

## INTISARI

Baja ST42 merupakan baja karbon rendah yang banyak digunakan untuk komponen mesin seperti roda gigi karena mudah dibentuk dan dilas, namun memiliki kekerasan dan ketahanan aus yang rendah. Salah satu metode untuk meningkatkan kekerasan permukaan baja adalah proses *pack carburizing*. Dalam proses ini, katalis digunakan untuk membantu proses difusi karbon ke permukaan baja. Penelitian ini bertujuan untuk menganalisis pengaruh variasi persentase katalis cangkang telur terhadap kekerasan permukaan, struktur mikro, dan kedalaman difusi karbon baja ST42 hasil proses *pack carburizing*.

Penelitian dilakukan menggunakan baja ST42 yang terlebih dahulu diberi perlakuan *normalizing* pada temperatur 900°C selama 1 jam. Proses *pack carburizing* dilakukan pada temperatur 900°C selama 2 jam menggunakan media arang tempurung kelapa dengan variasi persentase katalis cangkang telur sebesar 0%, 10%, 20%, dan 30%, kemudian dilanjutkan dengan proses *quenching* menggunakan media air. Pengujian yang dilakukan meliputi pengujian kekerasan Vickers dan pengamatan struktur mikro.

Hasil penelitian menunjukkan bahwa variasi persentase katalis cangkang telur berpengaruh terhadap kekerasan permukaan, struktur mikro, dan kedalaman difusi karbon baja ST42. Nilai kekerasan tertinggi diperoleh pada variasi katalis 20% sebesar 895,61 HV, sedangkan spesimen *normalizing* memiliki nilai kekerasan sebesar 154,9 HV. Pengamatan struktur mikro menunjukkan adanya lapisan difusi karbon pada daerah tepi spesimen. Variasi katalis 20% juga menghasilkan kedalaman difusi karbon tertinggi sebesar 87,63  $\mu\text{m}$ . Pada variasi katalis 30% terjadi penurunan nilai kekerasan dan kedalaman difusi karbon.

**Kata kunci:** *Pack carburizing*, baja ST42, cangkang telur, kekerasan, struktur mikro, difusi karbon.

## ABSTRACT

ST42 steel is a low-carbon steel widely used for machine components such as gears because it is easy to form and weld. However, it has low hardness and wear resistance. One method used to improve the surface hardness of steel is the pack carburizing process. In this process, a catalyst is used to assist the diffusion of carbon into the steel surface. This study aimed to analyze the effect of variations in eggshell catalyst percentage on the surface hardness, microstructure, and carbon diffusion depth of ST42 steel after the pack carburizing process.

The research was conducted using ST42 steel that was first subjected to a normalizing treatment at 900°C for 1 hour. The pack carburizing process was carried out at 900°C for 2 hours using coconut shell charcoal as the carbon medium with variations of eggshell catalyst percentages of 0%, 10%, 20%, and 30% by carbon weight, followed by a quenching process using water as the cooling medium. The tests conducted included Vickers hardness testing and microstructure observation.

The results show that variations in catalyst percentage affected the surface hardness, microstructure, and carbon diffusion depth of ST42 steel. The highest hardness value is obtained at the 20% catalyst variation, reaching 895.61 HV, while the normalizing specimen has a hardness value of 154.9 HV. Microstructure observation shows the presence of a carbon diffusion layer at the edge region of the specimen. The 20% catalyst variation also produces the highest carbon diffusion depth of 87.63  $\mu\text{m}$ . At the 30% catalyst variation, a decrease in hardness value and carbon diffusion depth is observed.

**Keywords:** Pack carburizing, ST42 steel, eggshell, hardness, microstructure, carbon diffusion.