

Toolbox for Tribology  
- friction, wear and lubrication



Smooth running

## Design the tribological system

Our unique competence set in surface chemistry enables us to characterize and design your tribological application to achieve the results you need.

### Low friction catheters

Obtaining the right friction of catheters for smooth use. We design the lubricating coating.

### Lubricating oils and seal materials

Screening of friction modifiers for applications such as motor oils. Evaluation of greases and bearing materials.

### Tablets that do not crumble

How to optimize powder processing, including operations such as milling, powder flow, mixing, tableting, etc.

### Perception of topical formulations

How to get great feeling moisturizers.

### Food that feels pleasant

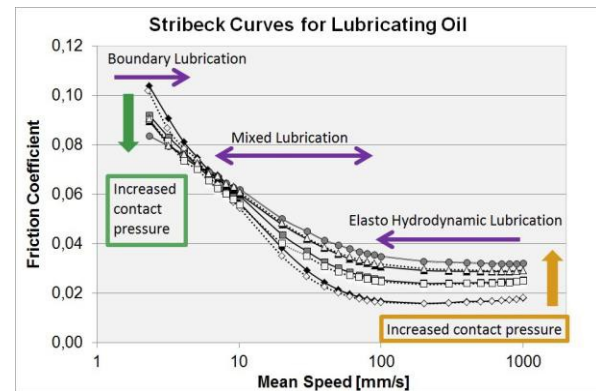
Why do some foods feel smooth and others don't

### Development of oral care products

What is behind the astringent feeling after rinsing the mouth with an antibacterial mouthwash?

### Paper packaging, faster production

How to reduce wear in paper machines and optimize printing.



Instruments	AFM Atomic Force Microscopy	MTM Mini Traction machine	Force Board	EHL Ultra Thin Film Mea- surement System	Amonton 2 ISO 15359	Peel Tester
Speciality	Combination with topography, conductivity, adhesion possible.	Versatility in choice of materials and measurement conditions.	A finger can be used as the probe surface.	Film thickness determination 1 to 1000 nm as a function of rolling speed.	Paper friction. Portable instrument.	
Type of materials	Sphere - flat geometry, Colloidal probes or AFM tip. Hair and other fibers.	Steel or PDMS ball. No limitations on disc material.	Flat, possible to attach to a flat plate of equipment.	Glass/steel Surface treated glass/steel.	Flat thin/typically paper and plastics.	Bendable material (to be bent around the sled for attachment).
Contact area/ Geometries	Ø~2-50 µm (colloidal probe) Ø~10 nm (tip)	Diameter Ball 12.7/19.05 mm Disc 46 mm Steel barrel/disc	Depends on choice and size of material in contact	Steel Ball Ø =12.6 or 19 mm /disc	Flat/flat 60x60 mm	65x65 mm Flat-flat (bend at edges)
Contact pressure/ Force	0.5 nN - 1 µN	~0 to 3.1 GPa 0.1 to 75 N	Vertical: 0-40N Horizontal: 0-10N	0 to 50 N 0 to 3 GPa	7.7 N	0.1 – 108 N
Speed	10 nm/s - 10 µm/s	-4 to 4 m/s	3-500 mm/s	0- 4 m/s	20 mm/s	0.08 - 127 mm/s
Friction coefficient, conditions	Sliding	Slide to roll ratios: 0-100%	Mostly sliding	Rolling	Sliding	Sliding
Temperature	-15 to 180°C	-10 to 150 °C	Ambient	< 50 °C water based lubricant <150 °C oil lubricant	Air, RH 22°C and 55% RH.	Air, RH 22°C and 55% RH.
Test lubricant/ medium	Air, transparent liquids, RH10-80%	Air, liquids 10 to 35 ml	< 1 ml	120 ml	-	-

The lubricants can also be characterized with high shear rheology, dynamic wetting and chemical analysis. Wear characterization is done with SEM-EDX, white light profilometry or AFM.



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