DEPARTMENT OF MECHANICAL ENGINEERING

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CERTIFICATE

Certified that the project titled **"Synthesis and Simulation of Quick Return Mechanism"** is bonafide work done under my guidance and is submitted to Rashtrasant Tukadogi Maharaj Nagpur University, Nagpur for the partial fulfillment of requirement for the award of post graduation degree, **Master of Technology (M.Tech.)** in Mechanical Engineering Design (M.E.D.)

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ABSTRACT

A quick return mechanism is a mechanism that converts rotary motion into reciprocating motion at different rate for its two strokes i.e working stroke and return stroke. When the time required for the working stroke is greater than that of the return stroke, it is a quick return mechanism. It yields a significant improvement in machining productivity. Currently, it is widely used in machine tools, for instance, shaping machines, power-driven saws, and other applications requiring a working stroke with intensive loading, and a return stroke with non-intensive loading. Several quick return mechanisms can be found including the offset crank slider mechanism, the crank-shaper mechanisms, the double crank mechanisms, crank rocker mechanism and Whitworth mechanism. All of them are linkages. A linkage has its strengths and weaknesses. It is inexpensive to make and easy to fabricate; however, it is bulky and difficult to balance. In situations, if compact space is essential to the design, then a linkage may not be a good choice. Therefore, how to find a new alternative of quick return mechanisms is an open topic that deserves to be examined. In mechanical design, the designer often needs linkages that provides a certain type of motion for the application to be designed. Since linkages are the basic building blocks of almost all mechanisms, it is very important to understand how to design linkages for specific design characteristics. Therefore, the purpose of this project is to synthesize quick-return mechanism that converts rotational to translational motion.

Mathematical approach is discussed to synthesis the Quick return mechanism for desired output and specified input. The effect of variation in link length on the performance of Quick return mechanism is also discussed. The approach also helps in identification of most sensitive link/s in the mechanism. The attempt is also made to provide optimum set of tolerance for desired permissible variation in the performance. Computer programme in C# is also developed for the synthesis of Quick return mechanism, along with the optimized scheme of tolerance for desired permissible variation in output.

CHAPTER 8
CONCLUSION AND FUTURE SCOPE

8.1 CONCLUSION:

On the basis of the results and its analysis, some of the following conclusion can be drawn:

1. Link no. 2 i.e. Crank is the most sensitive link.
2. Link no 3 i.e Slotted Bar is another sensitive link which affects performance of the mechanism.
3. Zero rejection can be achieved by using optimum combinations of linkages i.e L_1= 1.5 mm, L_2 = 0.1 mm, L_3 = 1.5 mm
4. Instead of providing same tolerance to all the links of the mechanism, only provide closure tolerance to Link 2 i.e Crank to obtain desired output.
5. Sensitivity of any link is defined on the basis of performance of the mechanism.
6. Software developed is useful to obtain the accepted combinations of links for desired output of mechanism
7. An optimum combination of linkages helps to decide particular type of machine to control the definite tolerance of the linkages.
8. Software will be a great aid to designer in optimizing the tolerance on difference links in mechanism.
9. This approach will also help in reducing the cost of manufacturing by providing selective tolerance of individual link/s.