

What causes microstructural deterioration during welding?

The dilution between the base plate and flyer plate during welding is the leading cause of microstructural deterioration. The interdiffusion of main elements in base (C,Fe) and flyer (Cr,Ni) plates may result in hardening region generation on the one hand and corrosion resistance decrease on the other hand.

What is the multi-layer welding process of stainless clad steel plate?

But due to the application of mixed filling metals, the multi-layer welding process of stainless clad steel plate essentially belongs to the dissimilar metal welding (DMW) between low carbon steel and stainless steel.

Which welding procedure should be applied for stainless clad steel plate welding?

In view of this problem, engineers posted that multi-layer and multi-passes weldings should be applied for stainless clad steel plate welding, namely, welding the joint into base, transition, and flyer seam layers. For such type of welding procedure, welding priority of three layers has a great influence on the joint properties.

Which welded joint has the best resistance to hydrogen blistering and hydrogen induced cracking?

The WM had the best resistance to hydrogen blistering and hydrogen induced cracking because only slight hydrogen induced cracking occurred under the most severe charging condition. Table 1. Surface hydrogen damage of the three main regions of the welded joint for different charging conditions.

How does hydrogen damage affect the resistance of X100 pipeline welds?

The HE resistance of different regions of the X100 pipeline welds decreased in order of WM < HAZ < BM, with different hydrogen damage modes on the surface, e.g., the BM exhibited predominantly hydrogen blistering for all hydrogen charging conditions, while hydrogen-inducing cracking more easily formed in the HAZ and WM.

How do charging conditions affect the severity of cracking?

Increased charging conditions (higher current density and/or longer time) increased the severity of cracking: the crack size and crack number increased and many cracks appeared in the middle thickness of the specimens, as shown in Fig. 7 b-d.

To solve the problem of energy loss caused by low energy utilization rate in the process of magnetic pulse welding (MPW), this paper presents a method to recover the energy after the first half wave of pulse current by using auxiliary capacitance. A detailed introduction of the working process of the improved discharge circuit was first carried out. Then experimental ...

The brittle fracture of the weld joint at low stresses is controlled by high-strength steel characteristics and welding defects. Based on fracture mechanics, the fracture behavior of the weld-base metal interface of a high-strength steel weld joint was studied to reveal the critical locations of the latter. From tensile fracture

experiments of 45 steel welded specimens, the ...

It is a solid-state welding process that protects the alloy maintaining the metallurgical properties of the base material, it is possible to weld materials such as metal matrix composites and rapidly solidified materials that may have adverse reactions when using fusion welding ... 5, Can weld materials that are sensitive to hot cracks ...

Hybrid laser-arc welding (HLAW) was applied for butt welding of 14.5 mm thick plates of ferritic cryogenic steel X8Ni9 containing 9% Ni, which is used for manufacturing storage and transport ...

2 · The chemical composition and mechanical properties of the 2195 Al-Li alloy plates used in the friction stir welding experiments are listed in Table 1 and Table 2, with welding ...

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 ...

properties of the base metal and weld zones on the canister mockup. Assessment of residual stresses associated with forming and welding was performed using a combination of three techniques. These include deep-hole drilling, the contour method, and xray diffraction. The -

A hot-rolled clad plate made of 316L stainless steel and S355 carbon steel was produced in a real industrial environment via GMAW welding, vacuuming, preheating to 1240 °C, and hot-roll bonding on four stand plate mills in nine passes with reduction rates between 20-6% per pass. The clad plates were solution annealed to achieve the usual delivery condition. ...

crack extended from the embrittled steel plate (crack-running plate) into the T-joint, propagated in the test plate by way of the weld metal, and then passed completely through the test plate. On the other hand, with an unwelded width of 33 mm (partial penetration welding), the brittle crack propagated and arrested within the test plate.

An approach is presented, based on the weight function method to calculate the stress intensity factors of semielliptical surface cracks originating from the notch root of welded joints. The ...

Whether the result of poor parts fit-up, rapid cooling or a variety of possible contaminants--from the atmosphere, base material or filler metal--weld cracking carries with it significant consequences for any welding operation. Not only does this defect adversely affect the integrity of the finished weldment, but it also requires significant time and money to rectify.

This study aimed to identify the fatigue crack initiation site of high-frequency mechanical impact

(HFMI)-treated high-strength steel welded joints subjected to high peak ...

The limited bending plastic strain seems to be caused by shock wave damage in the Mo plate due to high kinetic energy imparted to a flyer Mo plate during explosive welding [19, 20]. Noted that LCV ...

To avoid, or at least significantly reduce cracking susceptibility when welding carbon steels, do the following 6 things: Know the steel you are welding - many cracks occur because we assume that the welding procedure we used on one steel will work on other steels. The problem is that steels like ASTM A36 weld very similarly to AISI 4140 and ...

2 · The heat will be kept by thermal energy storage (TES) materials or exchanged by heat transfer fluid ... After welding, the stainless plates were cleaned with pickling paste. ... The ...

The first simulation was performed on the thin-plate tensile specimen of base metal to check the accuracy of the value of T_0 shown in Figure 9 and Figure 10. ... In addition, since the right end of the crack is the weld zone, the fracture energy of the weld is much larger than that of the base metal, so the crack is also easier to expand to the ...

(b) Load-carrying joint with the crack assumed to start at the weld toe. (c) Non load-carrying joint. [Figure The function f from equation (3:4) is plotted versus the quotient a/t]. 3.3 Tensile testing result Types of blade Thick Of the plates Fracture location remark 6mm 8mm 10mm Base plate 5.600 8.050 9.200 Base metal Weld has

Results indicate that base plate and weld metal meet the required specifications for static design but not for the dynamic loading experienced under this failure mode (i.e. ...

As a result, excellent impact toughness at low temperature has been obtained in coarse grain HAZ (CGHAZ) under 340kJ/cm of heat input condition in 40mm thickness plates. Besides, more than 100J of absorbed energy at -10°C have been achieved by optimizing welding consumables for A841 with high input welding.

3.1. Brittle crack arrest toughness, Kca of base plate The brittle crack arrest toughness value (Kca) was estimated by the ESSO test with the temperature gradient in the base plate (80 mm). In order to confirm the Kca of the base plate, ESSO tests of the 80 mm steel were conducted. Table 1. Chemical composition of EH40 steel plates (wt.%)

Weld Metal Zone. A large portion of cracks that occur in welding will be in or through the weld metal. Most of these cracks occur when the weld metal is still above 400°F [205°C] and are thus called "hot cracks." Crater cracks - these cracks occur at the end of a weld where the full cross section of the intended weld is not achieved. A ...

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Conventional defect assessment procedures of large engineering structures under elastic-plastic conditions, including pressure vessels, piping systems and storage tanks, among others, are based on fracture mechanics concepts to define a correlation between tolerable crack size and applied loading as measured by the linear elastic stress intensity ...

This two-part paper provides an overview on the state-of-the-art in the application of engineering fracture mechanics to weldments. This, of course, cannot be exhaustive but is limited to butt and fillet welds with crack initiation at weld toes. In the present first part, the authors briefly focus on the susceptibility of welds to cracks and other defects. Following this, ...

Welding, Joining and Coatings Research of Colorado School of Mines, Tim Pickle and Ben Schneiderman, used neutrons at the Department of Energy's (DOE's) Oak Ridge National ...

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