



**OPERATION OF TWO-AXIS SOLAR
TRACKING BY THE DISCHARGE OF WATER
FROM A TANK HANGING BY A NON-
CIRCULAR SPROCKET WHEEL**

Master of Engineering in Manufacturing Systems Engineering

by

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**A dissertation submitted to the Department of Mechanical Engineering,
University of Moratuwa in partial fulfillment of the requirements for
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Engineering**

by

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DECLARATION

This Dissertation paper contains no material which has been accepted for the award of any other degree or diploma in any University or equivalent institution in Sri Lanka or abroad, and that to the best of my knowledge and belief, contains no material previously published or written by any other person, except where due reference is made in the text of this Dissertation.

I carried out the work described in this Dissertation under the supervision of Dr. G. K. Watugala & Dr. W. K. Wimalasiri.

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Abstract

Two-axis solar tracking system operated by the discharge of water from a bottom hole of a tank filled with water was designed, constructed and tested. The water tank is hanged by a chain passing over a non-circular sprocket wheel which is fixed to the rotating shaft along the first solar tracking axis. A counterweight is also hanged by another chain passing over a regular circular sprocket. In the morning, the tank is full and the water tank and the counterweight on either side of the shaft balance in such a way that the solar panel is facing the East as required. This study shows that the contour of the non-circular sprocket wheel can be designed taking into consideration the reduction of weight of water tank with time and the required rotation for solar tracking. In addition to the hourly tracking by the above mechanism, provision has been made to tilt the second tracking axis of the solar panel manually on a weekly basis to compensate for the seasonal variation of the Sun's declination.

Results show that the additional cost involved in making this mechanism is justifiable when considering the increase of about 30% of more solar power obtainable by two-axis tracking.

The paper published regarding this tracking system at Sri Lanka Association for the Advancement of Science (SLAAS) in 64th Annual Sessions held on 01-06 December 2008 shown in Appendix A.

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