

ROLLING CHARACTERISTICS AND MECHANICAL PROPERTIES OF AI2Ca-CONTAINED 5052 AND 5083 ALLOYS

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Abstract

The wrought Al-Mg, 5000 series alloys have been widely applied to automotive, ship, building, beverage can, etc in the form of rolled sheet, because of their good formability, weldability, corrosion resistance and medium strength. Magnesium in aluminum forms solid solutions over a wide range of compositions and wrought alloys containing from 0.8% to slightly more than 5% magnesium are widely used.

The Mg solute has a strong tendency to oxidize during melting and casting, even after solidification also. The oxidation of Mg degrades process capabilities as well as quality and properties of products, which results in the limited application of Al-Mg alloys. Industrially, the trace addition of Be element has been added into Al-Mg melt to inhibit the Mg oxidation, even though it is extremely harmful to human body and not so effective due to its low content. Recently, a specially fabricated Mg alloy containing Al2Ca phase has been developed.

This study aims to assess the rolling fabrication characteristics of Al2Ca-contained 5052 and 5083 alloys, which were fabricated by using the Al2Ca-contained Mg mother alloy. The surface roughness of the slab, edge cracking and oil stain in rolling process will be addressed. Mechanical properties and strain hardening behavior of the rolled 5052 and 5083 sheets will be discussed in a variety of temper conditions. Finally, the forming result of an automotive component will be shown.

Keywords: Aluminum, Al-Mg alloy, 5000 series, rolling, mechanical properties

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