Power and Wear Reduction Using Composite Links of Crank-Rocker Mechanism with Optimum Transmission Angle

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Abstract : Reducing energy consumption became the major concern for all countries of the world during the recent decades. In general, power saving is currently the nominal goal of most industrial countries. It is well known that fossil fuels are the main pillar of development of world countries. Unfortunately, the increased rate of fossil fuel consumption will lead to serious problems caused by an expected depletion of fuels. Moreover, dangerous gases and vapors emission lead to severe environmental problems during fuel burning. Consequently, most engineering sectors especially the mechanical sectors are looking for improving any machine accompanied by reducing its energy consumption. Crank-Rocker planar mechanism is the most applied in mechanical systems. Besides, it is one of the most significant parts of the machines for obtaining the oscillatory motion. The transmission angle of this mechanism can be considered as an optimum value when its extreme values are equally varied around 90°. In addition, the transmission angle plays an important role in decreasing the required driving power and improving the dynamic properties of the mechanism. Hence, appropriate selection of mechanism links lengthens, which assures optimum transmission angle leads to decreasing the driving power. Moreover, mechanism's links manufactured from composite materials afford link's lightweight, which decreases the required driving torque. Furthermore, wear and corrosion problems can be treated through using composite links due to their flexural elastic modulus values and stiffness in addition to high damping of composite materials.

Keywords : Composite Material, Crank-Rocker Mechanism, Transmission angle, Design techniques, Power Saving **Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development **Conference Location :** Chicago, United States

Conference Dates : December 12-13, 2020

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