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Academic Sustainability at the Forefront of Covid#19 Pandemic @ Tribology

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Academic sustainability at the forefront of Covid#19 pandemic @ Tribology

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Abstract
The covid#19 pandemic in India is a message for the modulation of work-life balance at the fulcrum of sustainability. The balancing of work output with energy expenditure is viable for reducing environmental friction from the subjective frontier. The human body is a thermodynamic heat engine performing or delivering mechanical work in the presence of a rationalized environment. The reinforcement of HP-LC meal, enhancement of mechanical work, and emotional resilience regulate the sustainable pattern of the academic journey.

Keywords; Covid#19 pandemic, CO_2 evolution, Friction, Joint Tribology

1. Introduction

Friction, lubrication, and wear at the interacting surfaces of metal forming processes is a conventional rigid billet to large plastic deformation adhesion in the presence of environment viz. effective lubrication, starved lubrication, dry smooth surfaces, and stick-slip domain of hot forming [1-3]. Friction at engineered interfaces is governed by state variables in hydrodynamic lubrication, mixed lubrication, boundary lubrication, and sticking/slipping tribological zones proposed in the literature for the last 200 years [4]. Nature is conscious of the regulation of CO2 evolution and absorption as per the integrity of the carbon cycle, water cycle, and thermal loading for life on land. Transport, energy, manufacturing, and buildings have been evolving carbon footprints in pursuit of mechanical work by machines. The rise of preprints during the 21st century is realized on academic platforms quantitatively by preprint servers [5]. Covid#19 pandemic in India is environmental loadings evolved from tribological mechanical surfaces of engines for the promotion of green technology and advancement of sustainable development goals (Fig. 1).

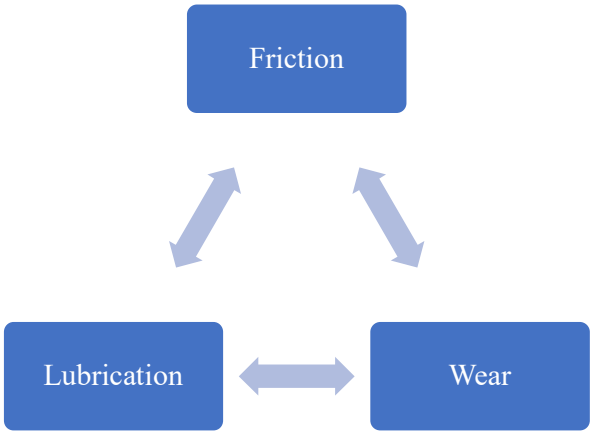

Fig. 1 The prediction of energy losses at the rubbing interfaces of mechanical machines for assessment of CO_2 evolution from fossil fuel-based IC engines

2. Sustainability

The reduction of environmental loadings, decent work, responsible consumption, and economic growth have been quoted under sustainability ahead of political lockdowns in India. Carbon is an element invincible in the biological synthesis of hydrophilic cellulose matter most abundant biopolymer found on the surface of the earth with manifold applications of natural fibres [6]. Friction at the rubbing interface consumes or dissipates energy ubiquitous in daily life from cell adhesion to human locomotion of stick-slip zone for energy balancing of fuel oxidation useful in doing mechanical work for the achievement of rational mechanical efficiency [7]. Nanoscience at the forefront of sustainability is expressed for the functionalization of the diversity of carbon nanomaterials in engineering applications [8-9]. Economy, environmental, and materials sustainability have been visible on roads of NCT Delhi for reinforcement of hybrid and electric vehicles with the fleet of conventional vehicles for upgradation of mechanical efficiency in large or reducing environmental reactions [10-11]. The Paris Agreement or COP21, IPCC, and FAME-II altogether ease political goals in addition to SDGs in the achievement of environmental sustainability [12-14]. Natural bamboo provides effective mechanical properties due to the covalent bonding of cellulose monomers with hydrophobic lignin matrix in forming bio-composites [15]. Materials sustainability, environmental sustainability, and energy sustainability have been the academic agendas for re-searching and publishing for heterogeneous bioabsorbable engineered matters.

3. Bio and bio-inspired science

Friction is a non-fundamental force observed from molecular adhesion to a large field of stick-slip seismology useful for dissipation of energy at rubbing contacts [16]. Friction, lubrication, and wear at rubbing contacts in the presence of the environment is termed “Tribology” initially coined during the second half of the 20th century in the writing of socioeconomic reports [17]. The impact of state variables shall influence tribology performance such as physical, chemical, and thermal factors at the interphase of rubbing surfaces [18-20]. The heterogeneity of Lubricin, Hyaluronan acid, and phospholipid at soft biological contact of articular cartilage provides an ultra-low friction coefficient in human locomotion [21-23]. The amphiphilic membrane, biomechanical diffusion, and heterogeneity of environmental biological molecules provide the mechanics and mechanisms of bio-lubrication [24]. The covid#19 pandemic in India is a materials and energy imbalance for providing reactive forces of nature due to the supramolecular interaction of charged particles evolved by nature consciousness or fossil fuel-based mechanical machines [25]. The friction coefficient is a ratio of shear force to the normal traction and is assumed to be independent of the apparent area of contact as shown in Table 1.

Substrates	**Friction coefficients**
Viscoelastic rough skin surface	>1.0
Healthy skin of human being	0.7-0.9
Dry smooth mechanical contacts	~0.3
Lubricated mechanical contacts subjected to heavy loads	~0.1
Healthy articulating cartilage	~0.001

Table 1 The friction coefficient for a diverse range of mechanical and biological substrates from lubricin boundary lubrication to stick-slip skin outer surface

Conclusions

The friction force at the tribological contacts of fossil fuel-based mechanical machines accounted for approximately 1/3rd of fuel chemical energy. The reinforcement of hybrid and EVs in the transport sector of urban cities has increased cumulative mechanical efficiency for reducing CO2 footprints over the biosphere. The human behavior, modulation of HP-LC fuel from conventional high carb fuel, and upgradation of per day mechanical work have been quoted for biotribology performance in the perusal of decent work.

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Conflict of Interests

None conflict of interests to declare

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