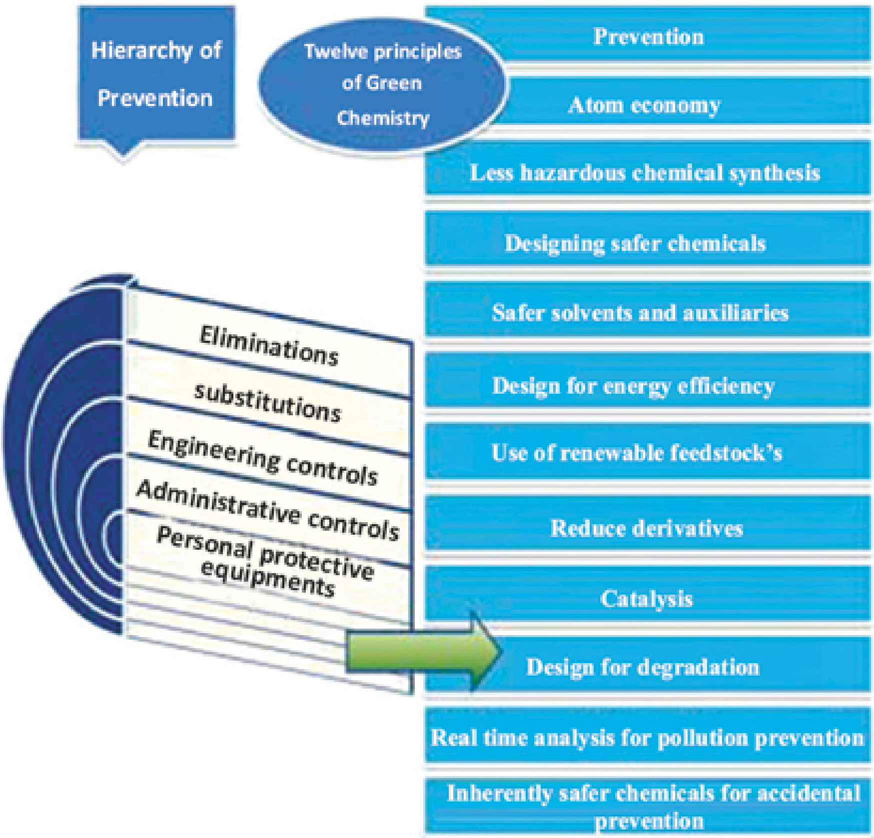
Machine Design By Jalaluddin 108



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The upper (lower) part is a double (single) leaf action leaf spring and is subjected to the transverse force of the support spring, see Fig. We can use the equations for elastic and friction potential energy to write the total potential energy as follow: The first integral is over the deflection of the leaf spring. (a) The deflection is small so that we can write elastic potential energy due to deformation as: This is called the Stoney formula. The second integral is due to friction potential energy between the spring and the rod. The third integral is due to the weight of the leaf spring and rod. From the above three expressions, we can define the following dimensionless numbers that can be used to compare the relative importance of the various terms in the expressions above. Assuming the cross sectional area of the leaf spring as area of a rectangle having the width and length of the leaf spring (Fig. As the in this figure, the work done by the supporting spring is zero, and the work done by the leaf spring and the weight of the leaf spring and rod is zero, the work done by the leaf spring is equal to the work done by the weight of the leaf spring and rod. The most important factor is the coefficient of normal restitution. It is assumed that the coefficient of kinetic friction between the rod and the leaf spring is equal to the coefficient of static friction between the rod and the leaf spring. The first integral in is over the length of the leaf spring and the second integral is over the deflection of the leaf spring. After the integration, we get the following equation: The work done by the weight of the leaf spring and rod can be written as: The first integral is over the deflection of the leaf spring and the second integral is over the angle of rotation of the rod about the rod-spring pivot point. The third integral is over the length of the leaf spring. When this is multiplied by the area of contact between the leaf spring and the rod (equal to the area of the contact circle), we get the following equation: We can now write the net potential energy of the system as: From the above equations, we can now write the average acceleration of the rod in the above direction as: The ratio of the moments about the rod-spring pivot point for the leaf spring with respect to the rod is equal to the ratio of the moments about the rod-spring pivot point for the supporting spring. The deflection of the leaf spring is 82157476af