

## Introduction

Use of laser welding to produce small diameter tubes allows a cost-effective method of production and has been carried out on steel tube for many years. The recent availability of high-power blue wavelength lasers allows quality welding of copper tubes at high speed - which had previously not been possible with infra-red lasers due to poor energy absorption. The Blue wavelength of NUBURU laser is absorbed by Cu by a factor of x1.2 compared that of IR lasers

## Current Process

The current process for making copper tubes with diameters under 5mm consists of a billet-piercing step followed by a series of die passes at decreasing diameters. This process is not ideal for all tube sizes as the number of process steps make it less cost-effective for decreasing diameters. A simple, one-step, process exists in laser welding a thin strip of copper into a tube as it passes through a die to form its shape. Larger copper tubes are welded with well-known traditional techniques.

## Testing

An [AO-200](#) was integrated into a commercial tube welding machine to demonstrate NUBURU's capabilities in the welding of small diameter, thin walled, copper tubing. In this testing, a sheet of 0.1mm folded copper was welded at the seam to create a 2mm diameter copper tube. Cross sections reveal a clean, defect free, weld between both sides of the copper sheet. (Figure 2).

Larger diameter tests were conducted on tubes ranging in wall thickness from 0.7mm to >1mm and diameters between 6 and 12mm. For this testing, 2 x AO-650 were focused down to a single spot for a combined power of 1.2W. This configuration was used to simulate NUBURU's next product line, the AI-1500 (1.5kW BPP<11). The resulting welds were of high quality and demonstrated a key benefit to welding with blue, little to no spatter. (Figures 3,4)

## Summary

[NUBURU's](#) AO-200 provides optimal weld quality for joining thin-walled copper tubes. As wall thicknesses increase, NUBURU's AO-650 and AI-1500 provide the same quality and can meet the demand of most line speeds today.

Follow or contact us via:  
LinkedIn @ [www.linkedin.com/company/nuburu](http://www.linkedin.com/company/nuburu)  
Website @ [www.nuburu.net](http://www.nuburu.net)  
Email @ [sales@nuburu.net](mailto:sales@nuburu.net)



Figure 1. AO-200 & AO-650

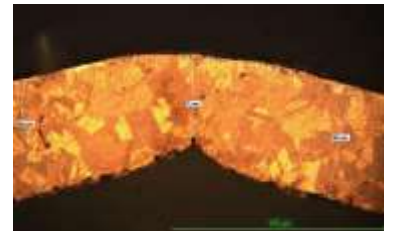


Figure 2. Cross section of 2mm copper tube



Figure 3. Cu Seam Weld



Figure 4. Cu Butt Weld