#### Div. 2 Helium-Enhanced Semi-Permanent Mold Aluminum Casting – Dr. Paul Sanders (Michigan Technological University); Agreement 12-13#05; 2-E Committee

**November 2015 (Yellow)**

***Accomplishments from last quarter***

* MAGMA analysis completed – shows trend of increasing heat conductivity into core with He injection
* Prepared and presented a project summary at “AFS Design and Production of High Quality Aluminum Casting”, Oct 5-7 2015, Nashville, TN

***Plans for current quarter:***

* Write and submit final report

***Programmatic Concerns:***

**August 2015 (Yellow)**

***Accomplishments from last quarter***

* Draft report in process
* MAGMA analysis – working to correlate simulated metal and core temperatures to measured data

***Plans for current quarter:***

* Finish MAGMA analysis; show effect of heat extraction from the metal die vs. core with and without He
* Write and submit final report
* Prepare presentation for “AFS Design and Production of High Quality Aluminum Casting”, Oct 5-7 2015, Nashville, TN

***Programmatic Concerns:***

**November 2014 (Green)**

***Accomplishments from last quarter***

* Completed microstructure and mechanical property measurement
* Presented project update to 2E committee on October 7th, 2014

***Plans for current quarter:***

* MAGMA analysis; Calculate effect of He on HTC based on cooling data
* Complete microstructure and property data analysis
* Write and submit final report – Contract ends November 30th, 2014

***Programmatic Concerns:***

None

**August 2014 (Yellow)**

***Accomplishments from last quarter***

* Sectioned castings for tensile testing and microstructural analysis
* Organized cooling data for MAGMA analysis
* Machining tensile samples and tensile testing in process

***Plans for current quarter:***

* MAGMA analysis; Calculate effect of He on HTC based on cooling data
* Complete microstructure and property analysis
* Write and submit final report

***Programmatic Concerns:***

Tensile testing and microstructure analysis is taking longer than expected. Requesting a 3 month extension to finish analysis and reporting.

**June 2014 (Green)**

***Accomplishments from last quarter***

* Mold and core box installed and runoff complete at Carley Foundry
* Casting trials complete
* Sectioning castings for microstructure and property analysis in process

***Plans for current quarter:***

* MAGMA analysis; Calculate effect of He on HTC based on cooling data
* Complete microstructure and property analysis
* Present project update to 2E committee on June 17th, 2014

***Programmatic Concerns:***

None

**February 2014 (Green)**

***Accomplishments from last quarter***

* Helium injection/TC fixture assembly complete
* Mold machining complete
* All mold, core box and He injection/thermocouple assembly parts shipped to Carley Foundry in December
* Preliminary core blown with instrumentation:



He injection tube

Thermocouples

* Presented project update to 2E committee on January 21st, 2014

***Plans for current quarter:***

* Core box and mold prep/runoff at Carley
* Casting trials at Carley Foundry (mid-March)
* Microstructure and property analysis

***Programmatic Concerns:***

The project has fallen slightly behind the original timeline due to mold fabrication taking longer than anticipated. A no cost time extension has been granted to extend the contract through August 2014.

**November 2013 (Green)**

***Accomplishments from last quarter***

* Thermocouple placement method refined (added TC support bracket)
* Helium injection/TC fixture assembly in process
* Ordered and received 70 thermocouples from Pyrotek (provided at cost)
* Core box machining complete
* Mold machining nearly complete; estimate 2 weeks to complete
* Presented project update to 2E committee on October 8th, 2013

***Plans for current quarter:***

* Complete He injection/TC assemblies
* Finish mold machining
* Core box and mold prep/runoff at Carley
* Casting trials at Carley (mid-December)
* Microstructure and property analysis

***Programmatic Concerns:***

None

**August 2013 (Green)**

***Accomplishments from last quarter***

* Project approval and start of contract; March 2013
* Mold and core box CAD complete
* MAGMA simulation of filling and solidification complete
* Refined gating for final design based on simulation results
* Helium injection system designed
* Thermocouple placement method developed
* Received binder core gas evolution model
* Received mold materials from Dura-Bar® (provided in-kind)
* Started core box fabrication
* Presented project update to 2E committee on June 6, 2013

***Plans for current quarter:***

* Complete mold and core box fabrication
* Complete helium injection system fabrication
* Complete casting trials

***Programmatic Concerns:***

None