

# Crystallographic texture variation in laser beam welded CoCrFeNiMn

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## Abstract

The crystallographic texture variation of a CoCrFeNiMn high entropy alloy sheet after laser beam welding was investigated in this work. The HEA sheet was welded using a disc laser of max. power 4 kW which also equipped with a Bright Line Weld module and a dual-core fiber of 100/400  $\mu\text{m}$ . The welding line was parallel to the Rolling direction. The texture has been investigated via high-energy x-ray and EBSD. To investigate the crystallographic variation in the welded HEA sheet, the textures were investigated from the fusion zone to the base material through the heat affected zone. The texture at the fusion zone was a combination of texture of the right and left side from the fusion line. Each side in fusion zone consists of a fibers  $\langle 100 \rangle //$  to the TD with  $\pm 10^\circ$  rotation around the RD direction. The texture at the base material consist of rolling type texture represented by  $\{110\}\langle 112 \rangle$  Brass,  $\{112\}\langle 111 \rangle$  Cu and  $\{123\}\langle 643 \rangle$  S components with a dominant  $\{110\}\langle 112 \rangle$  Brass components with a sharpness of 4.8 mrd. The microhardness profiles show a slight decrease in hardness from 260 HV0.1 for the base material to 240 HV0.1 in the fusion zone. The mechanical properties for the welded samples drop slightly for UTS: from  $900 \pm 15$  MPa to  $830 \pm 10$  MPa and for elongation: from  $18 \pm 3$  % to  $13 \pm 3$  %. The drop in the mechanical properties is due to the large grains in the fusion zone, the dissolving of the precipitation and the change in the texture. This alloy shows good weldability and could be suggested in engineering applications.

**Keywords:** Crystallographic texture; High entropy alloy; Laser beam welding; High-energy x-ray; EBSD.