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Recommended Cleaning Multi-Sided Pile Drum Strength Evaluation

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ABSTRACT
The article examines the displacement, mechanical stress, deformation and safety factor of its strength, caused by the force acting on the multifaceted pile, which cleans cotton from small impurities. Using the Simulation package of the Solid Works program, the results obtained as a result of the influence of factors on a multifaceted pile were determined.

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As a result of studying the motion of the drum with piles used in the process of cleaning cotton from small impurities, it was found that the dragging of the piles through the mesh surface, which is placed in the 1XK structure, is the reason for the main process of cleaning the cotton from small impurities, and this drum with piles is placed on the surface of the piles. It was determined that relatively large forces are applied to the elements. Therefore, the multi-faceted pile drum offered by us has been calculated. The Simulation package of the Solid Works program was used to calculate the strength of the drum with multi-faceted piles shown above. The force acting on the multi-faceted pile was calculated. Taking into account the efficiency of the recommended cleaner construction equal to 7t/h, we consider the force acting on the cleaner to be equal to F=11N.

This piled pile consists of a multifaceted pile with a diameter of 400 mm, taking a pile with a diameter of 50 mm, and based on the forces acting on it, its displacement, mechanical stress, deformation and strength reserve coefficient was determined.

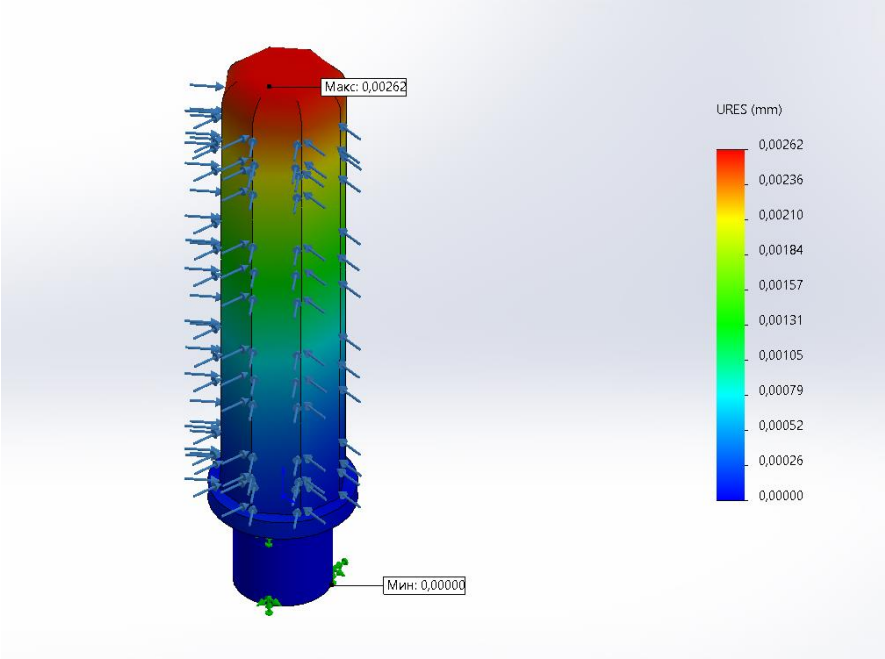

Fig.1. Displacement caused by a force acting on a multifaceted pile.

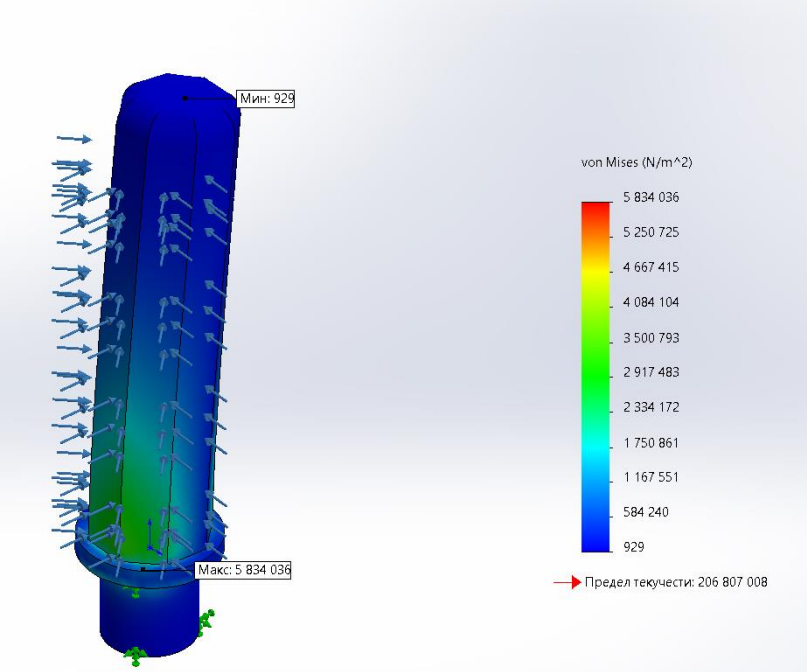

Fig.2. Mechanical stress resulting from a force acting on a multifaceted pile.

