

Collegiate Wind Competition 2017-2018

Market Team B1

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Full Design

- 1 MW Wind Turbine Design
 - Active Yaw
 - Steel Tubular Tower
 - S811, S809, S810 Series Airfoils
 - Direct Drive Generator
 - Shaft Design with no gearbox



Figure 1: 1MW Turbine View

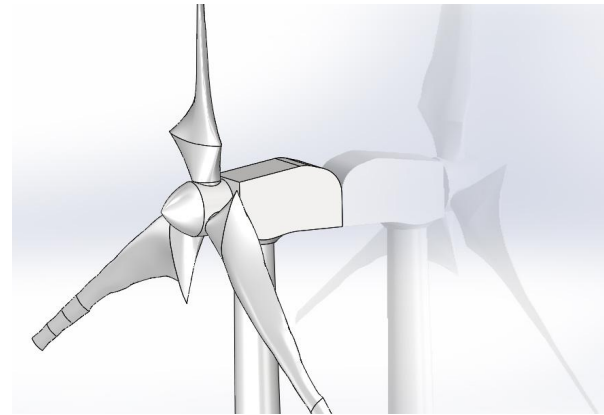


Figure 2: 1MW Turbine Rotor View

Blade Design

- 31.5 meter length
 - S811, S809, S810 Airfoil
- 2 meter diameter at the root

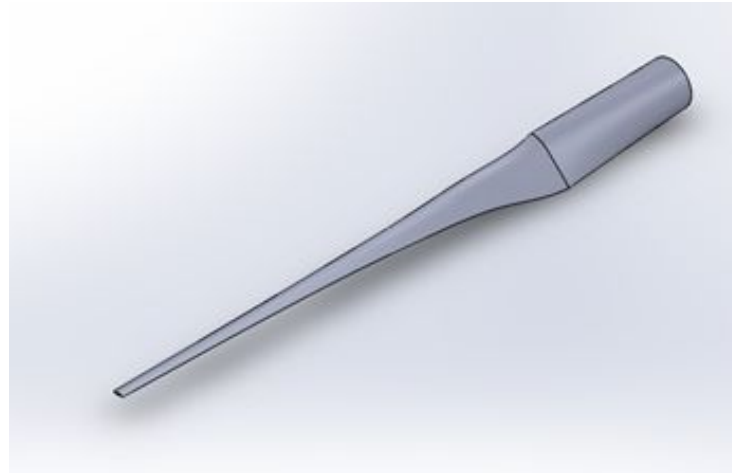


Figure 3: 1MW Blade

Hub

- AISI 304
- 2 mm
- 1.5 mm

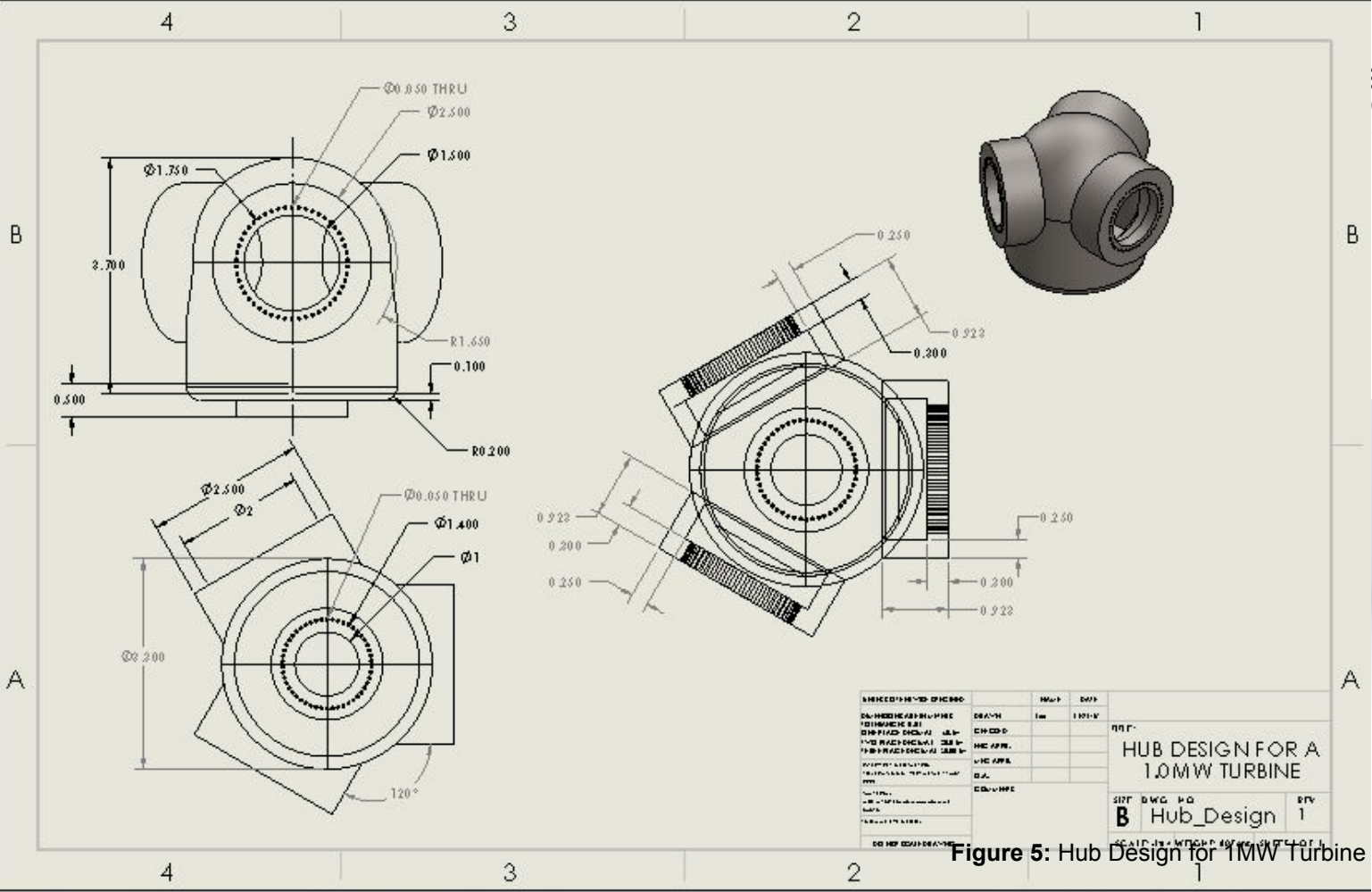
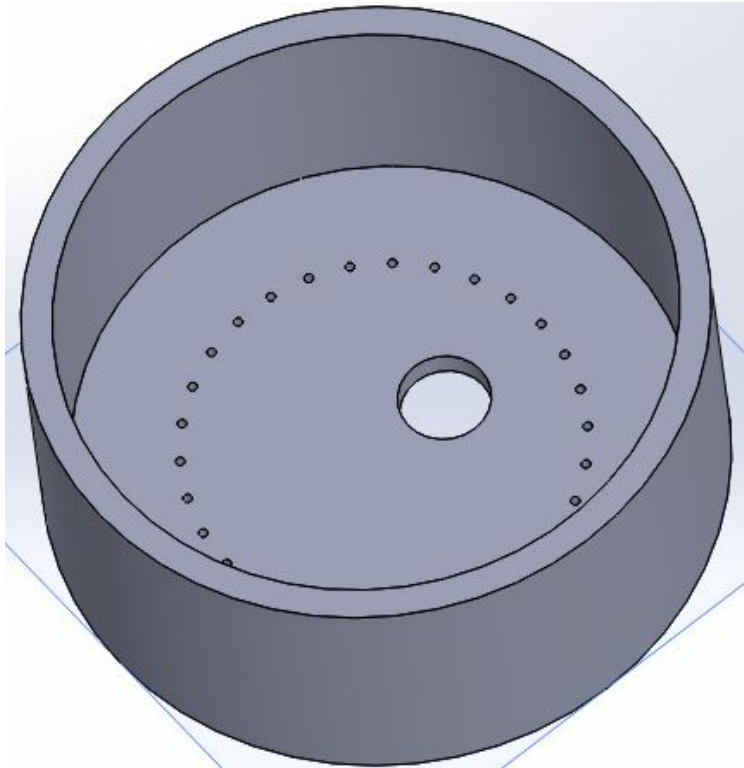


