Innovation Project Active Force Material

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- Using modern nanoscience surface engineering, it is planned to create new material providing propulsion active force due to different air pressure, acting on the different sides of the plate.
- First stage of the project is design and produce samples of new material. It is stage "idea – prototype".
- Next stage is organization of license sales.
- Last stage is building of production company to manufacture the new material.
- Strategy aim is high profitable business.

Product and applications

- Product is nanomaterial named Active Force Material (AFM)
- AFM is new project, it is future base of any propulsive drives.
- The technology can be applied for:
 - Aerospace propulsion units.
 - The rotor-type electro generators.
 - Ship propulsion engines of any power.
 - Auto car propulsion unit.
 - Any mechanical rotation machine.

Market

- Aviation, 10 bil. USD in year.
- Ships. 12, 5 bil. USD.
- Power engineering. 70 bil. USD.
- Auto Cars. 2,000 bil. USD.
- Plans: in 2017 sales of licenses 100 mil. USD.
- Considering 10% royalties from industrial partners the profit of the company in 2017 planned to be about 5 – 7 bil. USD.

Problems of the market

- Fuel is not low cost, it is limited, it is bad idea for ecology.
- Fuel technologies decelerate growth of the market.
- We can remove this problem using AFM nanomaterial.
- AFM technology is simple, safe and clean.

How it work

- Active Force Material create permanent active (non-reactive) force in one direction. It can be used to get rotation effect.
- It works due to air pressure difference (gradient of air pressure).
- Value and direction of the force can be controlled.



- Air pressure is 10 tons on any surface of 1 sq. meter.
- We can create different pressure of air onto different sides of plate.
- This difference (gradient) of pressure will provide powerful propulsion force.

Technical solution

- First way is special form of surface relief on one side of the plate.
- Other way is different properties of sides of the plate (picture). Elastic and inelastic surface will interact with molecules in different way. Here is gradient of temperature and propulsion force.



Special form of surface

Here are also two ways:

1. The special form (relief) of surface of a plate can **take part of kinetic energy** of air molecules to change local pressure from air to **the plate. In this case we'll get temperature** gradient also.

2. Other special form of surface can **re-direct motion vector of air molecules** in one preferable direction. By this way we can create more ordered motion of air (macro-wind) in one direction. It is also will produce gradient of air pressure cross the plate.

Analogy with other method



Gradient of air pressure Wing profile invented by Jukowsky & Chaplygin, Russia, 1904. Gradient of air pressure produce active (non-reactive) lifting force.

- Velocity of air above and below of the wing is different.
- Different velocity means different air pressure.
- No matter if the wing is moving or the air is moving.
- Air molecules always are moving chaotically.
- Special properties of Active Force Material will make this motion to be non-chaotical and get "wing effect" for stationary plate and without wind.

Idea by Maxwell



Maxwell proposed an idea to separate hot (more velocity) and cold (small velocity) molecules by means of some mechanism.

Special relief of surface can do it.

James Klerk Maxwell





Why it is possible in small scales?

Air molecules are moving. It is chaotical motion but there is part of trajectory where is linear motion. Using special regular relief of the material we can organize more ordered motion of the molecules, or reduce kinetic energy of the molecules, i.e. take off part of environmental heat energy to get propulsion force or to make machines work.



Nanotechnology



One of possible variants

- We need nanotechnologies to take off part of kinetic energy of the molecules and to make air molecules work. Commercialization of the AFM concept now is realistic using 50-500 nm nanoscale technologies.
- Idea: One side of plate of matter is made to be micro relief surface.
- Production cost is low.

Application of nanotubes



- Nanotubes of 50 500 nm diameter should produce particular ordering of the chaotically moving air molecules, if it is elastic tubes.
- Non-elastic material of the nanotubes will take off part of kinetic energy of the molecules.
- Elastic material of nano-tubes will re-direct molecules.

Nanotubes and mesoporous



- Photo: The nanotubes of 50 nm diameter, mesoporous material TiO2.
- Nanotubes are composed perpendicular to the plate. Important: It is open end tubes.



 Vertical plates also should produce re-direction of chaotical motion of air molecules along vertical axis. By this way we can get different pressure of air onto different sides of the plate.

Variants of relief



Creation of macro-wind



- Special micro elements can produce redirecting of chaotical motion of molecules.
- Macro-wind is estimated in one preferable direction.
- Momentum and driving force is estimated in opposite direction.

The plate and the box

- Horizontal effects: macro-wind can be produced by special relief.
- Plates can be composed to box.
- 10% effect in air of 1 atm 20C degrees means wind about 50 m/sec.

Elastic deformation of nanoelements

- We can use also elastic deformation of nano-hairs.
- Deformations of nano-hairs in collisions with air molecules means particular losses of kinetic energy of the molecules.
- Temperature gradient effects are estimated here.





Natural examples



Relief 200 – 800 nm in the Nature

Estimated Technical Parameters



We estimate force level of 1,000 kg for 1 sq. meter plate if we'll provide air pressure gradient about 10%. In this case, the box of 100 plates can produce 100 ton lifting force. It is 1 cubic meter box. No fuel, no input... it works!



Stages of the Project

		Period	Investment s	
1	Production of first AFM samples	3 months.	50,000 USD	
2	Production of prototypes for sale	6 months	100,000 USD	
3	Patent	6 months	50,000 USD	
4	Marketing, presentations, copyrighting	3 months.	50,000 USD	
5	Sales of licenses	12 months after start		
6	Holding company, income royalties	24 months after start		
7	Start of own production facilities	36 months after start		
We can plan cost of one non-exclusive license to be 1 – 5 Mil. Euro.				

Financial plan of sales of licenses

Year	Expenses	Income	NPV
2012	250,000	0	-375,000
2013	500,000	1,000,000	-155,000
2014	900,000	10,000,000	2,484,000
2015	1,600,000	30,000,000	7,880,000
2016	3,100,000	90,000,000	19,177,000

- Here is considered only sales of licenses.
- Discount factor 50% year.
- 39% Investor, ROI = 2991%.

The Proposal

- Required investments 250,000 USD
- The team:
 - Investor 39%
 - Founder 31%
 - Nanotechnology lab 20%.
 - Managers 5%
 - Authors 5%
- First stage require 50,000 USD to get samples of new nano-material.





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