INTISARI

Low alloy steel material peralatan kerja di pabrik pulp dan kertas bagian pengolahan kayu sangat umum digunakan dan mudah didapatkan namun memiliki ketahanan aus karena gesekan yang rendah. Dalam 224 hari, keausan permukaan peralatan karena gesekan sebesar 3,730 mm. Salah satu metode meningkatkan ketahanan aus permukaan ialah melapisi permukaan dengan deposit keras melalui metode pengelasan. Parameter pengelasan *hardfacing,* kuat arus pengelasan dan jumlah lapisan deposit menentukan kekerasan dan ketahanan aus. Elektroda pengisi deposit keras mengandung unsur pembentuk karbida keras seperti kromium, mangan, nikel, molebdium merupakan unsur utama pembentuk lapisan keras yang tahan keausan. Tujuan dari penelitian ini adalah mendapatkan parameter optimum dari pengelasan *hardfacing* terhadap nilai kekerasan akhir, laju korosi dan ketahanan aus karena gesekan permukaan.

Pada penelitian yang telah dilakukan, pengelasan *hardfacing* permukaan dengan SMAW *Shielded Metal Arc Welding* (parameter kuat arus 170A, 175A, 180A, 185A, 190A) jumlah lapisan 1 dan 2 lapisan, menggunakan elektroda Nova NX-100 4 mm mengandung unsur kromium (Cr) 32,5%, Mangan (Mn) 1,31%, Nikel (Ni) 0,11%, Silika (Si) 2,15%, Molebdium (Mo) 0,02%. Tahap pertama, pemotongan dan pembentukan sample diambil dari bagian peralatan kerja di pabrik pulp dan kertas bagian pengolahan kayu, Tahap kedua, proses pengelasan *hardfacing* permukaan dengan parameter yang telah ditetapkan. Tahap ketiga, pembentukan sample pengujian kekerasan permukaan, keausan permukaan, laju korosi, pengamatan makro struktur dan pengamatan mikrostruktur. Tahap keempat pengujian kekerasan permukaan, keausan permukaan, laju korosi dan pengamatan struktur mikro. Aplikasi secara langsung pada peralatan kerja dengan parameter optimum yang telah didapatkan dari pengujian laboratorium dilakukan dan diamati terhadap pengurangan ketebalan dari waktu ke waktu.

Hasil uji keausan dan kekerasan permukaan di laboratorium menunjukkan parameter optimum *hardfacing* didapat pada parameter kuat arus 185A, 2 lapisan dan parameter optimum laju korosi dengan parameter 170A, 2 lapisan. Pengujian langsung pada peralatan yang telah dilakukan, pengamatan selama 224 hari pengurangan ketebalan permukaan *hardfacing* karena keausan sebesar 0,566 mm diukur dengan *Ultrasonic thickness gauge*, ketahanan aus meningkat 6,6x dibandingkan tanpa dilakukan pengelasan *hardfacing*.

Kata Kunci: *Low alloy steel, Hardfacing*, Keausan spesifik, Kekerasan permukaan, Korosi

ABSTRACT

Low alloy steel material for working equipment in the wood processing part of pulp and paper mills is commonly used and accessible, but has low wear resistance due to friction. In 224 days, the surface wearing of the equipment due to friction is 3,730 mm. One of the methods to improve surface wear resistance is to overlay the surface with a hard deposit by welding method. Hardfacing welding parameters of welding currents and the number of deposit layers determine the hardness and wear resistance. The electrode as a hard deposit filler contains hard carbide forming elements such as chromium, manganese, nickel, molebdium which are the main elements for the formation of a hard wear-resistant layer. The purpose of this study is to obtain the optimum parameters of hardfacing welding on the final hardness value, corrosion rate and wear resistance due to surface friction.

In this study, surface hardfacing welding was carried out with SMAW Shielded Metal Arc Welding (current parameters 170A, 175A, 180A, 185A, 190A, number of layers 1 and 2 layers, using Nova NX-100 4 mm electrodes containing chromium (Cr) 32.5%, Manganese (Mn) 1.31%, Nickel (Ni) 0.11%, Silica (Si) 2.15%, Molebdium (Mo) 0.02%. The first stage, cutting and forming samples taken from part of the equipment at the pulp and paper mill in the wood processing section, the second stage, the surface hardfacing welding process with predetermined parameters. The third stage, the formation of samples testing surface hardness, surface wear, corrosion rate, macro structure observation and microstructure observation. The fourth stage of testing surface hardness, surface wear, corrosion rate and microstructure observation. Direct application on work equipment with the optimum parameters obtained from laboratory testing was carried out and observed for thickness reduction from time to time.

The results of wear tests, surface hardness in the laboratory indicate that the optimum parameters of hardfacing are obtained at the current strength parameter 185A, 2 layers and the optimum parameters of corrosion rate with parameters 170A, 2 layers. Testing directly on the equipment that has been carried out, observations for 224 days of hardfacing surface thickness reduction due to wear of 0.566 mm measured by Ultrasonic thickness gauge, wear resistance increased 6.6x compared to without hardfacing welding.

Keywords: Low alloy steel, Hardfacing, Specific wear, Surface hardness, Corrosion