

Assembly report: Wind Wall

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1. Abstract:

The objective of this report is to give the instructions and ways in which the 'Wind Wall' shall be installed, constructed and assembled.

2. Table of Contents:

Sln.	Heading	Page Number
1	Abstract	1
2	Table of contents	1
3	Introduction	1
4	Materials and Parts	1-2
5	Exploded View	2
6	Assembly	4-12
7	Special Considerations	13
8	Conclusion	13

3. Introduction

The Wind Wall is a cumulation of Vertical Axis Wind Turbines (VAWTs) Which are designed to extract the kinetic energy of the wind and convert it to electrical energy. The "Wind Wall" as such consists of 10 VAWTs which are of the Savonius Type (drag type wind turbine). The Blade has a profile of the 'Ugrinsky' type with a helical twist to enable it to operate with low wind speeds and relative independence on the wind direction. By grouping the VAWTs in a frame, it gives a greater power production and lesser usage of available space. Each unit VAWT in the "Wall" shall be connected in parallel to each other and each unit "Wall" shall be further connected in parallel to each other.

4. Materials and Parts: (For One Wall)

Sln	Material Used	Part	Quantity
1	ABS Plastic	Blade	10
2	Steel	Axial	10

3	Steel	Axial bearings	30
4	steel	Mounts	6
5	steel	Hooks	6
6	steel	Thrust Bearings	20
7	steel	Bolts	207
8	Aluminium	Generator Cover, frame	10, 1
9	Copper	Coils	10
10	ABS Plastic	core	10

