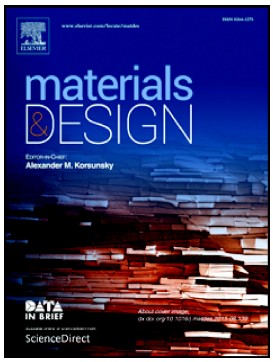

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Repair of arc welded DH36 joint by underwater friction stitch welding

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Abstract: Repair of arc welded DH36 joint by friction stitch welding was investigated in underwater condition to identify the influence of axial force and heat treatment on the defects, microstructure characteristics and mechanical properties of the repaired joint. The bonding quality of the subsequent overlapped friction taper plug weld (FTPW) and the overlapping FTPW were not as well as that of the previous overlapped FTPW. The conduct of the overlapping friction taper plug welding would induce cracking at the rounded transient of the overlapped FTPWs. High quality friction stitch welds could be obtained under the axial force of 35 kN with the result that tensile strength was more than 500 MPa. Microstructure of overlapping FTPW was mainly composed of lath bainite with maximum hardness up to 380 HV_{10}. Heat treatment, soaking at 550^{o}C, 600^{o}C and 650^{o}C for an hour before and after the overlapping FTPW, could significantly decrease the hardness of friction stitch weld and improve the drilling process of the overlapping FTPWs and could improve the