

RESIDUAL SCALE REMOVAL FROM HOT ROLLED STEEL PLATE SURFACE USING HIGH PRESSURE SPRAY NOZZLES

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Abstract

Descaling of steel in hot rolling processes is an application of high-pressure spray nozzles. The impact force and pressure of these nozzles can be determined using Newton's 2nd and 3rd axiom. This allows calculating the impact pressure approximately by a simple formula. Direct measurement of the impact is possible with a force transducer, scanning the area of direct impingement of the spray. Droplet size of the spray jet seems to be a secondary factor, because pure mechanical considerations lead to a sufficient model of the impact. However, measurement of the area, covered by the spray, shows that the water film of the jet has been disintegrated, when impinging on the surface, but has not been atomized completely. This can be proved by short-time photos. Different investigations substantiate the hypothesis, that thermal shock due to high gradients of surface temperature changes under the spray is a dominant physical mechanism of descaling, especially for secondary scale. That is why two additional types of experiments are necessary to characterize the influence of the water jet on the hot surface, which is the measurement of the heat transfer coefficient of the impinging water and the descaling test under laboratory conditions. The study of metallurgical and surface quality parameters of the steel before and after the test allows quantifying the descaling efficiency.