Analisis sisa umur pakai baja paduan rendah berbasis cr-mo superheater tube = Remaining life analysis of cr-mo based low alloy steel superheater tube

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Abstrak

Penelitian tentang remaining life RL pada industri bermanfaat bagi penentuan strategi pemeliharaan untuk menghindari kegagalan peralatan secara tiba-tiba dan mempunyai resiko operasional besar. Metode RL dikembangkan untuk memberikan prediksi RL yang akurat. Penelitian ini memberikan prediksi RL pada high pressure super heater tube yang dihitung dengan metode konvensional, metode creep rupture test dan metode scale growth. Data sampel 1Cr-0.5Mo Super heater tube diambil dari dua heat recovery steam generator HRSG yang sejenis. Metode konvensional menggunakan trending analysis data ketebalan aktual tube. Data ketebalan aktual diambil dari pengukuran inspeksi terkahir dan data riwayat inspeksi saat periode pemeliharaan sebelumnya. RL dihasilkan dengan ekstrapolasi trending line ke minimum wall thickness MWT yang dihitung dari standard ASME I PG 27. Creep rupture test dilakukan pada sampel high pressure super heater tube. RL dihasilkan dengan mengevaluasi time to rupture dari persamaan Larson Miller Parameter yang dikenal sebagai metode RL pada komponen temperatur tinggi. Metode scale growth menggunakan cumulative creep damage untuk memprediksi waktu kegagalan tube. Perbedaan antara prediksi waktu kegagalan dan waktu inspeksi terakhir menjadi prediksi RL. Berdasarkan metode konvensional, laju penipisan ketebalan tube berbeda-beda pada setiap posisi. RL yang dihasilkan berbeda-beda untuk ketiga metode. Perbedaan RL sebagai verifikasi dan analisis bersama dengan data dimensi dan sifat mekanik material uji.

.....The purpose of remaining life RL research is beneficial for maintenance strategy in industries to avoid unexpected failure which brings to high operational risk. Appropriate method is built to find out close RL prediction for equipment. This paper is present RL prediction of high pressure super heater tube between conventional, creep rupture test and scale growth method. 1Cr 0.5Mo Super heater tube specification was taken from two typical heat recovery steam generator HRSG as a sample. Conventional method use reasonable trending analysis of actual wall thickness tube data. Actual thickness data was taken on last inspection and historical inspection data. RL is yield by extrapolating data to minimum wall thickness MWT which calculated form ASME I PG 27 as standard. Creep rupture test conducted towards sampling tube which was taken from high pressure super heater bundle tubes. RL is yield as evaluation time to rupture of Larson Miller Parameter equation which already known as RL evaluation on high temperature component. Scale growth method use cumulative creep damage to predict time to failure of operated tube. The difference between time to failure and last inspection hour become RL prediction. Based on conventional method, tubes wall thinning rate are variable for each position. The remaining life gives very different between three those methods. The differences bring to discussion as verification and analysis with dimensional and mechanical properties as additional data.