# The Basics of Lubricants and Coolants

Sr. Instructor/STC/NBQ

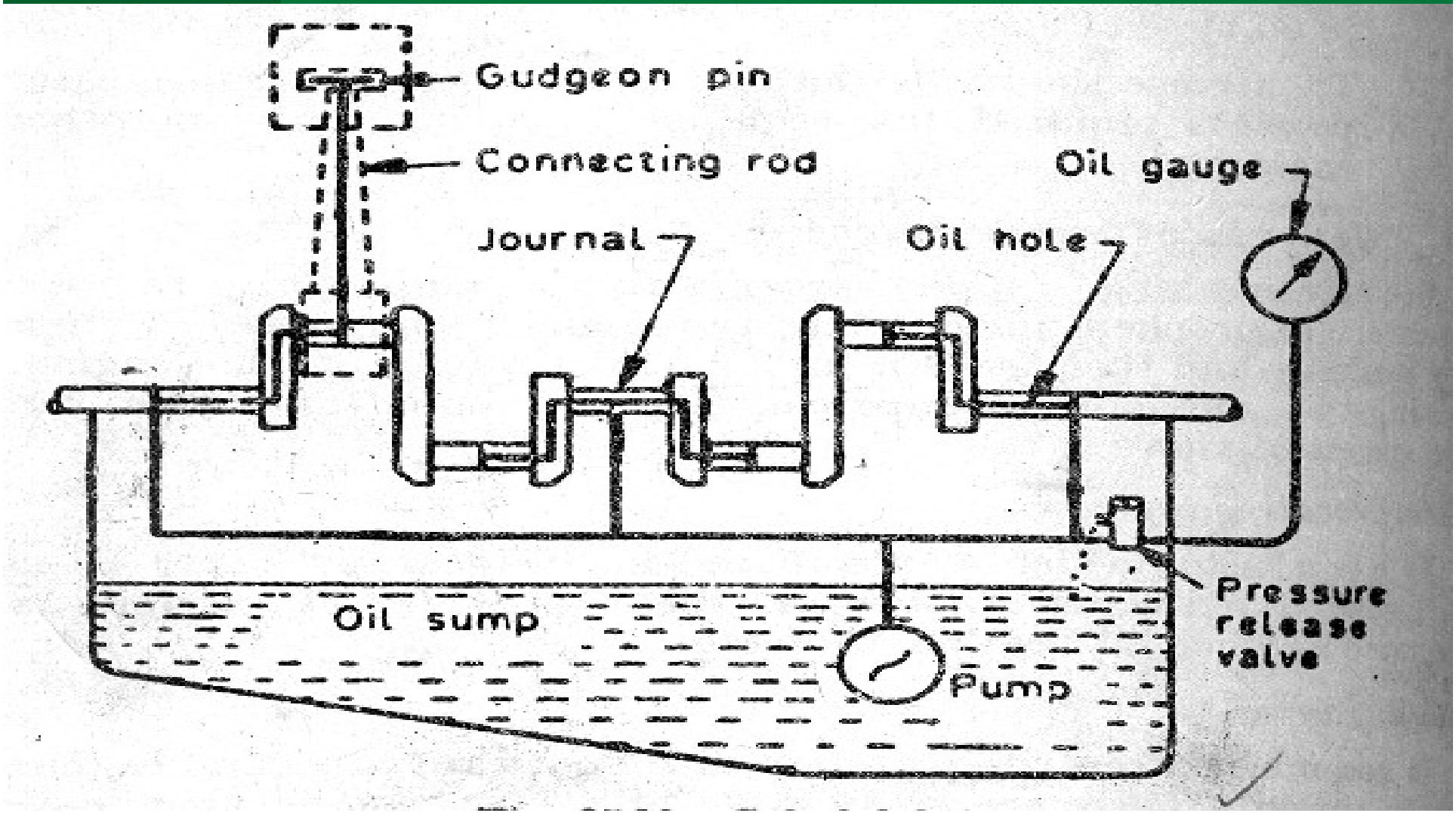
# Meaning of lubrication

- The process or act of **putting the lubricant at places of friction between different parts of machines** is called lubrication.

