Ministry of Higher Education And scientific research

Tikrit University

Faculty of Engineering

Al Shirqat Mechanics Department

Design of a Solar Cooker

As part of the requirements for obtaining a bachelor's degree in mechanical engineering

Tikrit University – AL Shirqat College of Engineering

Prepared by

Nawfal Mohammed Dakheel

Tabarak Safaa Ibrahim

Supervised by

Dr. Abd ulrazzaq Mohammad Saleh

Abstract:

This project investigates the design and performance of a solar cooker developed to harness solar energy for sustainable, emission-free cooking. The study specifically focuses on a parabolic dish-type solar cooker, which utilizes high-reflectivity mirrors to concentrate solar radiation onto a focal point, thereby significantly increasing temperatures and reducing cooking duration compared to conventional box systems. To ensure operational stability during periods of intermittent sunlight or after sunset, the system integrates a Thermal Energy Storage (TES) unit utilizing paraffin wax as a phase-change material. Experimental evaluations conducted in Sharqat, Iraq- a region characterized by high solar irradiance- demonstrated that the system can achieve temperatures exceeding 100°C under peak conditions. Additionally, the incorporation of a dual-axis solar tracking system and black-coated absorption surfaces enhanced thermal efficiency. The findings indicate that the proposed design offers a cost-effective and environmentally friendly alternative to fossil fuels, contributing to a reduction in carbon emissions. This study provides a foundational model for implementing domestic renewable energy solutions in sun-rich environments.