THE STRESS SIMULATION FOR FINDING PRIORITY TO THE FORCES AND LOADS FOR RIB FOR PREPARATION NEW DESIGN GINNING MACHINE

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Abstract. *The article conducts a study of rib using the solidworks program for an already defined load, the research process is described step by step. Having received the results of the study, a comparative analysis is carried out with the technical characteristics of gray cast iron.*

Keywords: *rib, simulation, technical characteristics of gray cast iron, Solidworks, saw silindr.*

Introduction

We use the Solidworks simulation program to test the priority of the rib of the new design ginning machine. For this, we determine the initial values. For this, we need to determine the value of the forces affecting this rib. The impact force acting on the raw material shaft by the saw cylinders of the new construction gin machine remains unchanged at the value of S=1359.6 N/meter at the radius of the working chamber r=260, r=230, r=200, r=170 and r=140. [1]

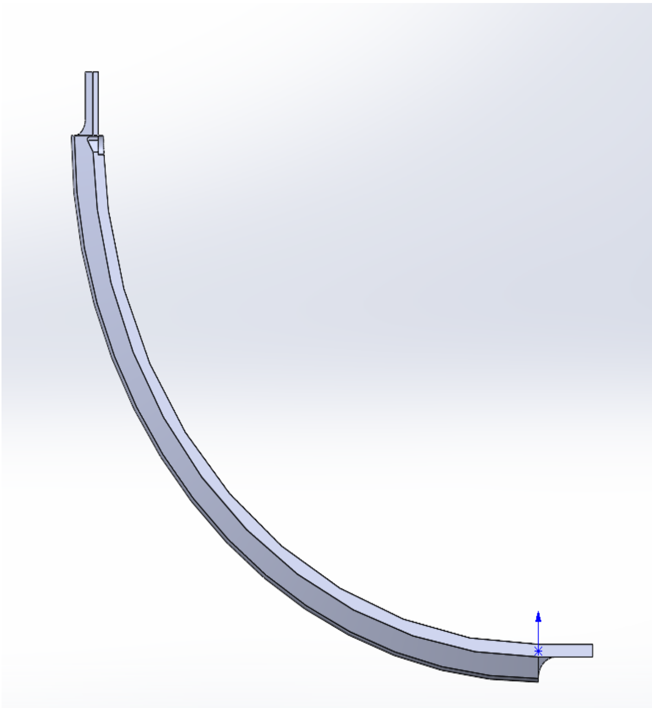
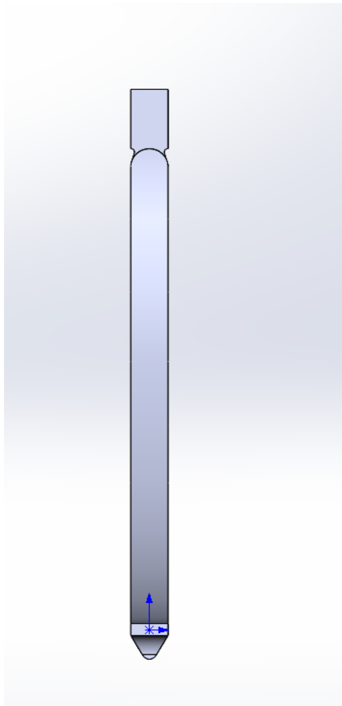

Fig.1. New design model of Rib

With the design program Solidworks CAD, we create a new design model of Rib (Fig. 1). When it is divided into 90 pils, a single pil gives a shaft torque of 15.1 newtons. However, there are two saw cylinders of 90 per 90 in one working camera and two saw cylinders of the same size. On one saw force of value with15.1 newtons on shaft of raw roller.[2]

Methods and research

The maximum of the force value on shaft of raw roller and saw cylinders find by this formula for New design model ginning maschine. S_{h2} = 231,06N/metr+ S=1359.6 =S_{AX2}, S_{AY2}, S_{BX2}, S_{BY2}=1590,6 Nyuton

