

# Application Note #06

## Improvements in Cutting Thick Steels with Fiber Lasers

### Overview

IPG’s fiber lasers are highly efficient and provide excellent cut quality for cutting thin steels up to a few millimeters in thickness. The high brightness of fiber lasers produces a more efficient cutting process in terms of power per unit length of cut; a 1.5 kW fiber laser can often cut the same thickness of steel as fast as a 2 kW CO<sub>2</sub> laser.

During the laser fusion cutting process, the oxygen assist gas is usually provided through a co-axial nozzle to the cut, an exothermic reaction then provides a large part of the energy delivered to the cut. For this reason most results for cutting thick steels >12.5 mm thick are very similar in terms of cut speed and cut quality becomes the key issue. For thicknesses up to 8 mm, the cut quality achieved on carbon steels with fiber lasers is better than or at least equivalent to that obtainable from high power CO<sub>2</sub> lasers.

This document focuses on work performed at IPG’s German Applications Laboratory and shows improvements in cut quality for materials thicker than 8 mm. Although many laser integrators are reporting high quality cuts on materials up to 25 mm thick using high power IPG fiber lasers, the cut quality analysis reported here has shown that 16 mm thick steels can be cut with a quality equivalent to that obtained from other lasers.

### CUTTING APPLICATION

Thickness	Power (W)	Speed (m/min)	Oxygen Pressure in Bar
16 mm	2500	0.85	0.45
12.5 mm	1500	0.90	0.60

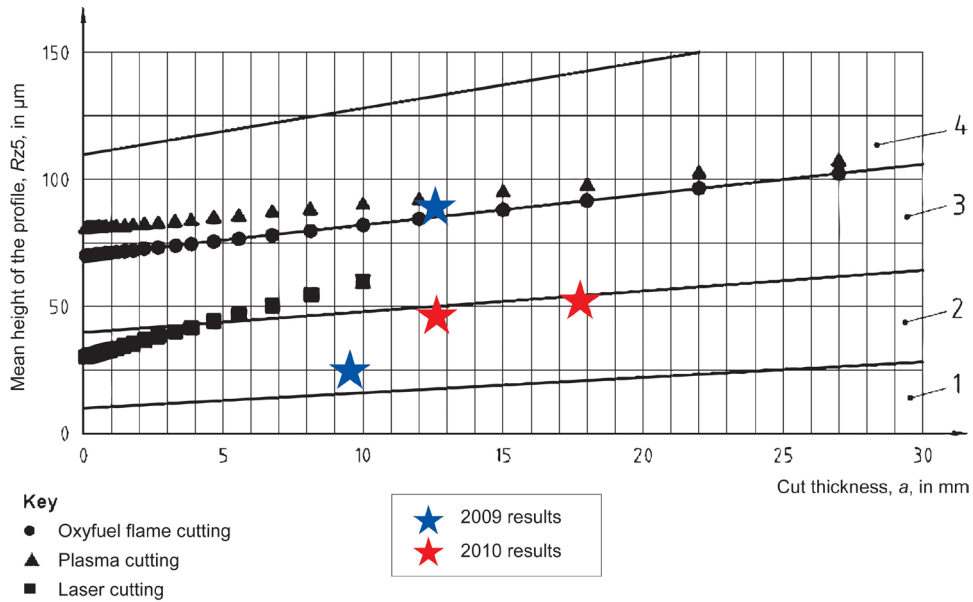
Table 1: Cut Speed

### Summary

IPG Photonics’ Application Facilities continuously perform R&D for proof-of-concept through process development of all materials processing applications with end users and systems integration partners. Contact any of IPG’s worldwide application facilities to arrange complimentary sample processing, evaluation and project planning

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**Figure 1:** Typical cutting qualities achievable with mean height of the profile, Rz5-Work piece thickness up to 30 mm

Results plotted on DIN 9013 chart



**Figure 2:** 16 mm Fiber Laser Cut Mild Steel

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