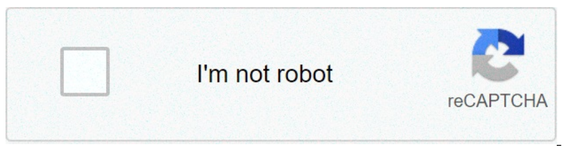

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Case hardening process ppt

1 A Seminar on Case Hardening Methods 2 à Ndex Introduction Methods for Place Surface Hardening Safety Coating Layer Administrations Methods Diffuse Substrate treatment of selective diffusion 3 Introduction Case hardening or surface hardening is the tightening process of the surface of a metal object. Deeper underneath to remain soft, thus forming a thin layer of more difficult metal, called the case, in the surface. This combination of surface and resistance is breaking on the impact is useful in parts, such as a camer ring gear, bearings or axles, turbine applications and automotive components that must have a very difficult surface to resist Wear, along with a sturdy interior along with a resistant interior the impact that occurs during operation. Most surface treatments result in compressive residual tensions in the surface that reduce the likelihood of crack initiation and help secure crack propagation in the case-nucleus interface. In addition, the hardening of the surface of the steel may have an advantage over hardening, because the less expensive low carbon and metering cakes can be hardened with minimum problems of cracking distortion and associated with hardening of thick sections. 4 There are two distinctly different approaches to the various MÃ © all for the surface hardening models involving an intentional acimulum or addition of new layers that involve superfect and subsurface modification Without any intentional acimulum or increase in piece dimensions 5 6 The first surface hardening group Methods include the use of fine films, coatings or solder overlays (hardfacings). Less economic limitations as quantities of production increase the performance of film fatigue, coatings and overlaps can also be a limiting factor, depending on the strength of titles between the substrate and the advantages of layers added with tools of tools, for example, tin coatings and al2O3 are effective not only because of its hardness, but also because its chemical began reduces crater wear and welding chips for the tool. Some overlays can transmit resistant properties to corrosion. Overlappings can be effective when the selective hardening of large areas is required 7 The second group of superfect hardening machines includes substrate treatment without constructing any layer in the devices of diffusion Surface modify the chemical composition of the surface with hardening spaces such as carbon, nitrogen or boron. Diffusion Methods can allow the effective hardening of all the surface of a part and are generally used â € â € œ when a large number of pieces should be hardened to surface. SELECTING SELECTIVE SELECTIONS allow for localized hardening. Selective hardening usually involves the hardening of transformation (heating and extinguishing), but some selective selective machining (selective nitrishing, impoant of âo ENS and EN Beam) are based Only in the modification of compositions 8 mothers of surface hardening diffusion The Básico process is thermochemical. It is necessary to improve the diffusion of hardening elements in the surface and subsurface regions of a part. The diffusion depth exhibits a time temperature dependence, such that: the case depth = k Â ° to the time constant diffusivity, K, depends on the temperature, the chemical composition of the gradient concentration of a particular hardening element. In terms of temperature, the constant diffusivity increases exponentially at the absolute temperature function. Concentration gradients depend on the surface kinema and reactions of a process 9 Methods of hardening by diffusion are categorized based on: various variations of hardening elements (such as the method of carbon, nitrogen or boron process) used to handle and carry the elements of hardening for the surface of the seal factors that influence the suitability of a specific diffusion of the spectric diffusion includes the type of steel, the hardness of the desired case, the case depth, the profile desired case, and 10 carbureaguration carburtion is the carbon addiction to the surface of low carbon, at temperatures (usually between 850 and 980 C, or 1560 and 1800 f) Which Austenite, with its high solubility to carbon, is the stable crystal structure. Hardening is performed when the high carbon surface layer is tempered to form a martensic case with good resistance to wear and fatigue, superimposed, a hard-carbon hardcore. 11 If the hardness of the cemented plays is mainly a function of the carbon content. When the carbon content of the action exceeds about 0.65%, additional carbon does not have any effect on the hardness but do not increase temperability. Carbon in excess of 0.65% can not be dissolved, which would require high temperatures to ensure the soluble carbon and austenitis. Higher levels of carbon, in case it will impact structural properties that can improve performance characteristics, such as wear, sliding contact fatigue, and rolling fatigue. 12 Carburação Steels Carburaçõesções for Cementão Normally has base-carbon contents of approximately 0.2%, with the carbon content of the cemented layer generally controlled to between 0.7 and 1% C. However, the surface carbon is often limited to 0.9% (ref 3) because too high carbon content can result in austenite retained and martensite brittle (due to training of carbides projected on the borders of grain). Most part of the cemented cords are deadcare (deoxidized by aluminum addiction), which maintain fine gran sizes, at temperatures of about 1040 C (1900 f). Aças in the grave grain practices can be carbured if a double tone is introduced to provide gran refinement. Double tone usually consists of a direct tmper, followed by a requound to a lower temperature. 13 Carburação MÃ © All Gás CarburizingVacuum Cement or low pressure plasma cementation The salt bathroom Cement CementaÃ§Ã£ 14 Gás Carburação 15 Plasma Cementation 16 Carburação Package 17 Bath Salt Carburação 18 Carbonitação Carbonitação is A technical treatment of surface hardening, which introduces carbon and nitrogen within the Austenite of Action. Cement Cement Austenite in Martensite after tmper. Tompera time is high. Mainly for high cement alloy carbonitret, nitrogen improves hardening capacity and therefore low carbon cakes can be treated here. Minor Time Time, resulting in less distortion and minimizing the potential for crevices 19 nitreness nitreness is a thermal treatment of surface hardening, which introduces nitrogen into the surface of the Açoa a range (500-550 C, or 930-1020 f), while it is in the Ferritian state. Because nitreness does not involve heating for the austenite phase with tompera the shaped martensite, nitride components would exhibit minimum distortion and excellent dimensional control. Nitrect has the added advantage of improving resistance to corrosion in salt spray tests. 