IGEM Grant Report

■ Progress (due January 1) ☐ Annual (due July 31) ☐ Final (due August 31)

IGEM Grant ___IGEM26-004_____ Principal Investigator: Prof. Amir Ali _____

Name/Full Title of Project: Advanced Compact and Efficient Heat Exchanger Tech.____

Submission Date__12/10/2025_____ Primary Institution: Idaho State University___

Section 1: Provide a short one-paragraph summary describing the project and its goals

The project's main objective is to numerically design and optimize, and experimentally evaluate the performance of a compact type of heat exchanger for efficient energy applications.

Section 2: Summary of project accomplishments for the reporting period and plans for the upcoming reporting period.

I. The numerical analysis and optimization of the new design have been completed.
II. Waiting for the manufacturer contract closure to start the fabrication of the prototype.

Section 3: High-level summary of budget expenditures for the period just completed. If budget is underspent at the time of report, explain why and plans for expending funds.

The high-level expenses are Student salary: $4,875, Faculty summer salary: $16,667, and Fringe (all): $2,575. As soon as we sign a contract with the manufacturing company, all assigned expenses for capital equipment and materials for modifying the experimental facility will be spent.

Section 4: Demonstration of economic development/impact, including the following as applicable: patents, copyrights, plant variety protection certificates received or pending; technology licenses signed, start-up businesses created, and industry involvement; private sector engagement; jobs created; external funding; any other pertinent information.

Currently, a couple of publications (one conference and one journal) are under preparation in numerical analysis. These publications will support a patent application and develop an external funding proposal to be submitted during the 2026 DOE, NRC, and NSF funding cycle.

Section 5: Number of faculty and student participants as a result of funding, and brief description of student efforts.

One nuclear engineering faculty (PI: Prof. Ali) is heavily involved in the project, conducting numerical design analysis and optimization. One graduate student is learning to conduct CFD analysis under the supervision of Dr. Ali and will be involved in the modification of the experimental facility. The graduate student will present the initial numerical analysis of the new technology at the upcoming American Nuclear Society (ANS) Meeting in June 2026.

Section 6: Updated details and/or progress on the long-term sustainability plan for the project and description of future plans for project continuation or expansion.

In discussion with the INL team, we are seeking to implement AI to develop a model to optimize the new HX technology for different applications. These efforts will add new dimensions to the technology design to meet diverse customers' needs.

Section 7: Expenditure Report – Attach an expenditure report as a separate document showing expenses toward the original budget submitted for this project. The expenditure report does not count toward the page limit. A written summary of budget expenditure should be provided in section 2 of this report. See the attached report.

Summary by Hierarchy - Current Year

(Data as of 12-01-2025 05:03:22 AM)

Period Dec-2025 | **By** Acct | **Budget** Annual Adjusted Budget | **Chart** = 9 | **Fund** = 110000 ISU General Clearing | **Orgn** = 630053 IGEM Adv Compact Heat Exchngr Tech | **Acct** <> 8951 Administrative Recovery Assessment | **Prog** = 04ORO Organized Research on Campus

Acct	Title	Annual Budget	Annual Adjusted Budget	Dec-2025 YTD Actual	Encumbrances	Budget Available	Budget Fav/Unfav
Operating Expenses							
6108	Faculty Overload	-40,837	40,837	0	0	40,837	100%F
6202	Graduate TA/RA	-16,000	16,000	0	0	16,000	100%F
6204	Student Non-Work Study	0	0	4,875	0	-4,875	U
6208	Faculty Summer Salaries	0	0	16,667	0	-16,667	U
6310	Fringe Allocation	-6,358	6,358	2,575	0	3,783	59.5%F
	Subtotal	**-63,195**	**63,195**	**24,117**	**0**	**39,078**	**61.8%F**
	Total Expenses	**-63,195**	**63,195**	**24,117**	**0**	**39,078**	**61.8%F**
Operating Expenses							
700	Travel	-6,000	6,000	0	0	6,000	100%F
730	Supplies	-15,805	15,805	0	0	15,805	100%F
800	Capital Expense	-40,000	40,000	0	0	40,000	100%F
	Subtotal	**-61,805**	**61,805**	**0**	**0**	**61,805**	**100%F**
	Total Expenses	**-61,805**	**61,805**	**0**	**0**	**61,805**	**100%F**
	Total All Expenses	**-125,000**	**125,000**	**24,117**	**0**	**100,883**	**80.7%F**
	Total Revenues Less Expenses and Transfers	**125,000**	**-125,000**	**-24,117**	**0**	**100,883**	**80.7%F**