Household mixer, based on a vortex-oscillatory effect
Mixer is one of the most popular kitchen appliances, and its main purpose - is mixing and whisking in the home.

A large number of designs of mixers for use in the home are known. Basically it mixers, which mix fluid by dint of the rotating working bodies of various types.
Data analysis

We have gathered a large database of hand-held and stationary mixers of manufacturing companies of all countries and their characteristics are listed below.

The absolute indices of price of mixers is used as the main characteristic. There are also presented the relative magnitudes:

- Energy costs (the ratio of the price to the power of mixer);

Unfortunately, many companies give incomplete information about their mixers, so the histogram shows only those mixers, which had all the necessary characteristics.
Energy costs of hand-held mixers of all countries

Manufacturing companies of hand-held mixers of all countries

The cost of electricity (thousands rubles / KW)
## Energy costs of hand-held mixers of all countries (Continued)

### Manufacturing companies of hand-held mixers of all countries

<table>
<thead>
<tr>
<th>Company</th>
<th>Cost of electricity (thousands rubles / KW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td>3.10</td>
</tr>
<tr>
<td>Company B</td>
<td>3.14</td>
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<tr>
<td>Company C</td>
<td>3.18</td>
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<td>Company D</td>
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<td>Company E</td>
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<td>Company F</td>
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<td>Company G</td>
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<td>Company H</td>
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<tr>
<td>Company I</td>
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<td>Company J</td>
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<td>Company K</td>
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<tr>
<td>Company W</td>
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<tr>
<td>Company Y</td>
<td>4.06</td>
</tr>
<tr>
<td>Company Z</td>
<td>4.10</td>
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</tbody>
</table>

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### The cost of electricity (thousands rubles / KW)
Prices of hand-held mixers of all countries

Manufacturing companies of hand-held mixers of all countries
Prices of hand-held mixers of all countries (Continued)

Manufacturing companies of hand-held mixers of all countries

Price (thousands rubles)
Energy costs of stationary mixers of all countries

Manufacturing companies of stationary mixers of all countries

The cost of electricity (thousands rubles / KW)
By analyzing and comparing the data, which we collected in the database and presented in the histograms, can be concluded that the existing mixers have some serious disadvantages:

1. Enter of rotation into the vessel is performed using complex devices through the up or bottom of the vessel.
2. Intensity and quality of mixing and crushing depends on the velocity gradient (change of speed inside processed mass). The movement of processed medium in the vortex mixers occurs in the form of monolithic vortex with weak stirring inside.
3. Low efficiency because of the large loss of mechanical energy on the way of energy conversion of large vortex in microscopic (which make the main mixing and grinding influence on the environment).

The main disadvantages of hand-held mixers:
1. Low power
2. The boundedness of functions of work. Mixers can not knead the thick dough, can not grind cooked vegetables
3. It is important to choose the right cookware for whipping, otherwise ingredients may scatter around the kitchen
4. Mixer takes hands, you can not break away from the cooking process.

The main disadvantages of stationary mixers:
1. Large-size, heavy weight
2. After use, the process of washing of mixer is time-consuming
3. The high cost
4. When working with complex ingredients, mixer jumps on the table and make a loud sound.

But these mixers are used because there is no better.
Our KNOW-NOW

We propose to use for mixing, crushing, extraction, speeding up the heat and mass transfer discovered by us vortex-oscillatory effect that can perform these tasks much more effectively and more economically as compared to the known analogues.

Vortex motion of processed medium in our mixer is created by means of mechanical oscillations (Know-How). Inside the vortex, fluid particles (or firm particles) are raised up, and simultaneously rotating and fluctuating. Reaching the top, the particles by an external surface of the vortex are lowered, simultaneously rotating and fluctuating.

Description of the vortex-oscillatory effects and advantages offered by us techniques compared to traditional listed on our page: http://www.vortexosc.com/modules.php?name=Content&pa=showpage&pid=13
Our mixer combines the best advantages of the vortex and vibrational mixing devices.

Despite the complexity of the physical processes occurring in a stirred medium, our mixer is very simple and cheap.

