Active Force Nanomaterial

Project ID 221503

HICOOL Global Entrepreneurship Competition

Founder Mr. Alexander V. Frolov, Russia

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Team profile

- Team composition
  - Founder of the project is Mr. Alexander V. Frolov, Russia, Tula.
  - Co-author member of the team is Mr. Michael P. Beshok, Russia, St.-Petersburg.
  - Nanotech staff and top-managers will be added in the stage of cooperation with Chinese nanotech laboratories.

Founder Profile

- Founder is Mr. Alexander V. Frolov, born in 1962. Graduated from High Military Telecommunication University in 1984 as wireless telecom engineer. Military duty as officer in 1984-1989. Work in St.-Petersburg central research institute «Granit» in 1989-1992 as engineer — researcher in electronic department. 1993-1994 business experience in own small firm. In 1994-2001 work in telecommunication companies. 2001 - 2016 owner of research firm Faraday Lab Ltd in St.-Petersburg, Russia. Research activity was in area of new aerospace technologies and alternative energy sources. Over 80 publications in English, German, Japanese, Spanish. Two books “New Energy Sources” and “New Aerospace Technologies”. Research Gate profile with total reads about 50000. In period of 2016-2022 Alexander V. Frolov was busy with real estate business in Tula, Russia. Key skills: Research experimental activity, personnel management, marketing and sales. Self-employed in 2019-2022.

Some of Mr. Frolov's Patent claims

- 1. "Method and device for creating a driving force", application No. 2004105178 dated February 20, 2004, author Alexander V. Frolov.
- 2. "Method and device for energy conversion", application No. 2004104046 dated February 11, 2004, author Alexander V. Frolov.
- 3. "Method and device for generating electrical energy by controlling the magnetic flux", application No. 2003118321 dated 06/23/2003. Frolov A.V.
- 4. "Method and device for controlling the temporal characteristics of physical processes by changing the energy density of space", application No. 2003110067 dated April 09, 2003. Co-authors Frolov A.V. and Chernobrov V.A.
- 5. "Method and device for converting rotational motion into translational unidirectional motion", application No. 2002128658 dated 10/25/2002, author Alexander V. Frolov.
- More information http://www.faraday.ru

Honors

- In 1983 Alexander V. Frolov was nominated as The Best Student inventor of the University.
- In 1993 Alexander V. Frolov was invited to Russian Physical Society as Expert of the Society.
- In 2002 Alexander V. Frolov was noted by International Biographical Centre of Cambridge for publication of his biography in 2000 Outstanding Intellectuals of the 21st century. (Letter of October 11, 2002 from Jon Gifford).

Member’s profile

- Mr. Michael P. Beshok
  - Author of first publication of 2003 about the technology of this project. He offered to apply special micro-relief of surface to take off part of air molecules kinetic energy. This method allow to provide unidirectional force without fuel. The idea is not patented.
  - Mr. Beshok has high education in area of electronics. Live in St.-Petersburg.
  - Self-employed in 2022.

Proposed equity in the team

- Investor 39%
- Founder 31%
- Chinese Nanotechnology lab 20%.
- Top-Managers 5%
- Co-Author 5%

Target market

- Product is new nanomaterial, it is named Active Force Material (AFM) by Alexander Frolov. Market position: AFM is future base of any propulsive drives.
- The technology can be applied for
  - Aerospace propulsion units (drones, aviation and also space drives).
  - The rotor type electro generators.
  - Ship propulsion engines.
  - Auto car propulsion unit.
  - Any mechanical rotation machine.

