NEEDS IDENTIFICATION AND PROBLEM STATEMENT

GNG1103, Section # F **Team # F3**

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Benchmarking

From researching technical information and user perceptions with respect to existing similar products, it has been determined that the best practices should include the following.

Technical

- Using durable material to withstand dust. [2]
- The testing environment has smooth walls for cleaning any residue easily for future tests. [2]
- Using a low stress and drag design serves to avoid continuous maintenance. [2]
- Installing a fail-safe prevents damage to the mechanism if a large section of the sample breaks off. [5]
- Increase in rotational speed is gradual to keep a more consistent flow of the fluid over the part. [5]
- Test the results by recording the percentage of chunks that pass through different size sieves. [3]
- Purifying the water so that calcium ions do not dissolve the sample, since dissolved sample might be mistaken for erosion. [1]

User

- Pref erably to measure erosion's effect as volume removed per unit mass of erodent (mm^3 per kg of the material being tested). [4]
- Prefers simplicity in design and properly correlates change in conditions to the effect of erosion. [4]

Designing with these considerations in mind will allow the product to meet the needs of future potential clients.

List of Needs

	What the Client Says	Interpreted Need
1	Select a range of practical features to control.	Control the type of material, the viscosity of the fluid in the system, and the speed of rotation. Does not need to include every factor that affects erosion.
2	Simulate harsher conditions than the actual conditions that the part will be used in.	Spins over 10 rpm, can heat the fluid.
3	Should be sturdily built and not vibrate apart.	Construction is done with care and detail; materials can withstand some forces from water, vibrations from motor, etc.
4	Testing system should be done in ambient conditions and safe.	Testing system should not be pressurized or conducted in elevated temperatures.
5	Any non-corrosive fluids can be used to test erosion effects.	The fluid used for testing erosion should be reasonable, applicable, and safe.
6	Test should be repeatable.	Testing system should be able to conclude a definitive result, which confirms or denies our theories based on our parameter changes.
7	The numbers of parameters used should be practical.	Have at least two parameters influencing erosion be incorporated in the test.
8	Collect the products after the test for further analysis.	Drains the remaining water and eroded material into a clean empty container to be analyzed by humans.
9	Quantitatively measure how erosion occurred.	Use the drained water to collect a reading that shows a difference from the initial amount of water in the system.

Grouped Needs

A. Mechanism Needs: 4, 1, 3

B. Data Gathering Needs: 7, 9, 8, 6

C. Materials Needs: 2, 5

Problem Statement

The problem statement can be defined as follows:

A need exists for CNL to be able to assess how well different materials hold up to erosion during a two-to-four-week span in harsher environmental circumstances, in a way that is safe, and repeatable.

Future Questions

After the client meeting, not all questions were resolved. Further clarification is needed on the following topics:

- Should the part be fully submerged or partially out of the water and/or should this be changed during a test?
- Will the system be expected to run without supervision?

References

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