Microstructure and Texture evolution during foil rolling of an extruded WE43 alloy

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Abstract

WE43 magnesium foils (thickness ≤ 200 µm) were successfully produced via hot rolling. The initially extruded material was heat treated at 450 °C for 2 h to achieve a more homogenous microstructure. Afterwards the sheets were hot rolled at 480 °C in two to five rolling passes to achieve a thickness less than 200 µm and finally heat treated (T5 and T6 heat treatment). Microstructural und texture evolution after foil rolling and the final heat treatment were investigated and the resulting mechanical properties were also evaluated. Therefore, the samples were quenched directly after foil rolling and the final heat treatment. The foil rolling led depending on the number of the rolling passes either to a deformation microstructure (two and three passes) or globular grains (four and five passes). As main recrystallisation mechanisms CDRX and TDRX were identified (see Figure 1).

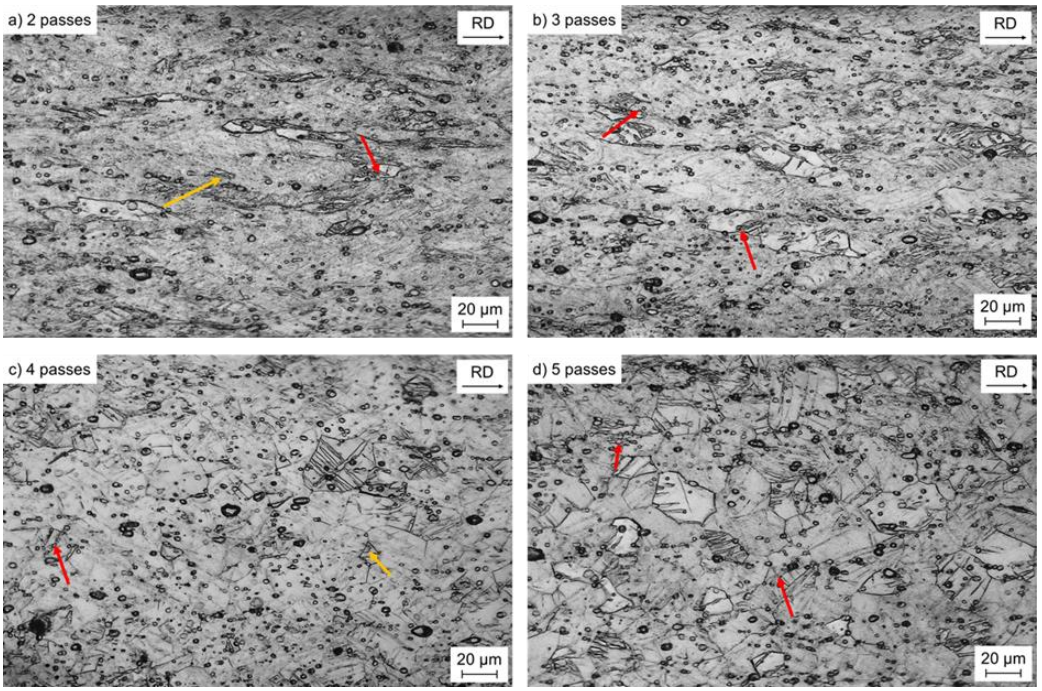

Figure 1: *Optical micrographs of the hot rolled WE43 foils after a) two; b) three; c) four and d) five rolling passes at 480 °C according, rolling speed of 1.0 m/s (red arrows: nucleation at twins, yellow arrows: subgrain boundaries)*

The resulting textures revealed the activation of non-basal slip of <c+a> dislocations during foil rolling. As a result of foil rolling the strength increases and the elongation decreases compared to the extruded and heat-treated state.

Keywords *foil rolling, WE43, hot rolling, microstructure, texture*