Свойство	Значение	Единицы измерения
Модуль упругости	1.9e+11	Н/м^2
Коэффициент Пуассона	0.27	Не применимо
Модуль сдвига	8.6e+10	Н/м^2
Массовая плотность	7300	кг/м^3
Предел прочности при растяжении	413613000	Н/м^2
Предел прочности при сжатии		Н/м^2
Предел текучести	275742000	Н/м^2
Коэффициент теплового расширения	1.2e-05	/K
Теплопроводность	47	W/(м·K)
Удельная теплоемкость	510	J/(кг·K)

Fig.2. Scheme of technical characteristics of gray cast iron

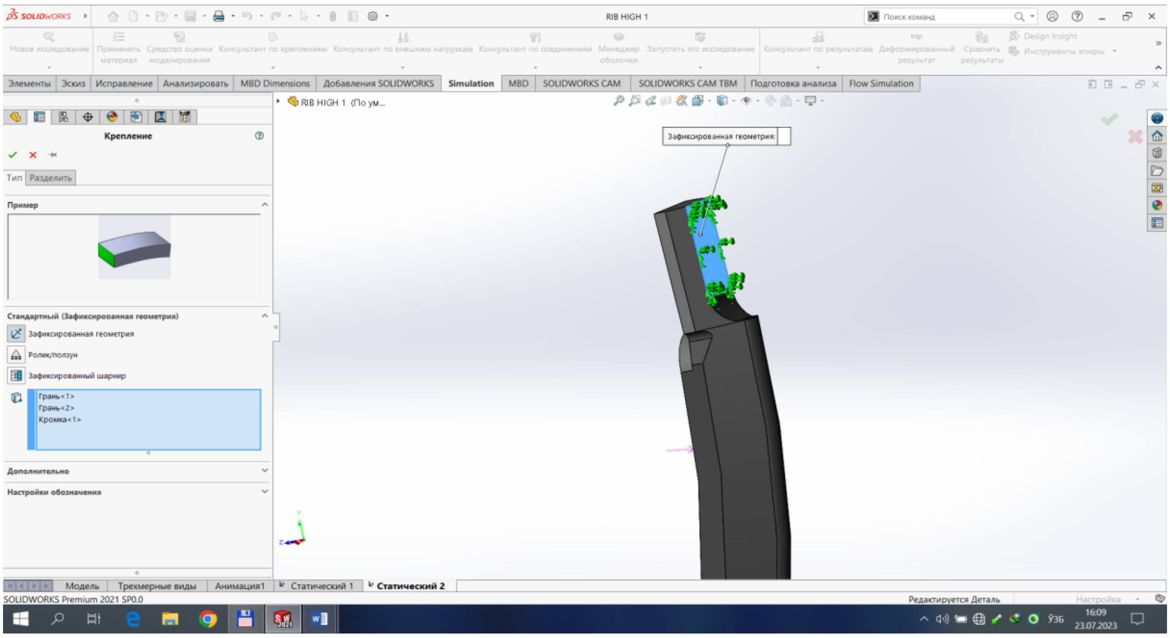

Fig.3. Attachment Point Designation in Solid Works

We select gray cast iron from a large range to use in our calculations. We will perform the work in the following sequence. We open the Solidworks modeling program and select the model of our drawn rib from the Solidworks CAD section.[3]

We open the Simulation Solidworks program and select the rib model drawn in the Solidworks CAD section. We get started by clicking the New research button in the Simulation menu window. Click on the External Research Consultant button and select the type of fastening rib to the structure (Fig. 3).

