Development of Power Converting Sub-system of Kite Power Generator

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Background and Motivation

- Worlds Energy consumption expected to increase by 48% by 2040
  - Wind turbines loud and an eye sore
  - Solar expensive and inefficient
  - Nuclear dangerous
- New forms of alternative energy need to be investigated

- **Design and implement the power converting subsystem of a kite power generator to power a light bulb and scale for a 100kW design**

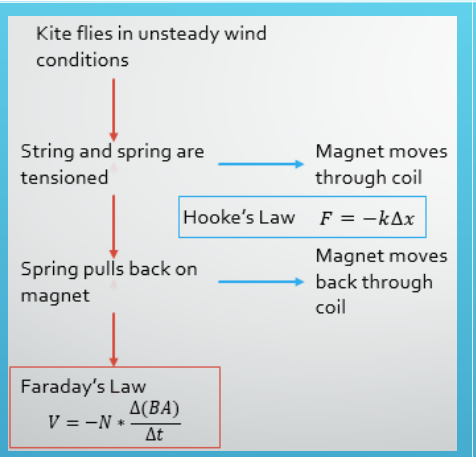

Figure 1. Power Generation Cycle

Scaled Concept Model

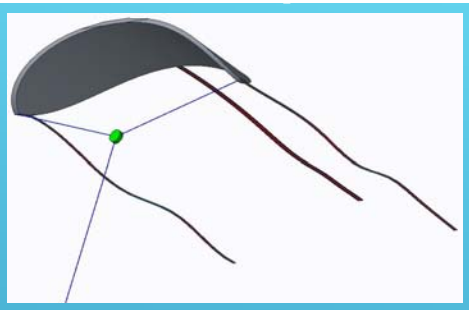

Figure 4. Concept Kite Design using kite tails

- Kite tails used to stabilize kite
- Needs to fly in figure-8 pattern
- Single or double winch model may be used

Demonstration Model

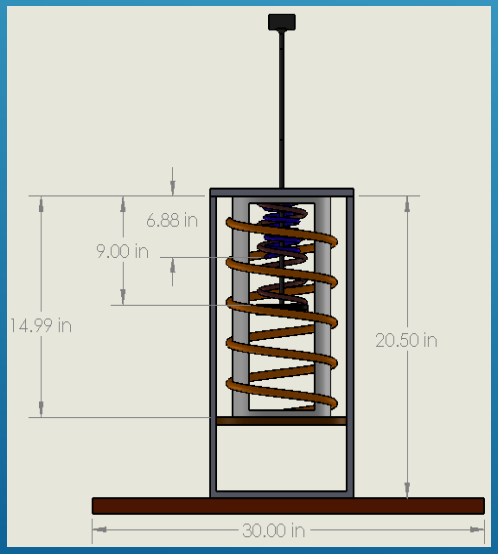

Figure 2. Demonstration Model

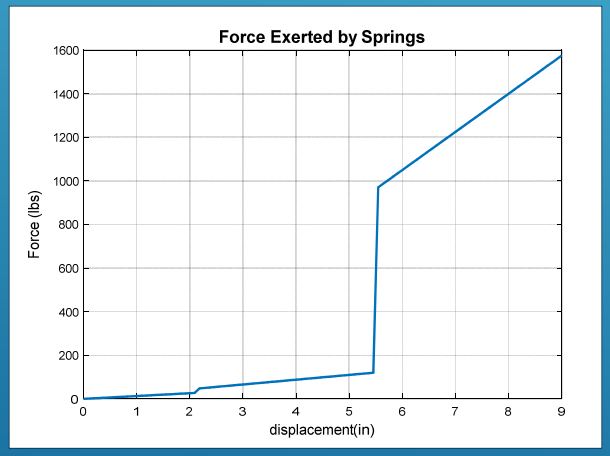

Figure 3. Spring Variation

Table 1. Spring Summary

Spring No.	Length (in)	Stiffness (lbs/in)	Outer D (in)	Inner D (in)	Solid Height (in)
1	9	13	3	2.616	1.54
2	6.88	9	1.5	1.25	1.88
3	3.5	153	1	0.676	2.11

- Power Generation expected to be 40W
  - 50 wraps/s
  - B = 1.32 T
- Mechanical input
  - Hand Cranked
- Concentric Springs
  - Third Spring is safety mechanism

Future Plans

- Build and test demonstration model
- FMEA for concept kite
- Run simulations to see how quickly the kite needs to follow a patter to achieve 100kW of power
  - Talk to Theo Jansen
    - Strandbeest
- Water collection concepts

References

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[3]"POWERFUL -UNLIMITED -FREE."SkySails GmbH-SkySails Propulsion for Cargo Ships. N.p., n.d. Web. 30 Sept. 2016.