RHEOMETERS - TRIBOMETER

Context and Objectives

- Lubricants = Industrial Fluids = Complex Materials

  $\Rightarrow$ **relationship between composition and behaviour**

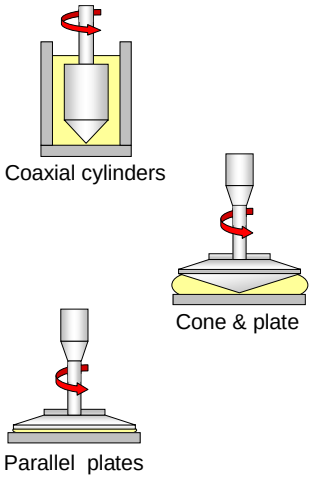
- **Rheological characterization:** rheometers $\eta = f(T, \dot{\gamma} \text{ or } \tau)$

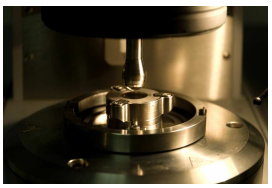
  high pressure viscometer $\eta = f(T, P)$

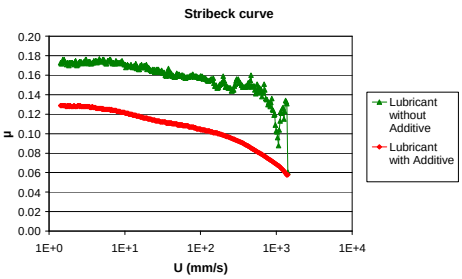
- Measurement of **friction** and **lubricating properties** $\mu = f(T, w, U)$

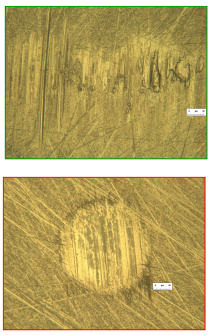
Rheometers

- Various geometries
- T: -40 to 200°C
- $\dot{\gamma}$: 10^{-3} to 18000 s^{-1}
- τ: 0.01 to 16000 Pa
- Torque: 0.1 µN.m to 200 mN.m
- Steady state/dynamic
- Frequency: 10^{-5} to 100 Hz



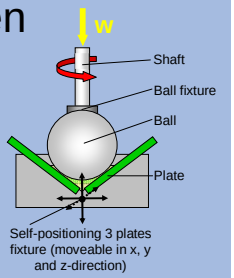






Tribology Cell

- Ball-on-plates
- Plate material to be chosen
- Small size plates: easy to handle and to analyze
- T: -40 to 200°C
- U: 10^{-4} to 1.4 m/s
- w: 2 to 70 N



Applications

Global lubricant response:

- **Lubrication regime** (full separation, boundary or mixed lubrication)
- **Film thickness calculation** for ball-on-plate tests (JEROTRIB)
- **Film thickness and friction prediction** from multiphysics models

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