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Investigation of Cutting Techniques of Hardox Steels

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The equipment used in heavy industries like mining or the construction of roads must meet special requirements such as a strong wear resistance and a high tenacity, leading to a good strength-to-weight ratio. A range of materials which meet those requirements is the Hardox steel groups [1-2]. Such steels are usually difficult to process by traditional mechanical cutting processes like milling or drilling because of their poor machinability by cutting. For this reason; efficient cutting techniques should be determined. Cutting sheets of different thickness is a big challenge for manufacturing companies. Mechanical cutting works on thin sheets made of structural steel. For thicker sheets are currently used different technologies of oxygen cutting, plasma, laser and water jet cutting [3].The aim of this work was to define and compare the above-mentioned cutting techniques of Hardox steel plates widely used in the industry. In addition, it may be possible to develop a general procedure for cutting steels using different cutting process.

The cutting was performed on a plate made of Hardox steel having the thickness of 8 mm. The quality of the parts processed by different cutting techniques was assessed by measuring their dimensions and surface roughness. The manufacturing time was also compared, as it directly influences the production cost. The relation between material characteristics such as microstructure and mechanical properties and the resulting machinability was studied.

Each of oxygen cutting, plasma cutting, laser cutting and waterjet cutting technologies has its own characteristics and range of applications in which it is the most economical. Therefore, deciding on specific cutting technology there should be taken into account e.g. steel grades, possibly other types of materials, their thicknesses and assumed cutting precision [3-4]. This study showed that water jet cutting does not cause any changes in the structure or hardness. The results obtained that the dimensional accuracy on the process parameters used in water jet is similar to that of the surface roughness. The cutting speed in laser and plasma cutting reduces results in an excessive amount of molten metal. As a result can be said; the application of this cutting method depends entirely on technical possibilities and cost calculation of using technology.

Keywords: Hardox steel, cutting, hardness, roughness.

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