INTISARI

Aluminium paduan AA 7050 merupakan salah satu aluminium paduan seri 7xxx yang digunakan sebagai bahan untuk struktur pesawat karena aluminium merupakan logam ringan, kekuatan relatif tinggi, toleransi terhadap kerusakan cukup baik dan memiliki ketahanan yang baik terhadap korosi. Namun, AA 7050 dapat mengalami korosi ketika dioperasikan dalam lingkungan korosif, seperti udara lembab, asam atau larutan garam. Salah satu upaya yang dilakukan untuk mengendalikan laju korosi adalah penggunaan inhibitor. Penelitian ini bertujuan untuk mempelajari pengaruh inhibitor kromat (CrO_4^{2-}), molibdat (MoO_4^{2-}) dan nitrat (NO_3^-) pada laju korosi dan laju perambatan retak material AA 7050 dalam larutan 3,5% NaCl.

Penelitian ini menggunakan inhibitor kromat (CrO_4^{2-}), molibdat (MoO_4^{2-}) dan nitrat (NO_3^-) dengan konsentrasi 0,1% ; 0,3% ; 0,5% ; dan 0,7%. Pengujian laju korosi menggunakan metode polarisasi potensiodinamik (*Tafel plot*) dan uji fatik dilakukan dengan amplitudo konstan dengan rasio tegangan (R) 0,1 dan frekuensi 10 Hz menggunakan spesimen pusat-retak tegang (CCT) dengan orientasi searah dengan pengerolan. Sebagai data pendukung dilakukan uji komposisi, uji struktur mikro, uji kekerasan *Vickers*, uji tarik dan metode polarisasi elektrokimia , mikroskop optik dan SEM dilengkapi dengan EDX-spektrometer.

Hasil penelitian menunjukkan bahwa laju korosi AA 7050 dalam larutan 3,5 % NaCl tanpa inhibitor adalah 0,035 *mpy*. Dengan penambahan inhibitor cenderung mengurangi laju korosi dicapai pada inhibitor kromat dengan konsentrasi 0,7% sebesar 0,0018 *mpy*. Di antara tiga inhibitor yang dipelajari, inhibitor kromat adalah yang paling efektif mengurangi laju korosi dan laju perambatan retak (da/dN).

Kata kunci : Aluminium paduan 7050, larutan 3,5 % NaCl, inhibitor korosi, CrO_4^{2-}, MoO_4^{2-}, NO_3^-, korosi, laju perambatan retak.

ABSTRACT

Aluminum alloy AA 7050 is one of the 7xxx series aluminium alloys and it is widely used as materials for aircraft structures because aluminum alloy AA 7050 is a light metal, which has advantages of relatively high strength, high fatique crack growth performance and good damage tolerance. However, AA 7050 is suffered from corrosion when it is operated in corrosive environments, such as moist air, acid or saline solution. One of the efforts made to control the rate of corrosion is the use of inhibitors. This research aims to study the effect of chromate (CrO_4^{2-}), molybdate (MoO_4^{2-}) and nitrate (NO_3^-) inhibitors on corrosion rates and fatigue crack propagation of the material plane AA 7050 in 3.5% NaCl solution.

Three inhibitors were studied namely chromate (CrO_4^{2-}), molybdate (MoO_4^{2-}) and nitrate (NO_3^-) as an inhibitor was added in a 3.5% NaCl solution with a various concentrations of 0.1%; 0.3%; 0.5%; and 0.7%. Measurement of corrosion rate using potentiodynamic polarization methods (Tafel plot) and the fatigue experiment was perormed a constant amplitude with stress ratio (R) of 0.1 and frequency was carried out of 10 Hz, specimens were machined in the form of centre- cracked tension (CCT) oriented in the longitudinal–transverse (LT) direction. As supporting data, other test including the chemical composition analysis, microstructure examination, Vickers hardness test, tensile test, and SEM equipped with EDX-spectrometer.

Results show that the corrosion rate of AA 7050 in 3.5% NaCl solution without the inhibitor is 0.035 mpy. The addition of chromate inhibitor tends to reduce the corrosion rate and among the three inhibitors studied, chromate is the most effective inhibitor to reduce rate of corrosion and lower fatigue crack propagation rate (da/dN). The optimum concentration is reached at a concentration of 0.7 % CrO_4^{2-} with minimum corrosion rate of 0.0018 mpy.

***Keyword** : Aluminum alloy 7050, NaCl 3.5%, corrosion inhibitors, CrO_4^{2-}, MoO_4^{2-}, NO_3^{2-}, corrosion rates , fatigue crack propagation rate*