

Investment Casting of Thin-walled IN625 Alloy

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ABSTRACT

Inconel alloys are austenite nickel-chromium-based superalloys. They are oxidation and corrosion resistant materials well suited for service in extreme environments subjected to pressure and heat. Strength of IN625 is derived from the stiffening effect of molybdenum and niobium on its nickel-chromium matrix; thus precipitation hardening treatments are not required. This combination of elements also is responsible for superior resistance to a wide range of corrosive environments of unusual severity as well as to high-temperature effects such as oxidation and carburization [1]. In the counter-gravity process, metal is drawn up into the mold by vacuum (figure 1b). After a brief hold time, allowing the parts and a portion of the gate to solidify, the vacuum is released and the metal in the central sprue flows back into the melt. Only a short, easily machined gate stub remains on the casting.

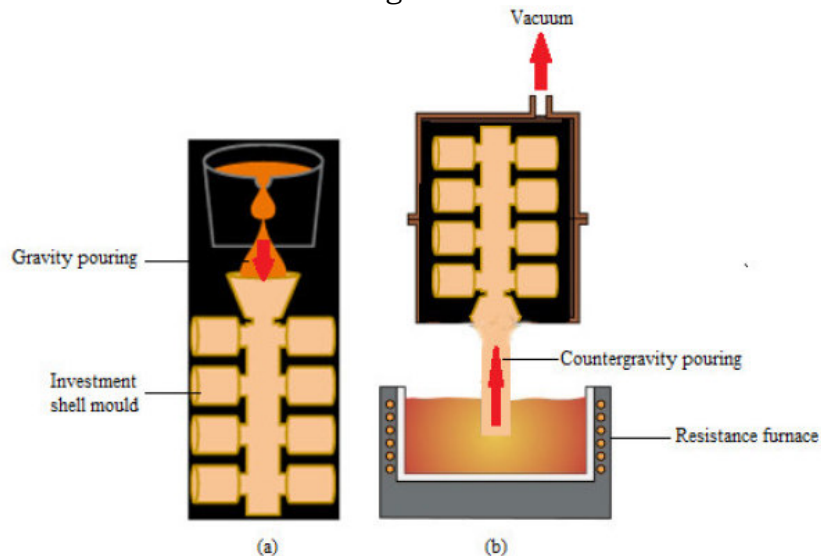


Figure 1: Pouring of investment shell moulds: (a) gravity and (b) counter-gravity.

The objectives of present work were as follows:

1. to cast IN625 alloy in thin-walled investment shell moulds under gravity pouring (figure 1a) and counter-gravity pouring (figure 1b) techniques, and
2. to compare the microstructures and mechanical properties of gravity and counter-gravity cast IN625 samples.

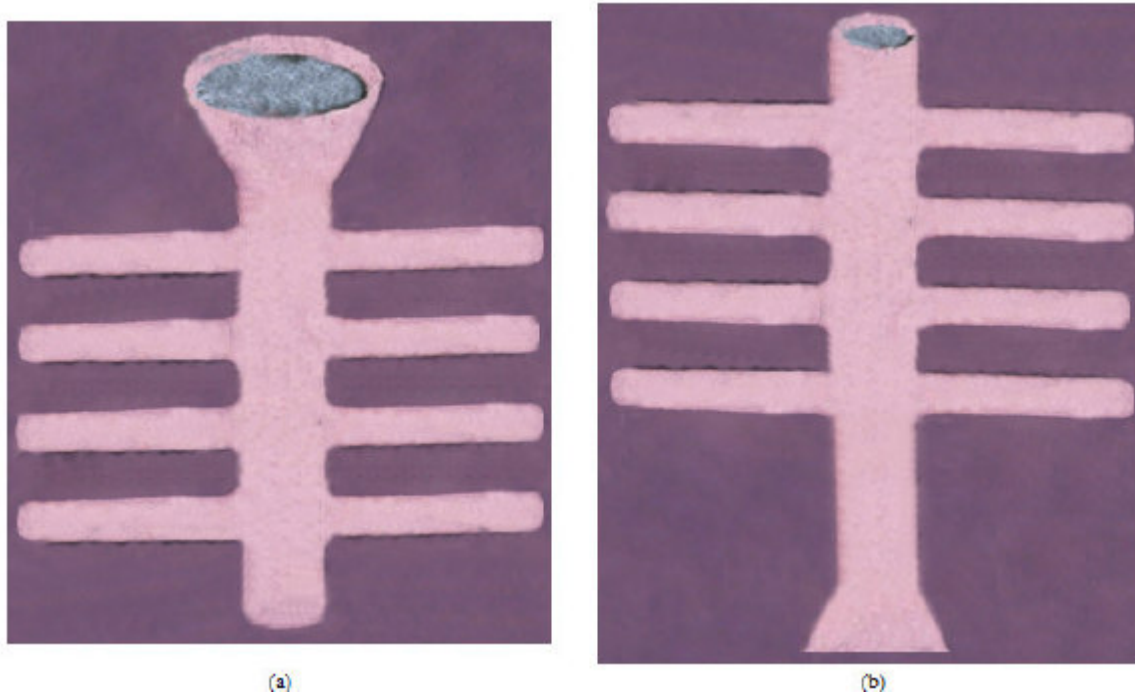


Figure 2: Investment shell moulds: (a) gravity poured and (b) counter-gravity poured.

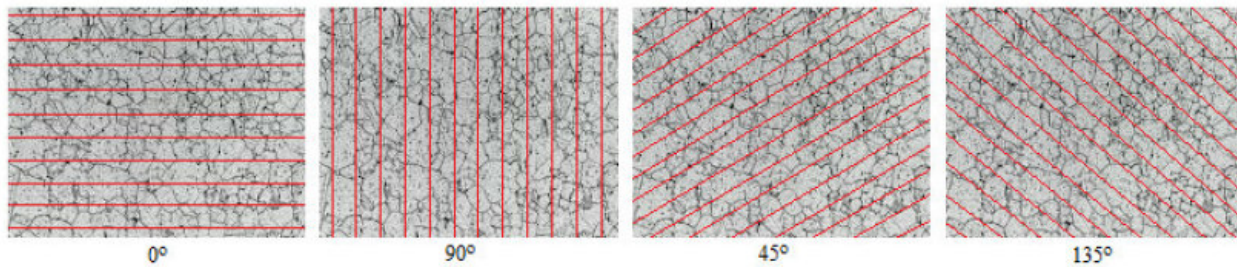


Figure 3: Grain size measurement.

The counter-gravity pouring of IN625 alloy in investment shell moulds has yielded fine grain structure in the castings. Also, the mechanical properties of IN 625 alloy are superior with counter-gravity pouring.

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