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Study on the Microstructure and Technological Properties of Clad Plates Made of Steels S235jR and X20Cr13 and S235jR and X5CrNi18-10 after Hot Rolling

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Key words: hot rolling, clad plates, carbon steel, alloy steel, hot rolling-bonding

The article presents the results of physical experiments consisting in the rolling of layered plates (clad plates). The experiments involved two types of two-layered flat bars, i.e. S235JR and X20Cr13 as well as S235JR and X5CrNi18-10. The experiment resulted in the development of a technology for the fabrication of layered flat bars made of structural steel S235JR, corrosion-resistant steel X20Cr13 and austenitic acid-resistant steel X5CrNi18-10. Microstructural observations were performed using a light microscope (LM) and a scanning electron microscope (SEM). The observations revealed the possibility of obtaining permanent joints through hot rolling and the possibility of applying steel grades S235JR, X20Cr13 and X5CrNi18 in the fabrication of layered plates.

Corrosion Resistance of Laser Beam Welded Joints in Ferritic Stainless Steel

Aleksander Lisiecki, Jan Orłowski, Santina Topolska

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Key words: laser beam welding, corrosion resistance, ferritic stainless steel, X2CrTiNb18

The primary goal of the research work was to determine the corrosion resistance of laser beam-welded joints made of ferritic stainless steel X2CrTiNb18 (1.4509) having a thickness of 1.5 mm. In some of the test joints, the weld was subjected to rolling. In addition, some other joints were subjected to heat treatment involving the use of a prototype induction heating welding station. The research work-related test results revealed that the test joints with the weld subjected to rolling were characterised by a significantly lower rate of linear corrosion progression (linear corrosion rate V_p = 0.008672 mm/year) compared to the test joints only subjected to laser beam welding and those subjected to heat treatment (V_p = 0.011052 mm/ year).

Gas Pipeline Welding Procedure Qualification – Standards and Tests

Julia Silezin, Sławomir Parzych

DOI: 10.327730/mswt.2024.68.3.3

Key words: welding, gas pipelines, natural gas, steel, NDT testing

The article describes the so-called combined welding technologies, marked as method “A” – 141/135, method “B” – 141/111 and method “C” – 141/136. In each of the methods, the root run (root layer) was obtained using method 141, whereas the groove was filled using methods 135, 111 and 136. In respect of the welding technology qualification process, the key issue was connected with finding an appropriate range of values for a heat input to each run, aimed to prevent dangerously high grain growth in the HAZ. The results of welded joint tests were fully consistent with the PN-EN ISO 15614-1 and PN-EN 12732 standards as well as Annex 5 to PI-ID-I03.

Quality Testing of Welded Joints of Wind Towers with Advanced Ultrasonic Techniques – a Case Study

Alicja Bera, Zbigniew Górski, Ryszard Pyszko, Jolanta Sala, Arkadiusz Szczurek

DOI: 10.327730/mswt.2024.68.3.4

Key words: wind towers, non-destructive tests, ultrasonic test, UT, PAUT, Phased Array, non-conformities/welding defects

The application of advanced quality control tests for welds is essential for enhancing competitiveness in the welded construction industry. The global focus on obtaining energy from alternative sources is leading to the increased production of wind towers. Improving the method of conducting inspections is necessary as wind tower structures are subject to 100% quality control of welded joints. The article presents the comparison of tests involving a model of an actual wind tower structure and ultrasonic methods, i.e. the conventional UT technique and the advanced and automated PAUT technique. An important element of the tests was the development of the instrumentation enabling the more accurate recording of the process.

Comparison of the Structure and Mechanical Properties of Coatings Arc-Sprayed with Eutronic Arc Flux-Cored Wires

Mateusz Sowa

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Key words: spraying, coating, arc spraying, erosion resistance

The article compares the erosion resistance, roughness and hardness of coatings produced by arc spraying. The study was conducted to compare the properties of arc-sprayed coatings with EuTronic Arc 599 and EuTronic Arc 595 powder wires on ASTM A516 Gr. 55 unalloyed steel substrates. Tests showed that the EuTronic Arc coatings exhibited very high hardness, averaging 755 HV for the EuTronic Arc 595 coating and 821 HV for the Eutronic Arc 599 coating. Application of the coatings increased the hardness, relative to the parent material, by 360 % and 400 %, respectively. The EuTronic Arc 599 coating showed a significantly higher roughness averaging 16.12 µm, compared to 12.35 µm for the EuTronic Arc 595 coating, which was likely caused by greater plasticization of the material during spraying resulting from the absence of carbides.