We determine the part of the attachment of our rib to the structure by pressing the fixation button. The places we have marked will turn into a green marker. Through calculations, we see that the raw roller shaft and the upper cylinder of the saw create a maximum force of 1590.6 Newtons in the working chamber. When we divide this maximum value by 90 saws, the force acting on each rib and each saw is approximately 17 newtons.[4]

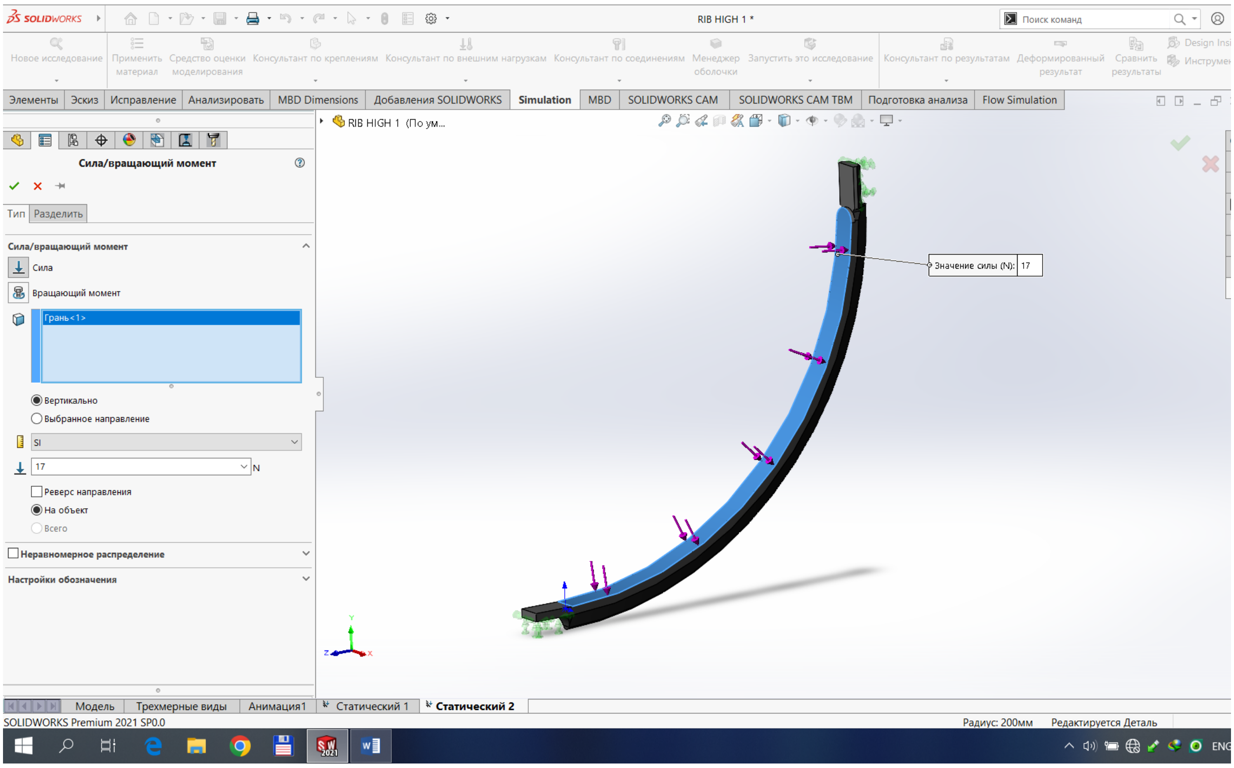

Fig.4. Solid Works select the type of force acting on the rib structure.

Push on the external load advisor button and select the type of force acting on the rib structure. In the property manager menu, select the SI measurement system and enter the force value of 17 newtons (Fig. 4).