5. Exploded View:

The Exploded view of the following parts are as given:-

5.1 The Generator:

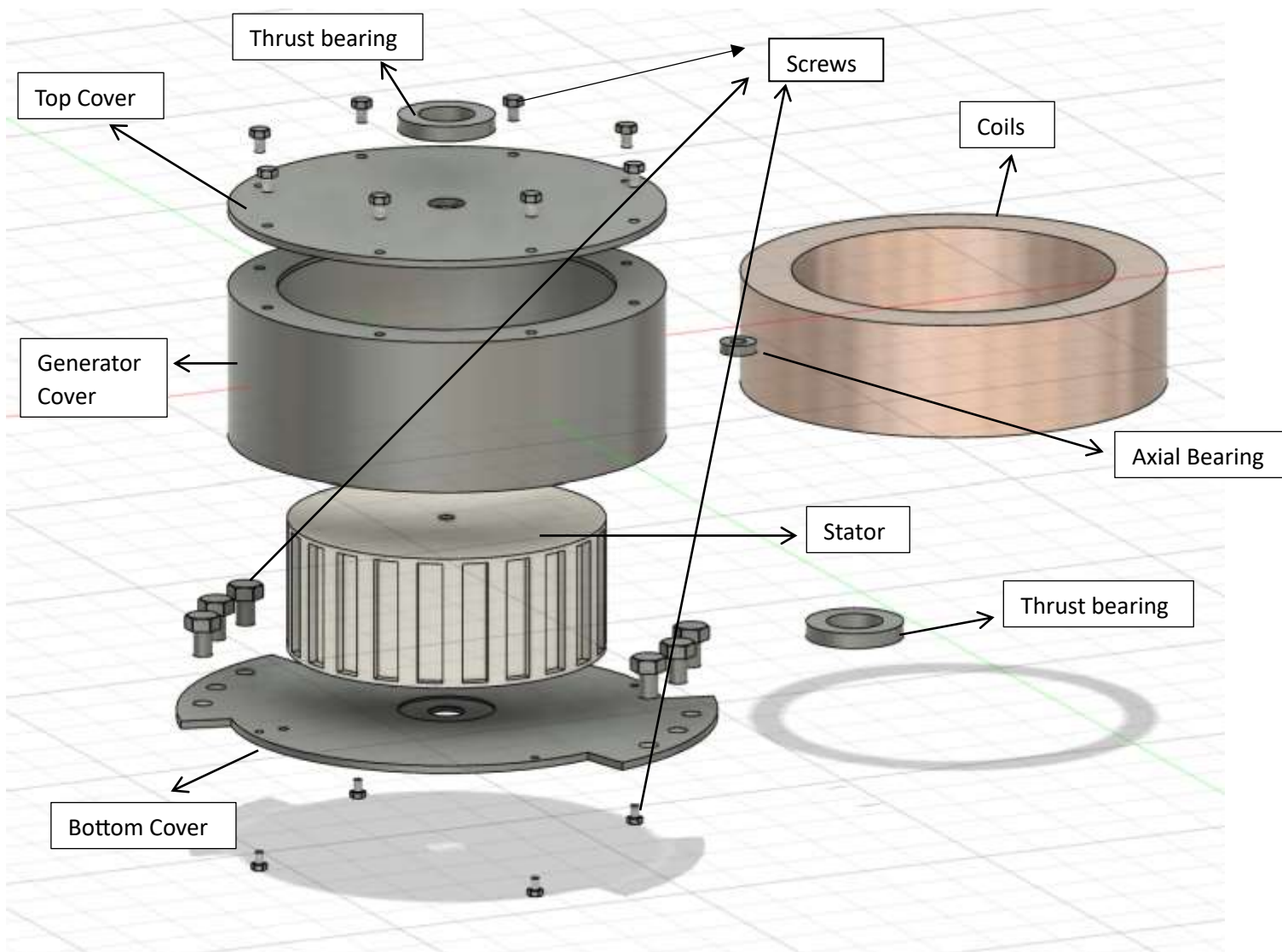


Fig 1. Exploded view of the generator

5.2 The Blade and Axial:

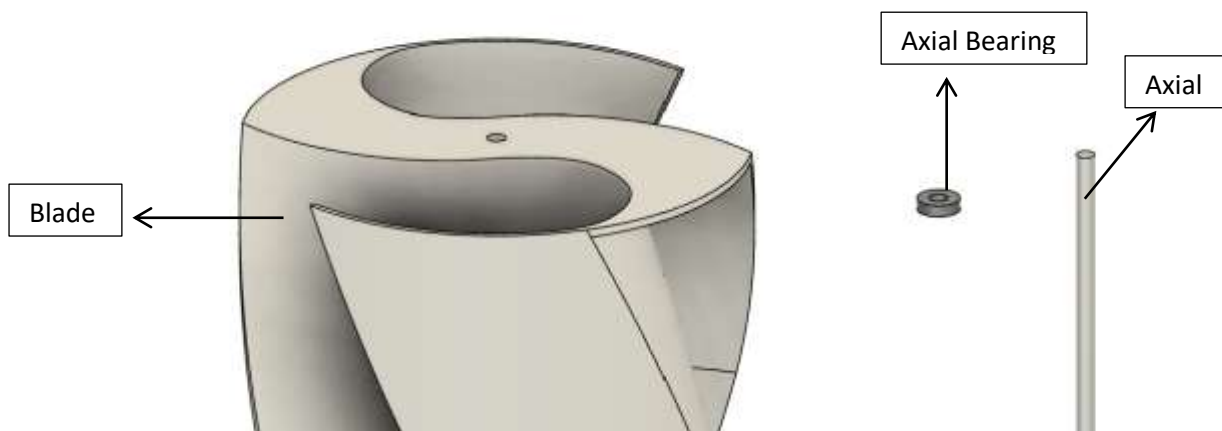


Fig 2. Top of the blade

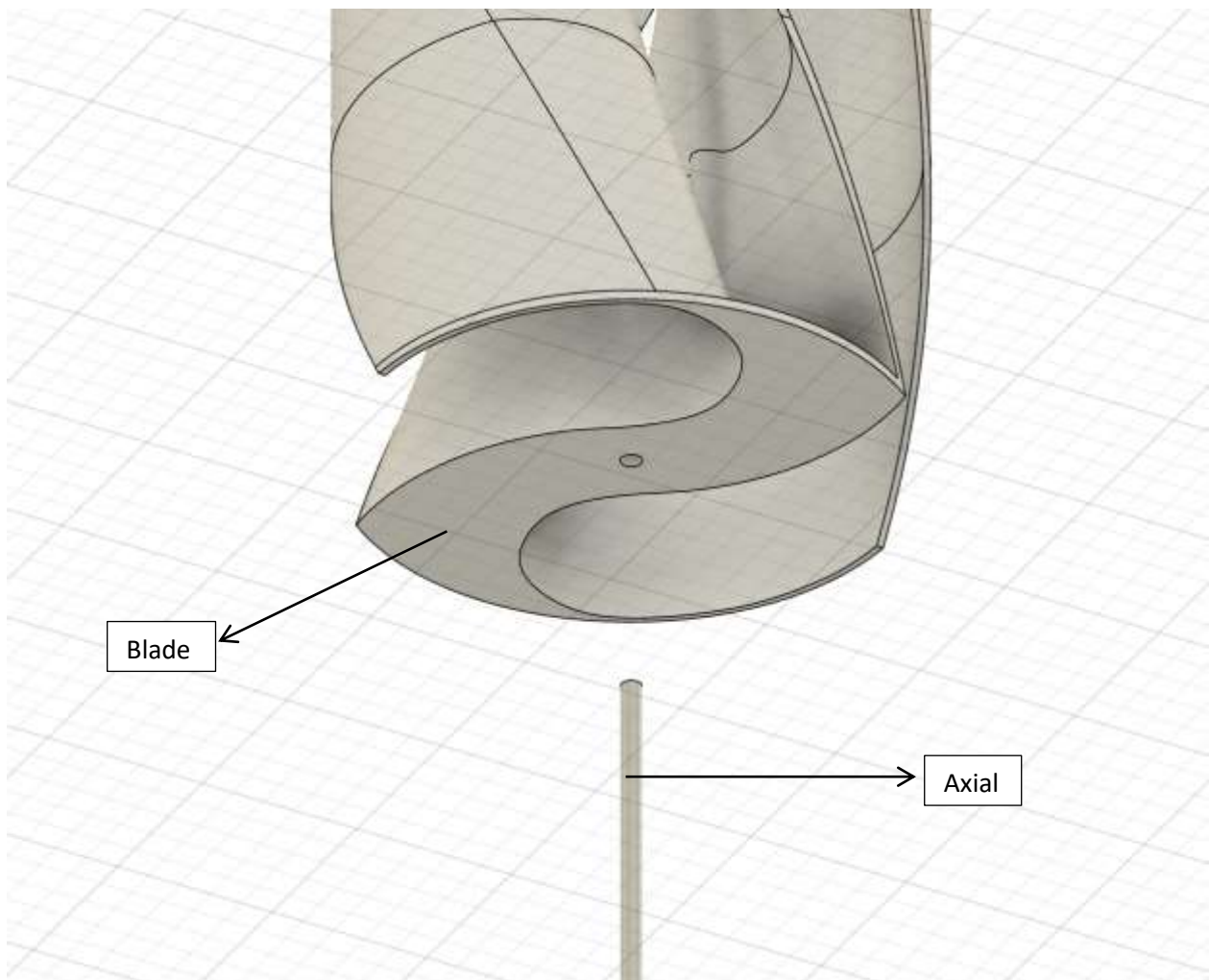


Fig 3 . Base of the blade

5.3 The Frame:

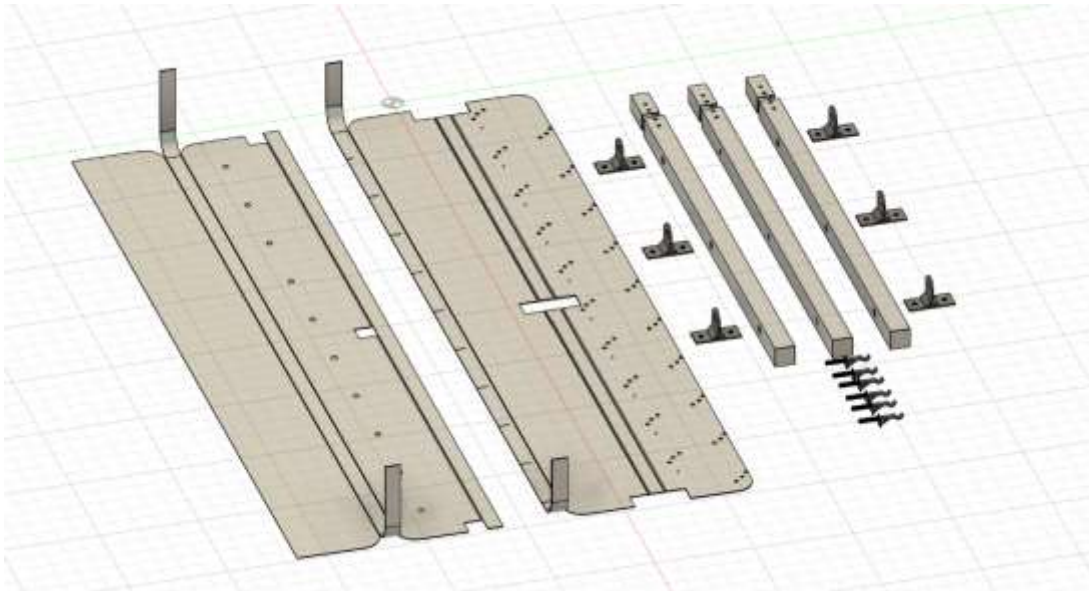


Fig 4. The frame and its parts

6. Assembly:

6.1 Assembly of the Generator:

- In the Casing of the generator, the serpentine coil is fit in the inner surface of the 'Generator Cover'. The 'Generator Cover' is placed upside down for this.

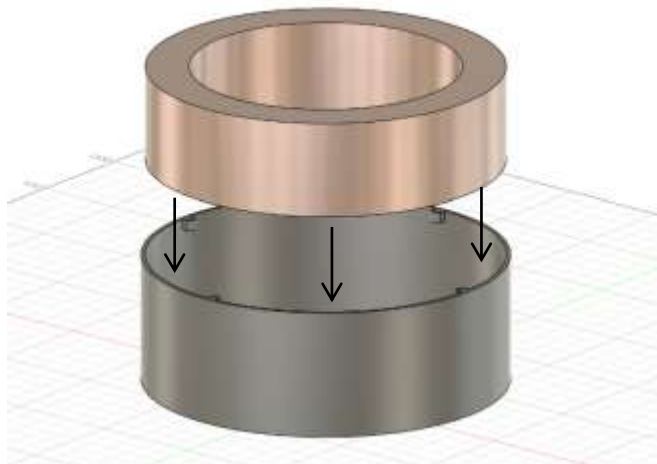


Fig. 5

- The 'Bottom Cover' is screwed down onto the 'Generator Cover' with appropriate screws in the given screw hole.

