



TRIBOLOGIE : PRINCIPES ET APPLICATIONS

TRIBOLOGY

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| Lecturers : 16.0 | TC : 0.0 | PW : 8.0 | Autonomy : 0.0 | Study : 4.0 | Project : 0.0 | Language : MI

Objectives

According to a recent study, 20% of the energy consumed by humanity is lost in contact between moving surfaces. This figure is enough to understand what tribology, a scientific discipline dealing with friction, wear and lubrication, can contribute to allow sustainable economic development. If the volumes are often correctly sized and designed, the surfaces constitute a physical barrier to control the energy dissipation in the sliding contacts. Taking into account tribological phenomena is becoming a mandatory step in many industrial fields (mobility, energy, health, etc.) to meet the technological challenges of sustainable production of consumer goods, control of energy consumption or reliability of manufactured products. Thanks to an interdisciplinary

Keywords : Friction, lubrication, surface engineering, contact mechanics, materials science

Programme

The mechanics of static contacts

- Contact between smooth and rough surfaces : role of the mechanical behaviour
- Role of thin solid films and coatings

Macroscopic laws of friction and wear

- Static and kinetic friction
- Physics of friction and wear

Surfaces and lubricants

Learning outcomes

- To analyse an industrial problem in tribology
- To characterize features of rough surfaces and liquid lubricants as they pertain to interface sliding.
- To suggest solutions for suitable applications based on improved materials selection, use of tribological coatings, improved design or lubrication.
- To apply the basic theories of friction, wear and lubrication to predictions about the tribological behavior of commonly encountered sliding interfaces.

Independent study

Objectifs :

Méthodes :

Core texts

G.W. Stachowiak, A.W. Batchelor, *ENGINEERING TRIBOLOGY*, Butterworth - Heinemann, 2014
I.L. Singer, H. M. Pollock *FUNDAMENTALS OF FRICTION: MACROSCOPIC AND MICROSCOPIC PROCESSES*, Springer Netherlands, 1992
F.P. Bowden, D. Tabor *FRICTION AND LUBRICATION OF SOLIDS*, Oxford University Press, 1954

Assessment

Final mark = 2/3 Knowledge + 1/3 Know-how
> Knowledge N1 = 100% final exam
> Know-how N2 = 100% continuous assessment