Vacuum Arc Remelting Of Steel And Alloys Technological

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PAM - Plasma Arc Melting Furnace*Electric Arc Furnace* **melt metal with magnets DIY Electric Arc Furnace Melting Copper and Iron Steel Making Process with Hot Metal, Scrap and DRI** Easy PVC Pipe Bending (How To/DIY) ~~Electric Arc Furnace penetration process~~ *Mini Arc Furnace (Arc Reactor Technology IRL) steel mill wet charge Electric Arc Furnace Steel Slag (EAF)* direct-arc furnace.flv ~~Titanium - The Metal That Made The SR-71 Possible~~ ~~Deringer-Ney: Vacuum Arc Re-melting Process~~ Molten Metal in a Vacuum *The Amazing Eddy Current* What is ELECTRO-SLAG REMELTING? What does ELECTRO-SLAG REMELTING mean? ~~Breakthrough in Nuclear Fusion? - Prof. Dennis Whyte~~ *How To Make An Electrical Arc Furnace* ~~Arc-melting of metals and alloys LONGER VERSION~~ **Vacuum Arc Remelting Of Steel**

Vacuum arc remelting (VAR) is a secondary melting process for production of metal ingots with elevated chemical and mechanical homogeneity for highly demanding applications. The VAR process has revolutionized the specialty traditional metallurgical techniques industry, and has made possible incredibly controlled materials used in the biomedical, aviation, and aerospace fields.

Vacuum arc remelting - Wikipedia

In steel: Vacuum arc remelting (VAR) In this process, employed for casting steels that contain easily oxidized alloying elements, a consumable electrode made of forged steel or of compacted powder or sponge is continuously melted by an arc under vacuum. At the same time, the shallow molten⋯ Read More

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Vacuum arc remelted (VAR) billets. For applications requiring a high-quality material with low contents of impurities, thus extremely low contents of non-metallic inclusions, steels melted in the normal way can be remelted in a high-vacuum (HV) furnace. This production method is designated VAR (vacuum arc remelting) and 'HV' is added to the steel grade designation.

Vacuum arc remelted (VAR) billets — Sandvik Materials ...

Vacuum arc remelting (VAR) is a secondary melting process for production of metal ingots with elevated chemical and mechanical homogeneity for highly demanding applications. [1] The VAR process has revolutionized the specialty traditional metallurgical techniques industry, and has made possible incredibly controlled materials used in the biomedical, aviation, and aerospace fields.

Vacuum arc remelting - WikiMili, The Free Encyclopedia

The main purpose of the remelting process is to clean the steel. In short: in the ESR process all oxidic particles are absorbed by the slag when the metal drops pass through the remelting slag. Apart from the deposition of macroscopic inclusions, the microscopic cleanliness is also significantly improved.

Remelting Steel for the Highest Demands: ESR and VAR ...

Pouring under vacuum lowers the hydrogen content, an important matter for large ingots. Vacuum arc remelting (VAR) In this process, employed for casting steels that contain easily oxidized alloying elements, a consumable electrode made of forged steel or of compacted powder or sponge is continuously melted by an arc under vacuum.

Steel - Special solidification processes | Britannica

Vacuum Arc Remelting (VAR) is typically the final melting process in the production of a wide range of alloys including superalloys, titanium, zirconium and specialty steels. During this process, a DC arc is struck under vacuum between a consumable electrode and a water-cooled copper crucible.

Modeling of Vacuume Arc Remelting of Alloy 718 Ingots

Vacuum Arc Remelting (VAR) and Electroslag Remelting (ESR) are two secondary refining processes applied to conventionally produced steel. A comparison of VAR and BSR is made with basic electric arc steelmaking, via a review of current literature. These refining processes greatly improve the structure and properties of low alloy steel.

TECHNICAL REPORT D D C

Vacuum arc remelting is a widely applied vacuum melting process used to control the solidification of segregation sensitive alloys. It is most commonly the final liquid metal processing step before forging. The first furnace, resembling furnaces in operation today, was built by vonBolten in 1903 (Noesen 1967).