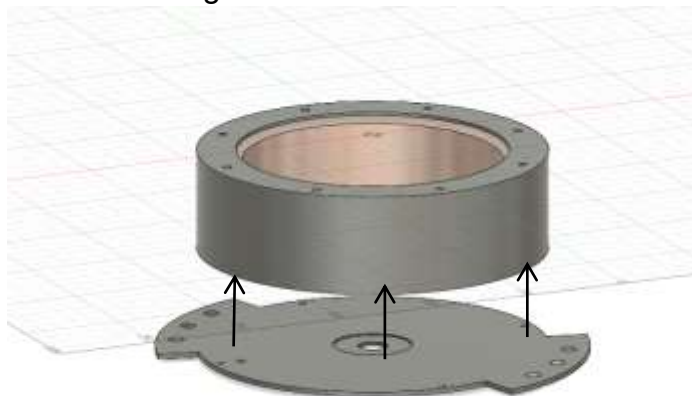


Fig. 6

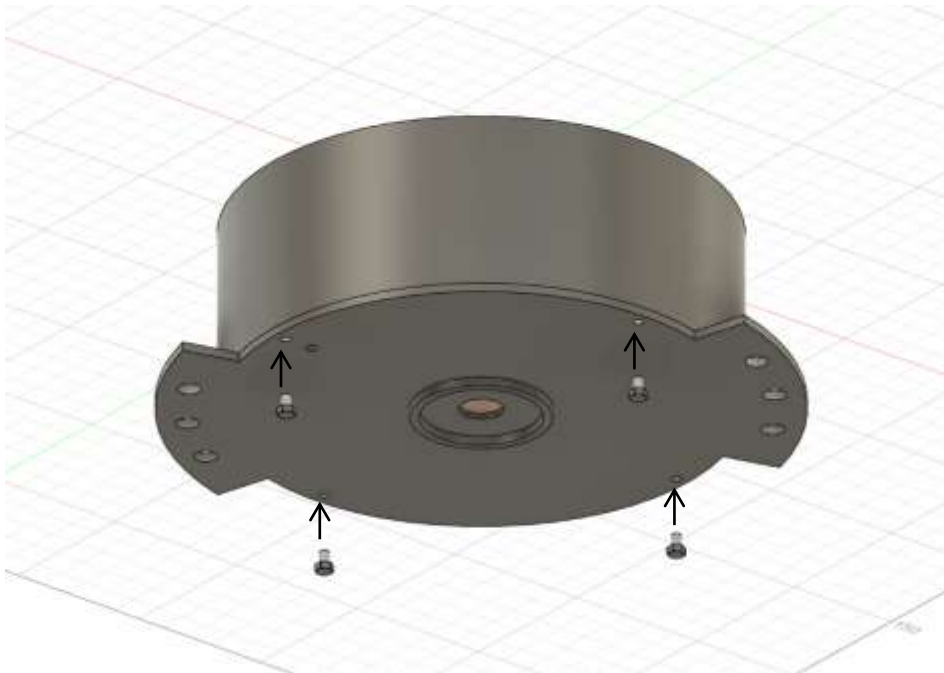


Fig. 7

- Now, the Stator and the axial is assembled separately. The Axial is put through the axial bearing, the stator, the axial bearing and the thrust bearing respectively and held together with glue.

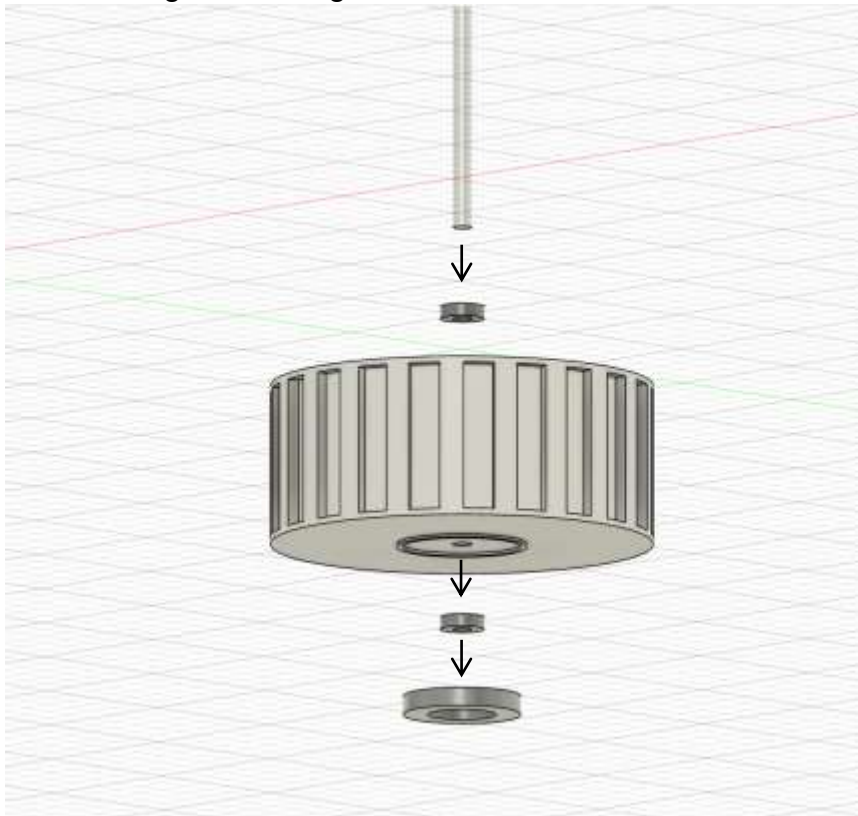


Fig. 8

- The Assembled stator and axial is placed in the generator.

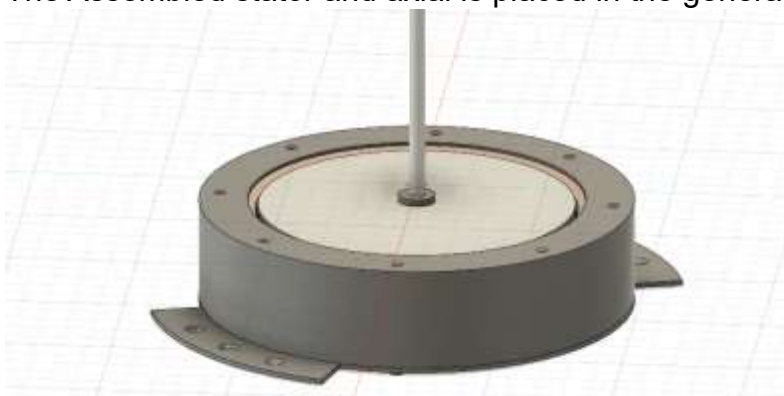


Fig. 9

- The 'Top Cover' is then placed on the generator and is screwed closed in its respective position. Put the thrust bearing on top of the generator lid and secure its lower portion using glue.

