

A Report on
Preparation and Estimation of Mechanical Properties of
POM-MWCNT Composites

A Project report submitted for the partial fulfillment of the requirements for award of
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IN
MECHANICAL ENGINEERING

Submitted by

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CERTIFICATE

This is to certify that the project entitled “**Preparation and Estimation of Mechanical Properties of POM-MWCNT Composites**” is the record of the work carried out by TAMARANA GANESH (21815A0343), LEKKALA VENU GOPALA SWAMY (21815A0353), MATTHURTHI NAVEEN KUMAR (21815A0355), NAKKA JAYA PRASANTH KUMAR (21815A0359) and VEDURUPARTHI MANOJ (21815A0364) students of final year B. Tech in the department of Mechanical engineering. This work is done for the partial fulfillment for the award of BACHELOR OF TECHNOLOGY during the year 2023-2024.

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ABSTRACT

Polymer gears are gaining prominence because of low friction, noiseless performance, light weight, oil less conditions, low cost and ability to absorb shock and vibrations. Plastic gears have been widely used with success in the automotive industry, food processing industry, printers etc. However, low load-carrying capacity, a short service life and poor heat resistance are the major drawbacks which hinders the wide spread applicability, particularly in high speed, heavy load or high ambient temperature conditions. The present work aims at developing plastic gears with improved load carrying capacity and durability with an ultimate objective to widen the range of applicability of plastic gears.

Apart from the gear tooth geometry and operating conditions the most influential factors that affect performance of the plastic gears are stiffness, strength, endurance limit, thermal resistance and wear resistance of the plastic gear material. Hence this work aims at improving the performance of the plastic gear by improving the above-mentioned properties of most commonly used plastic gear material POM. For this purpose, Multiwalled carbon nanotubes were selected for reinforcing POM

In order to achieve the uniform dispersion and better compatibility between CNTs and POM, CNTs surface was modified by various functionalizations like Carboxylation, silanation, thiolation and amination. Functionalization of the CNTs has resulted in significant improvement of strength, stiffness, endurance limit and wear resistance. Among various functionalizations carried out in this work salinization was found to be effective. Mechanical and wear properties are influenced by the weight fraction of CNTs and maximum improvement in properties is achieved at 1wt.% of CNTs.