

Министерство образования и науки Российской Федерации  
Ministry of Education and Science of Russian Federation

Федеральное государственное бюджетное образовательное учреждение  
высшего образования  
«Комсомольский-на-Амуре государственный технический университет»  
Federal State-financed Educational Institution  
of Higher Learning  
"Komsomolsk-na-Amure State Technical University"

**ТРИЗ ТЕХНОЛОГИИ 2016**  
**TRIZTECHNOLOGY 2016**

Материалы 6-й международной конференции  
школьников, студентов и аспирантов, 25 ноября 2016 г.  
Proceedings of the 5th International Conference  
students and graduate students, 25 November 2016

Комсомольск-на-Амуре  
2016

УДК 001  
ББК 95.4 + 30у  
Т673

Рецензент – кандидат технических наук, доцент В.Д. Бердоносов,  
профессор кафедры «Информационные системы»,  
Сертифицированный ТРИЗ специалист  
(г. Комсомольск-на-Амуре)

*Редакционная коллегия:*

Э.А. Дмитриев, д-р техн. наук, отв. ред.  
(г. Комсомольск-на-Амуре, КнАГТУ)

И.В.Макурин–кан. экономических.наук, зам. отв. ред.  
(г. Комсомольск-на-Амуре)

С.В. Белых –кан. техн. наук

### **ТРИЗ технологии 2016:**

материалы 6-й международной конференции школьников, студентов и аспирантов, 25 ноября 2016 г., Комсомольск-на-Амуре (Российская Федерация), Сыхынь (Южная Корея) 25 ноября 2016 г. /

редкол.: Э.А. Дмитриева (отв. ред.) [ и др.]. – Комсомольск-на-Амуре: ФГБОУ ВО «КнАГТУ», 2016. – 43 с.

ISBN 978-5-7765-1261-2

Материалы сборника посвящены актуальным проблемам развития ТРИЗ технологий.

Приводимые материалы могут быть полезны преподавателям вузов, руководителям предприятий, а также студентам и аспирантам технических специальностей и направлений.

ББК 95.4 + 30у

ISBN 978-5-7765-1261-2

© ФГБОУ ВО «КнАГТУ», 2016

## ENHANCEMENT OF THE GRADUATION TOWER OF COMBINED HEAT AND POWER PLANT

In this work the idea is on modernization of work of a graduation tower in CHPP-3, by a fence and also, the alternate use of heat generated by it, when cooling water appeared. Graduation towers are express devices for cooling large amount of water by using a directional stream of air. Their shortcoming is: loss of a large amount of heat when cooling water in graduation towers which is not used further anywhere.

The principle of work of set of components of combined heat and power plant – 3 can be described with use of the drawing.

