



CEN/TC 158/WG 11
Headforms and test methods

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Friction tests results - Leuven June 2017

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Background:

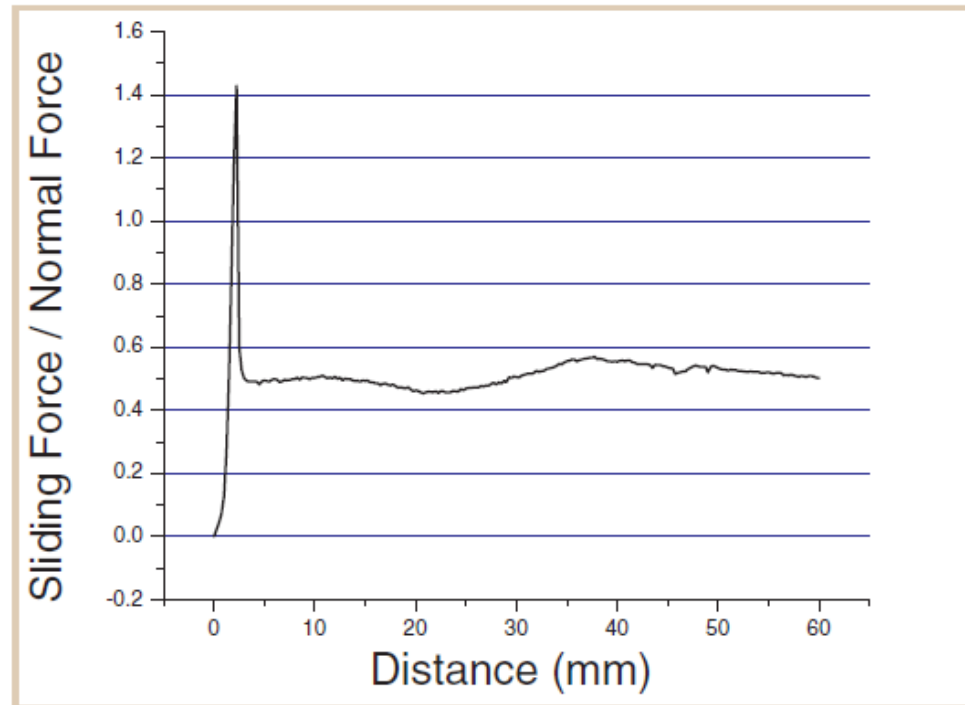
Committee URL: <http://cen.iso.org/livelink/livelink/open/centc158wg11>