General view of a mixer is shown on the right (blue color inside the vessel shows a rotating fluid).
The main advantages of the vortex-oscillating mixer over analogues:

1. The combination of a mixer, extractor and a mill in a single device.
2. The centrifugal acceleration of rotating particles processed environment is many times higher. Possible to get a centrifugal acceleration up to 7000g and above. As a consequence more speed mixing and grinding extraction.
3. The construction does not have the going down turbine for mixing and extraction. The equipment is easy to clean.
4. Simultaneous processing of the whole volume of environment with big vibrations and velocity gradients inside the volume of medium. It is leads to uniformity of processing of environment and improvement the processing speed several times.
5. The whole volume of the processed environment is moved with different speeds, which provides a good and rapid mixing.
6. The lack of grinding bodies (propellers, balls, rods, needles, etc.), and rotating components (vanes, etc.), which leads to the cheapening of the process and improvement of product purity, allows to create the highly efficient mill for micro powders. The reactor is not rotating.
7. No emission of the gas or liquid out of the reactor.
8. Smaller energy consumption per unit of cultivated environment.
9. Ease of maintenance.
10. Compact and lighter weight.
We have carried out the following successful experiments on various laboratory installations:

1. Extraction of tea.
The mix was prepared: cold water and tea leaves. Processing in a vortex occurred without heating for 10 minutes. Speed of extraction can be increased up to 1 min.

Result:
Tea, obtained after the extraction, has stronger aromas.

Recommendations for the use of our technology:
Our devices can possibly be used for the extraction of teas, coffee and other mixtures and cocktails at home.
2. The extraction of medicinal herbs.

The mix was prepared: cold water and crushed medicinal herbs.

Processing in a vortex occurred without heating for 20 minutes. Speed of extraction can be increased up to 1 min.

**Result:**

There was an medicinal herb extraction of (an extract exude after filter of the resulting mixture).

**Recommendations for the use of our technology:**

Our devices can be used for quick extraction of medicinal herbs at home (thanks to the extraction without hot water and boiling, all biologically active substances are stored).
3. Mixing of vegetable oil with water.

The mix was prepared: vegetable oil and cold water (in the ratio 1:10).

**Result:**

- We received the homogeneous mix of vegetable oil and water.
- The mix is not stratified for a few days.
The contents of broken eggs were poured into the reactor.

**Result:**
- We obtain the homogeneous frothed mixture.
- The mixture does not fall down and not stratified for a few days.
5. Cooking of activated water.

Settled water from the tap was processed in a vortex within 10 min.

**Result:**

Before processing - water had a 0.1 units of biological activity.

After 10 minutes processing - water had a 9 units of biological activity.

After 30 minutes processing - water had a 23 units of biological activity.

**Recommendations for the use of our technology:**

By using of our technology can be prepared activated (live) water and other liquids.
6. Crushing of sugar to powder.

Sugar consisted of pieces of size of 1-3 mm. Crushing of sugar are happened for 15 minutes.

Result:
- There was a crushing of granulated sugar. Micron size fractions have appeared.

Recommendations for the use of our technology:
- The intensity of the processing (level of vibration acceleration, speed of rotation, centrifugal acceleration) can be raised several times.
- Our devices can be used for industrial crushing materials like sand, ore, etc.
6. Grinding of coffee beans

Our mixer is able to grind the coffee beans (like coffee mill).

Besides, our equipment does not have the drawbacks of modern coffee mills:
- frequent breakdowns of body, knives, heterogeneity of crushing.
- the need for self-control the degree of crushing.
- Moreover, most models of coffee mills have one container for the finished coffee and beans.
- Knives at the bottom of coffee mills make inconvenienced when extracting finished powder.
Applications of our mixer-mill

1. Rapid cooking of tea, coffee, cocoa and other drinks including without heating.

2. Rapid cooking of medicinal tinctures without heating (with saving of biologically active substances, activity of medicinal tea is rising).