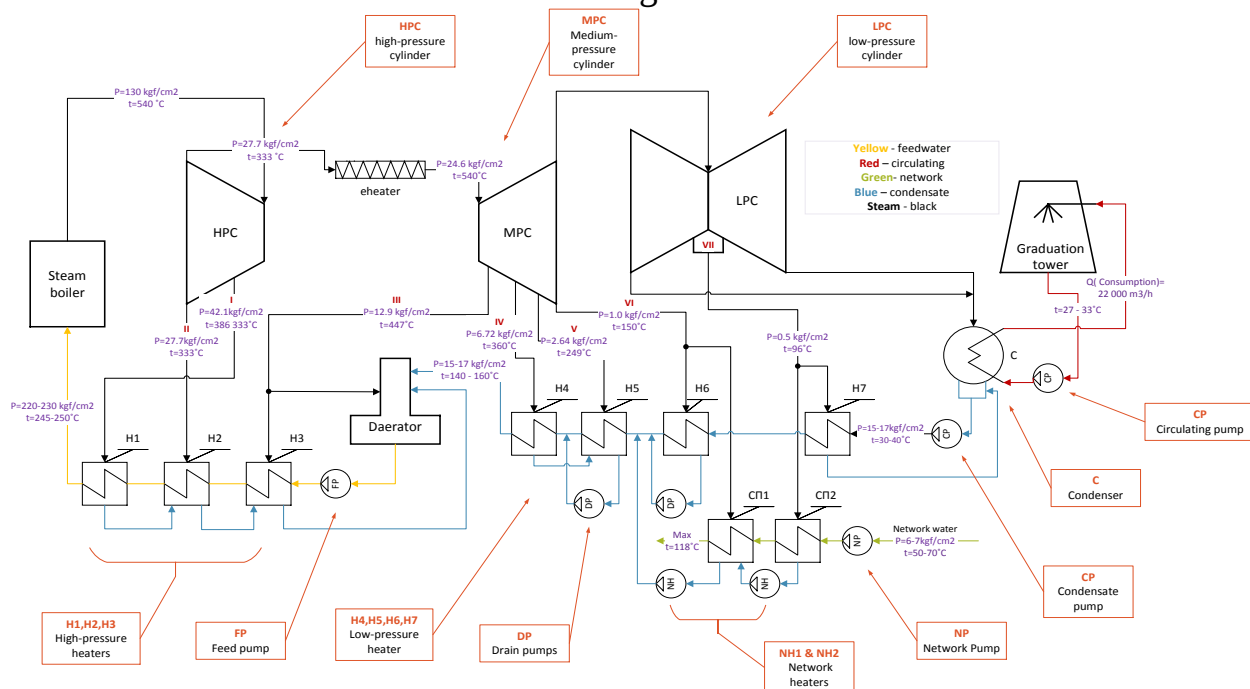


Figure 1 – the principle of work of a CHPP – 3

In a copper by using pumps, air and fuel moves (gaseous, fluid or solid). Fuel-air mix which burns in a copper fire chamber turns out, allocating a huge number of warmth. At the same time water passes on tubing, which settles down in a copper. The marked-out warmth is transferred to this water, at the same time its temperature increases and to be led up before boiling. Steam which was received in a copper again goes to a copper for overheating it above boiling point of water (with this pressure), then on steam lines it enters on the steam turbine in which steam makes work. At the same time it extends, decreases its temperature and pressure. Thus, the potential energy of steam is transferred to the turbine, this way, turns into kinetic. The turbine sets a rotor of the alternating-current three-phase generator in turn which is on one shaft with the turbine in motion and makes electric energy.

During work, 2 technical contradictions were formulated.

- TC1: If we close the graduation tower with cover, we will be able to hold enough thermal energy for its subsequent utilization, and water will be cooled at the same time insufficiently.
- TC2: If we do not close the graduation tower with cover, water will be enough cooled, but a large amount of thermal energy will be lost.

"Graduation tower" consists of: 1 – sprinkler; 2 – water distributor; 3 – tank (pool); 4 – water supply; 5 – water drainage; 6 – air input

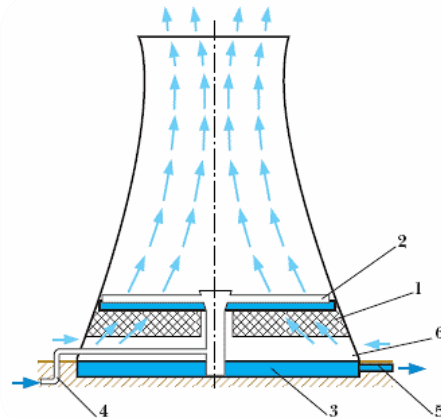


Figure 2 – Graduation tower scheme

As a product we considered these items: heat of water, water, steam. Tool is: graduation tower cover. On the basis of the formulated technical contradictions the graphic scheme of the conflict was made.

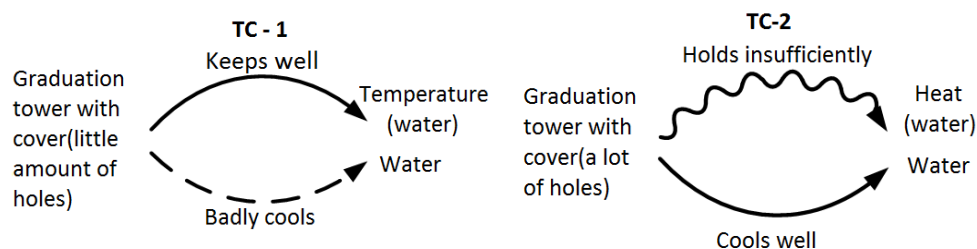


Figure 3 – Graphic schemes of the conflict

We choose second contradiction. In this case poor preservation of heat is provided, but water is well cooled. Strengthening of the conflict by the indication of the limiting condition of elements was made.