The displacement caused by the force acting on the multifaceted pile was determined using the Simulation package of the Solid Works program. The indicators of the resulting displacements in the polygonal pile are highlighted in color. It was found that the maximum displacement is 0.00262 mm in the parts shown in red. The maximum displacement is mainly on the initial surface of the polygonal pile and the minimum displacement is depicted in blue, in which case the value of the displacement is equal to 0. Average displacement values are depicted in green (Fig.1). Using the Simulation package of the Solid Works program, the mechanical stress generated by the force acting on the multi-faceted pile was determined. As shown in the image above, the pile's maximum mechanical stress is also marked in red. The calculation results showed that the maximum value of the mechanical stress is equal to 5834036 N/mm2, and it was determined that this stress is at the top of the multi-faceted pile. In the parts of the pile shown in blue color, the minimum value of

mechanical stress is 929 N/mm2. It was found that the mechanical stress on the lower surface of the polygonal pile is at a minimum (Fig.2).

In our next calculation using the Simulation package of the Solid Works program, the deformations caused by the force acting on the multi-faceted pile were studied. It was determined that the maximum deformation occurs in the lower part of the pile and its value is equal to 0.000025. And in the parts of the mesh surface shown in blue color, the deformation is equal to the minimum value (Fig. 3).

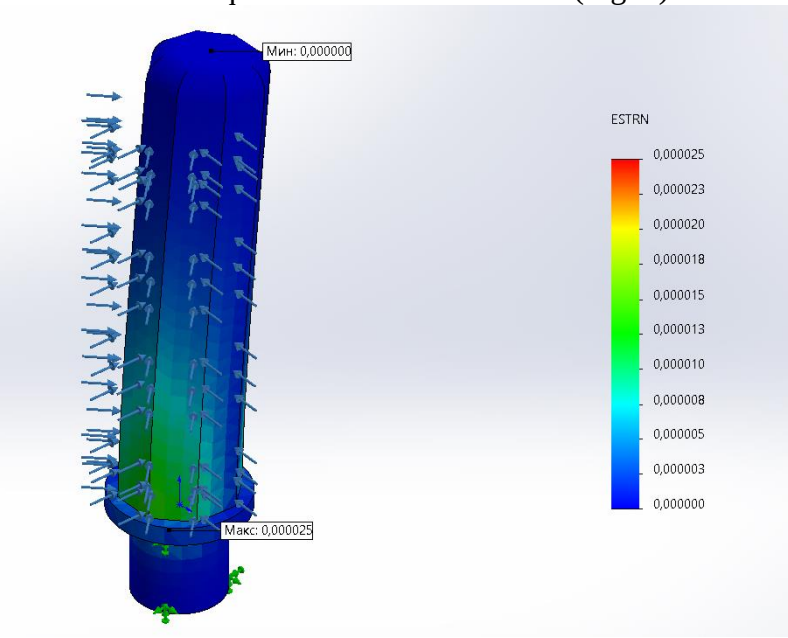

Fig.3. Deformation caused by a force acting on a multi-faceted pile

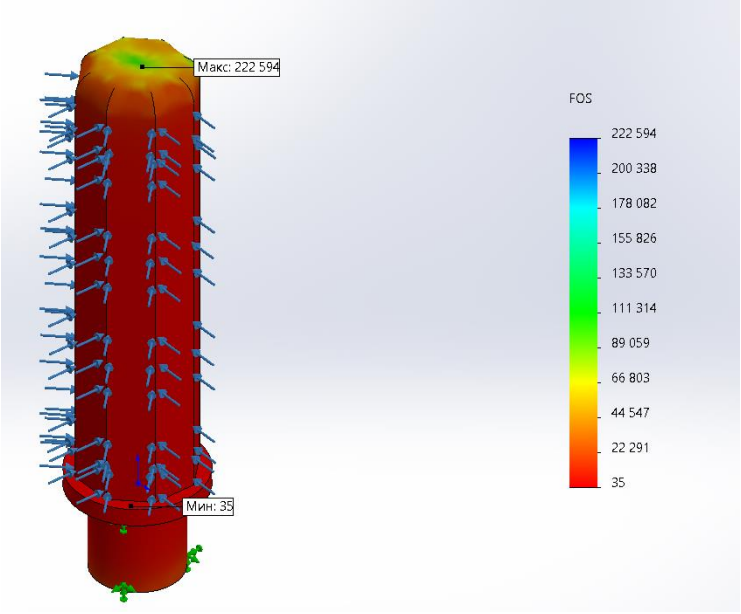

Fig.4. As a result of the force acting on the multifaceted pile, its strength reserve coefficient

As a result of the force exerted by the 1XK device on the multi-faceted pile proposed by us in the design work, the strength reserve coefficient of the pile was calculated. The strength reserve coefficient of the pile was found to be equal to 35 (Fig. 4). This means that it is possible to use the proposed multi-sided pile.

In order to eliminate the clogging of the 1XK aggregate, reduce the damage to the seed fiber, and in the conducted experiments, to prevent the damage caused by the impact of the cotton cleaning aggregate on the

drum pile with a pile, a multi-faceted pile was proposed. Determined the speed of the pile drum in the cotton ginning process from the existing and proposed multi-sided pile in cotton ginning plants. The proposed multi-faceted pile is designed for durability. In order to reduce the mechanical impact of the cotton cleaning unit on the cotton fiber and seed and increase the efficiency of cleaning from small dirt, a multi-faceted pile was proposed and the number of revolutions was determined using a tachometer.

Conclusion

Using the Simulation package of the Solid Works program, the mechanical stress generated as a result of the force acting on the multifaceted pile was determined. It was determined that the maximum deformation occurs in the lower part of the pile and its value is equal to 0.000025. It was determined that the coefficient of strength reserve of the pile is equal to 35. This means that it is possible to use the proposed multi-sided pile.

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