Characterisation of sliding friction

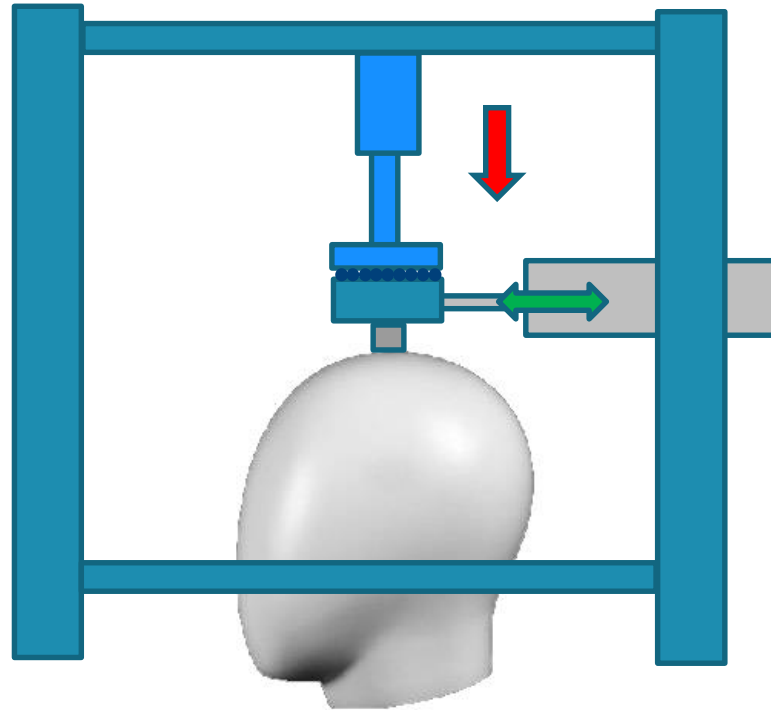
Measuring coefficient of friction

- Static friction coefficient
- Dynamic friction coefficient



Set up under development

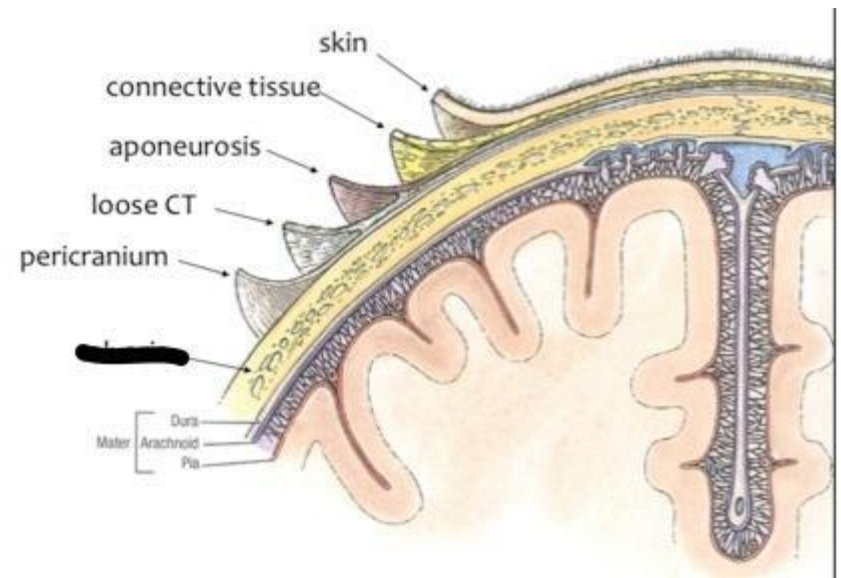
Pneumatic cylinder
(0-0,7 MPa pressure)



