

Republic of Iraq
Ministry of Higher Education
and Scientific Research
Al-Mustaqbal University College
Chemical Engineering and Petroleum Industries Department



Subject: Properties of Petroleum Fuels

3rd Class

Lecture five

TURBINE OILS

- Turbine oil is a high-quality circulating oil used in
 - steam turbines and
 - many other industrial applications.

- It is essentially a bearing lubricant, and as such it must be able to lubricate
 - the bearing/gears and
 - protect these machine parts against wear.
 - Also turbine oil acts as a heat transfer medium and keeps bearing temperatures below 150 to 180°F.

- The function of the turbine and the type of service dictates the viscosity of turbine oil.

- Turbine may be
 - a direct drive,
 - geared turbine,
 - or hydraulic turbine.

- Industrial and marine power generation turbines are generally horizontal turbines.

- Hydraulic (water) turbines are generally vertical units.

- Gas turbines, similar to aircraft turbines, are often used in naval or other high-speed vessels.

- In general, steam turbine oils generally meet the requirements of industrial gas turbine systems.

- The major difference between steam and gas turbine workings is
 - that in gas turbines, oil works in a dry atmosphere,
 - whereas in steam turbines, oil works in the presence of steam.
 - Higher temperatures are encountered in gas turbines.

- Typical oil temperature at full load may exceed 390°F.
- The viscosity of turbine oils ranges from – 20 to 450 cSt at 104°F
- Viscosity is largely determined by any associated transmission gearing, as in the case of steam turbines. Turbine oils protect critical system components from rust and corrosion.
- The oil must have good water separation characteristics to minimize the formation of emulsions.
- Turbine oils are formulated from
 - high-quality paraffinic base oils and
 - fortified with additives that provide oxidation resistance and minimize the formation of sludge and varnish deposits.
 - A foam inhibitor additive is generally included in the formulation to prevent excessive foam buildup, which interferes with lubrication.

BASE OILS

Turbine oils are formulated from highly refined paraffinic base oils with a high viscosity index (VI).

the following advantages:

- Lesser antioxidant requirement
- Longer life
- Possible design and operation of machine at higher temperature
- Less carbon and varnish deposits
- Improved low-temperature fluidity
- More efficient water and foam separation

turbine oils must have more than 85 percent saturates, aromatics below 15 percent, and sulfur less than 0.4 percent by weight