

**THE EFFECT OF TEMPERATURE ON THE IMPACT TOUGHNESS OF
LEAF SPRING STEEL FOR LEAF SPRINGS**

Name of Student : Sahrin Ahadi
Student ID : 2204221408
Supervisors : Suhardiman, S.T., M.T
Burhan Hafid, S.T., M. T

ABSTRACT

Leaf springs are important components of vehicle suspension systems that must possess high impact toughness to withstand shock loads during operation. Temperature is one of the factors affecting the mechanical properties of leaf spring steel, particularly the material's ability to absorb impact energy. This study aims to analyze the effect of temperature variations on the impact toughness of leaf spring steel and the characteristics of the resulting fracture surfaces. The study employed an experimental method using Charpy impact testing based on the ASTM E23 standard. The material was first subjected to chemical composition analysis using the JIS G1253:2002/Amd1:2013 method. Testing was conducted at temperatures of 50°C, 30°C, 10°C, 0°C, -10°C, -30°C, and -49°C, with three specimens for each temperature variation. The results showed that increasing temperature increased the absorbed energy and impact toughness, whereas decreasing temperature resulted in lower impact toughness. Fracture surface observations revealed a change in the fracture mechanism from predominantly ductile fracture at higher temperatures to mixed and brittle fracture at lower temperatures. These findings indicate that temperature significantly affects the impact toughness of leaf spring steel and therefore needs to be considered in the material selection for vehicle suspension systems.

Keywords: *leaf spring steel, temperature, Charpy impact test, impact toughness, fracture.*