R.V.COLLEGE OF ENGINEERING

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A Project report on

"NEW CONCEPT DEVELOPMENT AND RE-DESIGN OF OIL EXPELLER FOR PONGAMIA SEEDS"

Sponsored by

Karnataka State Biofuel Development Board

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SYNOPSIS

Majority of the world's energy needs are supplied through petrochemical sources, coal and natural gas. All these sources are exhaustible in nature and at current usage rates, these fuels will be consumed shortly. Diesel fuels have an essential function in the industrial economy of a developing country and are used in transportation, industrial and agricultural sectors. Being renewable, biodiesel has an advantage of less sulphur content causing relatively lower environmental pollution. Biodiesel is obtained by processing non edible oils, for which the sources are plenty. The extraction of oil from oil seeds is achieved through oil expeller.

A rotating screw shaft forms an important part of the oil expeller that conveys the seeds through the barrel, which squeezes the oil and discharges cake at the choke end of the barrel. Oil expelling in general is being carried out in two passes. The expeller industry is in need of a better design to improve the work capacity and recovery of oil. A modification in the screw shaft design is vital in improving the expelling process. Also the level of human intervention involved in the process being high, an attempt to minimize the same could be beneficial.

The primary objective of this project was to design an oil expeller that can extract oil in a single pass and also provide better yield with reduction in expelling time. The project attempts to propose a conceptual design by innovative thinking and specifying room for improvement of the oil expeller. The project began with the study of existing oil expellers and understanding drawbacks of machine. A standard method of product development was followed to generate various concepts and concept evaluation was done to arrive at a combination concept for oil expelling with the aid of selection matrices. The selected flour mill concept was tested to check for its process feasibility and it was found to crush the seeds. Once proved successful the selected concept was taken for detailed design using CATIA V5 and Unigraphics NX6. Based on the design, the Screw conveyor (Worm shaft) was successfully fabricated. There is an improvement in the strength of the worm shaft as main shaft and screw component are fabricated as a solid part.

The available machine was preoccupied with production due to which the fabricated shaft could not be introduced into the machine for testing. However, the existing machine with progressive shaft was used in combination with flour mill

(as two independent entities). Though the yield obtained was 210ml/kg which is in comparison with that of the existing oil expeller the total time decreases to a minimum of 2 minute 58 seconds when tested for 5kg of seeds.

Though the overall cost of machine would increase due to the addition of flour mill part, the redesigned oil expeller increases the overall oil yield per unit time and also the amount of oil extracted per kg of seeds is expected to increase which would compensate for the increase in the cost of the machine.