

## OBJECTIVES

To bring a basic formation on lubricants, their chemical composition, their properties, their mode of action and their applications in the various organs.

On completion of the course, the participants know:

- the principal mechanical parts that are lubricated
- the basic principles of lubrication
- the chemical properties of the lubricants, depending on their applications
- the essential properties of lubricants and their evaluation methods.

## COURSE CONTENT

### EQUIPMENTS AND MECHANICAL PARTS LUBRICATED 0.5 day

General description of the main mechanical parts (bearings, gears, hydraulic pumps, machine-tools, thermal engines, ...).

Modes of lubricant application.

### LUBRICANTS CLASSIFICATIONS AND SPECIFICATIONS SYTEMS 0.5 day

Viscosity classifications; principles of classification and specifications of industrial and engine lubricants.

### WHY TO LUBRICATE? 1 day

Characterization of friction, friction laws.

Flow properties of liquid lubricants (viscosity and viscosity index).

Elements on the theory of lubrication (lubrication regimes).

Wear phenomena (adhesive, abrasive, corrosive, fatigue, wear, ...).

Functional properties of lubricants.

### WITH WHAT TO LUBRICATE? 2 days

#### Liquid lubricants

Mineral and synthetic base stocks (definition of the ATIEL categories, chemical structure, essential properties, manufacturing).

Lubricant additives (detergents, dispersing additives, oxidation inhibitors, rust and corrosion inhibitors, extreme pressure and anti-wear, viscosity index improvers, pour point depressants, ...).

#### Solid lubricants

Different types of solid lubricants (lamellar, polymeric, others).

Characterization and properties.

Use in lubrication.

#### Greases (semi-solid lubricants)

Different types of greases.

Structure, composition and properties.

### METHODS FOR LUBRICANTS CHARACTERIZATION 1 day

**Physico-chemical tests:** thermal and oxidation stability, rust and corrosion protection properties, surface properties (foaming, demulsibility, air release), materials compatibility, various thermal tests (flash point, ash, Conradson residue, ...).

**Compositional analysis:** spectrometry, chromatography, elemental analysis.

**Mechanical tests:** notions on engine tests, mechanical tests on actual parts (hydraulic pumps, gears, bearings), testing on simulation machines (4-balls, FALEX, TIMKEN), testing on laboratory tribometers.

**Environmental aspects of lubricants:** toxicity, biodegradability.

### ▲ Who should attend?

Engineers and technical staff beginners working in development, technical assistance, manufacturing and sales of lubricants, in mechanical engineering offices, desiring to acquire knowledge in the lubrication and lubricants areas.

### ▲ Duration

**5 days**

### ▲ Dates & Location

**Non-scheduled**

**May be organized for a single company**

### ▲ Lecturers from

- IFP Training
- INDUSTRY

Ref. **LUB / LUBLUB-E**

*The education given calls for some basic academic knowledge in mechanics, physics and chemistry. A refreshment can be given when necessary.*