

Lubrication of Metal Working Operations & Machine Tools

3 days

LUB/LUBTMX-E

Overview

LEVEL

Expert

PURPOSE

This course provides a better knowledge on metal removal operation and plastic deformation to the non-specialized people for a better understanding of the role of the lubricant.

It gives information on the different types of products (functional properties, chemical composition, characterization methods) and presents an overview of the problems raised by the products in use, from their introduction in use to their withdrawal, including the hygiene, toxicity and environmental aspects.

LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:

- detail the different machines used for metal removal and rolling,
- describe the different metal working operations,
- describe the different types of fluids for metal working and thermal treatment,
- give the information needed to introduce the fluids in use, their follow-up and their withdrawal,
- solve the possible in-service issues,
- give the necessary information of the toxicity, hygiene and environmental aspects.

WAYS AND MEANS

Interactive exercises with the teacher to determine the lubricant to use depending on the type of organ and the operating conditions.

Interactive exercises of questions-answers between the participants using sets of play cards to synthesize the essential points of the lectures.

PREREQUISITES

No prerequisites for this course.

Agenda

MACHINE TOOLS & ROLLING MILLS

0.5 d

Description of the different types of machine tools and rolling mills. Lubrication plans of the various equipment. Possible problems in service.

MAIN OPERATIONS OF METAL WORKING

0.5 d

Description, principle and mechanism of the metal removal operations (cutting, spark erosion).
Machinability of materials, wear modes of cutting tools.
Description and mechanism of the metal forming operations (rolling, deep drawing, forging, extrusion, wire drawing).
Description and mechanism of thermal treatment operations (quenching, annealing, tempering).

FLUIDS FOR METAL MACHINING & THERMAL TREATMENT

1.25 d

General classification and specifications:

Metal working: ISO 6743-7 classification and ISO 12927 specification.

Thermal treatment: ISO 6743-14 classification.

Neat oils:

Chemical composition (base stocks and additives) - Characterization of the products and evaluation performance. Composition performance relationship.

Water mixed fluids:

Chemical composition (base stocks and additives) - Characterization of the products and evaluation performance. Composition performance relationship.

Biology of water based fluids (bacterial phenomena, fluids degradation, prevention of bacterial degradation.

Quenching and tempering products:

The different categories (oils, aqueous polymeric solutions, salts). Composition, characterization, performance evaluation. Composition performance relationship.

FLUIDS IN SERVICE

0.5 d

Ageing of the products and follow up in service (mechanism of the ageing, analytical methods for follow up, interpreting the results).

Possible problems in service: pollution by foreign oils (hydraulic, slide-ways, rust preventives); miscellaneous pollutions (metal, calamine); treatments of products in service (foam suppressors, biocides, ...). Withdrawal of the products: methods and channels.

HYGIENE - TOXICITY - ENVIRONMENT

0.25 d

Toxicity and product labeling.

Products susceptible to raise problems or under debate: boric acid, alkanol amines, C₁₀-C₁₃ chlorinated paraffins, formaldehyde and derivatives - Corresponding labels and associated phrases of risks.

Aerosols of neat and water based fluids.

Toxicity of emulsion in service.