



# Tribology for Green Transportation

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## Introduction

The transportation industry widely involves materials which are in a sliding contact. The friction in the various contact pairs such as pistons, bearings, valves, gears, etc. in an automobile is a major contributor to the energy losses. Apart from the emissions from the automobile exhaust, the wear debris also poses a threat to the living organisms. Tribologists and material scientists are working to mitigate the energy losses incurred in the various sliding wear applications. The growing energy demands and the environmental consciousness have added to the quest. The mitigation of the energy losses and the consequent environmental impact can be achieved by way of the following strategies:

- a. Development of new materials such as nanocomposites and self-lubricating materials.
- b. Development of new lubricating oils and additives which aid in lowering friction.

- c. Development of coatings and surface engineering.
- d. Exploring the use of biobased oils as lubricants.
- e. Addition of nano-additives in lubricants to enhance their anti-wear and antifriction potential.

The major issues with these strategies are the less efficient production methods for material development and the poor stability of additives. Moreover, the dependence of wear and friction on the numerous operating conditions such as contact pressure, sliding velocity, temperature, surface conditions, humidity, etc further makes the tribological problem more complex.

Although a lot of work is being done recently on the new material development for tribological applications, however an application oriented work is still in developmental phase. Moreover, the synergism between the various parameters which determine the friction and wear characteristics are also not much explored.