Vacuum Arc - an overview | ScienceDirect Topics

Vacuum arc remelting further removes lingering inclusions to provide superior steel cleanliness and remove gases like oxygen, nitrogen and hydrogen. Controlling the rate at which these droplets form and solidify ensures a consistency of chemistry and microstructure throughout the entire VIM-VAR ingot, making the steel more resistant to fracture or fatigue.

Electric arc furnace - Wikipedia

Consarc is well known to producers of speciality steel, superalloys, and reactive metals. We pioneered commercial ingot production using automated Vacuum Arc Remelting (VAR) furnaces. We were the first to apply load cell weighing of electrodes to improve process control.

Vacuum Arc Remelting Furnaces - Consarc

the base of the copper mold in a vacuum atmosphere. Once the remelting has begun, the arc is set between the electrode and the growing ingot. The objective of this operation is to better control the solidification of the final ingot, its inclusion population, and possibly take advantage of the vacuum to pursue the steel refining [4].

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ESR reduces other types of inclusions as well, and is seen as an alternative to the vacuum arc remelting (VAR) method that is prevalent in US industries. An example of the use of the electro-slag refined (ESR) steel technique is the L30 tank gun. CrNi60WTi is a stainless steel which is best formed by either ESR or

Electro-slag remelting - Wikipedia

On the other hand, the investments in state-of-the-art technology such as Pressure Electro Slag Remelting (PESR), Vacuum Induction Melting (VIM) and Vacuum Arc Remelting (VAR) are the result of research showing a real need for a new generation of steels.

The Pressure Electroslag Remelting Process (PESR) :: Total ...

Vacuum Arc Remelting Another melting process often used with stainless steel is vacuum arc remelting (VAR). This is a secondary melting process that produces metal ingots that have an elevated chemical and mechanical homogeneity. It is commonly found in industries such as medical and aerospace.

Stainless Steel Melt Practices - Clinton Aluminum

Vacuum arc remelting is a widely applied vacuum melting process used to control the solidification of segregation sensitive alloys. It is most commonly the final liquid metal processing step before forging. The first furnace, resembling furnaces in operation today, was built by vonBolten in 1903 (Noesen 1967).

Remelting - an overview | ScienceDirect Topics

Vacuum arc remelting (VAR) is a secondary remelting process for vacuum refining and manufacturing of ingots with improved chemical and mechanical homogeneity. In critical military and commercial aerospace applications, material engineers commonly specify VIM-VAR steels. VIM means Vacuum Induction Melted and VAR means Vacuum Arc Remelted.

The Electric Arc Furnace - The Graphite Network – Steel ...

Vacuum arc remelting: melting reactive and refractory metals and steel for highly demanding applications Our Vacuum Arc Re-melting technology delivers consistently higher yields and replicateable metals and is ideal for high integrity applications where cleanliness, homogeneity, and robustness of the final product are essential.

Dr. Boris Medovar, a member of the Soviet Academy of Sciences, is a promi nent member of the E.O. Paton Electric Welding Institute in Kiev, one of the pre-eminent institutes of the USSR. The Paton Institute, internationally famous for its entrepreneurial efforts in electrical welding processes, is also famous for its application of electrically based processes in melting and remelting of high alloy and high-temperature materials. These include the ESR (electroslag re melting) process, the ESC (electroslag casting) process, skull remelting based on electron-beam processes, plasma arc processes, and electric arc processes. Along with the ESR process for ingot production is the commercial plasma arc remelt process for specialty steels, particularly where high nitrogen contents may be desired, as in austenitic stainless steels. Major industrial centers are now scattered throughout the USSR and are a major factor in high-alloy, high strength, low- and high-temperature materials. The ESR process was developed in response to the Western development of the VAR (vacuum arc remelting) process for producing very highly alloyed materials during the growth period of the jet engine age. The V AR and ESR processes utilize different purification and refinement processes that are extremely critical in very highly, complexly alloyed superalloys and high-speed tool steels. In water-cooled remelt systems, they also achieve relatively rapid (directional) solidification, minimizing segregation and coarse phase separation of undesir able impurity elements or elements that tend to form coarse brittle phases.

