



GE Wind Turbine Generator Gearbox

EGR 100-015

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INTRODUCTION

- A WTG gearbox operates in difficult environments and is subject to water ingress leading to corrosion of delicate machinery.
- There are multiple solutions to this problem but many of those are not feasible.
- Using a material like stainless-steel in the gearbox will prevent corrosion but its high cost makes it impractical to use.
- A dehumidifier attached to the gearbox to remove water as well as moisture from it seems to be a

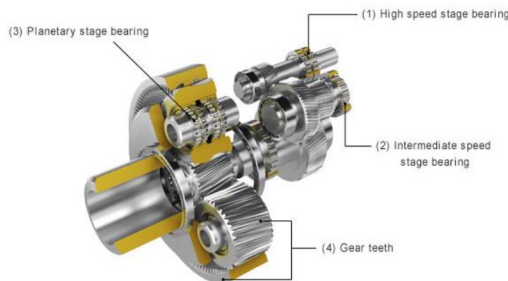
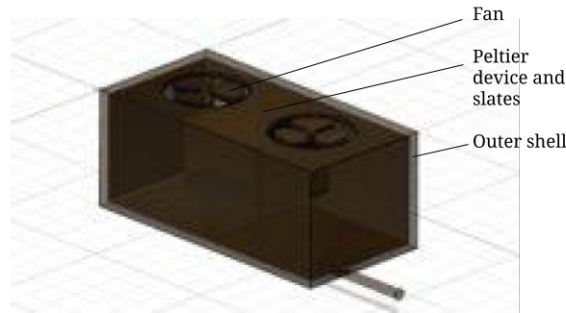


Figure 1: Typical WTG Gearbox Gear Configuration



METHODS

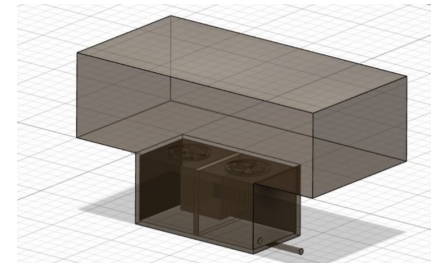
- Included a Peltier device in order to create a temperature difference.
- The temp. difference was used to condense water vapor into its liquid form and remove it from the gearbox
- Metal slates were added to the Peltier device to provide a surface for water to condense on to
- The fans help draw in unfiltered air, and return dry air back into the gearbox
- Calculated the volume of each individual part and the cost of the desired materials
- Compared costs when using different materials for the outer shell in order to find what is most cost efficient

RESULTS/ CONCLUSION

- Peltier device - purchased from outside source
- Shell's material – Carbon-steel
- Heat sinks – Aluminum
- Fans - polypropylene
- Final cost ranges from \$5687.89-\$53915.88 depending upon the size of the device with respect to the gearbox.

Table 1: Total Estimated Cost

Model	Multiplication Factor (m)	Total Cost using Carbon-steel (\$)	Total Cost using Stainless-steel (\$)
1	2	4792.09	5687.89
2	3	13623.38	15641.64
3	4	27824.08	31414.49
4	5	48303.61	53915.88



REFERENCES

Wood, R. "Tribology and corrosion aspects of wind turbines." *Wind Energy-Challenges for Materials, Mechanics and Surface Science* (2010).