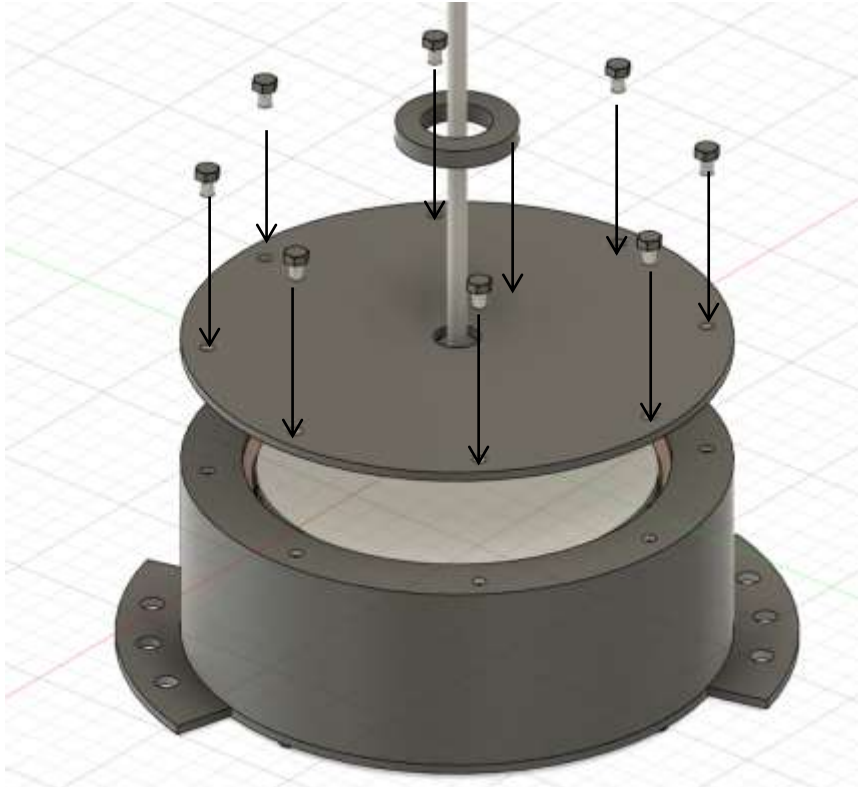


Fig. 10

- The Generator is complete.

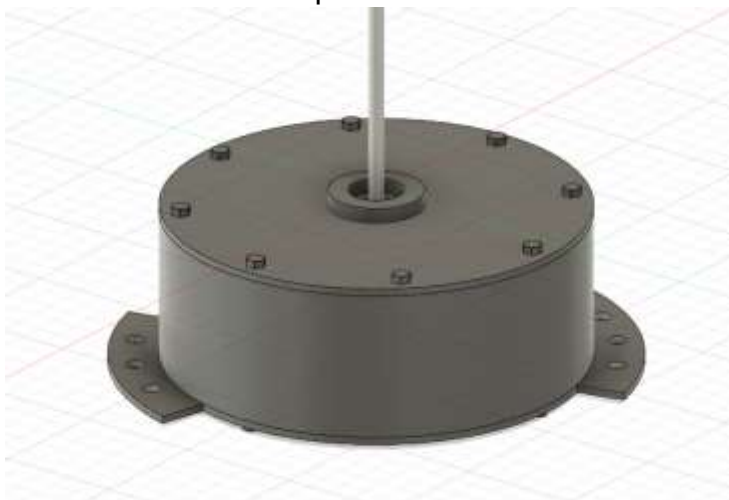
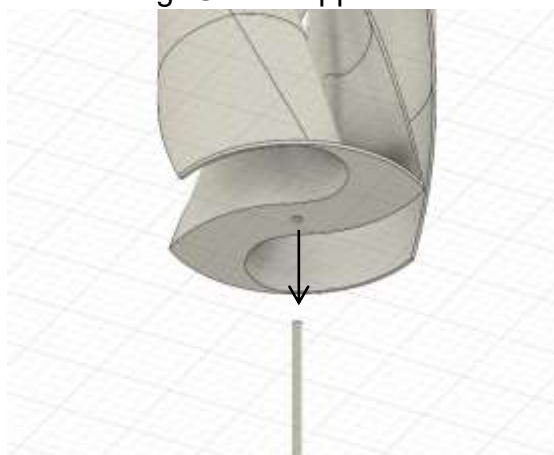


Fig. 11

6.2 Assembling the VAWT:

- On the assembled Ggenerator and axial, the blade is slid down the axial till it is in firm contact with the thrust bearing. Glue is applied to the shaft of the axial to



connect it to the blade.

Fig. 12

- The top axial bearing is then affixed to near the tip of the axial in such a way that when the 'Top Frame' is fixed to the 'Frame Body', the bearings are in the same level with the lower surface of the 'Top Frame'.



Fig. 13

- The VAWT is fully assembled.

6.3 Assembling the Frame:

- The Frame is manufactured from metal sheets.
- The 'Top Frame' is divided into 8 pieces.

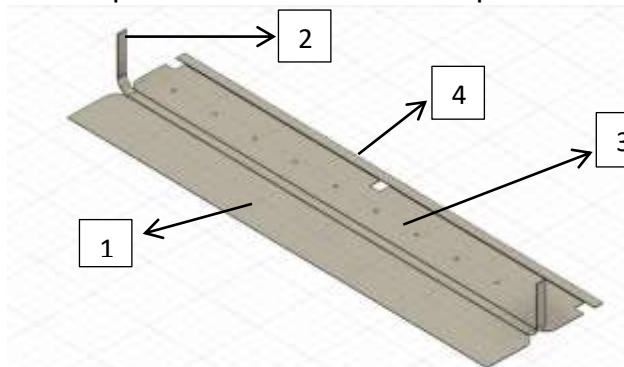


Fig. 14

- Piece '2' is welded onto piece '1' in the following way:

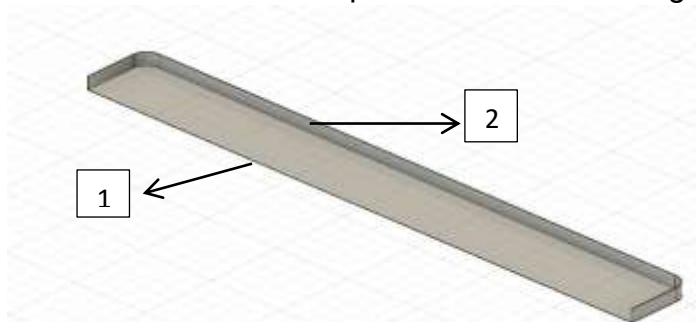


Fig. 15

- Piece '3' is welded onto piece '2' in the following way:

