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WELDABILITY OF THE HARDOX WEAR PLATES USED IN THE TRUCK INDUSTRY

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ABSTRACT

The automotive industry, as one of the most dynamically developing branches of the world economy, has set the direction of expansion of new design solutions using modern materials. Significant reduction in the weight of cars as well as semi-trailers in the period of past few years was the result of the development of new types of steels, in particular fine-grained Hardox steels. These steels are generally preferred in transport and mine industry, heavy construction equipment, shredders and conveyor applications because of their high resistance, good formability and weldability [1]. Quality of the welded joint depends on properties of the base metal and the filler metal, geometry of the groove, skill of the welder and welding equipment condition. The biggest problem, which is related to weldability of this steel, especially for work pieces of large thickness, refers to possibility of cold cracks appearance. They appear as a consequence of the high content of hydrogen or presence of martensite in the structure [2]. Those problems mainly can be solved by proper selection of electrodes, controlled heat input and, only in special cases, by preheating or post-welding heat treatment. All these said, point to conclusion that if one needed to obtain good properties of the welded joint, it is necessary to follow the recommendations presented in the specialized literature and instructions [3]. Test results of some researchers [1-4] confirm good weldability of the materials and very high strength properties of the joints obtained.

Hardox steels are categorized according to their alloy components and the hardness. The basic range of the steel has the five-number code for determination of the Brinell hardness; 400, 450, 500, 550, 600. The increasing code number means higher hardness, abrasion resistance, tensile strength and on the other hand it means also decreasing ductility, toughness and weldabilitiy [5]. These steels can be welded by all conventional welding methods [6]. This information is aimed at simplifying, improving and boosting the efficiency of the welding process. The study brings closer knowledge in area of welding of these steels often used in the production of special equipment. It describes features of sheet metals, welding procedure, their weldability, preheat temperature and interpass temperature, a choice of additional material.

The aim of this paper was to compare weldability results of above-mentioned Hardox steels. In addition, it may be possible to develop a general procedure for welded steels using different welding process. Joints in Hardox steels have been performed using different arc welding methods, considering welding materials and parameters recommended by producer. Based on microscopic tests and hardness measurements a method of thermal joints treatment has been proposed, consisting in their hardening and low-temperature tempering at the heat-affected zones. The results show that Hardox 400, 450 and 500 steel series can be welded without initial warming up until the plates' thickness 40 mm. Welding plates having high carbon and carbon equivalent content should be subjected to preheat or post weld heat treatment.

Keywords: *Hardox Steels, Weldability, Truck Industry, Wear Resistance, Martensitic Structure.*

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