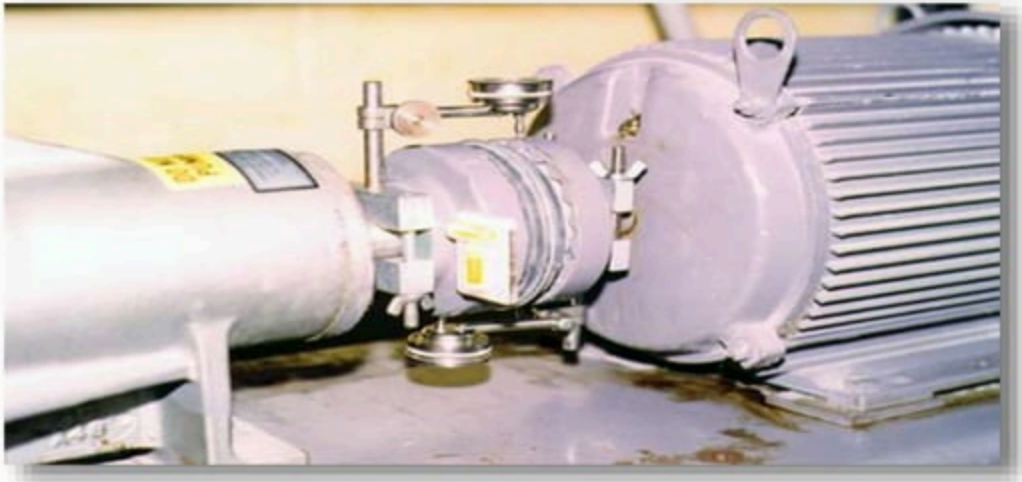


Shaft Alignment

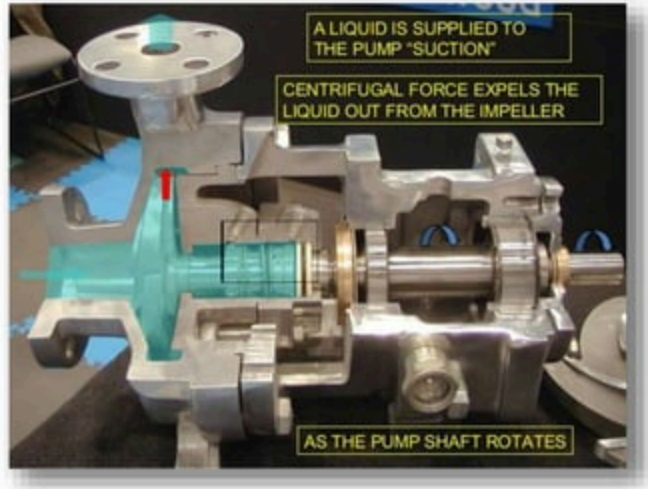


Inspection During Maintenance:

- Pump Impeller.
- Mechanical Seal.
- Gland Packing.
- Shaft Sleeve.
- Relieve Valve.
- Pump Element (PD).

Mechanical Seal

- Seal may fail due to lack of lubrication. Due to which temperature rises at the sealing faces that will damage the elastomer part of the mechanical seal.
- Pump Vibration. Vibration imparts forces on each part of the seal components. Vibrations may be due to worn bearings.