3. Cooking of mixtures (sunflower oil with water, etc.).

4. Cooking of wine and vodka mixes.

5. Cooking of activated water.

6. Crushing to micron size: sugar, coffee beans, cocoa, etc.

7. The combination in one unit of functions of the mixer, extractor and a mill.
Components of mixer-mill:

1. Elastic elements for a cup suspension bracket, in serial sale.
2. Cup from a food stainless steel, in serial sale. The mixer is equipped with three cups, the others can be bought in addition in shop.
3. Vibrator, in serial sale.
4. Round support under the base.
5. Suction cups for fixing the mixer to the table to prevent movement of the mixer on the table (produced in series).
6. Exterior plastic housing (it is required to make a stamp, the approximate look is presented in drawing above).
7. Wire with a plug for an electricity supply.
8. Holding device for the cup.

Generally, assembly works. Turning and milling works aren't required.
The equipment is necessary only for cutting rods.
For a long time we were spending most theoretical, experimental and design work.

We have received great results. Based on our experience, knowledge and the results of our experiments, we are confident that we can create a product that will combine the functions of a mixer, mills and extractor. And with all this, our device will have a much better performance compared with all analogs.

We are looking for investors and partners for the development of high-performance mixers carrying out functions of the extractor, the mixing device, mills and activator of liquids.
Our offers

1. **Mixer-mill for home use.**
   Capacity of 0.5-1 liter.
   Thanks to the high quality and speed of cooking, simplicity of construction (there are no bulky inputs through the top or the vessel bottom), the proposed extractor is much better than existing.
   Can also be used for crushing of products.
   With an appropriate design and advertising the proposed mixer can force out from the market the existing models of mixers.
   The potential market - millions of pieces per year.

2. **Industrial mixer.**
   Capacity of 2-20 liters
   Appointment and the characteristics are the same as for a home mixer. For cafes, restaurants, etc.
   The potential market - tens of thousands of pieces per year.

3. **Activator of water ("living" water)**
   We can develop a different modifications of equipment for cooking of activated water for various purposes.
   In carrying out R & D it is required not only to develop the mixer design, but to carry out large volume of works on receiving qualitative drinks, medicinal mixtures, the crushed material, etc. After carrying out all these works corresponding changes have to be made to a mixer design.
# Summary 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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</thead>
<tbody>
<tr>
<td>R&amp;D of household mixer</td>
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<td>Production of the 1st batch of mixer</td>
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<td>100</td>
<td>0,005</td>
<td>0,0001</td>
<td>0,01</td>
<td>0,005</td>
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<tr>
<td>Production of the 2nd batch of mixer</td>
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<td>10000</td>
<td>0,5000</td>
<td>0,0001</td>
<td>1</td>
<td>0,5000</td>
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<td>Serial production of mixer, 1st year</td>
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<td>500000</td>
<td>13,3333</td>
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<td>Serial production of mixer, 2nd year</td>
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<td>80,0000</td>
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<td>3 510</td>
<td>95</td>
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<td>256</td>
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<tr>
<td>Profitability (ratio of net profit to all expenses), %</td>
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<td></td>
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<td></td>
<td></td>
<td>220</td>
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<tr>
<td>The ratio of cost of R &amp; D to the serial selling price of mixer</td>
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<td></td>
<td></td>
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<td></td>
<td>4000</td>
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</table>
The graph shows that investing into the mixer starting to pay off with 17 months from the beginning of investment in research and development.

Profit after 3.5 years will be about 220 million dollars.
The market of implementation

Application:
- For personal use only.
- For restaurants, cafes, etc.
- Domestic and foreign agricultural enterprises and enterprises in the food industry.

Terms of R & D - 11 months.
The cost of R & D – 400 000 dollars.
Method of payback - sale of serial products.
Profitability - 220%
Patent research have been done.

Patent application in Russia and abroad have already prepared.

Patent application will be submit simultaneously in Russia and abroad, together with the investor, provided the investor will fund of product development and patenting abroad.
Contacts

"Vortex oscillation technology" Ltd
Moscow, Russia
Dr. Evgeny Sorokodum,
President and CEO

mob. phone: +7(903)-184-04-07
skype: esorokodum
e-mail: esorokodum@dol.ru
website: www.vortexosc.com

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