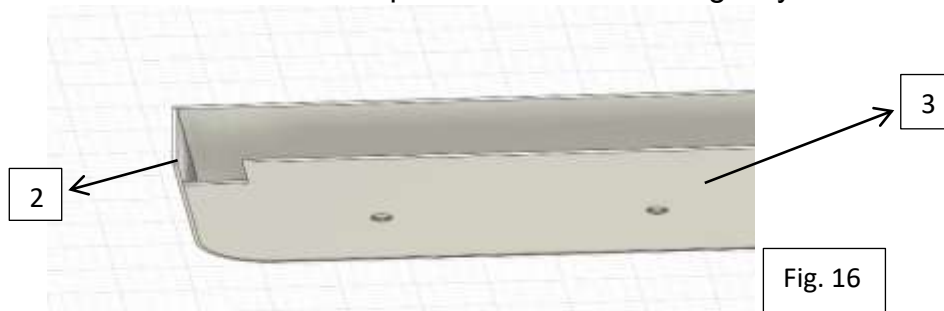
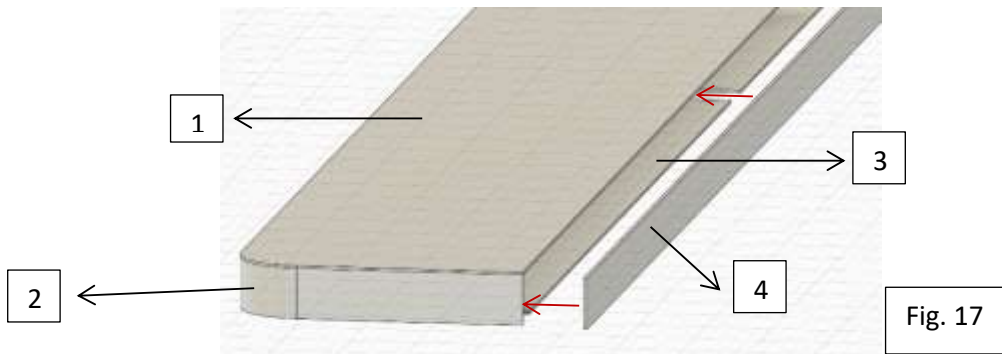
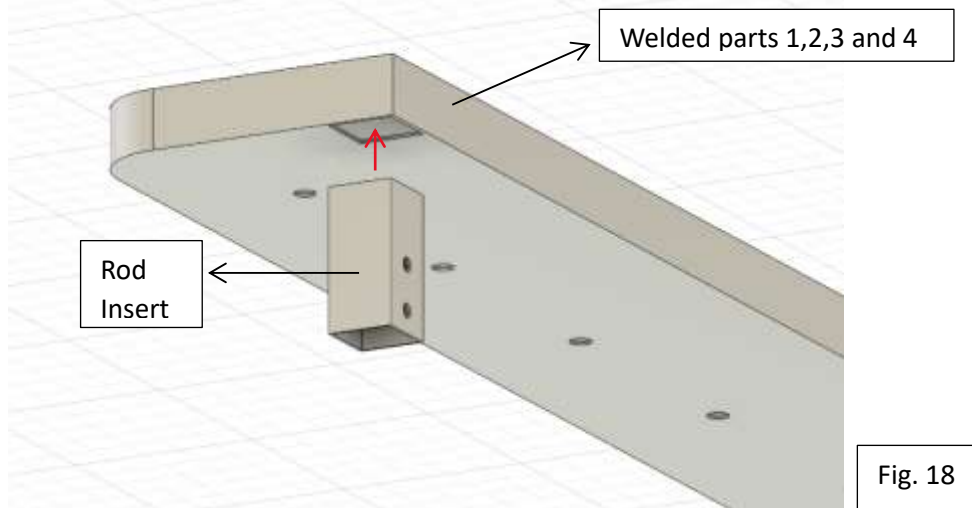


Fig. 16

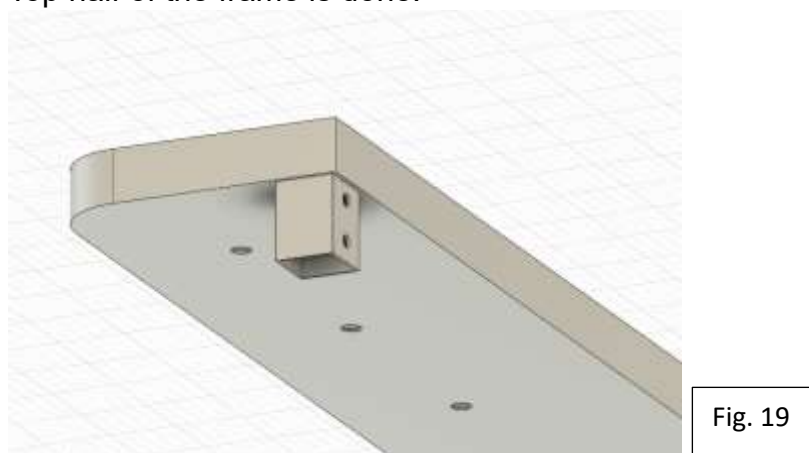
- Piece '4' is then welded to piece '3', '2' and '1' in the following way:



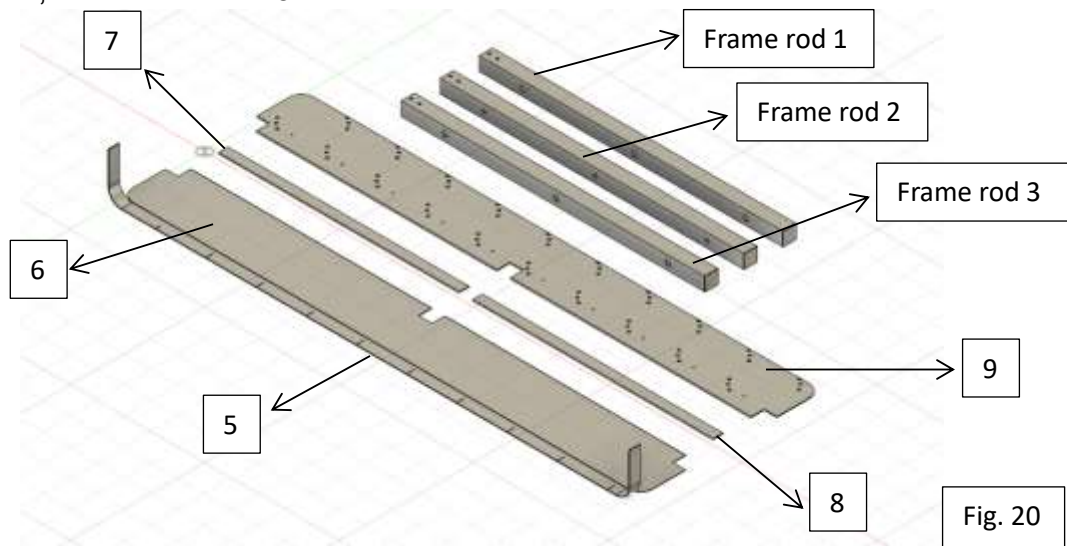
- The 3 'Rod Insert' is then welded onto the frame in this manner:



- Top half of the frame is done.



- The 'Frame body' consists of 8 parts namely: 5,6,7,8,9, Frame rod 1, Frame rod 2, and Frame rod 3.