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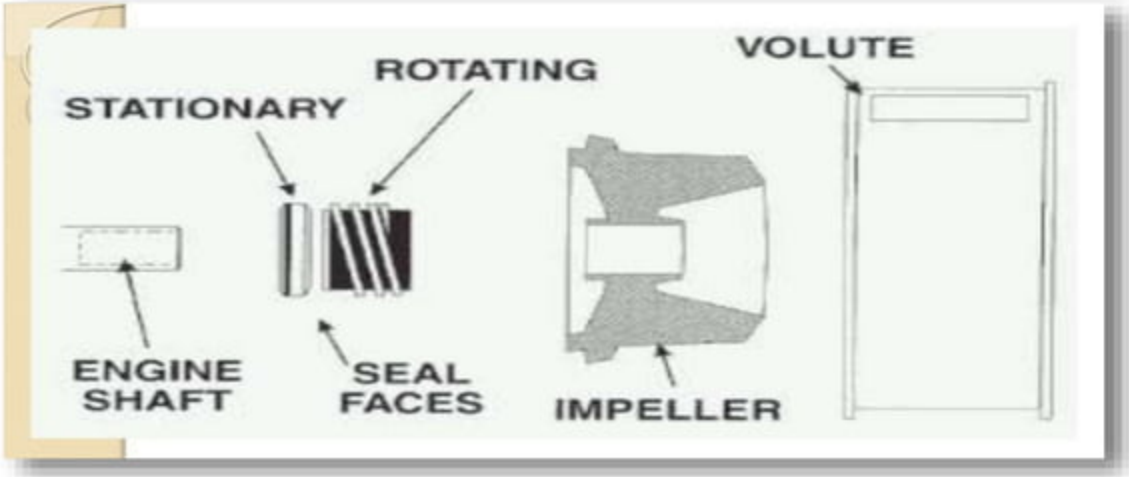
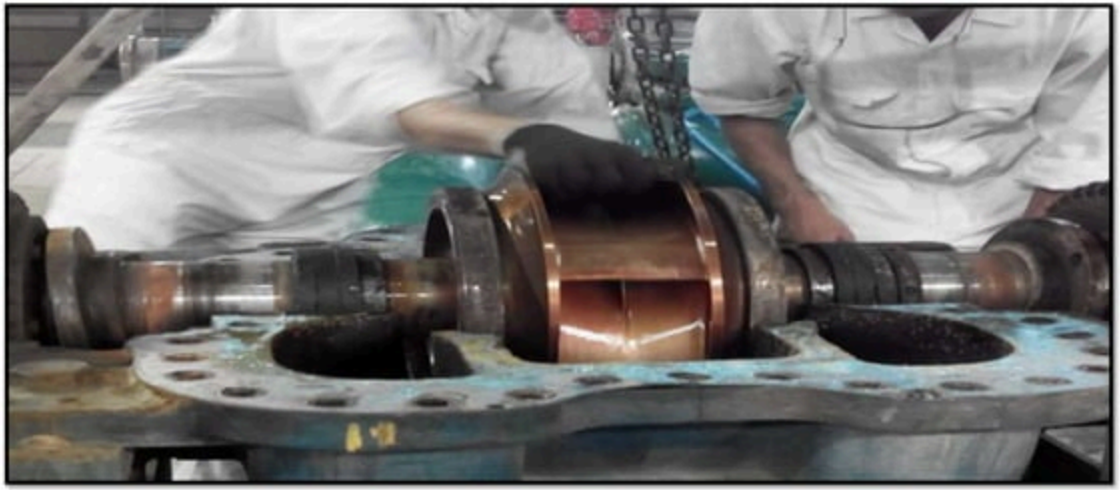
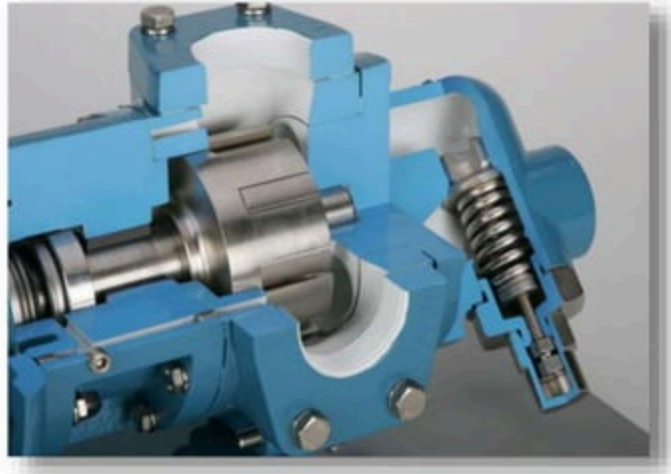

VOLUTE
ROTATING
STATIONARY
ENGINE SHAFT
SEAL FACES
IMPELLER

Gland Packing

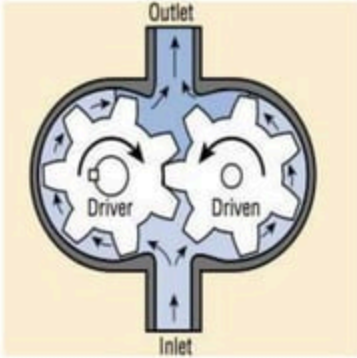


Relieve Valve

- During Pump Maintenance relief valve is overhaul for cleaning and inspection purpose.
- Checking spring stiffness etc.



Pump Element Inspection




Thank you!

QUESTIONS