Figure 4: Hub Drawing

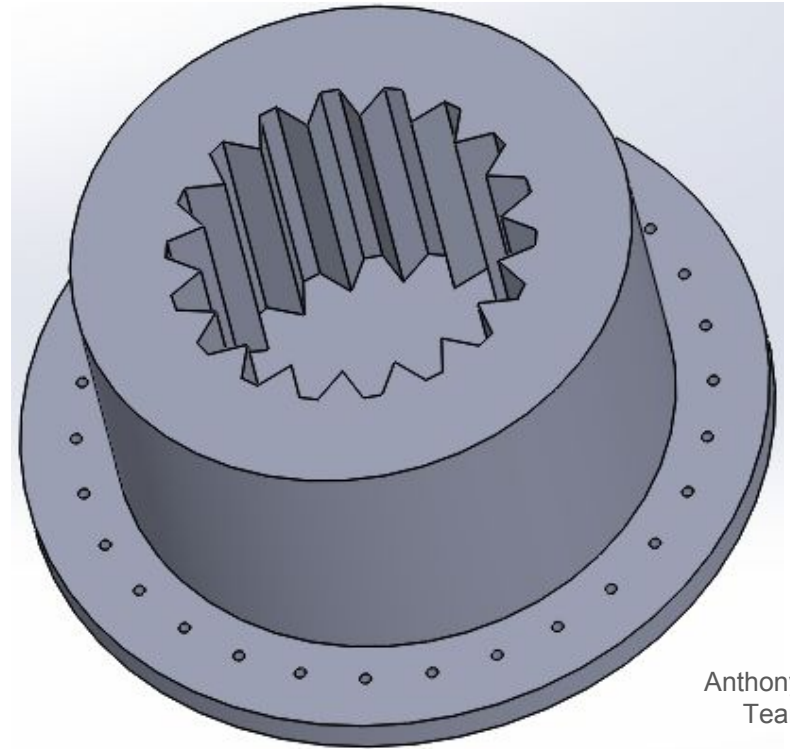
Figure 5: Hub Design for 1MW Turbine

Pitching System

Outer Pitching Ring w/ Motor Mount



Inner Pitching Ring



Tower Design

- Steel tubular tower design
 - Hollow tube
 - Tapered for strength and cost
 - S500 Grade Structural Steel
- 80 meter height
 - Higher in the boundary layer
 - Wind resource data
- Assembled on site
 - Four sections bolted together
 - Ease of transportation
- Flanged base
 - Bolted to foundation
 - Foundation dependent on location