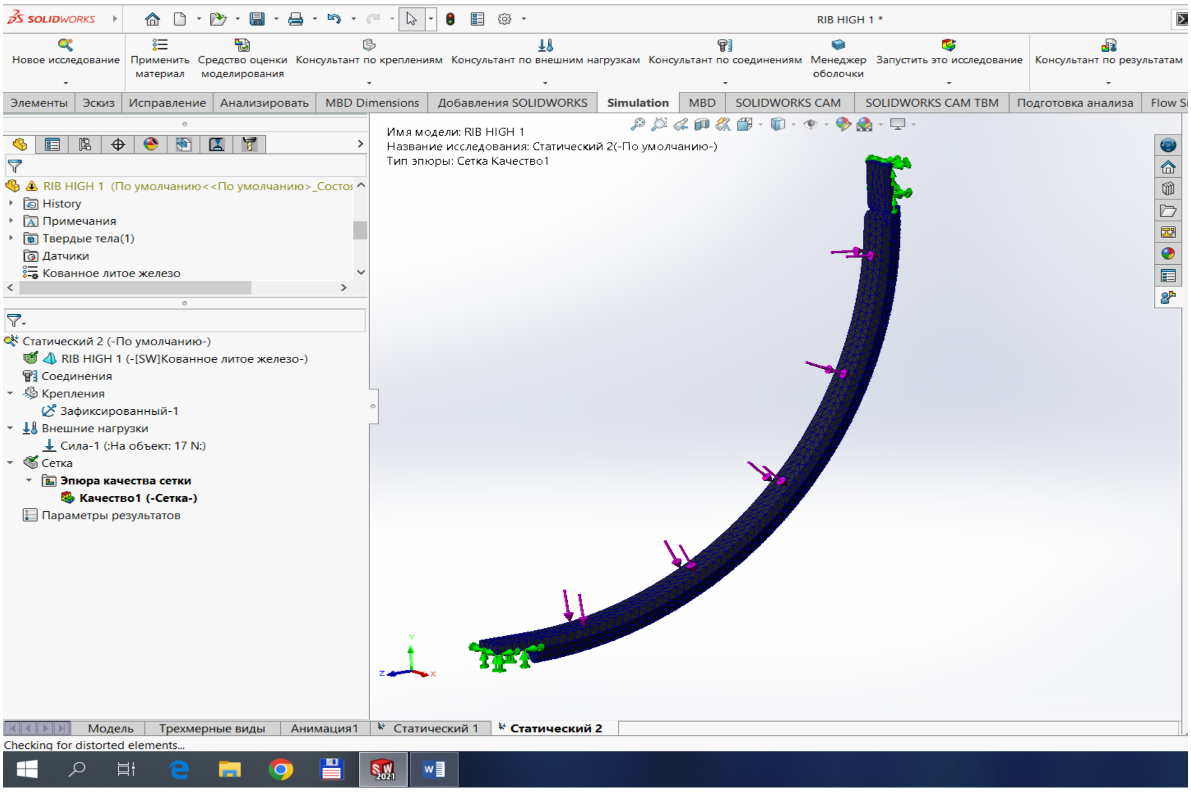

Fig.5. Solid Works meshes the object to determine stresses, strains, and displacements.

We cover the entire part with a mesh in the SolidWorks program, since it is affected by the bulk stress on the rib of the new design (Fig. 5).

