

Comparison of dry and wet fibre laser profile cutting of thin 316L stainless steel tubes for medical device applications

Abstract

In medical coronary stent fabrication, high precision profile cutting with minimum post-processing is desirable. Existing methods of profiling thin tubular metallic materials are based mainly on the use of Nd:YAG lasers. In recent studies fibre lasers have been used for stent cutting. However, for profiling thin (<4 mm diameter, < 200 μm wall thickness) stainless steel tubes, back wall impingements often occur. This paper presents a comparison of wet and dry pulsed fibre laser profile cutting of 316L stainless steel tubes. When water flow was introduced in the tubes, back wall damage was prevented. Meanwhile, heat affected zone (HAZ), kerf width, surface roughness and dross deposition have also been improved compared with the dry cutting. The scientific study on the effect of internal water flow on laser cutting of thin tubular stainless steel material is reported for the first time.

Keywords; Dross; Laser cutting; Precision; Stent; Water