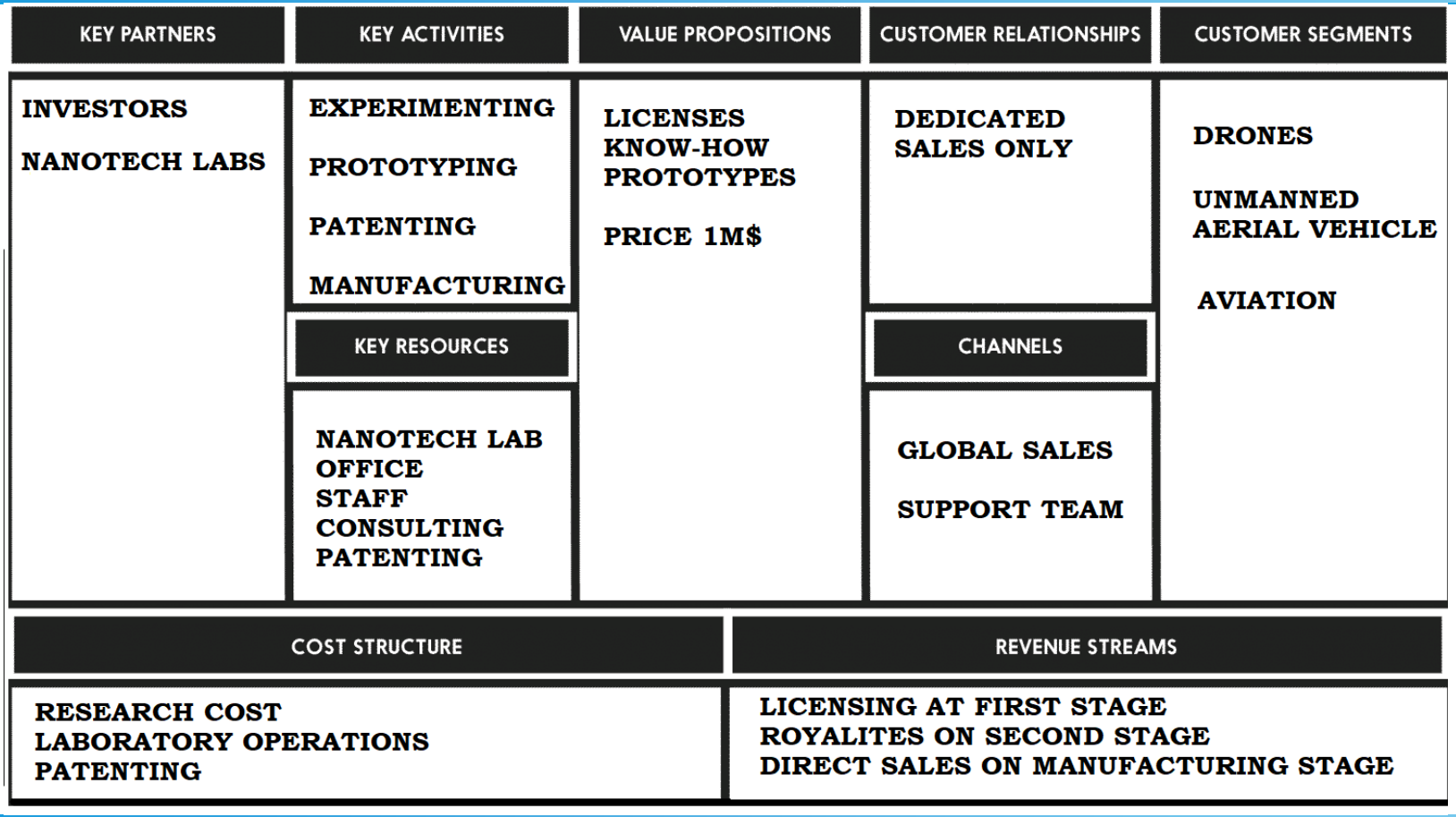
Market size

- Aviation 10 bil. USD in year.
- Ships 12 bil. USD.
- Power engineering 70 bil. USD.
- Auto Cars. 2,000 bil USD.
- Our plans: 2025 sales of licenses about 100 mil. USD
- Considering 10% royalties from industrial partners the profit of the company after 2025 planned to be about 5 - 7 bil. USD per year.

Advantages: Unique value of AFM for aerospace

- We offer new method to provide lifting and propulsion force with siginifcant fuel saving. Range and time of flight can be increased by this way without cost. Also important aspect of AFM propulsion technology is reliability of design. AFM is not located in one place of the vehicle. Many small AFM plates can be distributed on all surfaces of the aviation vehicle to provide lifting force. In this case any damage of several AFM plates is not critical for correct operation of the device. This property is important for any aviation device.

Business model



Competitor analysis

- There are no open information about other research projects in this topic. This project is high innovative direction of investments.
- Our advatages are:
  - Alexander Frolov developed the idea since 2003 and now we have detailed conception and some experimental results.
  - We have understanding of important aspect of the technology, that is elastic properties of the surface of interaction with gas molecules.
  - We know how this method can work in closed sealed box with high pressure gas of heavy molecules. This conception allow us to increase the force effect and develop this technology **for space projects** besides aviation applications.

