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Quarterly Management Document FY20, 1st Quarter, Multi-pass Hybrid Laser Arc Welding of Alloy 740H

Thomas M Lillo

January 2020

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WBS Element	**Project Title**	**Contract Number**	**Contract Start**	**Contract End**
C.B.75.AA.01.01.01	Multi-pass Hybrid Laser Arc Welding of Alloy 740H	?????	10/01/19	09/30/2022

Performer Name and Address	**Principal Investigator(s)**
Thomas Lillo Idaho National Laboratory P.O. Box 1625 Idaho Falls, ID 83415	Thomas Lillo

BUDGET AND COST REPORT

Prior Year Funds ($K)				**0**								
Total Current Year Commitment ($K)				**859**								
Projected Current Year Costs ($K)				**435**								
	O	**N**	**D**	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**
Monthly Planned Costs	**4**	**10**	**10**									
Actual Monthly Costs	**2**	**13**	**7**									
Monthly Variance	**2**	**-3**	**3**									
Total costs – planned	**4**	**14**	**24**									
Total costs - actual	**2**	**15**	**22**									

MILESTONE REPORT

Milestone Designation	Milestone Description	Due Date	Revised Due Date	Completion Date
Task 1.A	Purchase of Laser Wobble Head by PSU	12/31/2019	3/15/2020	
Task 1.B	Deep Penetration Land Welding Development	09/30/2020		
Task 1.C	Modeling of Deep Penetration Welding	9/30/2020		
Task 2.A	Purchase and installation of laser wobble head by INL	12/30/2020	3/15/2020	
Task 2.B	Single pass bead-on-plate welds with microstructure characterization	06/30/2020		
Task 2.C	Multi-pass HLA welds	09/30/2021		
Task 2.D	Stress Relief Cracking Evaluation	9/30/2021		
Task 2.E	Mechanical Properties and Creep Testing	9/30/2021		
Task 2.F	Radiograph Welds for Defects	3/31/2021		
Task 3.A	Complete 3” thick weld using 12 kW laser	6/30/2022		
Task 3.B	Modeling and Simulation of 3” thick Weld	6/30/2022		
Task 3.C	Complete 3” thick weld using 4 kW laser	6/30/2022		
Task 3.D	Characterization – Microstructure & Mechanical properties of 3” thick weld	9/30/2022		
Task 3.E	Stress Relief Cracking Evaluation of 3” thick weld	9/30/2022		
Task 3.F	Radiograph 3” thick welds for defects	6/30/2022		

TECHNICAL HIGHLIGHTS

Task 1.A, Purchase of Laser Wobble Head by PSU

The subcontract with PSU was finally implemented the last week of December 2019 and a quote for the wobblehead was obtained. Procurement paperwork has been started and the purchase is expected to be made in January 2020. The wobblehead is expected to be received and installed by 3/1/2020. Therefore the expected completion date for this task has been revised to 3/15/2020.

Task 1.B, Deep Penetration Land Welding Development

Since the subcontract with PSU finalized at the end of December 2019, no work on this task was performed during the first quarter of FY20. Work will commence as soon as Task 1.A is complete. Progress is expected to be rapid once the wobblehead is installed and the delayed start of this task is not expected to adversely affect the expected completion date.

Task 1.C, Modeling of Deep Penetration Welding

Delays on implementation of the subcontract with PSU until the end of December 2019 has prevented any progress on this task. However, a search for a student was initiated who will work on this task. The delayed start is not expected to adversely affect the expected completion date for this task.

Task 2.A, Purchase and installation of laser wobble head by INL

The wobblehead for the INL system was spec'd out with input from Todd Palmer at PSU. A quote was obtained from IPG Photonics, Inc., and the unit was ordered. Expected delivery date is 2/27/2020. This has delayed work on this task and requires the expected completion date to be date for this task to be changed to 3/15/2020. While waiting for the wobblehead to arrive, work was proceeded on designing the integration of the wobblehead into the current INL hybrid laser welding system. This will ensure that once the wobblehead arrives it can quickly be attached to the system and work on Task 2.B, below, can commence.

Task 2.B, Single pass bead-on-plate welds with microstructure characterization

This task cannot start until the laser wobblehead arrives and is installed on the hybrid laser welding system. The delayed start is not expected to adversely affect the expected completion date as tiem can be made up quickly.

Task 2.C, Multi-pass HLA welds

Task is not scheduled to start yet.

ISSUES

Although there were significant delays in the implementation of the PSU contract, they are not expected to significantly impact the completion date of the various tasks which will be accelerated somewhat to get the project back on schedule. As such, there are no apparent issues with schedule, scope or budget of the project at this time.

Report Prepared By	Date
Thomas M. Lillo	01/24/2020