- Part '5' is welded onto part '6':

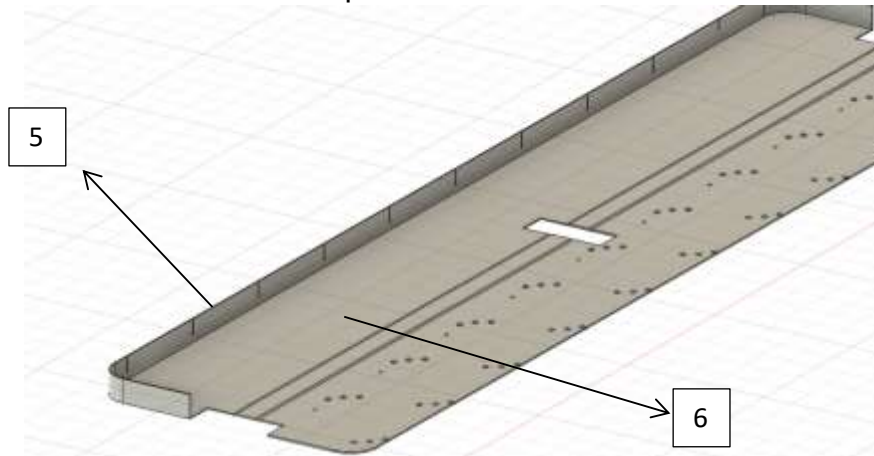


Fig. 21

- Part '8' and '7' is welded onto part '6':

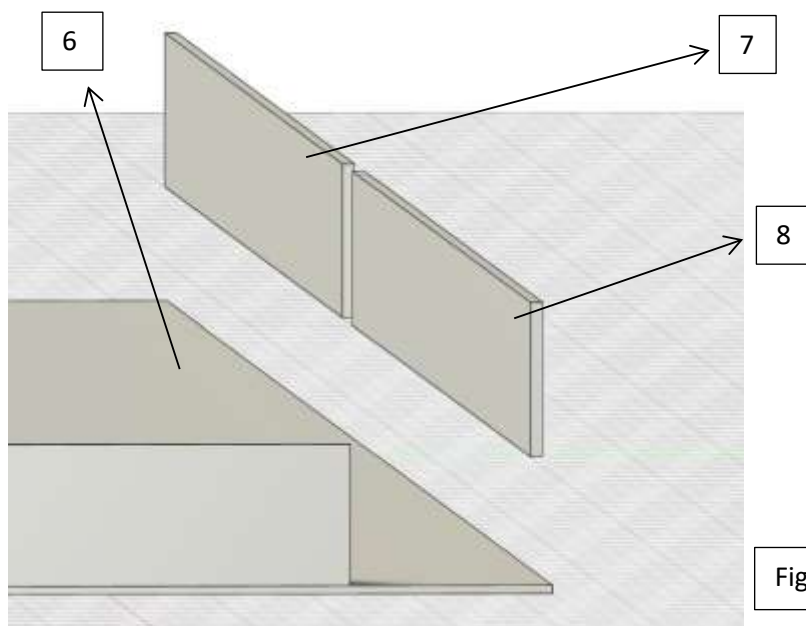


Fig. 22

- Part '9' is welded onto part '5', '7' and '8'.

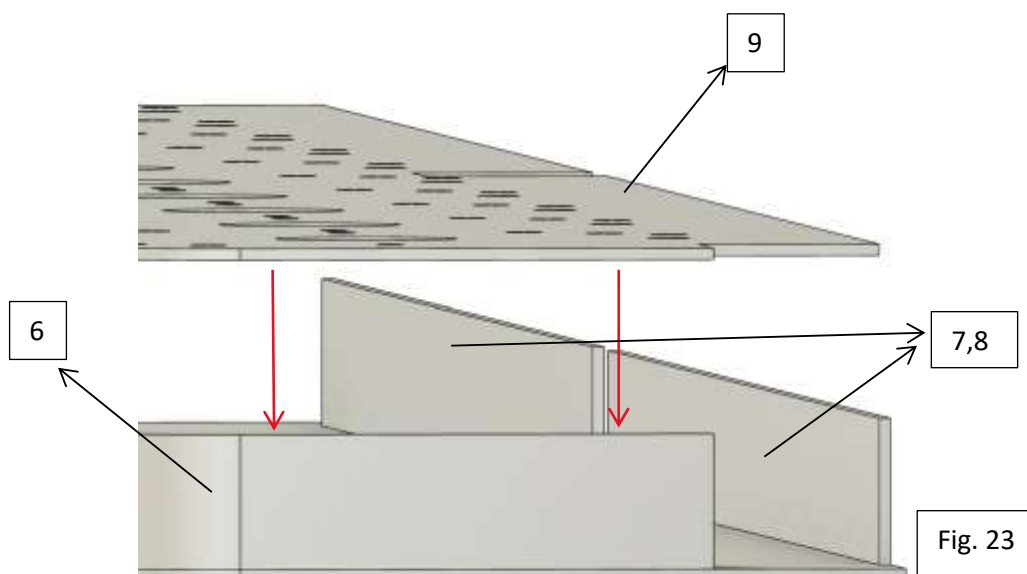
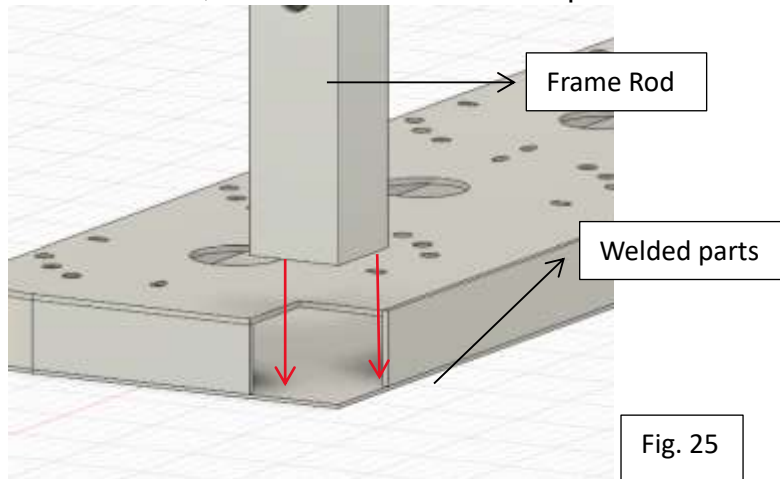
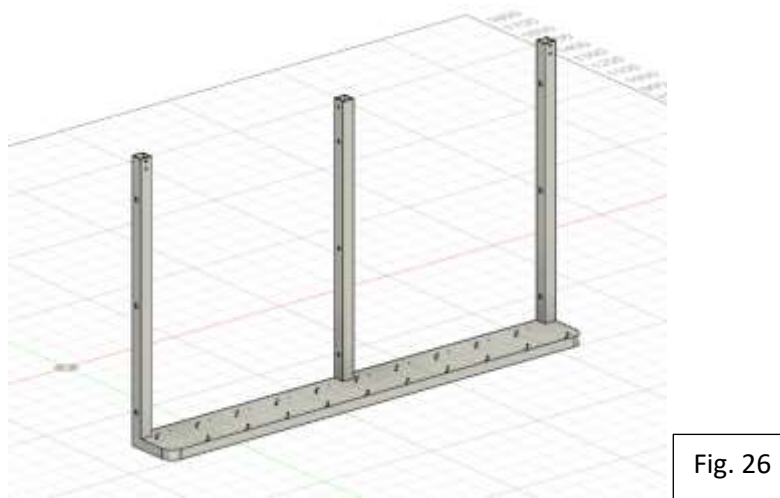


Fig. 23

- 'Frame Rod 1, 2 and 3' are welded into position in the following way:

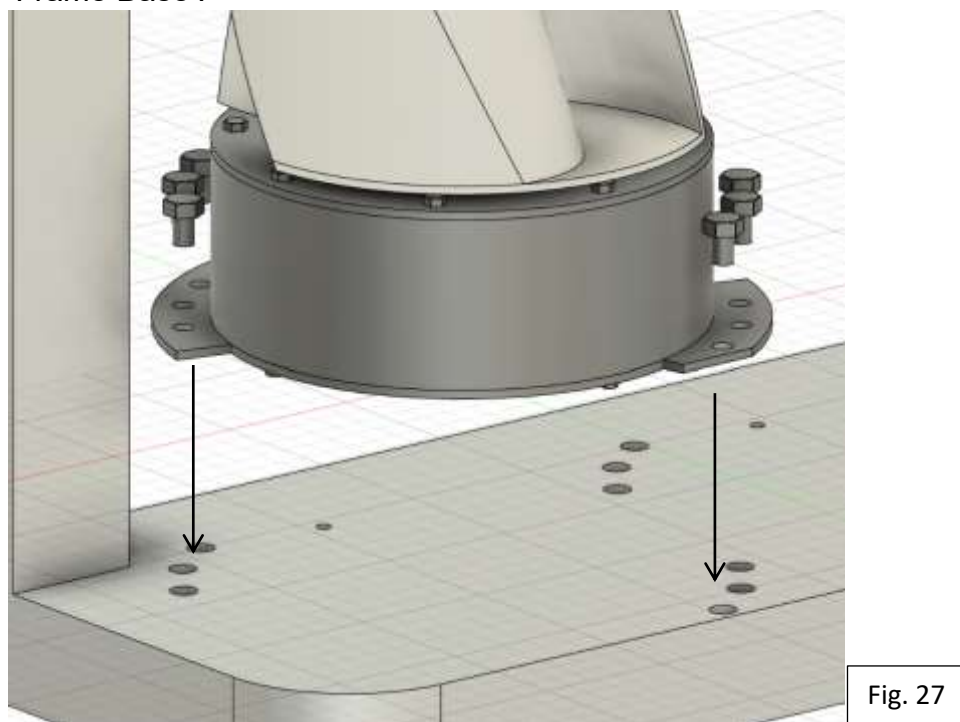


- The assembly of the 'Frame Body' is complete and the 'pins' are fitted and welded to the middle frame rod..



6.4 Assembling the Wall:

- The VAWT is first placed in its intended position given by the cutouts in the 'Frame Base'.



- The VAWT is then screwd into position.

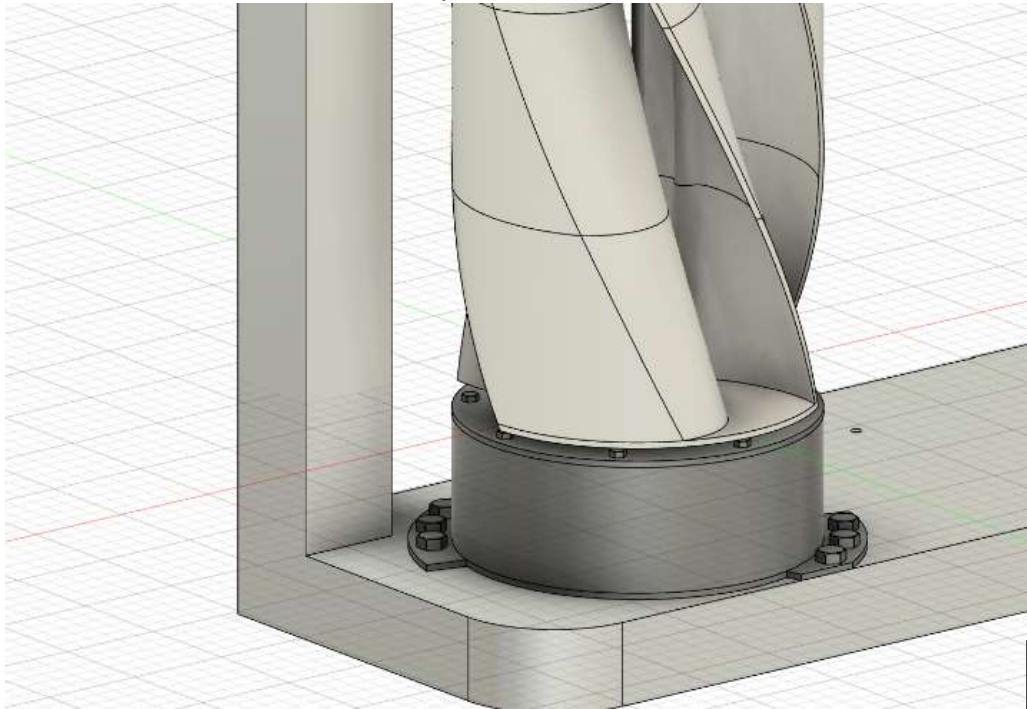


Fig. 28

- The 'Top Frame' is then secured in position using screws.

