

STATIC, SLIDING AND ROLLING FRICTION

MED 05.01



Material

Item-no.	Qty.	Description
DM680-2P	1	Static, sliding and rolling friction board
DM680-2R	1	Block for friction and stability
DM132-1B	1	Torsion dynamometer 1 N
DM132-1C	1	Torsion dynamometer 2 N
DM132-1D	1	Torsion dynamometer 5 N
DM132-1F	1	Torsion dynamometer 10 N
DS400-3K	1	Bosshead cross-pattern, Demo, green
DG200-1S	1	Cord, white, D=1.7 mm, L=5 m
P7806-1G	1	Storage box II big, with cover

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Purpose

To demonstrate the dependence of the frictional forces on the surface condition and on the normal force with which the friction surfaces are pressed together.

Preparation

The static, sliding and rolling friction board is raised and placed on a non-slipping surface on a table (for example put it on a box as shown on the image); the plastic side of the friction board is facing upwards.

Cut off a 50 cm piece of the cord and make loops at the both ends of the cord.
Position the block for friction and stability on the left end of the friction board.

Put the cord to the hook of the block for friction and stability.

The bosshead is mounted on the support rod of the Torsion dynamometer;
it serves as a handle for the dynamometer.

Hang the free end of the cord to the hook of the Torsion dynamometer.
The Torsion dynamometer is now pulled horizontally, at a slow but constant speed to the right.



Experiment

While pulling observe the Torsion dynamometer - measure the friction force and enter the results in the chart below

Result

To move the block away from the rest position a little more force is required.
This force is called "static friction". As soon as the block is in motion less force is required.
We call this force "rolling friction".

Material of the friction surface	static friction (N)	rolling friction (N)
smooth (plastic)		
coarse (sand paper)		
Rolls (rolling friction)		

Also determine the static and rolling friction from the other surfaces of the friction plate.

Conclusion

The friction depends on the surface condition.
The sliding friction is lower than the static friction under the same conditions.
The rolling friction is less than the sliding friction and much less than the static friction.

Note

The use of the Newtonmeter instead of the Torsion dynamometer is not recommended in this experiment because the force can be read only with difficulty due to strongly fluctuating values.