

Nitrocarborising in a fluidised bed furnace with CO₂ gas additions: studies on the properties of resulting compound layers

I Wayan Sujana, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=89892&lokasi=lokal>

Abstrak

Karakterisasi terhadap lapisan senyawa hasil perlakuan panas feritik-nitrokarburisasi yang menggunakan dapur fluidised bed dan mengandung campuran gas CO₂ telah dilakukan di dalam penelitian ini. Penelitian menggunakan baja karbon AISI 1040 (0,4 %C) yang dinitrokarburisasi pada temperatur 570°C, dimana komposisi atmosfer divariasikan sesuai penambahan 1-3% gas CO₂ dengan waktu proses 1-4 jam. Hasil pengujian XRD menunjukkan lapisan senyawa yang terbentuk prinsipnya terdiri dari γ' Fe₄(N,C) dan ϵ Fe_{2.3}(N,C). Meningkatkan kandungan gas CO₂ didalam atmosfer menyebabkan pembentukan fasa ϵ Fe_{3_3}(N,C) lebih stabil. Pengamatan metalografi dan XRD mengkonfirmasi terbentuknya lapisan senyawa dengan fasa ϵ Fe_{2.3}(N,C) dominan untuk waktu proses 4 jam. Penambahan waktu proses dan kandungan gas CO₂ berkaitan dengan terbentuknya porositas pada lapisan senyawa. Hasil analisa SEM mengindikasikan porositas yang terbentuk tidak berlebihan. Sehingga dapat disimpulkan, nitrokarburisasi menggunakan dapur fluidised bed mengandung atmosfer 1-3% CO₂ dan waktu proses 4 jam dapat menghasilkan lapisan senyawa yang unggul terhadap keausan akibat gesekan.

The characteristics of compound layers resulting from ferritic nitrocarburising with atmosphere containing CO₂ gas additions have been investigated using a fluidised bed furnace. The experiments made use of AISI 1040 steel. Treatment temperature was set at 570°C; atmosphere composition and treatment time were altered accordingly. Compound layers produced were essentially comprised of γ' Fe₄(N,C) and ϵ Fe_{2.3}(N,C). Increasing CO₂ contents and treatment time leads to stabilisation of ϵ phase and compound layer thickness. A predominantly ϵ phased layer was produced by 4 hours treatment duration. Porosity in the compound layer was found related with an increase in treatment time and CO₂ composition. At a present work, 4 hours treatment duration did not exhibit severity level of porosity. Therefore, it is concluded by the present experiment that nitrocarburising in a fluidised bed furnace with 4 hours duration and 1-3% CO₂ gas additions is capable to produce a superior anti scuffing compound layer.