

USER NEED STATEMENTS	INTERPRETATION
For safety purposes, hot fluids won't be allowed, and neither will dangerous liquids	lukewarm fluids that are not too corrosive
RPM will stay at 10	No RPM shift
I want the system to speed up the erosion of the sample under mesurable parameters.	device needs to increase erosion speed and mesures taken must be recorded
The device does not need to be portable	Stationary/portable (optional)
The system must be repeatable	Consistant results
Noise will not be an issues	No noise constraints
The pump will be exposed to small debris	Pump must last long
System should be easy and simple to use	User friendly controls
Careful about things being dissolved	system must increase erosion and not dissolution
Can only test for about a month	Must show signs of erosion in under a month
system will test a single sample of a 10cm diameter by 5cm thickness disc	a 10cm diameter by 5 cm thickness disc
Must not be expensive to create	Cost effective

STATEMENTS TO BE CLARIFIED

Clarification required:

Dimensions of the system

Measurement of abrasives placed within

Conflicting statements:

Constant RPM vs More flexibility in system

Must be able to simulate real life conditions vs High pressure and temperature not allowed

Prioritization

Time	5	Time is the most crucial part of this project as the client wants this project to determine which is the most effective to test erosion in a short period of time. This is to make the erosion system at CNL more efficient as the last part that was tested was not tested long enough causing the system that was developed with that part to start eroding faster than the expected.
Safety	5	Safety is one of the main priorities due to the client not wanting any liquid that is highly corrosive or temperatures that can cause severe burns. Safety is also a high priority due to the environment that the erosion test system would be running in as there are many safety precautions that have to be taken in a lab to ensure that everyone is safe. Safety is not the first priority as the client emphasized about the time frame of when it should be done more than how safe the erosion test system should be.
Precision	4	Consistent and repeatedable results is needed for reliable data and to validate the testing instrument, thus highlighting its importance
Accuracy	4	Accurarcy in result is important as the inaccruate data measured by the instrument will show the resistance of erosion on the tested sample in a manner that misleads the users. (capable of showing data that is from erosion and not from any other phenomenon like dissolution)
Durability	4	Durability is important because the device shouldn't break down during a test, the fragility of our system could jeopardize the testing or the results thus financial compromises might be met to meet the needed standard (durability more important than cost).
Cost	3	The measures that will be taken to create our device could surpass the 100\$ budget. If that were the case, we believe it to be a necessary compromise to meet the more important needs that the CNL stated such as consistency, accuracy, and safety of the device. Otherwise, the prototyping of the HALT system should stay underbudget but this will not be guaranteed.
Ease of use	3	It is easy to see why the prototype being easy to use falls lower on the priority list than needs related to performance and results like, must show signs of erosion under a month, consistent, accuracy, and durability. Because at the end of the day if the product is a little bit tough to use but it works well it would be worth the struggle to use. As for cost and safety. Team Breaking Good decided that if the product can cost less in expense for it being a little harder to use than it is worth it not only for us and our measly 100\$ budget but also for the company. Which must find cost affective solutions if they want to thrive. And as for safety we have a duty as engineers to make safe products and that is why ease to use falls 7th on the ranking list.
Controllability	2	Controllability of environment parameters falls last on the priorities list because not only is it not as important to be able to set the pressure or speed of revolutions of the machine we are designing. But it is also not cost affective, it would require a lot of time and money. This would be useful in some aspects true, and if our design group sees an opportunity to measure the environmental parameters of the machine, then the more data the better. But if we do not see the opportunity along the way then it will not make our design a failure. This is why it is labeled last on 2 (optional).

PROBLEM STATEMENT

The client needs a safe, cost-effective, and durable testing device to measure the environment parameters and increase the effect of erosion on the material in an accurate and consistent manner all the while capable of showing results within a month.

USER NEED IDENTIFICATION (excel sheet used to identify/organize raw data): [DELIVERABLE B.xlsx](#)