

## Optimisation of Process Parameters used in Welding for Axle Housing



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**Keywords:** Optimisation, Design Matrix, Electrode Wire, Shielding Gas, Power

**Abstract:**

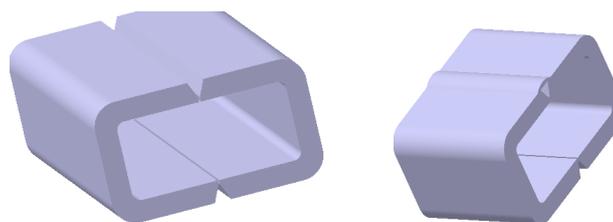
Optimization has an important role in the industries today as each and every industry aim for reducing cost of their process. The aim of the project is to reduce the welding cost of axle housing by optimizing the process parameters of gas metal arc welding process. The major objective of the project is to identify and select critical process parameters, which affects the cost of welding process.

Scope of the project is to reduce the cost of welding of axle housing without compromising the quality of component by optimizing certain parameters, which have direct effect on welding process. After carrying out initial study on welding process, electrode wire, shielding gas and power were identified and considered as important factors contributing for the cost of welding. With further study and analysis, electrode wire emerged as main factor for cost of welding. Root cause analysis carried out on electrode wire showed more weld wire consumption, which was due to increase in weld bead width. It was decided to reduce the width of weld without compromising the quality. Voltage and speed of welding are the two parameters that directly help in reducing the consumption of weld wire. Using Taguchi method, design matrix with 8 experiments has been created and weld trials have been carried out to arrive at optimized weld parameters. After arriving at optimized weld parameters, welding experimentation has been carried out in zone 2 on running component.

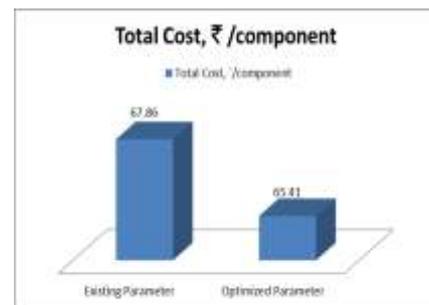
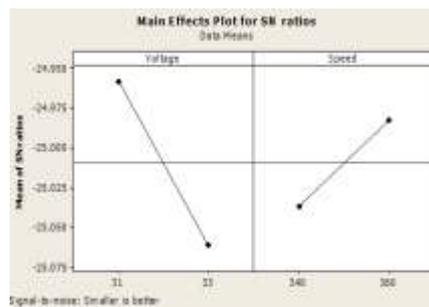
The optimized weld parameters on running component showed reduction in weld width on running component. The weld width reduced from 19 mm to 17.65 mm. The measured weld width was validated using SN curves generated using MINITAB. The quality of the weld was checked by penetration test and was found to be well within the specification. Weight of weld wire was measured to be 0.708 kg before optimizing the weld parameters and optimized weight of weld wire was measured to be 0.680 kg. There was 4.92% reduction in cost of electrode wire by using optimized welding parameters. Total cost of welding process reduced by Rs. 2.45/component.



**Axle housing**



**Weld width design**



**Optimized bead width, SN ratios and cost differentiation**