

PRECISION LASER WELDING ASSISTED WITH INTELLIGENT VISION SOFTWARE OF BALANCE SPRING TO COLLET REQUIRED IN HIGH QUALITY MECHANICAL WATCHES

CHALLENGES

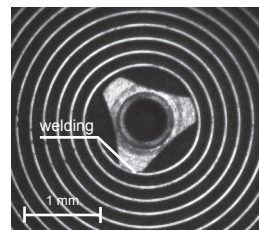
- ▶ Laser welding of the balance spring to collet (thin material on thick material) requires a precisely controlled laser beam / power
- ▶ After laser welding (thermal process), the balance spring cannot be deformed or lose in reference to collet.
- ▶ The laser weld must be stress and crack free.
- ▶ The positioning accuracy of the laser weld must be +/- 5 μm over the length of the balance spring.
- ▶ The exact position of the balance spring must be retained during welding.
- ▶ The weld must be aesthetically acceptable i.e. not visible.
- ▶ Prevent oxidation and extract soot, need to weld under a protective atmosphere.
- ▶ Prevent overflowing material which could impair the oscillation, function.

ADVANTAGES

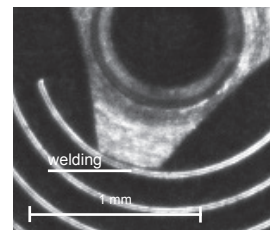
- ▶ No deformation
- ▶ High-resolution image
- ▶ No oxidisation

RESULTS

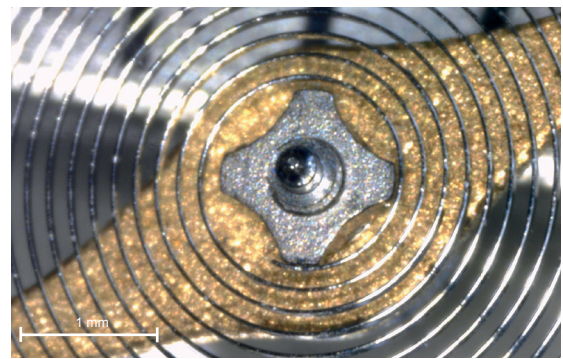
- ▶ Positioning accuracy +/- 1 μm
- ▶ Repositioning using dynamic intelligent vision for precise weld location.
- ▶ Smooth laser welded seam compared to a spot weld which would form excess material
- ▶ High quality welds of the balance spring on collet. Oscillation of the spring according to stringent Swiss watch-making standards.



Balance spring and collet



Detail of weld seam



Balance spring welded to collet

CPAUTOMATION PRODUCT

GENERAL SPECIFICATIONS

Turn key Laser Welding unit	TLase
Speed	< 2 s
Positioning accuracy	+/- 1 μm