Schenck 25 kN
fatigue machine
 ± 6 or ± 12 mm
0-5 Hz

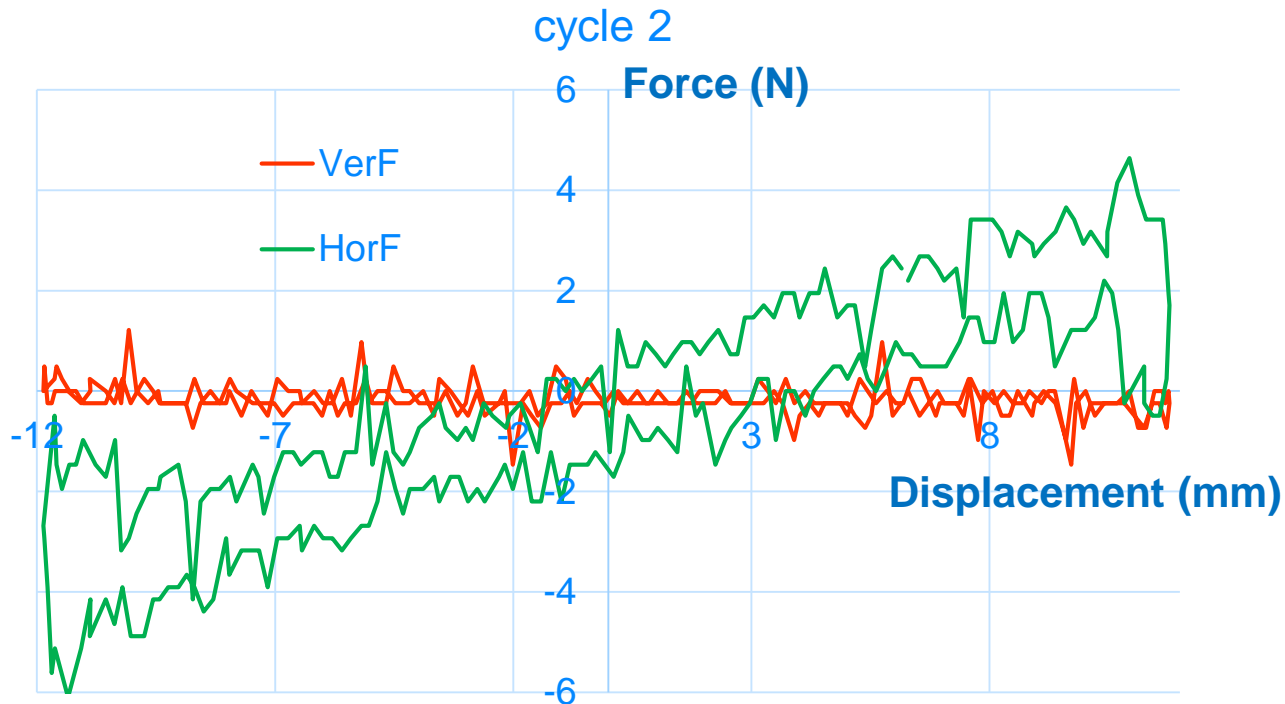
Set-up details

- Horizontal motion
 - Max stroke: 23 mm
 - Duration of motion: down to 20 ms
 - Velocity: up to 3 m/s
 - Sinusoidal curve and stepped curve
- Compression force
 - Compression stress of 0,7 MPa
 - Contact surface \varnothing 10 mm
 - Indentor: steel and PTFE
 - Constant and pulsated
- Heads
 - EN-960
 - Hybrid III
 - Cadaver heads (5)
 - PUR dummy head



