2016

A Comparison of Flywheels and Batteries as a Solution for Energy Instability

Michael Ambrose
*Worcester Polytechnic Institute*

Justin Harris
*Worcester Polytechnic Institute*

Evan Kelly
*Worcester Polytechnic Institute*

Ian Sun
*Worcester Polytechnic Institute*

Follow this and additional works at: [https://digitalcommons.wpi.edu/gps-posters](https://digitalcommons.wpi.edu/gps-posters)

*Part of the* Architecture Commons, Arts and Humanities Commons, Business Commons, Education Commons, Engineering Commons, Life Sciences Commons, Medicine and Health Sciences Commons, and the Social and Behavioral Sciences Commons

Recommended Citation

This poster represents the work of WPI first-year students submitted to the faculty as evidence of completion of a course requirement for the Great Problems Seminar (GPS). WPI routinely publishes these posters on its website without editorial or peer review. For more information about the GPS program at WPI, please see [https://www.wpi.edu/academics/undergraduate/great-problems-seminar](https://www.wpi.edu/academics/undergraduate/great-problems-seminar).
Problem Statement

Electrical instability is one of the main issues that the modern electrical grid faces today. This instability affects a number of different sectors that rely on constant, uninterrupted power to function. The current solution to this problem is the use of batteries which have a number of disadvantages that could be improved upon with the use of alternative energy storage systems. This project will advocate for the use of flywheels over batteries as a better solution to the problem of energy instability.

Project Goals & Methodology

- Research needs and demands of energy sensitive facilities
- Gather quantitative information on different uninterruptable power sources
- Make a numeric comparison between flywheels and batteries
- Make an argument for the implementation of flywheels in power sensitive facilities

Data Center

- Downtime leads to revenue loss
- Damaged computer hardware
- Program data corruption
- Long recovery time

Health Care

- Operation schedule thrown into disarray
- Refrigerators, Chillers, CT/MRI Scanner damage
- Corruption of data records

Industrial Manufacturing

- Equipment shutdown is in slow stages to prevent damage
- Machinery may take days to start up properly
- Revenue loss from down time

Conclusion & Next Steps

Flywheel based uninterruptible power supply (UPS) systems are overall superior to battery based systems with regards to the majority of the established criteria. They are applicable to the needs of industry, data centers, and hospitals. The next steps would be to present our findings to perspective facilities, and calculate the cost-benefit analysis for the transition from a battery to a flywheel UPS system.

Acknowledgements

We would like to extend our gratitude to our faculty advisors, Professor Geoffrey Pfeifer and Prof. Brian Savilonis, our peer learning assistants, Samantha Ervin and Hary Tekleqiorgis, and our contacts Bill Grudzinski and Professor Alexander Emanuel without whom this project would not be possible.

References