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Thixoforming 7075 aluminium alloys

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Abstract: Commercially extruded 7075 alloy (extrusion ratio of 16: 1) has been used as a feedstock for thixoforming in order to investigate thixoformability of a high performance aluminium alloy. The microstructure in the semi-solid state consists of fine spheroidal solid grains surrounded by liquid. The results of thixoforming with one step, two-step and three-step induction heating regimes are presented. Typical defects in poorly thixoformed material (e.g. liquid segregation, impedance of flow by unrecrystallised grains and porosity) are shown alongside successfully thixoformed material (thixoforming temperature of between 615 and 618degreesC with a three-step induction heating regime). The highest yield strength and elongation obtained for material thixoformed into a simple graphite die and heat treated to the T6 condition is 478 MPa and 6.9% elongation. For thixoforming at 615 degreesC into a tool steel die heated to 250 degreesC, the highest yield strength and elongation obtained are 474MPa and 4.7% (ram velocity 2000 mm/s). These values (particularly for strength) are approaching those of 7075 in the wrought heat treated condition (505 MPa and 11% elongation). (C) 2004 Elsevier B.V. All rights reserved.

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