

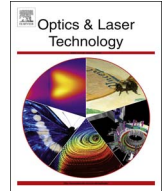


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Full length article

## An investigation of laser cutting quality of 22MnB5 ultra high strength steel using response surface methodology



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### ABSTRACT

In hot press forming, changes of mechanical properties in boron steel blanks have been a setback in trimming the final shape components. This paper presents investigation of kerf width and heat affected zone (HAZ) of ultra high strength 22MnB5 steel cutting. Sample cutting was conducted using a 4 kW Carbon Dioxide (CO<sub>2</sub>) laser machine with 10.6 μm wavelength with the laser spot size of 0.2 mm. A response surface methodology (RSM) using three level Box-Behnken design of experiment was developed with three factors of peak power, cutting speed and duty cycle. The parameters were optimised for minimum kerf width and HAZ formation. Optical evaluation using MITUTOYO TM 505 were conducted to measure the kerf width and HAZ region. From the findings, laser duty cycle was crucial to determine cutting quality of ultra-high strength steel; followed by cutting speed and laser power. Meanwhile, low power intensity with continuous wave contributes the narrowest kerf width formation and least HAZ region.