

N_e = number of blades which action jointly on the soil.

Table 2: Input Parameters for the Analysis

Sr.	Parameters	Values
1	Rotary tiller work depth (mm)	220
2	Rotary tiller work width (mm)	1500
3	Rotor rpm	210
4	Blade peripheral velocity (m/s)	5
5	Total number of blade	36
6	Number of blades on each side of the flanges	6
7	Prime mover forward speed (m/s)	1.2
8	Number of blades which action jointly on the soil	6
9	Prime mover Power (HP)	37-45
10	Traction efficiency (η)	0.9

5. Results

The analysis results of left hand blade in graphical mode have shown in figures below. As in case of tillage tools, deformation is related to tool wear but stress plays a major role which results in wear of the tool [6]. In this analysis, because of variations in tool shape the stress variation is obtained. The resultant for deformations, Von-Mises stress, maximum principal stress, tensile stress and shear stress is shown in Figures 1-6 below are for LH Rotavator blade of 9mm thickness.

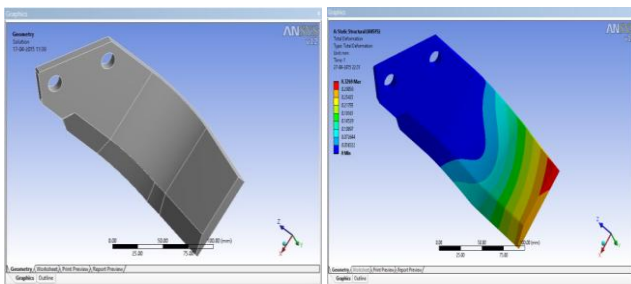


Figure 1: 3D-Model Figure 2: Deformations

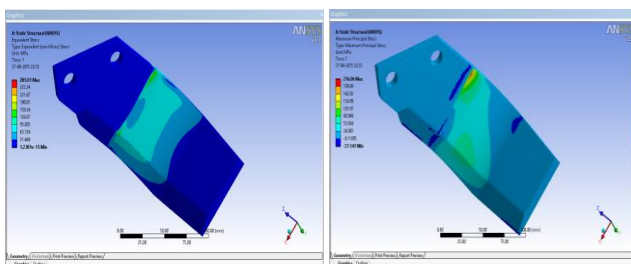


Figure 3: Von-Mises Stress Figure 4: Max. Principal Stress

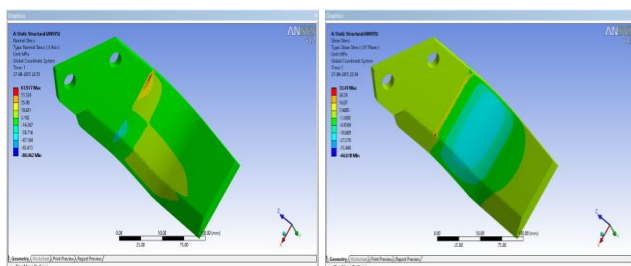


Figure 11: Tensile Stress Figure 12: Shear Stress

Table 3: Stresses in Blade

Sr.	Factor	Values
1	Maximum Deformations	0.33 mm
2	Maximum Von-Mises Stress	285 MPa

3	Maximum Principal Stress	216 MPa
4	Maximum Tensile Stress	68 MPa
5	Maximum Shear Stress	33.4 MPa

6. Conclusions

3D CAD model of tillage blade is analysed to new design constraints. This model is analysed for deformations, Von-Mises stress, maximum principal stress, tensile stress and shear stress. The results of structural analysis are evaluated for 45HP tractor. For effective performance of rotavator blade it is suggested for the lab and field testing.

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