Influence of Laser Shock Peening Surface Treatment on Fatigue Endurance of Welded Joints from S355 Structural Steel

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This work deals with fatigue testing of the EN S355 structural steel welded joint. The weld was manufactured by the MIG welding technology and as the filler material was used the G3Si1 wire. The fatigue tests were carried out in the rotating bending mode on the specimens manufactured from the welded joint of the S355 steel. The main aim was to evaluate the fatigue endurance of the weld material and for this reason were used machined axis symmetrical specimens to remove the notch effect of the weld shape. In order to increase the fatigue endurance of the weld, the Nd-YAG laser was used for laser shock peening (LSP) of specimens surfaces, which lead to removing of the weld defects but in overall caused that LSP has behaved as the notch and lead to decreasing of the fatigue endurance. Obtained results of fatigue tests are compared, discussed and supported by correlation with results of additional experiments, e.g. identification of incurred structures after the laser shock peening by the metallographic observations and micro-hardness tests.

Keywords: S355, fatigue, laser shock peening.

Acknowledgment

The research was supported by European regional development fund and Slovak state budget by the project "Research Centre of University of Žilina", ITMS 26220220183 (40 %), Scientific Grant Agency of the Ministry of Education, Science and Sports of the Slovak Republic and Slovak Academy of Sciences, grant No.: 1/0123/15 (30 %) and by the project APVV 14-0096 (30 %).

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Paper number: M201632