Deliverable H

GNG 1103-F Winter 2024

University of Ottawa

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INTRODUCTION

In this deliverable, we embark on an in-depth analysis of Prototype III, representing a pivotal juncture in our project's progression. Building upon the foundation laid by its predecessors, Prototype III signifies a concerted effort to address the objectives outlined in our project plan with precision and ingenuity.

Our foremost objective in developing Prototype III is to refine and optimize the erosion testing device, ensuring its efficacy in meeting the stringent requirements set forth in our project plan. With a clear understanding of the "why," "what," and "when" of prototyping, we have meticulously crafted a prototype with a targeted objective: to enhance the device's performance and reliability in erosion testing scenarios.

Central to our prototyping endeavor is the meticulous documentation of our test plan, analysis, and results. Each component of Prototype III has undergone rigorous scrutiny, from the motor and overheating duration to the sample rotating system, leakage potential, and slurry mechanism. Through methodical testing procedures, we aim to not only evaluate the functionality of our prototype but also solicit invaluable feedback from potential clients and users.

As we progress through the iterative design process, feedback from stakeholders remains integral to our success. Leveraging insights gathered from client meetings and engagements with potential users, we continue to refine our design to align with their needs and expectations. Moreover, we extend our outreach efforts beyond formal channels, seeking feedback from a diverse range of individuals, including friends, family, and other trusted sources.

In addition to presenting detailed testing outcomes, this report unveils an updated bill of materials and revised target specifications, reflecting our commitment to continuous improvement and refinement. With Prototype III, we set the stage for continued innovation,

propelled by a steadfast dedication to delivering a solution that exceeds the expectations of our clients and end-users.

Objectives:

Prototype testing plan:

TEST ID	Test Objective (Why)	Basic Test Method (What)	Description of Results to be Recorded and how these results will be used (How)	Estimated Test duration and planned start date (When)
1	To see if a microcontroller Arduino works.	For the prototype III we are going to put an Arduino onto the switch	We will record if the Arduino is accurate, if it is then we will mark down that the Arduino works	2 min 3/24/2024
2	Different slurries	We will use 3 different abrasives in the liquid used in prototype III	If the material deteriorates enough, then the weight before and after will be measured. If there is not much erosion, then photographic data will be recorded to find which slurry is the best for erosion.	4h 3/17/2024-3/24/2024

Analysis/results:

Time until overheats	5 min
Time until cooldown	20 min
Secure lid on system (3X2.5min)	Lid is secure
Is rod secure (3X2.5min)	Rod is secure
Slurry to put? (1/8 container)	Good
Slurry to put? (1/4 container)	Good
Slurry to put? (1/2 container)	Good

Results

Test Objective (Why)	Basic Test Method (What)
To see if a microcontroller Arduino works.	The Arduino was not able to connect to the microcontroller to the system, so for our final prototype we will be manually controlling the motor during testing
Different slurries	We tested two different slurries one, that was fine metal powder and the other that was less fine metal

	scraps unfortunately because the metal powder was covering the sample. We were not able to see any signs of erosion.

Test ID 1

Bill of Materials:

Material	Price $
Bucket	4.75
Jug	2.50

Free of cost material: bolt, screws, nuts, washer, motor (lightning)

Comments from potential clients/users

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Mr.Ko (an undergraduate student who is applying for his masters)

“only the edges will be fully exposed to the erosive force, maybe if it vibrated up and down it could erode more of the sample”

Trello link