Accurate control of the electrode gap in a vacuum arc remelting (VAR) furnace has been a goal of melters for many years. The size of the electrode gap has a direct influence on ingot solidification structure. At the high melting currents (30 to 40 kA) typically used for VAR of segregation insensitive Ti and Zr alloys, process voltage is used as an indicator of electrode gap, whereas drip-short frequency (or period) is usually used at the lower currents (5 to 8 kA) employed during VAR of superalloys. Modem controllers adjust electrode position or drive velocity to maintain a voltage or drip-short frequency (or period) set-point. Because these responses are non-linear functions of electrode gap and melting current, these controllers have a limited range for which the feedback gains are valid. Models are available that relate process voltage and drip-short frequency to electrode gap. These relationships may be used to linearize the controller feedback signal. An estimate of electrode gap may then be obtained by forming a weighted sum of the independent gap estimates obtained from the voltage and drip-short signals. By using multiple independent measures to estimate the gap, a controller that is less susceptible to process disturbances can be developed. Such a controller was designed, built and tested. The tests were carried out at Allvac Corporation during VAR of 12Cr steel at intermediate current levels.

This report addresses a mechanical property characterization of a split argon-oxygen decarburized (AOD) heat of 4340 steel which was further processed by vacuum arc remelting (VAR) and electroslag remelting (ESR) into 12.7 cm (5 inch) square forgings. Properties examined were hardness, tensile, Charpy V-notch impact, and fracture toughness as a function of tempering temperature over the range of 163 C (325 F) to 649 C (1200 F) for both the longitudinal and transverse orientations. Microstructural aspects are also addressed.

Two applications of vacuum technology to metallurgy are discussed. One concerns the consumable-electrode vacuum-arc remelting of AISI 316 stainless steel. An air-melted and a vacuum-arc remelted heat are compared with respect to composition, processing and welding, room- and high-temperature mechanical properties, magnetic permeability, inclusion count, and behavior in the Huey corrosion test. The vacuum heat was lower in carbon, oxygen, and hydrogen than the air-melted heat. The low oxygen and hydrogen were attributed to the melting process, while the low carbon was not. Both heats were similar in processing and welding behavior as well as in mechanical and physical properties. In Huey corrosion tests of sensitized material, the air-melted steel was attacked much faster than the vacuum-melted material. However, this difference was ascribed to the difference in carbon content between the two steels. Thus, in this study, no differences attributable to the consumable-electrode vacuum-arc remelting process were observed.

Large gun tube forgings are presently produced from statically-cast electric arc furnace steel ingots. Vacuum Arc Remelting (VAR) and Electroslag Remelting (ESR) are two secondary refining processes applied to conventionally produced steel. A comparison of VAR and ESR is made with basic electric arc steelmaking, via a review of current literature. These refining processes greatly improve the structure and properties of low alloy steel. Gas and inclusion contents are lowered, and mechanical properties and soundness are improved. VAR is a simpler and more developed process than ESR, but the latter is more flexible and versatile. In addition ESR produces a much higher yield.

This report gives the experiences of several steel producers and consumers with vacuum degassing as a melting practice in the manufacture of high-strength steels for critical applications. The parameters involved in determining the effects of melting practice on mechanical properties are outlined. Pertinent melting processes are described and evaluated qualitatively. In presenting the data, vacuum degassing is compared with other melting practices such as conventional air melting and consumable-electrode vacuum-arc remelting (CEVAR). Generally, there is a trend indicating that vacuum degassing is being used in some production applications instead of air-melted or CEVAR material. In terms of higher and more uniform transverse tensile properties and impact strength, longer fatigue life, and improved cleanliness, the CEVAR alloys were the best. Vacuum degassing by any of the various methods resulted in an improvement in properties of air-melted alloys. In some instances it appeared that the quality of CEVAR alloys could be approached when stream degassing or D-H (Dortmund-Horder) treatment was applied to air melts. Recommendations are given for additional investigations on the effects of melting practice on mechanical properties of premium-quality steels. (Author).