

# Turbine Foundation Loads

## Tower Overturning Moment

### Proven Energy WT 15000 Wind Turbine

Revision			Prepared by	
Status	Date	No.	Author	Checked
Issued	20/03/05	0.1	NJH	JA



Calculate the Tower foundation loads due the wind loading on the turbine  
Loads in accordance with international norm: IEC 61400-2  
Assume that the tower wind loading is a uniformly distributed load, variations in wind speed with height will be neglected in this calculation.

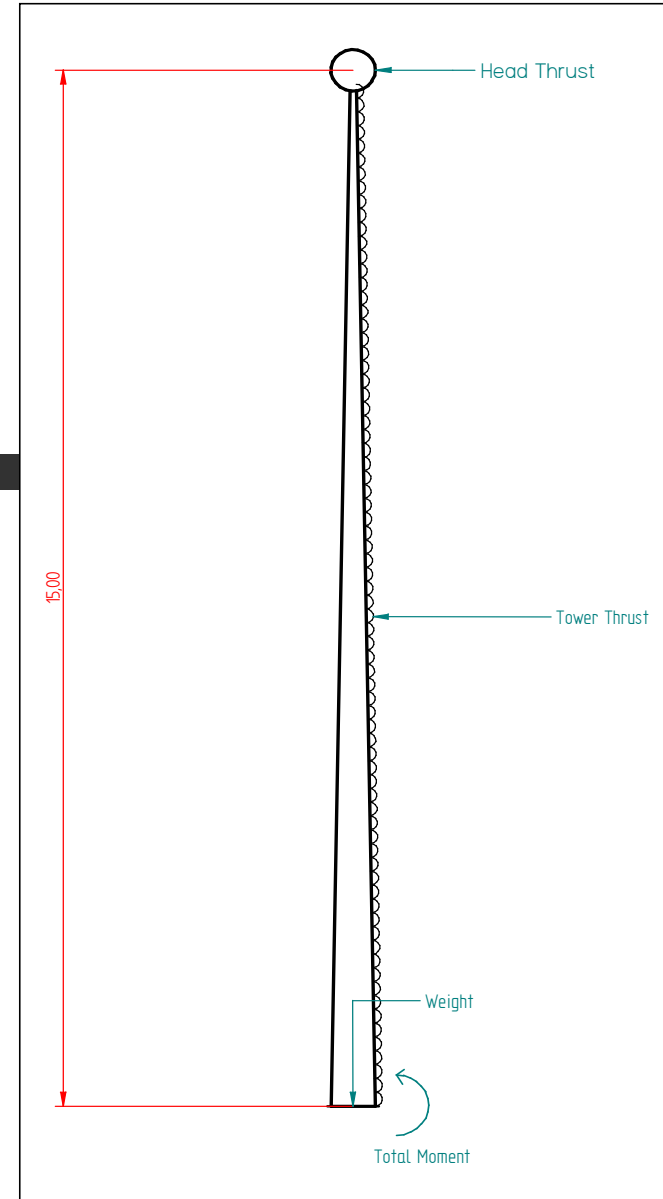
#### Input Parameters

Head Mass = 1100 kg<sup>i</sup>  
Mast Mass = 1450 kg<sup>ii</sup>  
Mast Length = 15 m  
Head Thrust = 26 kN<sup>i</sup>  
Tower Thrust = 24.41 kN<sup>iii</sup>

**Total Overturning Moment = 551.4 kNm**  
**Total Horizontal Thrust = 50.4 kN**  
**Turbine Weight = 25.0 kN** (vertical force ex. Foundation)

#### References

- i. From Technical Specifications pdf on Proven Website
- ii. Tower Mass only from CU Lighting, 1250kg, plus 250kg for tower top
- iii. From Tower wind loading calculations spreadsheet



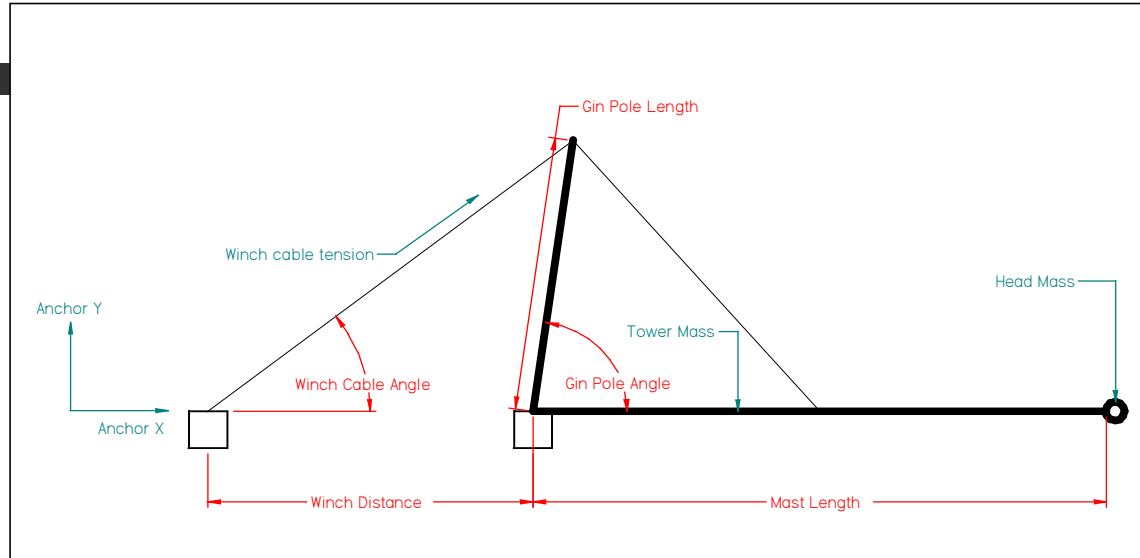
**Turbine Foundation Loads**  
**Anchor Point Loading During Winching**  
**Proven Energy WT 15000 Wind Turbine**

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**Input Parameters**

Head Mass =	1100 kg <sup>i</sup>
Mast Mass =	1450 kg <sup>ii</sup>
Mast Length =	15 m
Mast CoG =	5.8 m <sup>iii</sup>
Gin pole length =	7.5 m
Min Winching distance =	8.5 m
Gin Pole angle	82 deg
	1.4 rads
Winch cable angle =	38 deg
	0.7 rads



**Find the lifting moment required due to the head weight and tower weight**

Assume highest loading is when the turbine is horizontal, and has just left the ground, this causes the greatest moment.

Total moment due to head and mast weight = 244.4 kNm  
 Horizontal force at the end of the gin pole = 32.9 kN

**Winch Cable tension = 41.7 kN**

**Winch Anchor X = 32.9 kN**

**Winch Anchor Y = 25.6 kN**

**References**

- i. From Technical Specifications pdf on Proven Website
- ii. Tower Mass only from CU Lighting, 1250kg, plus 250kg for tower top
- iii. From SE model