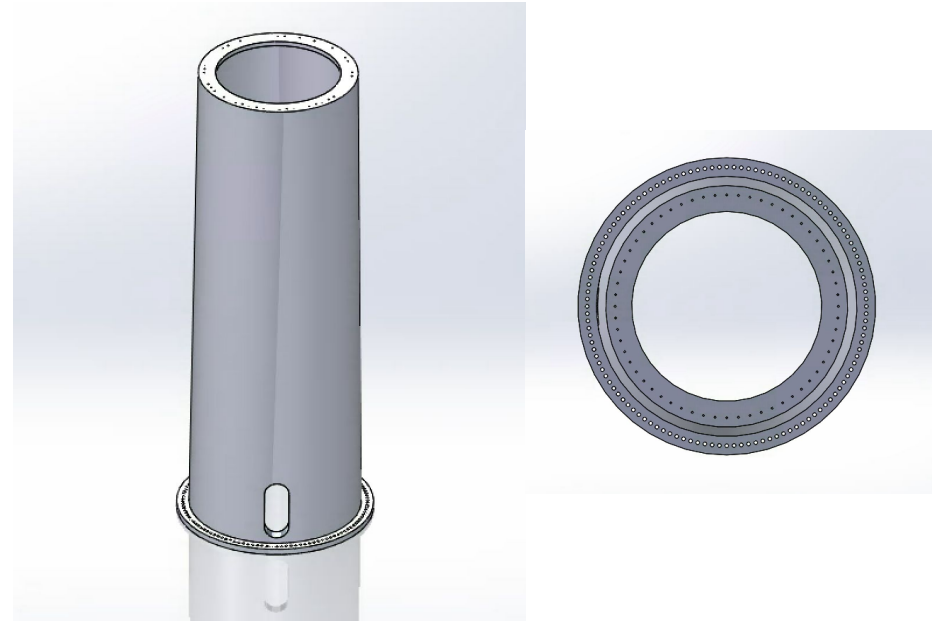
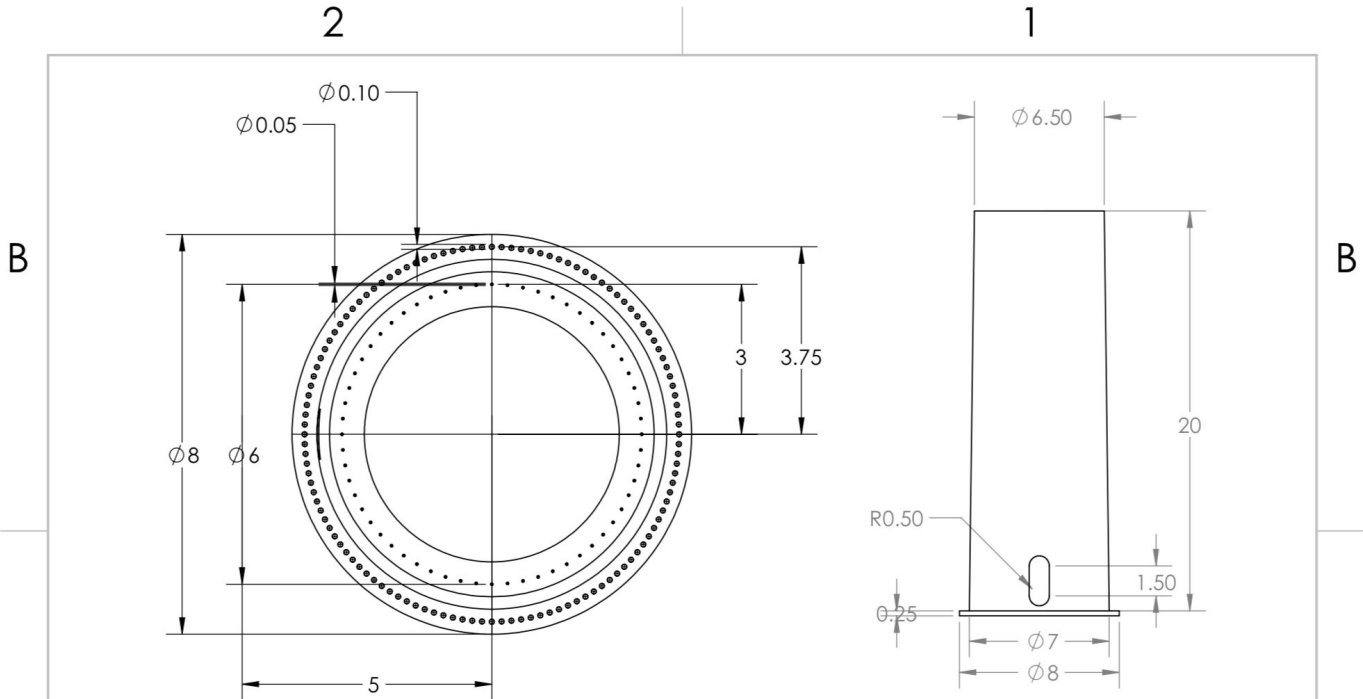


Figure 6: Steel Tubular Tower
Section 1 Design



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		UNLESS OTHERWISE SPECIFIED:		NAME	DATE
		DIMENSIONS ARE IN METERS	DRAWN	MV	12/4/17
		TOLERANCES:	CHECKED		
		FRACTIONAL ±	ENG APPR.		
		ANGULAR: MACH ± BEND ±	MFG APPR.		
		TWO PLACE DECIMAL ±	Q.A.		
		THREE PLACE DECIMAL ±	COMMENTS:		
		INTERPRET GEOMETRIC TOLERANCING PER:			
		S500 Steel			
		FINISH			
NEXT ASSY	USED ON				
APPLICATION		DO NOT SCALE DRAWING			

TITLE:		
Tower Section 1		
SIZE	DWG. NO.	REV
A	Part T.1	
SCALE: 1:250		WEIGHT: SHEET 1 OF 1

Shaft Design

- Material
 - AISI 1040 cold drawn steel because of its high ultimate tensile strength and yield strength