Results

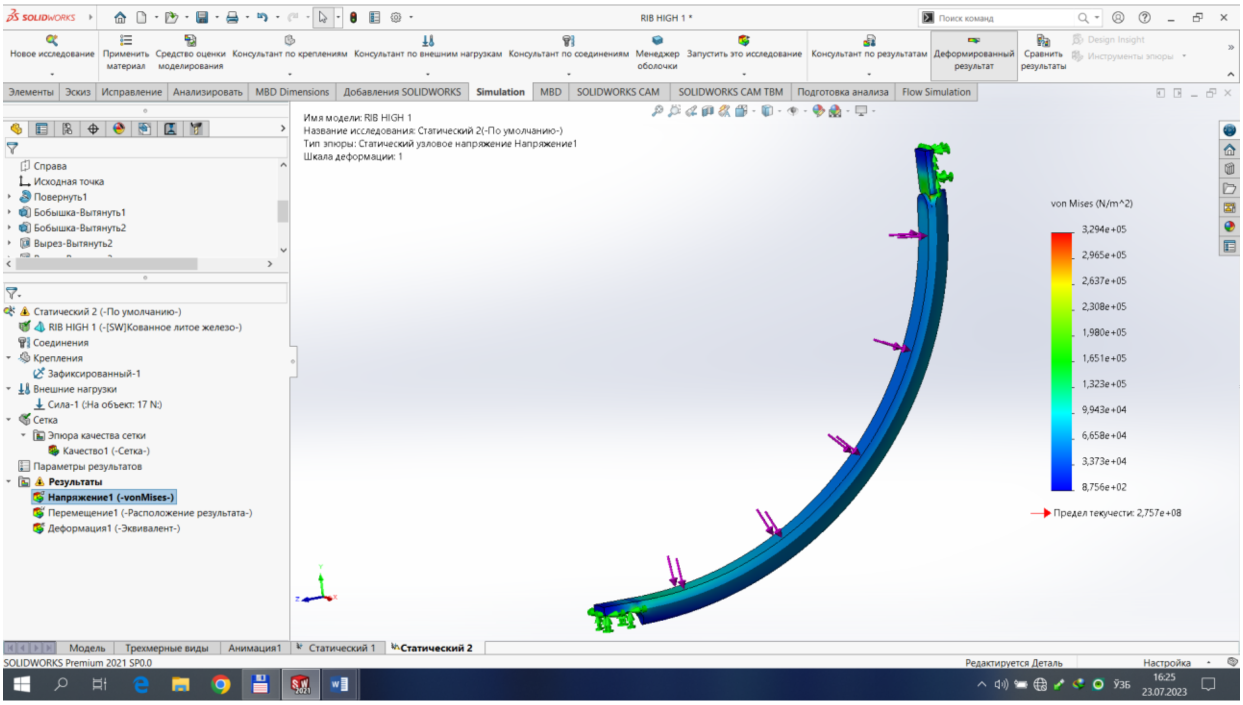

Fig.6. Graphical stress distribution and structure.

After clicking the Start study button (Fig. 6), a simulation of the stress distribution is generated. It can be seen that the maximum stress is 3.294 $^{+5}$ (N / meter2), taking into account the geometric characteristics of our body, the yield strength, i.e. the allowable voltage is 27.5742e $^{+7}$ (N/meter2) And in this case, cases of structural failure or failure during operation are excluded.[5]