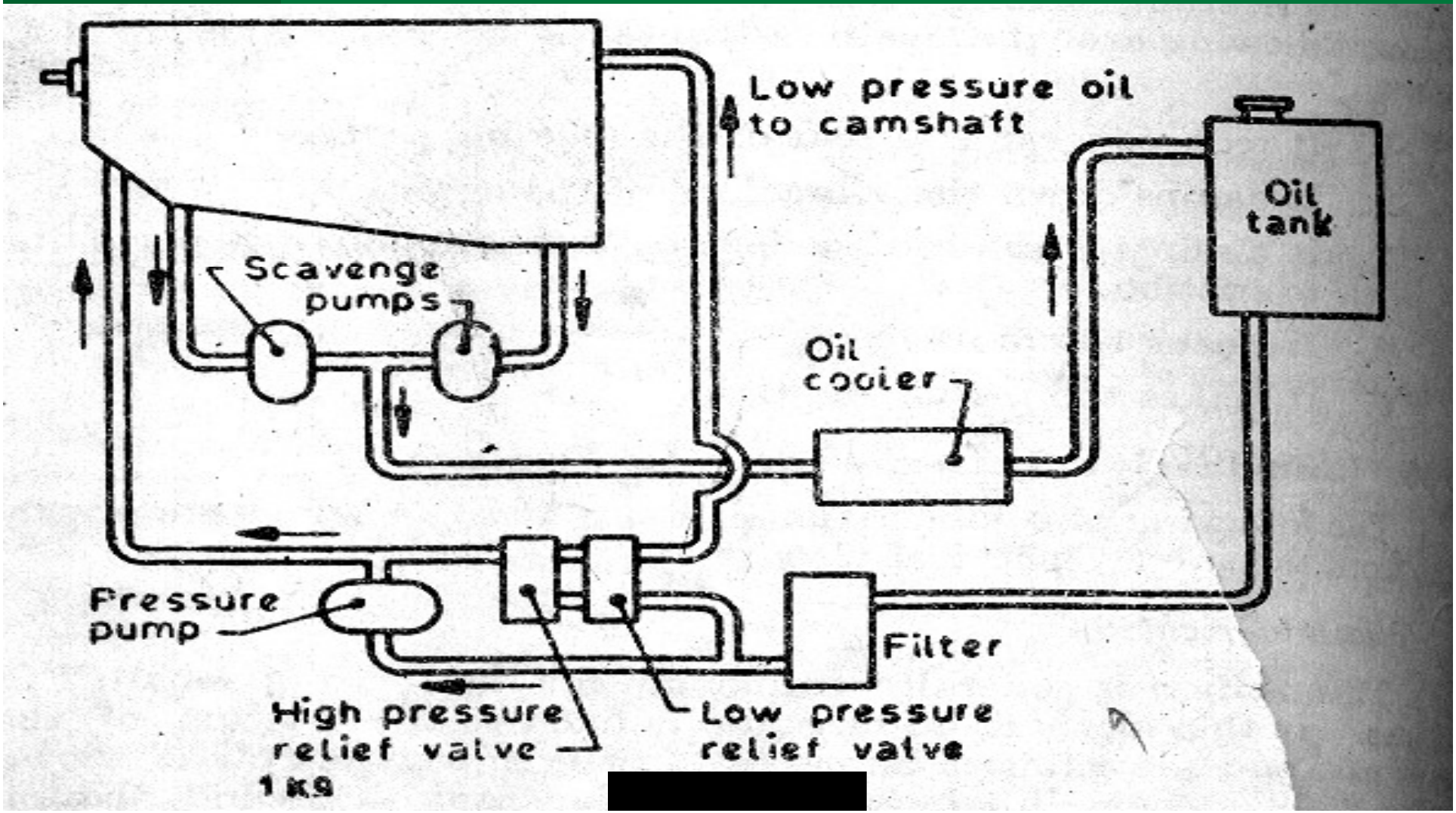
# Methods of lubrication

- Gravity Feed Method
- Splash Method
- Forced Feed Method

# Splash Lubrication Method



# Forced Feed Method



# Lubricants

The substances used for lubrication are called lubricants.

# Function of a lubricant

- Lubricate - Reduce friction
- Cooling  - Heat transfer
- Cleaning - Detergency
- Noise pollution - dampening
- Sealing – prevent leakage
- Protection – prevent wear

# Lubricate – reduce friction

- The effects of friction
  - Metal to metal contact
  - Leads to wear and tear
  - Generates heat
  - Results in Power loss
- Lubricant reduces friction by forming a film
  - Reduces ill effect of friction

# Cooling

- When fuel is burnt in an engine
  - 33% is useful power
  - 33% removed by cooling water
  - 33% by lube oil and radiation
- Lube oil removes heat from all areas and brings it to the engine sump.
- Improper cooling can lead to over heating, lead to wear, distortion and failure.