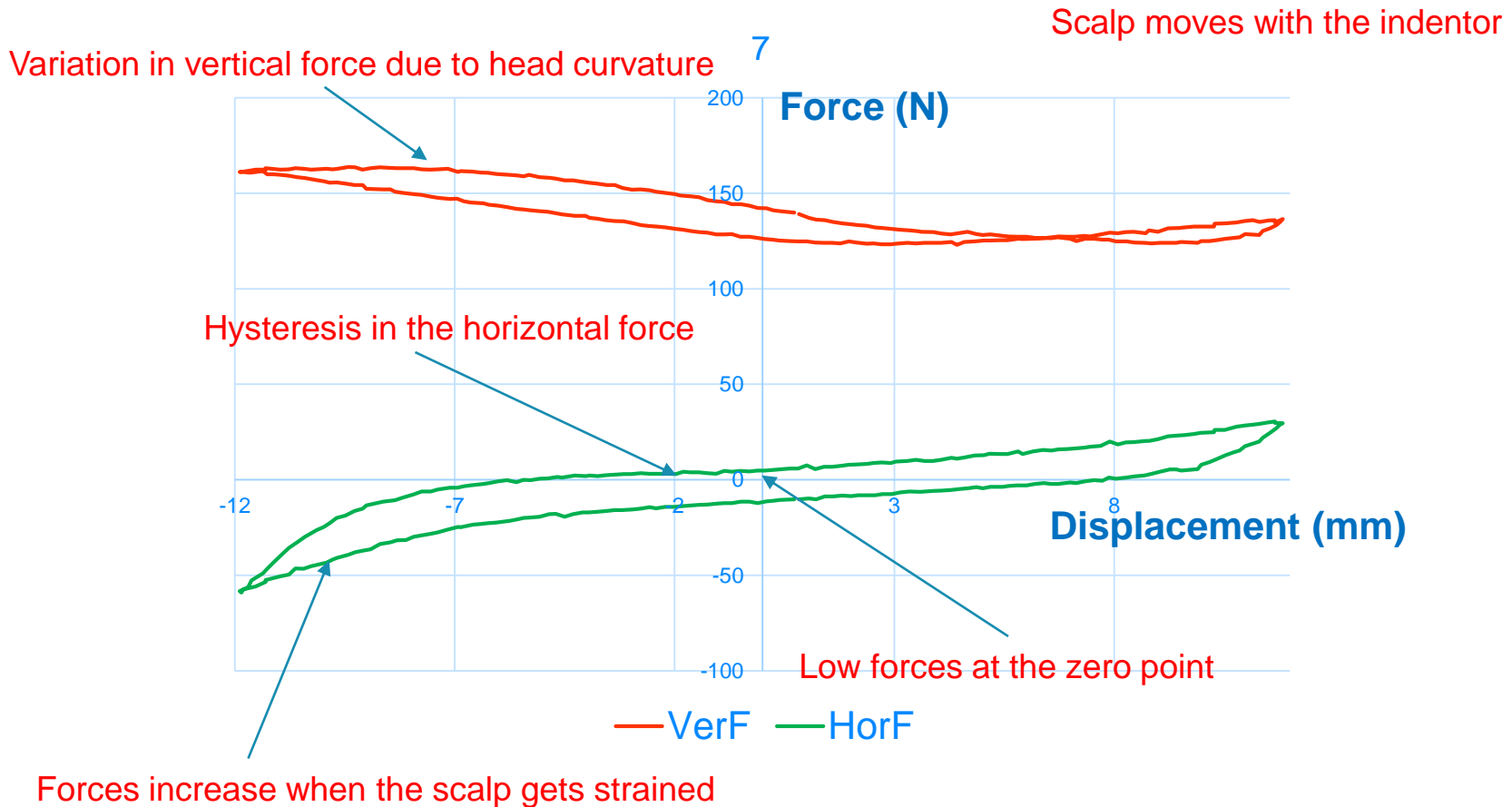
Test approach

- Apply horizontal motion without contact
 - Determination of system friction



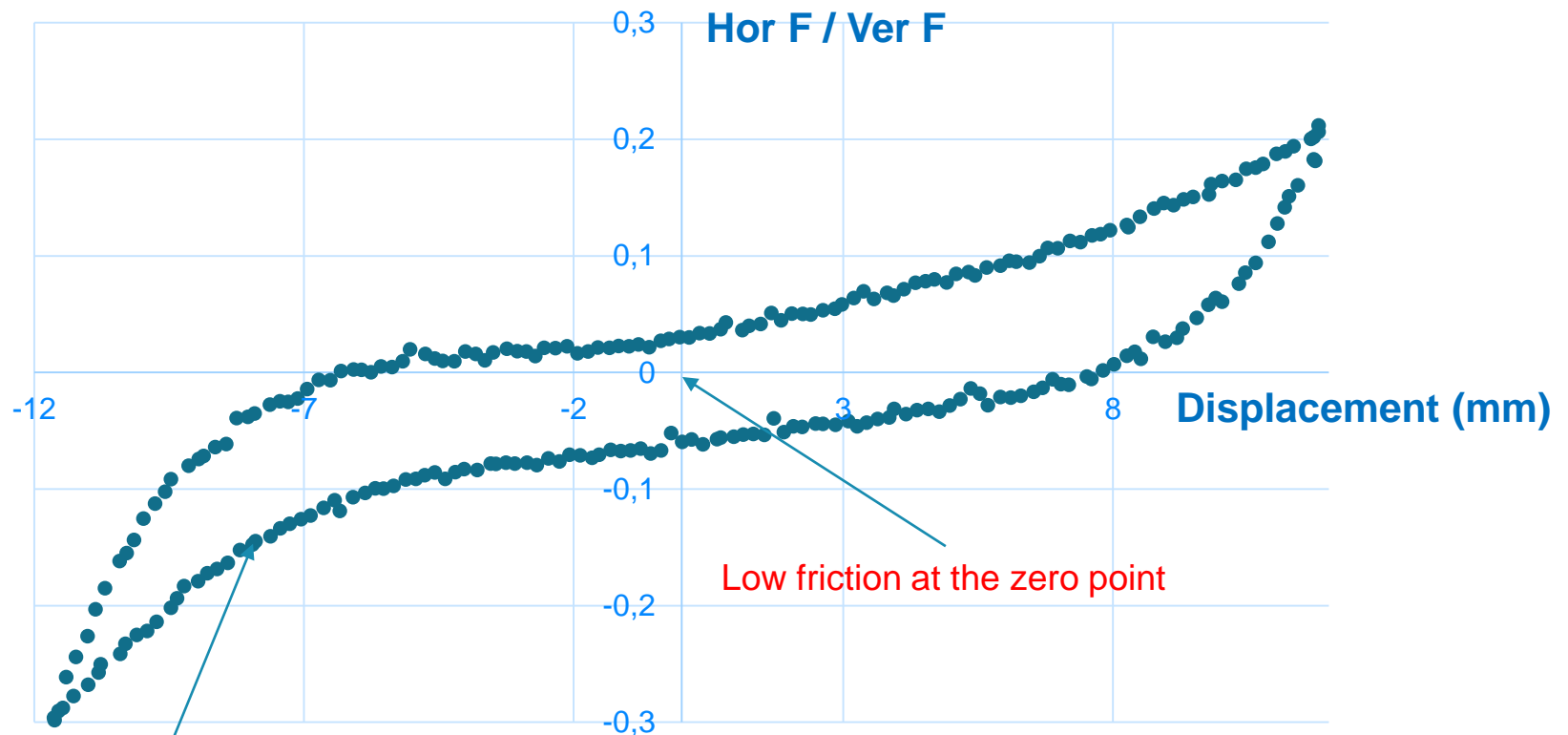
Test approach

- Apply vertical force



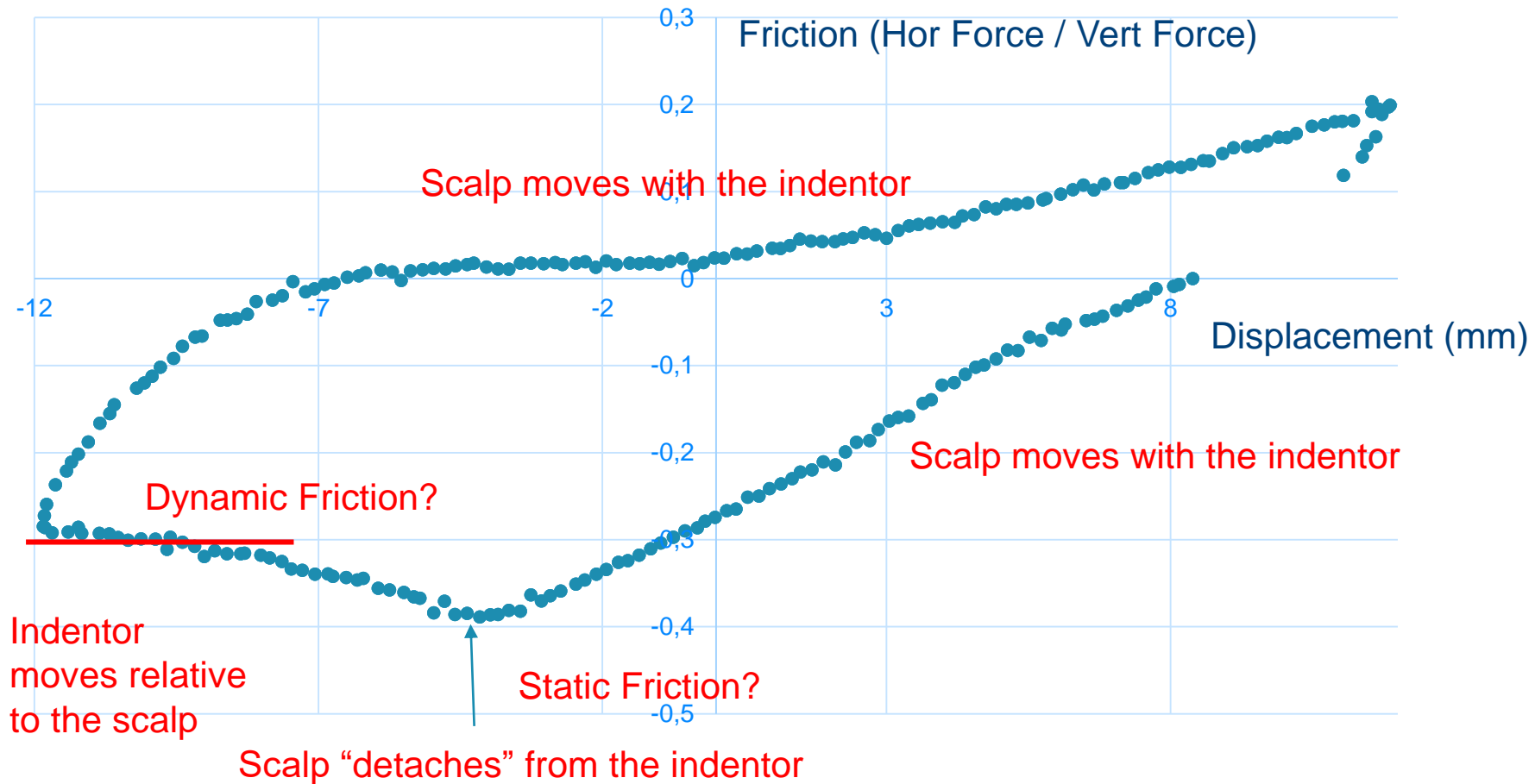
Test approach

- Correction of the horizontal force
- Calculation of the “coefficient of friction”



“friction” increases when the scalp gets strained

- In almost all experiments, the scalp moves with the indenter and slides over the skull
 - Independent of pressure, strain rate, head hair, ...
 - Displacements of ± 6 mm and ± 12 mm
- Some experiments were performed at low strain rate (0,5 Hz) with “extreme” indenter position, so a maximum motion in one direction and straining of the scalp is maximum



Typical values

- Friction scalp skull: 0.03-0.06
- Static friction fabric – scalp: 0.35
- Dynamic friction fabric – scalp: 0,26