

2017

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## Recommended Citation

Weber, Noah and Ghods, Masoud, "Spurious grain formation due to convection at cross-section-changes during directional solidification" (2017). *Undergraduate Research Posters 2017*. 56.  
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## ***Spurious grain formation due to convection at cross-section-changes during directional solidification***

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### **Abstract**

Turbine blades are a critical component in high powered gas turbine engines. These components are directionally solidified to have a single grain orientation, which allows them to operate under high temperature and stress conditions. Spurious grain formation is a major concern when forming these turbine blades. The purpose of this study was to study the effect convection has on forming these defects within turbine blades. Two alloys, Pb-5.8%Sb (solutally unstable) and Al-19%Cu (solutally stable) were directionally solidified upward in a positive thermal gradient (thermally stable) in a graphite crucible having abrupt cross-sectional area change from 3.2 mm diameter to 9 mm diameter. In the Lead alloy after the cross-section-expansion there is no observable new grain formation. However, in the Aluminum alloy there is extensive new grain formation after the expansion.