# Cleaning

- Cleans carbon and varnish deposits
- Flushes the entire system removing
  - Deposits
  - Acids
  - Wear products
  - Moisture
- Removes external contaminants dust, moisture (external)

# Noise reduction

- Reduce noise
  - By preventing metal to metal contact
- Dampens noise
  - As between camshaft and tappet

# Sealing

- Oil film
  - Between piston ring and liner
  - Helps in creating a gas tight seal

# Protection

- Protection against acids and moisture
- Very important to increase life of component and equipment

# Types of Lubricant - Physical

- Liquid
- Solid
- Semi solid

# Types of Lubricant - Physical

- Liquid
  - Vegetable oil (Drying & Non-drying oil)
  - Mineral oil or synthetic oils
  - Fats oil
- Solid
  - Graphite, Mica, Wax, Talac etc.
- Semi solid
  - Soft Greases
  - Hard Greases

# Typical lubricants - Application

- Engine oils
- Gear Oils
- Turbine Oils
- Hydraulic Oils
- Metal working oils
  - Cutting oils
  - Forming Oils
- Rust preventives

# Properties of lubricants

- Viscosity
- Oiliness
- Flash Point
- Fire Point
- Pour Point
- Emulsification
- Specific Gravity
- Acidity

# Lubricators

The sources with whose help lubricant is supplied between the two parts in operation are called lubricators.

# Lubricators Arrangement

- Wick lubrication arrangement
- Liveness glass arrangement
- Oil cup arrangement
- Oil can arrangement
- Oil gun arrangement
- Grease gun arrangement
- Ring lubrication arrangement

# Cutting Fluid (Coolant)

**Introduction:**

**Kinds of cutting fluids:-**

- Mineral and animal oil
- Soluble oil

# Properties of Cutting Fluid

- Lubricant
- Coolant
- Welding Resistance Properties
- Rust Resistance Properties

# Advantages of Cutting Fluids

- It performs lubrication between the job and the cutting tool.
- Save the job from burning.
- Save the job and tool from blending.
- Save the job from rust.
- Increase the life of tool.
- Keeps the tips and edge of the tool away from the chips.
- The rate of cutting increases.
- Good finishing on the job during cutting.

# Metals, Operation and Proper Cutting Fluids

| Material | Drilling | Reaming | Threading | Tapping | Milling |
|---|---|---|---|---|---|
| Aluminiu-m | Soluble oil 10 to 25% & water 75-90% | Kerosene oil, Mineral oil | Cutting oil, Kerosene oil | Service oil | Soluble oil, Mineral oil |
| Brass | Soluble oil 25% water 75% | Dry cutting oil | Cutting oil | Mineral oil | Soluble oil, Mineral oil |
| Copper | Soluble oil | Soluble oil | Soluble oil | Soluble oil | Soluble oil |
| Mild steel | Mineral oil | Cutting oil | Soluble oil | Soluble oil | Soluble oil |

# Difference between Lubricants and Coolants

| Lubricant | Coolant |
|---|---|
| (1) Thin layer of this fluid between two machine parts helps in keeping them cool. | (1) It helps to cool down the job and cutting tool while cutting operations carried out. |
| (2) It gives long life to m/c parts. | (2) It gives long life to cutting tools. |
| (3) It saves m/c from rust. | (3) It saves job from rust. |
| (4) It helps in the smooth running of m/c and its parts. | (4) Cutting is done easily with its use. |
| (5) It protects the m/c and tools from becoming jam. | (5) It protects the job and tools from becoming jam. |
| (6) It helps in keeping the m/c fit and in good working condition | (6) It helps in giving fine finishing on the jobs. |

# Major specifying organizations

- SAE – Society of Automotive Engineers (USA)
- API - American Petroleum Institute
- US Military Specs – US - MIL – 2104 -
- CCMC – European Specification
- ISO – International Standard Organization – ISO 3348
- NLGI – National Lubricating Grease Institute

# SAE viscosity grades for engine oils

## Designated

- With corresponding viscosity
- For high temperature application
- Warmer areas/regions
  - SAE 20
  - SAE 30
  - SAE 40
  - SAE 10
  - SAE 50
  - SAE 60

# SAE viscosity grades for engine oils

## Designated

- With corresponding viscosity
- For low temperature application
- Colder areas/regions
  - SAE 0 W
  - SAE 5 W
  - SAE 10 W
  - SAE 15 W
  - SAE 20 W
  - SAE 25 W

# SAE viscosity grades for Multi grades - Engine Oils

Multi grades are designated with two SAE number

Widely in use today

- SAE 10w/30, 15w/30, 25w/50
- SAE 5W/30, 20W/40
- Suitable for use in winter and summer months or seasons
- Available in Engine oils & Gear oil

# Thank you