

## ABSTRACT

*Fe-5,62Al-15,14Mn alloy is an alloy steel that is included in stainless steel replacing conventional stainless steel with Fe-Cr-Ni alloy. Some applications of Fe-5,62Al-15,14Mn alloy require high ductility and free internal stress. The deep cryogenic treatment (DCT) process is an alternative process that can be done. This study aims to study the effect of DCT immersion time on the microstructure and mechanical properties of Fe-5,62Al-15,14Mn alloy.*

*The material used in this research is Fe-5,62Al-15,14Mn alloy steel castings. The composition test is carried out to determine the content contained in the test material, then specimen preparation is carried out. DCT process is carried out by immersion in liquid nitrogen at -196 temperature°C with a variation of 1, 2, 3, 4, and 5 hours, after which it is refunded at room temperature(warming). The tests carried out were microstructure testing with an optical microscope, wear testing using the method Ogoshi, and corrosion resistance testing using the weight loss method using a 3.5% NaCl chemical solution for 100 hours.*

*The results of the chemical composition test show that the percentage of Fe content is 75.60%, Al 5.62%, Mn 15.14% so that it is categorized as high alloy steel. Observation of the microstructure photo shows the structure of austenite, ferrite, and kappa. The highest wear value of Fe-5,62Al-15,14Mn alloy in the process specimen Deep Cryogenic Treatment with an immersion time of 5 hours at  $7.6 \times 10^{-7}$  mm<sup>2</sup>/kg and the lowest wear value in the process specimen Deep Cryogenic Treatment with an immersion time of 3 hours at  $3.5 \times 10^{-7}$  mm<sup>2</sup>/kg. The highest value of corrosion resistance of Fe-5,62Al-15,14Mn alloy in specimen is raw material 19.73 mpy and the lowest corrosion rate value is in process specimen Deep Cryogenic Treatment with immersion time for 3 hours of 9.55 mpy.*

**Keywords :** *Fe-Al-Mn Alloy, Deep Cryogenic Treatment, material testing.*