CHAPTER 12: FRICTION MODULE 3/4, CLASS 8

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Increasing Friction

As we know that friction is a necessary evil, at some places we need to increase friction whereas at other places we want to reduce it.

- Friction can be increased by increasing the roughness of the surfaces in contact.
- Sole of your shoes is grooved to provide better grip on the floor, so that one can move safely.
- PVC soled shoes have a better grip on oily surfaces than rubber soled shoes.
- Players have spikes on their shoes to increase friction to prevent them from slipping.
- Badminton courts have wooden of anti skid PVC flooring, to prevent players from slipping.
- Treaded tyres of cars, trucks and bulldozers provide better grip with the ground.

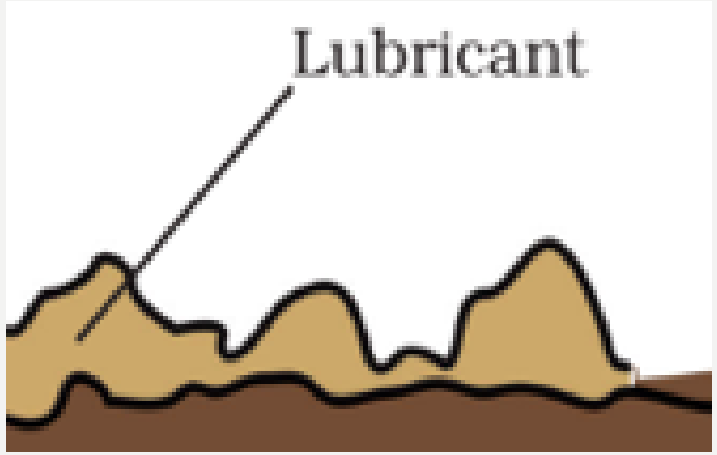
Reducing Friction

Friction can be undesirable and can be reduced by:

- Using Lubricants like powders or oils and grease
- Using rollers or wheels
- Using ball bearings in fans, bicycles, vehicles to reduce friction
- We sprinkle powder on carrom board to reduce friction
- Oil or grease is applied between moving parts of machines to reduce friction
- Wheels are used in vehicles to reduce friction
- Body of Vehicles, Ships and aeroplanes are designed to reduce viscous drag




What are Lubricants?



The substances which reduce friction are called lubricants.

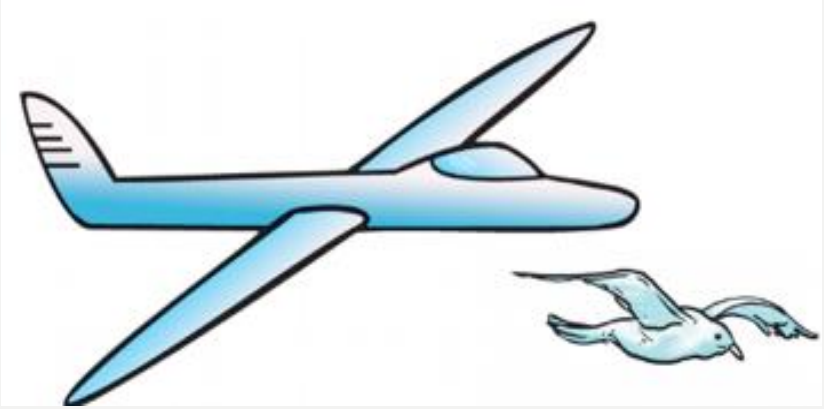
- To reduce friction in order to increase efficiency, oil, grease or graphite is applied between the moving part of a machine. They form a fluid film between the moving surfaces and prevent wear of rubbing parts
- In some machines, it may not be advisable to use oil as lubricant. An air cushion between the moving parts is used to reduce friction
- We can reduce friction by polishing surfaces or using large amount of lubricants, but friction can never be entirely eliminated
- In our everyday life, we use luggage fitted with rollers. Heavy machinery is moved by placing logs or metallic rollers under it

Fluid Friction or drag

You know that air is very light and thin. Yet it exerts frictional force on objects moving through it. Similarly, water and other liquids exert force of friction when objects move through them. So we can say that fluids exert force of friction on objects in motion through them.

Fluid friction is the force of friction exerted by liquids and gases on objects moving through them.

- It is obvious that when objects move through fluids, they have to overcome friction acting on them. In this process they lose energy. Efforts are, therefore, made to minimize friction. So, objects are given special shapes
- Birds and fishes have special shapes which would make them not to lose much energy in overcoming friction
- Hence, all vehicles are designed to have shapes which reduce fluid friction



Similarity in shapes of an airplane and a bird

What does Fluid Friction or drag depend on?

Fluid friction depends upon:

1.The speed of the object.

2.Shape of the object.

3.The nature of the fluid in which it is travelling.

Example1: Birds flying in air have streamlined body to reduce fluid friction.

Example 2: Fishes living in water have streamlined body.

Example 3: Aeroplanes and spacecrafts have streamlined body to reduce fluid friction .

What are the uses of Friction?

Friction is useful for many of our daily activities.

- It is possible to hold a tumbler due to friction between the hand & the tumbler
- Friction between the feet & the ground helps us to walk on the ground
- It is possible to write with a pen or pencil on a paper due to friction between the pen or pencil and the paper
- It is possible to write on a blackboard with a chalk due to friction between the chalk & the black board
- Friction is also important to anyone driving a car. Friction between the tyres and the road helps automobiles to move on roads
- Grooved tire treads allow space for water to be channelled away from the road tire contact point, allowing for more friction in wet conditions
- Friction between the bricks helps in the construction of buildings.

How does reducing Friction reduce energy loss?

FRICTION is always present in any machine with moving parts.

If the machine is small, or the forces Fluid friction are low, the amount of heat produced by friction may be also small.

Each time two moving surfaces touch each other; tiny bits of material are broken off by friction.

Hence in bigger machines to prevent wear, air / water-cooled oil coolers are installed to reduce the frictional losses.

THANK YOU

END OF MODULE 3/4