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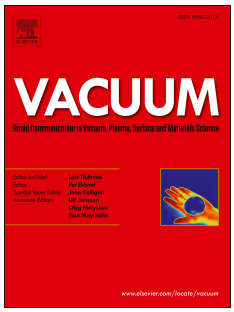

Plasma nitriding without formation of compound layer for 38CrMoAl hydraulic plunger

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Plasma nitriding without formation of compound layer for 38CrMoAl hydraulic plunger

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Abstract In this study, low temperature plasma nitriding (LPN) was primarily used in 38CrMoAl hydraulic plunger to overcome the peeling problem of the compound layer in real application. The cross-sectional microstructures of the treated samples were observed by optical metallography, phase constituents were determined by X-ray diffraction (XRD), the microhardness profile and brittleness of surface were measured by microhardness tester. The results showed that no compound layer was formed while plasma nitriding at 450℃for 6h, and XRD also confirmed that there existed no γ'-Fe_4N. Meanwhile, the brittleness was decreased at lower temperature plasma nitriding comparing with normal plasma nitriding (NPN), due to no brittle compound layer formed on the outmost layer.

Keywords: plasma nitriding; 38CrMoAl steel; microstructure; brittleness

1. Introduction

The hydraulic plunger is a key component of axial piston pump; its reciprocating motion transmits fluid to target location, Therefore the hydraulic plunger is subjected to friction and wear in service. The shape of hydraulic plunger investigated in this research is shown in Fig.1, and its technical requirement is as below; the cross-sectional hardness is required to be higher than $890HV_{0.5}$ and $510HV_{0.5}$ at the depth of 0.1mm and 0.3mm, respectively.

Insert Fig.1

38CrMoAl steel is a kind of widely used nitrided steel. It is usually used to produce hydraulic plunger in application. The surface of plunger should have high hardness, wear resistance,

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