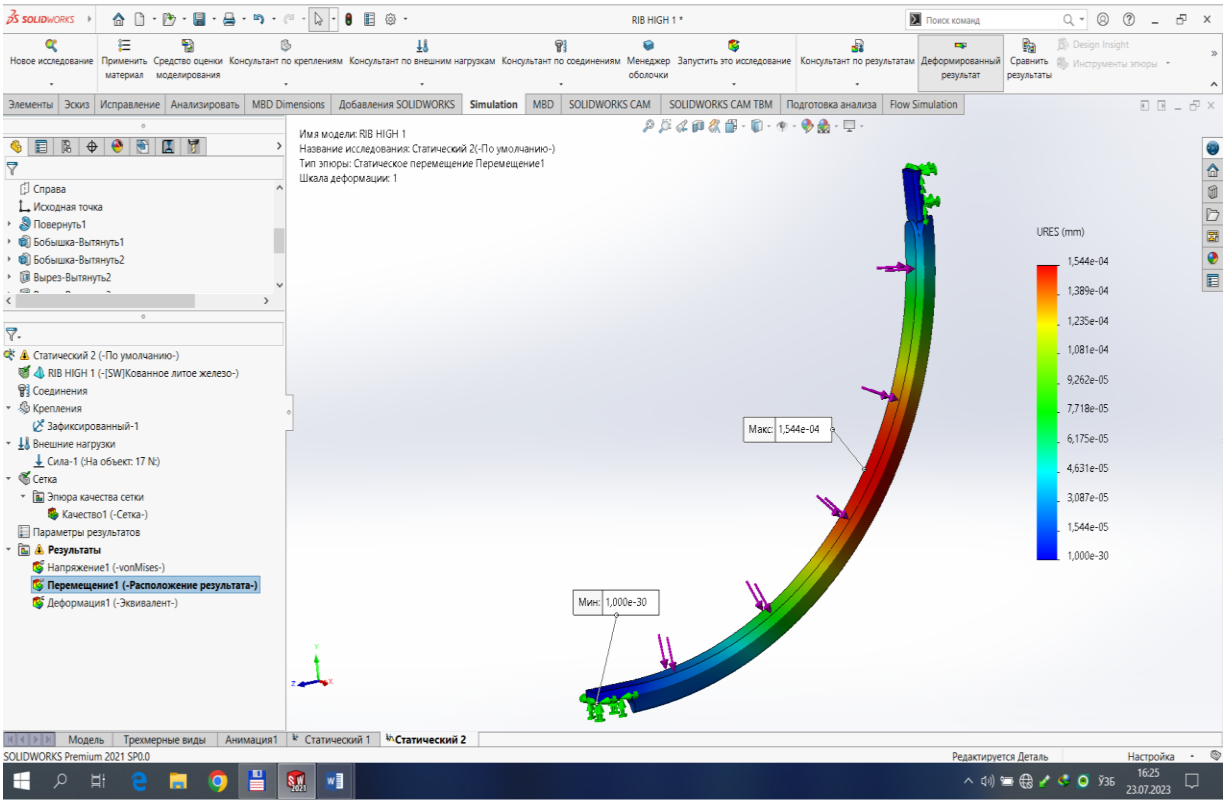

Fig. 7. Graph of the distribution of displacements in the structure

As can be seen from the displacement modulus distribution graph shown in Figure 7, the maximum displacement value after modeling is 1.544^{-04} (meter). Taking into account the geometric characteristics of our body, the allowable value of the displacement modulus for our material is 8.6 e^{+10} (N/meter2), therefore, the forces acting on our structure and the load ensure the stability of the structure, also do not failures are observed during operation and vibration is excluded.[6]

From the strain distribution plot shown in Figure 8, it can be seen that after simulation, the maximum strain value is $1.269e^{-6}$(Nm), and since the limiting value of our design is $4.13613e^{+9}$(Nm) (Figure 2), the applied forces and load are resistant to loads, and no deformation is observed.

