SURFACE ALLOYING BY ION, ELECTRON, AND LASER BEAMS pdf

1: Surface Alloying of Cylindrical Steel Parts Using Non-Vacuum Electron Beam Treatment

This book presents the papers given at a conference on the surface treatments of alloys using ion, electron, and laser beams. Topics considered at the conference included energy deposition, heat.

A multiple-needle-cathode plasma surface alloying process has been developed for improving the properties of surface hardness, wear resistance and corrosion resistance of Ti6Al4V. The process is performed at working pressure of 30PaPa with 9-needle-cathode of W80Mo20 alloy rods array and a high pure graphite plate cathode as target electrode. A maximum microhardness is times much harder than the substrate. The results show the presence of carbide and nitride ceramics phases contribute to high microhardness and wear resistance. The multiple-needle-cathode discharge plasma treatment is an effective method for improvement of the mechanical and tribological properties of titanium-base alloys by formation of graded diffusion hard surface layers. The present paper describes this novel process and properties characteristics. The purpose of this research paper is focused on the X40CrMoV hot work tool steel surface layers improvement properties using high power diode laser. In the effect of laser alloying with powders of carbides occurs size reduction of microstructure, as well as dispersion hardening through fused in but partially dissolved carbides and consolidation through enrichment of surface layer in alloying additions coming from dissolving carbides. Introduced particles of carbides and in part remain undissolved, creating conglomerates being a result of fusion of undissolved powder grains into molten metal base. In effect of convection movements of material in the liquid state, conglomerates of carbides arrange themselves in the characteristic of swirl. Laser alloying of surface layer of investigated steel without introducing alloying additions into liquid molten metal pool, in the whole range of used laser power, causes size reduction of dendritic microstructure with the direction of crystallization consistent with the direction of heat carrying away from the zone of impact of laser beam. Remelting of the steel without introducing into liquid molten pool the alloying additions in the form of carbide powders, causes slight increase of properties of surface layer of investigated steel in comparison to its analogical properties obtained through conventional heat treatment, depending on the laser beam power implemented for remelting. The outcome of the research is an investigation showing the structural mechanisms accompanying laser alloying. Aluminium alloys are commonly used lightweight construction materials. Spray-formed alloys, in particular, represent a group of materials with very high Si contents and a homogeneous distribution of primary Si and other alloying elements in solid solution and intermetallic compounds. The paper deals with current results of EB surface alloying and dispersing of such alloys using a high frequency beam deflection technique. The results concerning the interactions between the EB and the material and its effects on the layer microstructure, characteristic layer properties as well as detailed researches into friction and wear behaviour and future prospects for the technological transferability to industrial applications will be discussed. The microstructure, microhardness, friction coefficient, amount of wear and corrosion resistance of electron beam treated specimens were investigated. It is shown that the electron beam treated specimens can improve the properties of material. The coating has an average microhardness of approximately HV, the friction coefficient of electron beam irradiation treated specimens is considerably lower than that of TiN coating. When the electron beam irradiate times is appropriate, the roughness of surface will much lower, and it will achieve polishing effects. The corrosion behavior of the composite coating in 3. In comparion with the corrosion potential for 3Cr2W8V alloy, the corrosion potentials of TiN coating and electron beam treated specimen are increased respectively. The electron beam treated specimen has the lowest corrosion current density as well as the highest corrosion potential showing an improved corrosion resistance compared with 3Cr2W8V alloy. The resulting structures were analyzed in great detail by metallographic analysis and by scanning electron microscopy SEM

SURFACE ALLOYING BY ION, ELECTRON, AND LASER BEAMS pdf

2: G. Foti & D.C. Jacobson: Surface Modification and Alloying (PDF) - ebook download - english

Surface modification and alloying by ion, electron or laser beams is proving to be one of the most burgeoning areas of materials science. The field covers such diverse areas as integrated circuit processing to fabricating wear and corrosion resistant surfaces on mechanical components.

Ti2N, TiN as well as carbonitrides e. It was found that the nitrides were preferably produced at moderate beam intensity by which the nitriding depth increased greatly with multi-shot irradiation. No or less nitrides were produced under irradiation of very high intensity or less number of shots. The origin of incorporated C in the nitrides is mainly attributed to the anode material of ion diode used in the IPIB apparatus. The theory of electronic beam machining is explained in detail, which include electronic beam come into being. The structural drawing is bring brought by this study. The drive principle of worktable movement and the procedure control of electronic beam machining is describe detailedly. The elementary problem is solved on electronic beam machining in theory. Microstructural, optical and mechanical properties of oxide and fluoride films are examined. Superior optical quality, durability and environmental stability are achieved for oxides deposited by ion assist reactive ion beam sputtering and thermal evaporation. The materials and deposition techniques are discussed with regards to manufacturing of optical interference filters for near-UV â€" mid-IR wavelengths. High performance of thin film materials and optical filters is demonstrated. Lower beam current gives finer surface and more accurate structure. The value of depth obtained was less than the initial depth of mill due to re-deposition, influenced by low sputter yield of silicon. Milling time and dwell time play important roles in milling process to get high aspect ratio of microholes. The quality of the high-carbon rod is determined by mechanical properties, which depend on microstructure characteristics, in particular the perlite grain grade. The existing technique for determining the perlite dispersion has the main drawback - the subjectivity of choosing the five worst view fields for evaluation, which reduces the accuracy of the determination results. The article presents the results of a study aimed at increasing the objectivity and accuracy of the evaluation of high-carbon wire rod perlite grain grade. An improved technique for determining the high-carbon wire rod perlite grain grade â€" Pgg with five view fields is proposed. The cross-section of the rod sample is considered as an inhomogeneous area from the perlite dispersion point of view, which is divided into three annular zones with different levels of perlite dispersion. Selection of five view fields is carried out as follows: Statistical analysis of the experimental data showed that all view fields should be located on the same diagonal. The location of the view fields is fixed and is unchangeable for all samples under study. The technique described in the article is an effective tool for analyzing the structure of high-carbon steel wire rod.