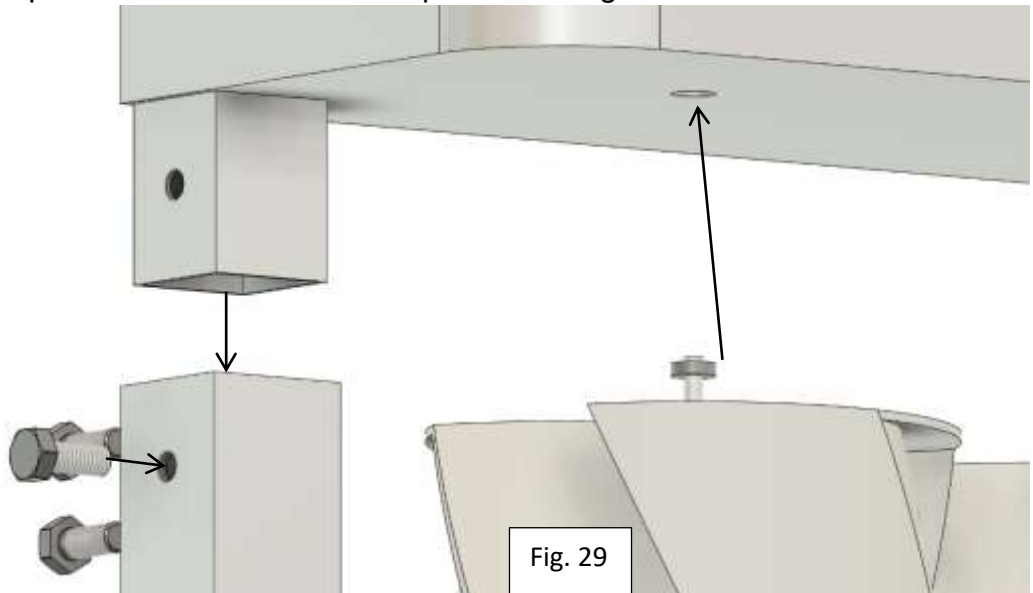


Fig. 29

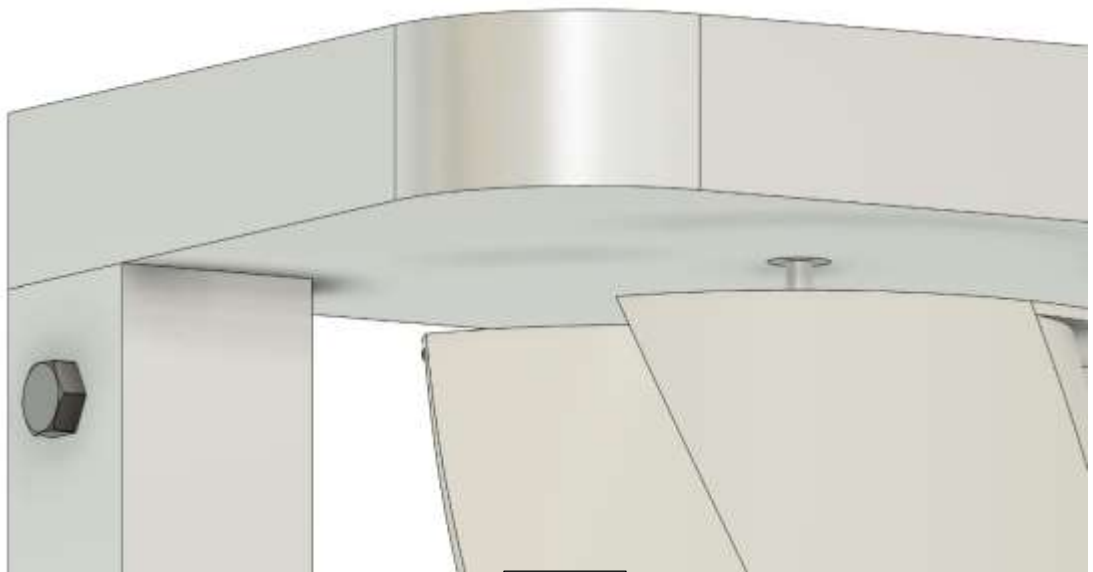


Fig. 30

- The Wind Wall is now fully assembled.

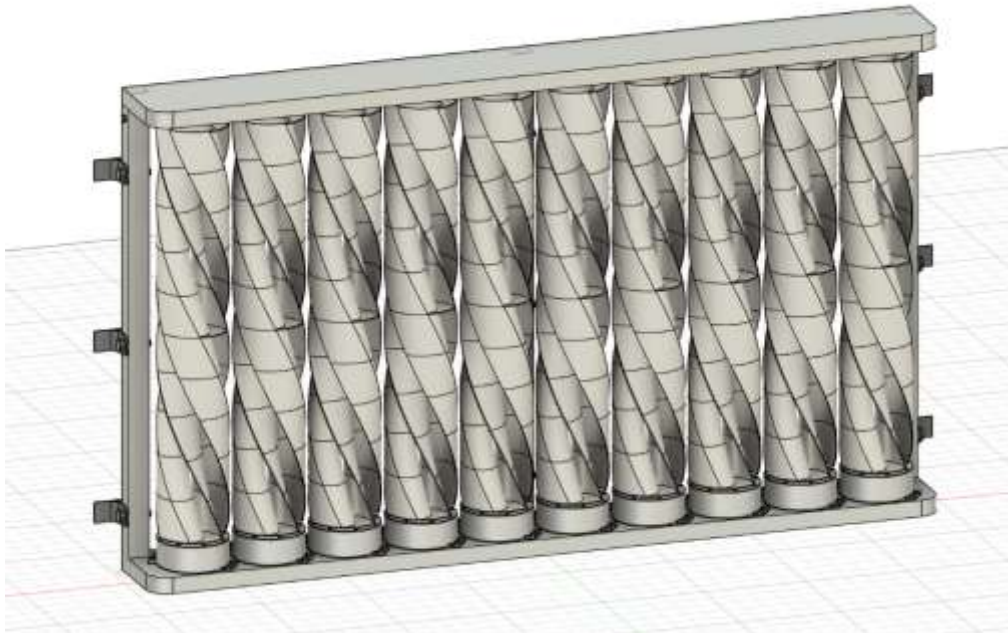


Fig. 31

6.5 Mounting the Wind Wall:

- First the 'hooks' and 'mounts' are secured firmly to the wall of a building.

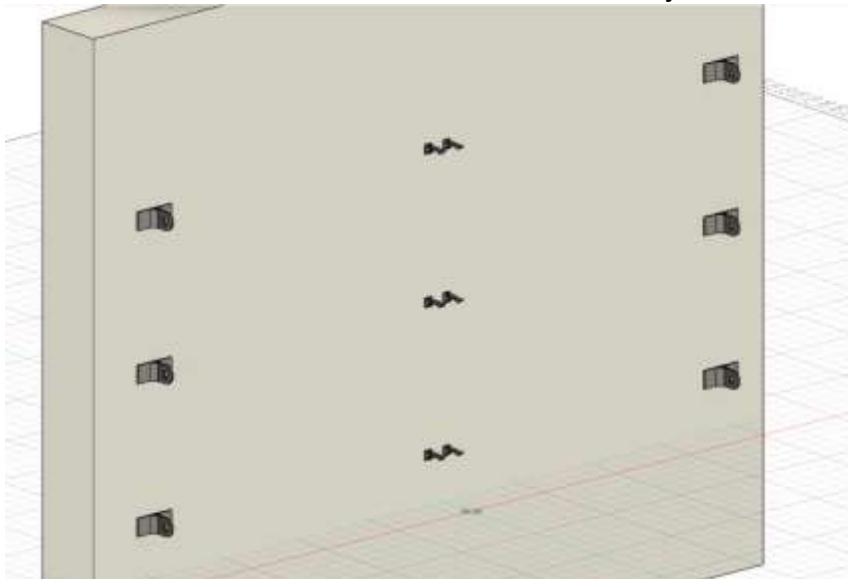


Fig. 32

- Then the wall is hoisted and placed on the 'Hooks' first. This helps in holding the 'Wind Wall' in position before it is screwed to the mounts.

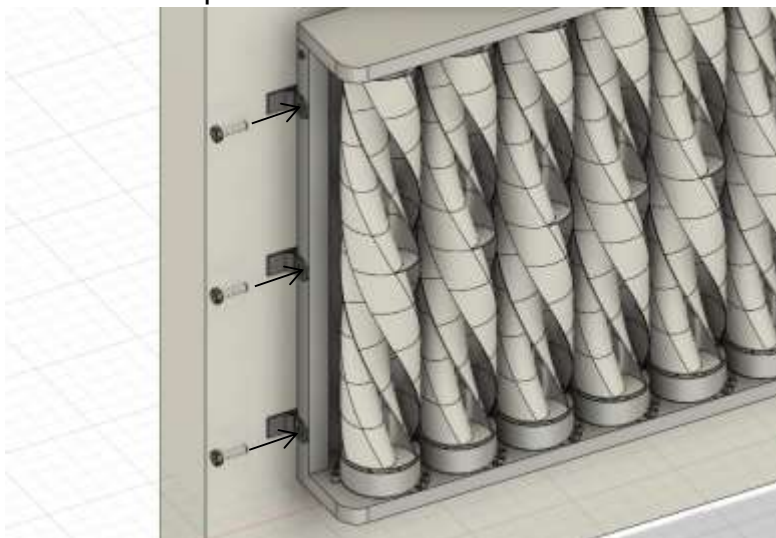


Fig. 33

- The 'Wind Wall' is mounted to a Wall.

7. Special Considerations:

- **Tolerance:** No more than 0.1 mm deviation in the position of the holes for the bearings, screws and wall mount.
- **Lubrication and Maintenance:** The External bearings are to be lubricated once or twice a year as per the requirements.

8. Conclusion:

The assembly of the wind wall is carried out in steps, first the generator is assembled then the blade is fitted and the complete VAWT is then mounted and secured onto the frame. The frame can be assembled in parallel to the generator as it does not effect the assembly process.

Key checks required are: The positioning and accuracy of all the holes for the screws and fitting, The alignment and accuracy in spacing of the mounts and hooks, The alignment accuracy of all the bearings and finally the welds between the parts.
