

# Cutting

## 5mm Stainless steel with Air and Nitrogen

Laser cutting is a popular technique for metal profile cutting, particularly for stainless steel due to faster cutting speeds and exceptional quality. The process uses a focused laser beam with a co-axial assist gas to remove the excess molten metal from the cut. Different gases can be used based on their properties and how they influence the quality of cut. The common assist gases used are nitrogen, oxygen, and air.

Nitrogen and compressed air were used as assist gas to make test cuts with 5mm thick stainless steel (grade 316) using a redPOWER QUBE 3kW fiber laser. When cutting with air, the presence of oxygen produces an exothermic chemical reaction, which releases heat, causing an increase in the cut speed but also leaves a brown tarnished edge. In contrast, when using nitrogen as assist gas, there is no chemical reaction at the cut edge. Instead the assist gas shields the metal edge, resulting in a shiny edge.



It was also noted that the cut speeds varied between these assist gas tests. Using air as the assist gas produced a

greater cutting speed than that of nitrogen. The results obtained shows a production level cutting speed of 3.6 m/min using air and 2.8 m/min with nitrogen assist gas. Furthermore, the compressed air assist only required 10 bar of air, compared to 16 bar of nitrogen.

Although using Oxygen can give higher cutting speeds the resulting cut edge is heavily oxidized, typically requiring post processing. Overall, nitrogen assist gas provided a cleaner cut edge than with compressed air, but was also the slower option.

### Application Parameters

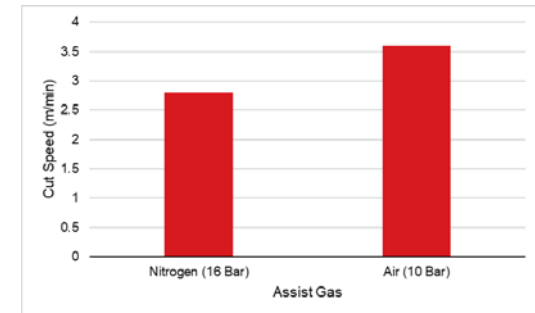
Type	redPOWER QUBE Cabinet
Power	3kW
Beam Diameter	125 $\mu$ m (1/e <sup>2</sup> )
Beam Quality	4.5 mm.mrad BPP

Gas Used	Edge Cut (at 5mm)
Air	
Nitrogen	

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