Prince Sattam bin Abdulaziz University
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# Electrical Mechanical Battery

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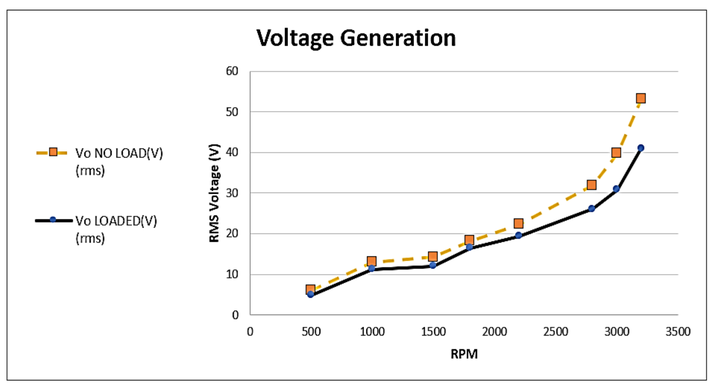
## Abstract

A Flywheel storage system is a type of mechanical energy storage that uses a rotating mass to store and release electrical energy. It works by accelerating a flywheel to a very high speed and maintaining the energy in the system as rotational energy. When energy is extracted from the system, the flywheel's rotational speed is reduced because of the principle of conservation of energy This paper aims to design a special SPM motor for FESS, which utilizes the inertia of the rotor mass. The motor is a single-phase induction motor with a hexagonal rotor shape, which allows for more mass and permanent magnets on the rotor surface to generate power from the induction motor in the same way as the SPM motor.

## Objectives

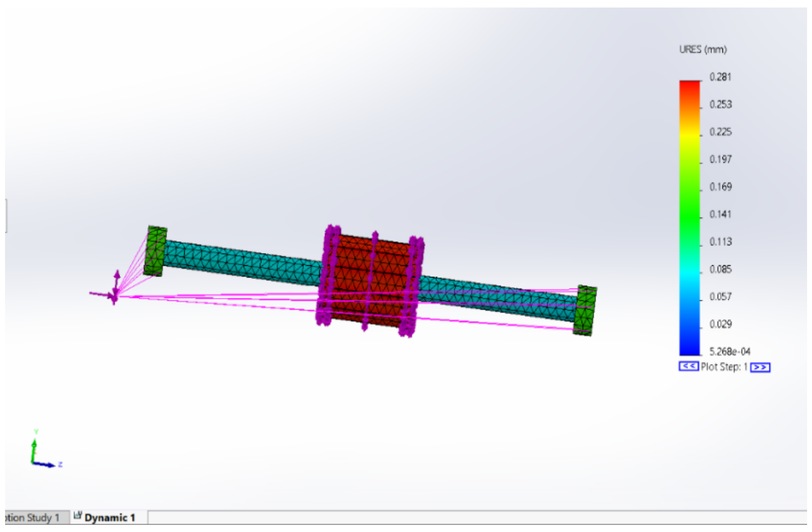
- Selection a suitable motor for FESS.
- Design of the rotor.
- Make a prototype.
- present the details of the prototype and its performance under load and unload conditions.