20 The nitrect mechanism is generally known, but the specific reactions that occur in different types of action and with different nitreness media are not always known. Nitrogen has a partial solubility in iron. It can form a solve solution with nitrogen ferrite contents until about 6% in about 6% N, a compound designated by prime gamma (G0) with an FE4N composition , Is formed. A nitrogen contents greater than 8%, the product of the equilibrium reaction is compound and, FE3N. Aças containing strong nitride formation elements such as aluminum, crommite, vanadium, molybdenum and 21 nitrated carbon steel (tempered and revenued). The most significant hardening is reached with a class of cçion alloys which contain approximately 1% al. When Actions are nitrated, aluminum aluminum forms of aluminum particles, which force the ferrite and strengthening structure to create displacements 22 process for nitridinggas nitreness (cash furnace or of fluidized bed), liquid nitrectation (salt bath) plasma nitrectation (iam) in a study study 800 commercial stores in the United States and Canada, 30% offered nitreness services, of which: 21% nitreness offered 7% bath offered salt nitrect 6% offered bed Fluidized nitreness 5% nitreness offered Plasma 23 Advantages and disadvantageste Advantages and disadvantages of these techniques are similar to those of Cement. Process times for the gap nitreness can be quite long, that is, from 10 to 130 h, depending on the application, and the depths of cases are relatively poorly profound, usually less that 0.5 millimeters of plasma nitreness allows faster nitration, and the surface saturation quickly achieved from the results of the plasma process of ferrific diffusion Pida .. 24 Austenic nitrocarbon ferriticnitrocrobrozing is a process of surface hardening that uses both carbon and nitrogen, but with more nitrogen than that of carbon when compared to carbonitret. There are two types of nitrocarbonet: ferristic ferrotal ferrotal nitrocarbonetation occurs at lower temperatures in the ferriz temperature range (500-550 C) and involves nitrogen diffusion in the case. Austenic nitrocarbonet is a more recently developed process with process temperatures in the range of 675-775 C (1245-1425 f). 25 differs austenic nitrocarbon of nitrocarbonetação ferrícação in capacity for deeper cases of cases with better loading capacity, but can result in a greater distortion part because of the processing temperatures more and the tone process required. Although ferry and austenic nitrocarbon. They have higher processing temperatures than nitreness, they have the advantage of being suitable for carbon cakes. 26 Applied Energy Methodssurface COP Hardening can be achieved by heating and localized tone, without any chemical modification of the surface. Most Common Method Calls Tompera by Inducse Limitation Limitations Colding Hardening: Include the possibility of distortion distortion Hardening: requires narrow coupling between the part and coil (especially When using high frequencies), which must be precisely maintained. 27 Flame hardening draws hardening consists of austenitization the surface of a heating steel with a maacharic or oxyhydrogenic torch and immediately tone with water or water base polymer. The result is a tough surface layer of martensite on a molter inner indoor native with a ferrite-perlite structure. There is no change in the composition, and therefore the hardened flame action must have a suitable carbon content for the hardness of the desired surface. The heating rate and heat conduction for the interior seems to be more important in the depth establishment case than the use of a high temperability. 28 Heating by inducing heating inducing is a extremely versatile heating that can perform the hardening of the uniform surface, the hardening of the localized surface, through hardening, and Tompera of hardened pieces. The heating is achieved by placing a ferrous steel in the magnetic field generated by the high alternating frequency current passage through an inducer, usually a copper coil cooled to water. The heating depth produced by induction is related to the frequency of the alternating current, energy input, time, part of coupling and delay of tmper. 29 Advantages in the form of radiant and secondary heat are eliminated, the process is suitable for the online production. More fast Energy Efficiency Process Less Distortion Small Footprints 30 Surface Laser Heat Heat TreatmentLaser Surface Heat Treatment is widely used to harden the localized areas of the Iron and Aã Machine Components Fused. There is no chemical changes produced by hardening laser transformation, and the process, such as inducing and hardening calls, provides an effective ethics to selectively harden ferrous materials. 31 Other ThreadsSurface Members Fusion Laser Surface Fusion Results Laser surface in a refinement of the structure, due to the rapid extinction of the molten surface alloy surface material, The elements are added to fused fused mass To change the surface composition 32 Other MÃ © All Diffusion CoatingsDiffusion Coatings are deposited by heating the components to be treated in contact with the powder coating material in an inert atmosphere (solid state diffusion), heating them in an atmosphere of a volatile compound of the coating material (gaseous phase deposit out of contact or chemical steam deposit) 33 METHOD OF SELLED STATEMENT DIFFUSION , modalizing methods of gas phase deposit in Burando Gás Chromization (metallization, chemical steam deposit and packet cement) carbeto Titanic (CVD) 34 ¢ ion ion are with very high energy led to a substrate. Ons of almost any spanish span can be deployed, but nitrogen is widely used to improve resistance to corrosion and tribological properties of the cakes and other leagues. The main difference between the plasma nitrishing and the implantation of the levels is that the implantation of the onsters can be performed at room temperature. 35 Implementation Makers of onsters accelerate, generated by specially designed fonts, in very high energies (from 10 to 500 kEV). In the nitride plasma is