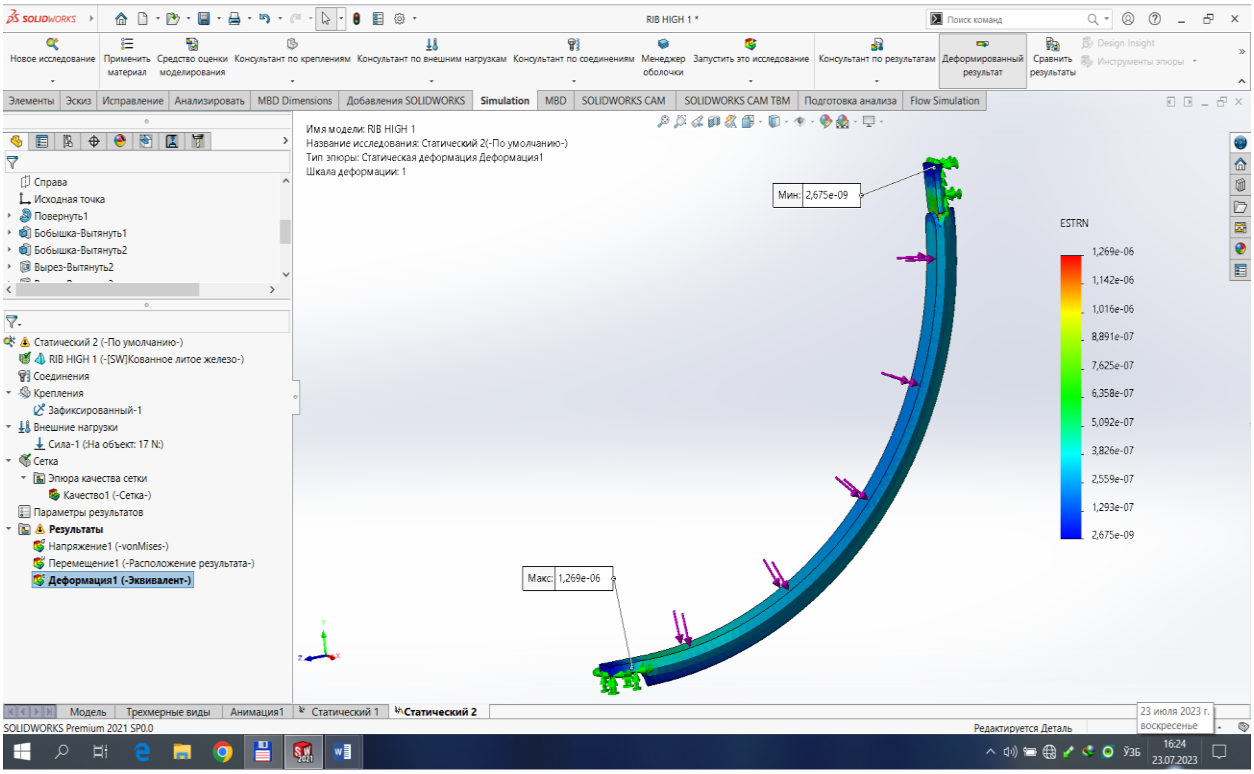

Fig.8. Graph of the distribution of deformation in the structure

From the strain distribution plot shown in Figure 8, it can be seen that after simulation, the maximum strain value is $1.269e^{-6}$(Nm), and since the limiting value of our design is $4.13613e^{+9}$(Nm) (Figure 2), the applied forces and load are resistant to loads, and no deformation is observed.

Conclusion

The rib with a new design is due to the fact that two saw cylinders are located in one working chamber. The load on the saw cylinders is reduced by 40% on the lower cylinder and 60% on the upper cylinder. The maximum stress obtained from the simulation is 3.294+5(N/meter2), so the yield strength of the material, i.e., the allowable stress, is 27.5742 e+7(N/meter2), so we give priority to the forces and loads on our structure. Since the maximum deformation value obtained from the simulation is 1.269e-6(Nm), the material chosen for our design has a limit value of 4.13613e+9(Nm) (Figure 2), the applied forces and load will take precedence and no deformation will be observed. In this case, cases of structural failure or failure during operation are excluded.

REFERENCES

1. Azizov Shuhrat Mamatovich. (2022) Calculation Energy of Efficiency New Ginning Machine. *Engineering*, 14, 163-172. doi: 10.4236/eng.2022.144016.
2. Azizov Shuhrat Mamatovich (2023) The new construction of the ginning machine analyzes the damaging forces of cotton fiber and seed depending on the change of the volume of the working chamber and the location of the saw cylinders in the chamber. *XORAZM MA'MUN AKADEMIYASI AXBOROTNOMASI* –8-1/2023
3. Shuhrat Azizov, Muhammadaminhon Ibrohimov, Farhod Uzoqov and Mirshoroffiddin Mirzakarimov The modelling and introductions of new type ribs of lattice of the two cylinder of gin E3S Web Conf., 273 (2021) 07020 DOI: https://doi.org/10.1051/e3sconf/202127307020
4. Shuhrat Azizov, Muhammadaminhon Ibrohimov, Farhod Uzoqov and Mirshoroffiddin Mirzakarimov. (2022) Statically Analysis of the Stress State of Saw Gins Consisting of 90, 100, 110, 120, 130 Saws. Engineering, 14, 329-338. doi: 10.4236/eng.2022.148026.