Pain point analysis and solutions

- Operational risks can be reduced by collaboration with high professional nanotech lab team of our business partner. Nanotech partner must use his existing lab equipment to reduce cost of the project.
- There is some «new product risk». Introduction of our product on global market will be organized by means of Worldwide on-line marketing and presentation of neww product for the Customers.
- Serious risk is related with possible attempts of competitors to still the technology. We have to provide high level of technological secrets and strong patent protection of Intellectual Property.

Business model and profit

- The profit model here is sales of liceses after 12 months of the project, then we can start sales on demand of the Customer after 36 months of the project.
- Prices of licences in aviation B2B market is about 10 mil. USD per one non-exclusive license.
- Production cost of elements of the product can be compared with low cost microelectrincs items, i.e. 1-10 USD per 1 sq. cm size unit. Final product for customer can be manufactured as large 1 sq.m size plate that is made of 10000 elements, i.e. one order will cost 10,000 — 100,000 USD.

R&D capability and Technical level

- Present technical level of the project is «idea-prototype experimenting».
- Future R&D work require cooperation with Chinese nanotechnological partner. Required experience of this nanotech partner is **surface nanoengineering, elastic nanostructures, asymmetrical nanostructures of 100 — 50 nanometer scale.**
- Also these nanostructures can be produced by means of semiconductor manufacturing lithography process with Chinese microelectronic partner. Modern art of this technology allow to create 50nm - 5nm size structures on any surface, that is necessary for AFM effects.
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Project technical characteristics

- Idea is simple: we can take off part of gas kinetic energy by means of special nanostructures. It provide Gas Pressure gradient and propuslion force.
- It is published, tested with minimum effect in 2011-2014, it is not patented.
- Perspectives: 10% in open air pressure gradient is equal to 1,000 kg force for 1 sq. meter plate. So, 100 plates (it is 1 cubic meter box) can produce 100 ton lifting force. Fuel is not necessary but this device will take off heat energy from environmental. In this case we can design propulsion drive for 1 million ton aerospace transport with significant fuel saving method.
- This technology in closed sealed box allow increase the force in times and use it for space projects besides aviation and drones.
- Technical barriers can be solved in cooperation with high level nanotech laboratory or with microelectronics corporation of 50 nm scale facilities.

Status of operation and future plans

- In 2003 the idea was published by Mr. Beshok as method for open air environmental media.
  - 2011 -2013 simple experiments were made by Mr. Frolov. Minimal effects were detected with TiO2 nanotubes and aerogel.
  - 2014-2016 the idea was developed for closed sealed box with high pressure gas and heavy molecules. Not tested yet.
  - 2016-2022 Mr. Frolov developed mathematical algorithm of the process and tried to get contacts with Russian software programmers to build computer simulation of the process. It is necessary to get optimal solution of the nanostructures for maximum force effect.
  - Future plan is joint work on this topic with Chinese nanotech partner.

Financing planning

- 50,000 USD is required start investments to organize experimenting and get samples of new nano-material in cooperation with Chinese nanotechnological partner.
- Total financial plan is about 250,000 USD for the first year.
  - Production of first samples 3 months 50,000 USD
  - Production of prototypes for sale 6 months 100,000 USD
  - Patent work 6 months 50,000 USD
  - Marketing, presentations, copyrighting 3 months 50,000 USD
  - Start of Sales 12 months after start

Future plans

- Present status of operation is work on algorithm of the computer model simulation.
- Founder use only his own finances for this project. There is no other investors and there is no revenue now.
- Future development strategy is based on joint work with software programmers in China to get workable simulation and then to move the project in nanotech lab of the Chinese partner.
- The capital demand is planned as 250,000 USD for first 12 months.
- Planned time for registration and landing in Beijing is about 1 month after start of financing.

Plan for landing in Beijing

- It is planned to work with Chinese nanotech partner as join company. All future results will be joint property.
- This plan determine location of future company in Beijing.
- The future company require minimum office space in some business center, that is located not far from laboratory facilities of the Chinese nanotech partner.
- Additional laboratory and production facilities will be planned after 12 months of the project.