

At present, the effects of welding residual stress on structural integrity are assessed based on the international evaluation standards, mainly including BS 7910, API 579, and R6 methods [[1], [2], [3]]. One of the features of the BS 7910:2013 guide is the expansion of Annex Q on "Residual stress distributions in as-welded joints" aimed primarily to increase user ...

This paper studies the effect of laser power on the microstructure and mechanical properties of medium Mn steel (MMS) and dual-phase (DP980) steel welded joints by laser welding. The microstructure in the welded DP980 region primarily consists of martensite extending from the fusion zone to the fine-grained heat-affected zone (FG-HAZ), inter-critical ...

In welding of high-strength steels, e.g. for foundations and erection structures of wind energy plants, unacceptable defects can occasionally be found in the weld area, which should be removed by thermal gouging and subsequent re-welding. High shrinkage restraint of repair welds may lead to crack formation and component failure, predominantly in interaction ...

Abstract. Mechanical abusive loadings, as an inevitable consequence of road accidents, can damage the embedded energy storage system in an electric vehicle and deform its constitutive parts, e.g., the lithium-ion batteries. Therefore, to study the mechanical responses of these batteries and avoid expensive testing equipment and rigorous safety percussions, ...

In terms of joint mechanical properties, Pouranvari et al. [14] compared the tensile shear mechanical properties of resistance spot welded and its weld bonding joints of martensitic stainless steel. The report pointed that the failure load and energy absorption of weld-bonding joints increased by 100 % and 110 %, compared to spot weld joints.

Consequently, this paper presents the research carried out regarding the capacitor energy storage welding technique of Ni 63 Cr 12 Fe 4 Si 8 B 13 amorphous ribbons. The structural analysis was done by microscopy, X-ray diffraction, and differential scanning calorimetry, and the mechanical behavior was determined by nanoindentation.

High-arc-energy welding undoubtedly increases the tendency for both local softening and embrittlement to occur in the coarse-grained heat-affected zone (CGHAZ) of line pipe girth-welded joints. In this paper, the CGHAZs of X80 welded joints with series of arc energies of 20.3 kJ/cm, 29.9 kJ/cm and 40.2 kJ/cm were prepared by automatic submerged ...

Lithium-based rechargeable batteries, including lithium-ion batteries (LIBs) and lithium-metal based batteries

(LMBs), are a key technology for clean energy storage systems to alleviate the energy crisis and air pollution [1], [2], [3]. Energy density, power density, cycle life, electrochemical performance, safety and cost are widely accepted as the six important factors ...

The effects of welding energy on the mechanical and microstructural characteristics of ultrasonic-welded pure copper plates were investigated. Complex dynamic recrystallization and grain growth occurred inside the weld zone during ultrasonic welding. At a low welding energy, a thin band of straight weld interfaces was observed and had an ultra-fine grain structure. With an increase in ...

This review presents a detailed summary of the latest technologies used in flywheel energy storage systems (FESS). This paper covers the types of technologies and systems employed within FESS, the range of materials used in the production of FESS, and the reasons for the use of these materials. Furthermore, this paper provides an overview of the ...

Energy storage welding refers to a sophisticated welding technique that harnesses stored electrical energy for the joining of materials, primarily metals. ... including metallurgical alterations or the introduction of stress fractures. Through energy storage welding, control is maintained over heat levels, thus safeguarding the integrity of the ...

The new procedure yielded cost savings (SAW working efficiency increased by about 80%), improved mechanical properties, and presented moderate residual stresses. Analysis revealed that the welded joint's low-stress and high-stress damage assessments may be affected by shifts in the strain localization spot under loading.

T-joint welding is a key manufacturing process of large storage tanks. However, complex residual stresses are generated and have a great effect on the structural integrity of storage tanks. The high residual stress caused by welding and the discontinuous structure may result in tank cracking and failure. In this work, the residual stress distributions on the inner ...

AA2024 and AA7075 dissimilar alloy welding have a wide range of applications. In this study, friction stir welding (FSW) of serrated joint interface with three different parameters was proposed. The microstructure, tensile strength, and microhardness of the joint were studied. The microstructure evolution and mechanical properties of aluminum in the weld ...

Three papers explore the optimization of welding processes and the development of advanced techniques to enhance weld quality, energy efficiency, and mechanical properties. Contribution (1): Effect of Laser Heat Input on the Microstructures and Low-Cycle Fatigue Properties of Ti60 Laser Welded Joints [ 12 ].

The effects of welding energy on the mechanical and microstructural characteristics of ultrasonic-welded pure copper plates were investigated. Complex dynamic recrystallization and grain growth occurred inside the weld

zone during ultrasonic welding. ... In USW, the effective stress distribution inside the metal coupon was dynamically changed ...

This paper adopted the new process of double-sided oscillation laser autogenous backing welding and double-sided oscillation laser-TIG hybrid filling welding to achieve 80 mm thick SA-738Gr.B steel narrow gap welding in the horizontal position. The microstructure, mechanical properties, and residual stress of the welded joints in the as-welded (AW) state ...

The use of thin foils or micro-foils is increasing across different industries such as microelectronics, aerospace, automotive, packaging, energy and medical industries []. Often these foils are exposed to elevated or depressed temperatures, corrosive environments, thermal cyclic loading and mechanical stress []. Therefore, the demand for efficient and flexible joining ...

The typical stress-strain curves were presented in Fig. 2 b, and the key mechanical properties were summarized in Table S1. As shown in Fig. 2 b, all the PEG4K-B x -PEG6K possessed impressive mechanical properties, which mainly depended on the coordination of dynamic boroxines and abundant hydrogen bonds.

A cryogenic hose is used to transport liquefied natural gas at sea, where flexible fittings are sealed by corrugated lining and end flange welding. However, the extreme cryogenic temperatures of the conveyed fluid introduce substantial challenges to the integrity of the fitting seals" structure during the LNG transfer process. In order to study the sealing performance of ...

Misalignment has a significant impact on the fatigue performance of circumferential weld joints in pipelines, which can significantly reduce the fatigue life. Misalignment generates a structural stress concentration on the pipeline, which proportionally reduces its fatigue strength. Moreover, due to the misalignment, the reinforcement of the root ...

The primary absorbed energy is the absorbed energy when as-weld residual stress (RS) is present. ... His research interests include FE analysis of the plastic forming, residual stresses of welding and its applications in mechanical engineering. Youngseog Lee received the B.S. in Mechanical Engineering from Pusan National Univ., Korea, in 1989 ...

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