## Voltage Generation

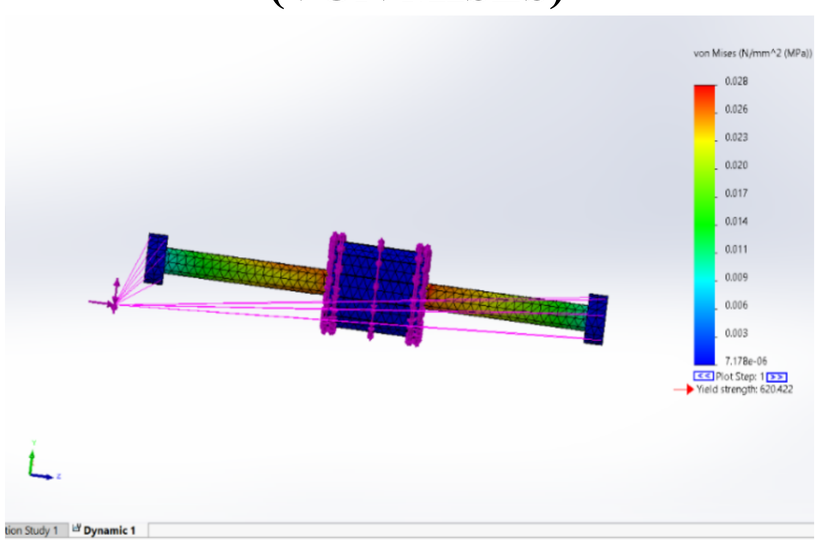



## Rotor after attaching the magnetic

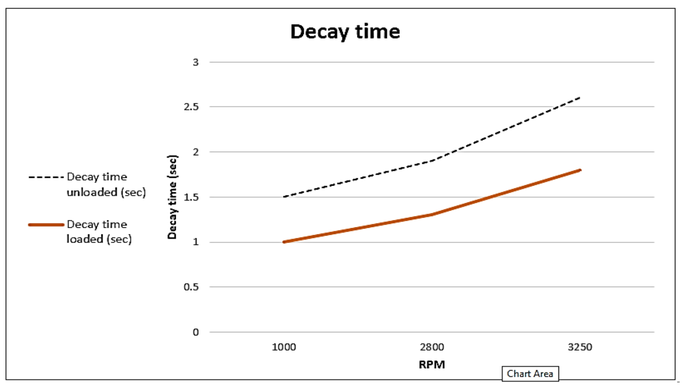
## Dynamic simulation of the shaft (Displacement)




## Dynamic simulation of the shaft (VON MISES)



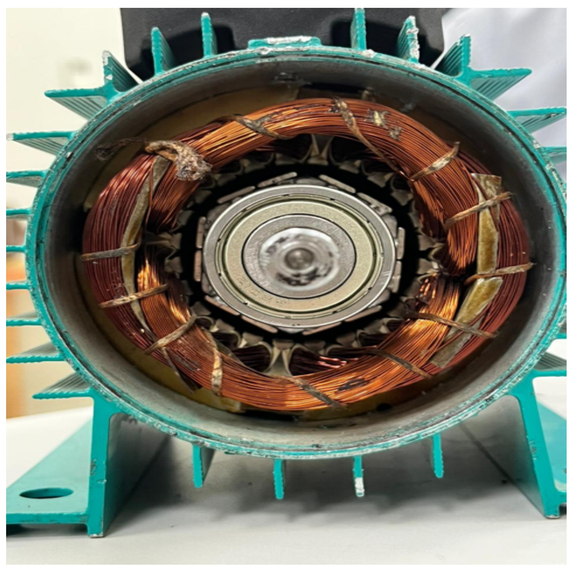

## Decay time




## Experimental work

- Buy 0.5 hp motor and disassembly the parts.
- Turning and milling the rotor.
- Buy a magnetic and attached around the rotor.
- Manufacturing a flywheel and attached on the shaft.
- Assembly the prototype.

## Side view of the prototype



## Constraints

Our study take in consideration the following constraints:

- Environment.
- Sustainability.
- Ethical.
- Technical.
- Social.
- Cost.
- Time.
- Availability of magnetic pieces.
- Machining the rotor.

## Recommendation

- Improvement of electrical machine.
- Improvement of Mechanical design.
- Improvement of the bearing system.
- Buy the magnetic before starting, it is very rare.

## Conclusion

Energy storage can help maximize the use of renewable energy. we recorded all result that we get from the system, so it can be applied this concept with any renewable source to make a balance between the demand and the power supply, all the work done was not complected to our expectations due to the time limitations, but we add it in the recommendations.