Equipment for husking of sunflower seeds, oleaginous and cereal crops
Relevance

At present, the removing the husk from the sunflower seeds, oleaginous and cereal crops is very important. This allows to remove the husks together with the mineral contaminants and pathogens, to reduce the content of antinutrients by 15%, crude fiber and energy costs during the heat treatment of grain by 20 percent.
There are various machines for cleaning seeds from the husk vortex, vibratory, planetary, centrifugal and other types. We done analysis these machines and it is available for review below (or see attachment № 1).
Specific expenses at electric energy cost on a unit of production (Manufacturers of all countries)

Manufacturers of equipment for husking sunflower seeds (all countries)
Based on data from summary analysis, we can conclude that the existing machines for hulling of sunflower seeds have some serious drawbacks. They are:

- unreliable,
- expensive
- lead to significant losses of finely fragmented particles
- decrease biological value of seed
- spend a lot of electricity.

But they are used because better machines are absent.
Our KNOW-HOW

We have developed a new way to create an intense vortex motion using mechanical vibrations (without rotation of the blades, wheels, cylinders and other bodies, without a compressor, etc.).

This method of rotational motion was tested experimentally.

Description of the vortex-oscillation effects and the benefits offered by our technology compared with traditional are given on our website:

http://www.vortexosc.com
The motion sunflower seeds in a vortex

Left picture: particles (seeds) inside the vortex rotate and simultaneously move upward, and then, by rotating, move down on the outside of vortex. Inside the vortex - emptiness. Right picture: shows the trajectory of a particle in a vortex in more detail - except the vortex motion, the particle has also an oscillatory motion.

The removing the husk from the sunflower seeds is due to simultaneous exposure to the material is very intense vibration, a large centrifugal acceleration and rotational motion of the material (seeds). The working parts (screws, mills, etc.) or the balls are not required. The reactor does not rotate. The material is rotated by means hesitation. Sunflower seeds are peeled yourself. Husking will occur once in the whole volume (without stagnant regions).

The process of husking of seeds can be discrete and continuous.

The reactor can be open or hermetically sealed.
The design of the vortex-oscillation laboratory installation for husking seeds

1 - Hole for the product download
2 - The reactor (plain tube of Plexiglass)
3 - Ribs for husking
4 - The disc that transmits vibrations to the reactor
5 - The hole to the product unload
Working principle

In the reactor are located a few ribs (from 1 to 4, depending on the diameter of the reactor and the speed of seeds).

On the input of device the crude sunflower seeds are served in a certain quantity.

Due to simultaneous exposure to the material very intense vibration, a large centrifugal acceleration and rotational motion of the material, the seeds are getting more speed.

Seeds are moving in the reactor with high speed, they are hitting about these ribs and due to this strike the seed husks is separated from the grains.
Results for husking of sunflower

100 gr. untreated seeds supplied to the reactor.
The process of husking seeds occur within 30-40 seconds.
Result: 80-95% husking
Productivity of the laboratory setup for peeling seeds - 6 kg / h
Drying of sunflower seeds

The drying of sunflower seeds plays the important role in the production, because seeds are not stored for a long time in raw form. The owners spend a lot of money on the installation for drying seeds, despite the fact that these units have many drawbacks: unreliable, often burn, very expensive and they are reduce the biological value of seeds.

But they are used, because there are not better installation.
The results of drying sunflower

Equipment was tested in the laboratory. Before starting the experiment the mass of incoming seeds was measured.

The seeds are spinning in a vortex during 30-40 seconds. Due to the high centrifugal acceleration of the water molecule sought to the periphery and are allocated through the capillaries in the husk. Even when opening the reactor walls was observed in the moisture.

Repeated weighing of seeds showed that the mass of seeds decreased by 3-5%.
The main advantages of vortex-oscillation installation over analogues:

1. Centrifugal acceleration of rotating particles of the processed environment is many times higher. The centrifugal acceleration by up to 7000g and higher can be obtained. As a result the speed and level of crushing are higher.

2. Low power expenses for a unit of the processed environment.


4. Smaller sizes and smaller weight.

5. Allows you to increase the efficiency of husking and reduce the amount of damaged seeds.
# Financial Plan

<table>
<thead>
<tr>
<th>Name of the stage</th>
<th>Duration of the stage, months</th>
<th>Unit cost, million dollars</th>
<th>Quantity, pcs</th>
<th>Expenses, million dollars</th>
<th>Selling price per unit, million dollars</th>
<th>Revenues from sales, million dollars</th>
<th>Profit/Loss, million dollars</th>
<th>Net profit/loss, million dollars</th>
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<tbody>
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<td>R&amp;D of machine for cleaning seeds</td>
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<td>10</td>
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<td>0,27</td>
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<td><strong>15 110</strong></td>
<td><strong>128</strong></td>
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<td><strong>275</strong></td>
<td><strong>225</strong></td>
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</table>

Profitability (ratio of net profit to all expenses), %

| The ratio of cost of R & D to the serial selling price of machine for cleaning seeds | 25 |
The graph shows that investments in mill start paying off from 18 months from the beginning of investment in R&D. Profit after 4 years will be around 183.3 million dollars.
Our offers

We can develop to you as individual installation, and a whole line for processing of sunflower seeds:

1. Installation for husking of sunflower seeds, oleaginous and cereal crops. Productivity: 3 t / hour. The cost of the laboratory installation: 250-300 thousand dollars. Period: about 1 year (the price and period are corrected according to the specific technical specifications).

Then we can develop the installation productivity 5-18 tons / hour.

2. Installation for cleaning oilseeds, cereals and root crops.

3. Installation for drying seeds.

4. Installation for receiving of sunflower oil.

5. Installation for grinding the husk of seeds.

6. Technological line for cleaning sunflower seed from the husk, receiving of sunflower oil and other products.
The structure of the technological line for processing of sunflower seeds:

- The treatment of sunflower seeds from the husk
  - drying of seeds
  - Peeled seeds
    - Manufacture of miscellaneous products
    - Extraction of sunflower oil
  - Separation (separation of grain from the husk)
    - The husk
      - Using the husk:
        - as fertilizer
        - as animal feed
        - useful chemical substances
Contacts

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