SURFACE ALLOYING BY ION, ELECTRON, AND LASER BEAMS pdf

3: Electron Beam Surface Alloying of a Magnesium Alloy with Al

Get this from a library! Surface alloying by ion, electron, and laser beams: papers presented at the ASM Materials Science Seminar, October , Toronto, Ontario, Canada.

A zircon coating was applied on the surface of Ti-6Al-4V alloy by plasma spray and its effect on the high temperature tensile properties of the alloy as well as the oxidation behavior of the alloy were studied. The results show that the elongation of the coated specimens is higher than that of the uncoated ones, while the ultimate tensile strength of the alloy is not changed. An oxide film had formed on the surface of uncoated Ti-6Al-4V alloy, however no such oxide film was found on the coated alloy at the early of stage. The coating can prevent oxygen penetration into the substrate thus prevent embrittlement of the subsurface zone. The ductility could be improved by means of the zircon coating. The optical micrographs of the specimens show little change in microstructures of the coated and uncoated specimens. Zircon coating has no effect on the microstructure of the substrate alloy. The surface morphology and hardness of electroless Niâ€”P alloy plating on aluminum alloys substrate in an alkaline plating bath with sodium hypophosphite as reducing agent were investigated. The effects of bath pH on the plating rate, compositions and surface morphology of theelectroless Ni-P deposits were studied. The results showed the deposition rate of the electroless Niâ€”P deposits increased with the rise of the bath pH, while the P content decreased. Scanning electron microcopy SEM of the deposits showed nodular structure for the deposits. Hardness data of the Ni-P coatings indicated that electroless Niâ€”P plating could obviously improve the hardness of aluminum alloy. The effect of Cd and Sb addition on the microstructural and mechanical properties of as-cast AZ31 alloys was investigated and compared. The results indicate that the difference of Sb and Cd in the microstructure and mechanical properties of as-cast AZ31 magnesium alloy is significant. Oppositely, by addition of 0. Accordingly, the Cd-refined AZ31 alloy exhibits higher tensile and impact toughness and Brinell hardness properties than the Sb- refined one. In this study, Al-Si alloy protective coating was deposited on the surface of ZM5 magnesium alloy by cold spray technology. Researchers observed the surface morphology of the coating by SEM, and researched tribological properties of the substrate material and the coating. The results show that, the bonding mechanism of the Al-Si alloy coating and substrate is metallurgical bonding and mechanical interlocking. The abrasion mechanism of Al-Si alloy coating is adhesive wear. The friction coefficient of the coating is higher than magnesium alloy in different friction frequencies. Greater change in friction coefficient is caused by the inhomogeneous phase composition. But the wear track depth of the coating is smaller than magnesium alloy. Wear-resisting property is improved. In order to protect magnesium alloy structure used in equipments, Al-based alloy coating on ZM5 magnesium alloy surface was prepared by Supersonic-Particles-Deposition SPD. Microstructure,bonding strength,hardness, anti-scratch property of the deposited Al-based alloy coating were analyzed and tested using scanning electron microscope SEM ,energy dispersive spectrmomter EDS , dualization stretching method and scratch testing machine. The results indicated that the coating was compacted with 1. The bonding strength value was Microhardness of the coating was about 1. The anti-scratch property of the processed coating improved obviously compared to Mg-substrate.

SURFACE ALLOYING BY ION, ELECTRON, AND LASER BEAMS pdf

Humanism of Miltons Paradise lost Never trust a thin cook and other lessons from Italys culinary capital Glutathione and sulfur amino acids in human health and disease Divorce and money The Methodist way of life. The purpose of mathematics Iris johansen devils triangle Mba cet 2016 books Doctor, lawyer, Indian thief Control of crop diseases Southern Pacific in Oregon pictorial Drafting Corporate Agreements 2007 Evolving nationalisms : Zionism and Arabism, 1880-1914 Pink Floyd the Wall V. 4. Six French plays. Water Boats (Science Factory) Maurice the Shake and Gaston the Near Sighted Turtle Lifting as they climb The Day That Lady Liberty Cried. The art of warlords of draenor Microsoft Outlook 2000 for Windows for dummies quick reference Zygomatic implants the anatomy guided approach 8 Troy: The Circle-girt City 181 Race, gender, and ethnicity : competition for employment opportunities Estimated consumption and earning for third world populations XIV. Resolves, etc. 1717-1753. Internet standards and protocols Dan brown inferno book Spirits, science, and pseudo-science in the nineteenth century Cfa level 2 books 2015 Chicken other birds The Raiders Bride US policy and regional security in Central America Standard rug sizes Philosophy of human person book The third wheel diary Stellar surface structure The theory and practice of the Mandala P.I. V25#5 ANALYSIS IN SOUTH AMERICA Your smart business plan