Introduction:
Erosion testing is a crucial process for assessing how materials withstand abrasive forces, but it often takes too long to yield meaningful results. This project revolves around creating a prototype erosion testing system that can significantly speed up this process. The aim is to provide manufacturers with a faster and more cost-effective way to evaluate material erosion, without compromising on safety or data reliability. By addressing these needs, we hope to empower manufacturers to make quicker and more informed decisions about material selection, ultimately enhancing their operational efficiency.

Client Needs:
In our initial meeting with the client, we gathered a variety of needs, frustrations, and desires related to erosion testing. These needs have been converted into properly interpreted need statements:

Test Acceleration: The client requires a system that can significantly accelerate erosion testing compared to conventional methods. This need arises from the impracticality of waiting for extended service time to observe erosion.

Consistency and Data Integrity [1]: The system must deliver consistent and reliable erosion data, ensuring the integrity and accuracy of the results.

Cost-effectiveness [3]: The client seeks a solution that is cost-effective in terms of both initial setup and operational expenses. (100$ manufacturing limit)

Replicability [1]: The system should be replicable, allowing for consistent results across multiple testing iterations.

Safety [2]: Safety is a top priority; the system must operate within safe temperature and pressure limits, especially keeping the temperature below 40 degrees Celsius.

Flexibility [3]: The client needs the ability to test different materials, operating speeds, and lifetimes, making flexibility a key requirement.

Conclusiveness [1]: The system should provide conclusive results, enabling manufacturers to confidently select the right material.

Problem Statement:
Our team has formulated a concise and specific problem statement based on the identified needs:

Certainly, here's a reworded version of the problem statement:

"Develop and construct a prototype erosion testing system designed to substantially expedite the evaluation of erosion in rotating components. The system must guarantee the consistency

and dependability of erosion data, maintain safe operating temperatures below 40°C, and provide versatility to accommodate a range of materials, operating conditions, and lifetimes. This solution should present cost-effective testing options and yield definitive results, facilitating manufacturers in the efficient selection of appropriate materials."

Additional Considerations:
It's important to keep in mind that when we first met with the client, we might not have learned about all the problems or needs they have. And as we work on the project, we might discover new challenges we didn't expect. So, we'll stay alert and make sure to find any information we might have missed or any new issues that come up. We'll write these down and deal with them in the later parts of the project.

Also, we'll compare how users see similar products to understand our problem better and what potential users need.

Our main goal is to focus on solving this problem. We want to help manufacturers choose the right materials more easily and make the erosion testing process smoother. This should make their work more efficient and effective.