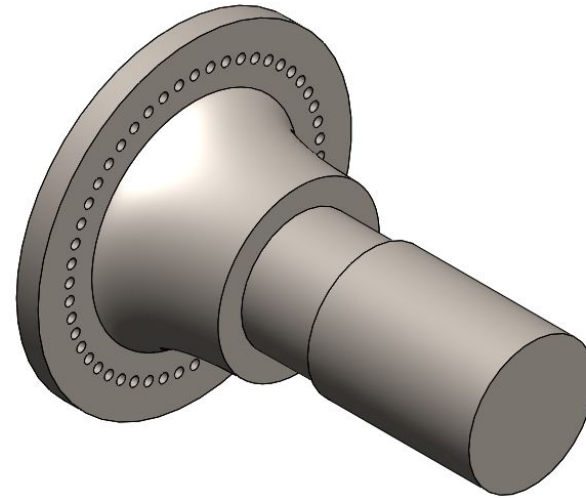


Figure 7: SolidWorks Design for 1MW Turbine

Mainframe/Nacelle Design

- **Design Features**
 - Ribbed to increase strength
- **Material**
 - Constructed from AISI 1020 Steel
 - Desirable strength characteristics
 - Low cost

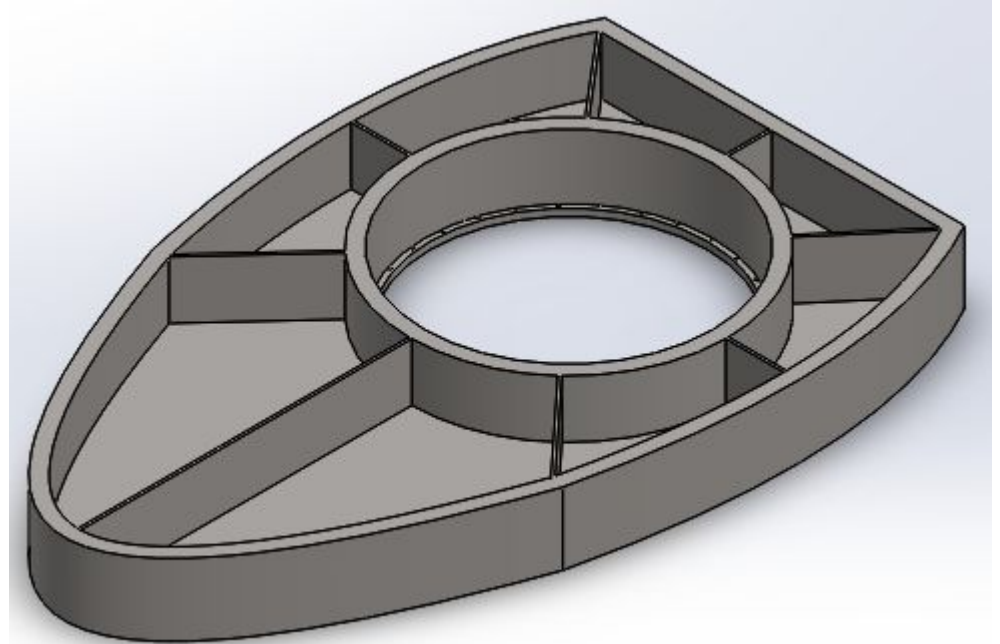


Figure 8: Mainframe Design

Yaw Design

- Slewing ring bearing with internal gears.
 - Will use single-row spherical type ball bearing.

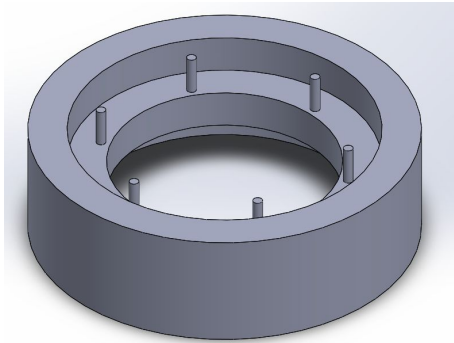


Figure 9: Yaw Bearing Tower Mount

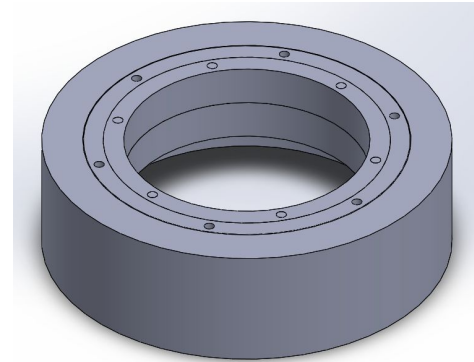


Figure 9: Tower Mount with Bearing