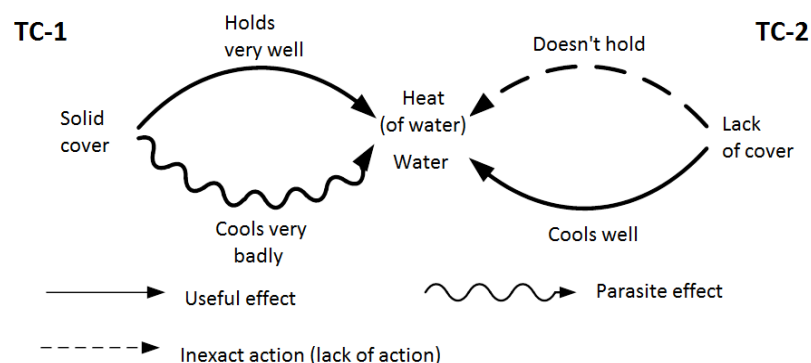


Figure 4 – Graphic representation of the strengthening

The graduation tower with the absent cover badly keeps heat, but at the same time well cools water

It is necessary to find such X element which will provide absent of cover to keep heat, at the same time kept an opportunity to good cooling the water. The graduation tower with the absent cover badly keeps heat, but at the same time well cools water. It is necessary to find such X element which will provide absent of cover to keep heat, at the same time kept an opportunity to good cooling the water.

For defining of the X element, we have to define operational zones and reveal a zone of their contact. As operational zones, we have: zone of heat liberation and zone of selection of water. In addition, crossing of operational time of selection of water and heat was defined.

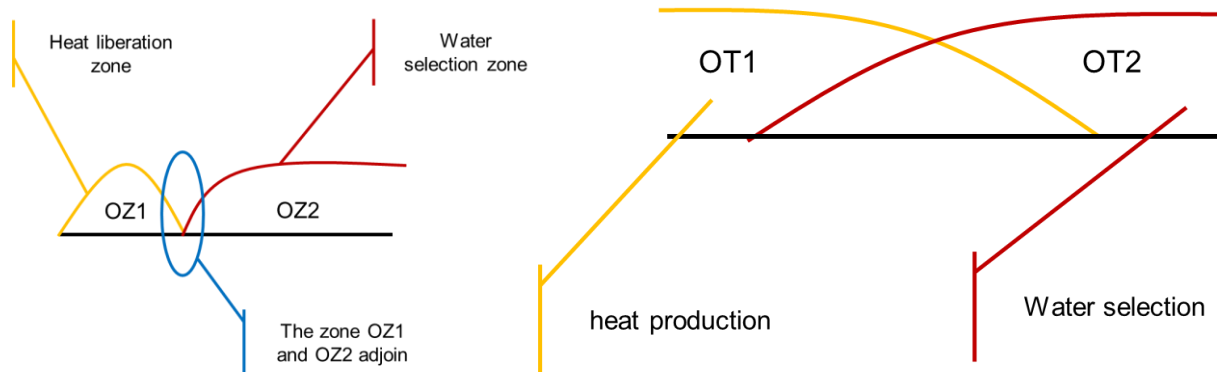


Figure 5 – Definition of operational zone(OZ) and operational time(OT)

X element, wasn't complicating the scheme at all and without causing the harmful phenomena, within an operational zone and during operational time, cools water in a graduation tower and at the same time keeps heat. One of the first offered decisions – was use of a geothermal heat pump in the pool (tank) of a graduation tower. The principle of work of the heat pump is based on using a difference of temperatures and almost similar to operation of the ordinary refrigerator or conditioner.

It is considered to be that heat pumps can only concentrate thermal energy of a surrounding medium and transfer her to the consumer only as thermal energy, for example, for heating of the buildings and production rooms. But nothing prevents us to use technologies, that is similar to those that are used in a thermos. That will turn the condenser, first of all, into the accumulator of thermal energy. Due to padding energy consumptions, the zone with the under density of energy in an evaporator and a zone with the increased energy density in the condenser is created. And further the trick is more narrow, on the one hand, to support this ratio by means of continuously working pump, and on the other hand to turn the received energy into the electric power.

The solution we proposed is application of a mini-tornado in graduation tower for cooling the water. In the field of central "top" the falling dry cold mass of air meets the rising warm wet mass of air. At the same time water vapors are quickly converted from the lower streams condensed) in liquid, and sometimes even during snow. It is necessary for implementation of this decision: A pay-off of cold air under

pressure and the fan which rotation of blades will develop electric energy. We will take the idea of "cover" for a graduation tower from the idea of creation of a simulated tornado in the museum of Mercedes-Benz.

During work several developments on improvement of work of a graduation tower were presented:

1. Installation of a geothermal heat pump in a graduation tower for strengthening of its function of cooling of water by a fence of heat and its use for heating of water for production needs of combined heat and power plant.

2. Power generation at the expense of a heat pump.

3. Use of the principle of a tornado for cooling of water in a graduation tower and productions of electricity.

As the basic the decision is chosen 2 as it allows not only to carry out an intake, the energy emitted in a graduation tower at water condensation but also to carry out at the expense of it padding power generation.

The solution of a tornado is not considered as the basic because of need of intervention in a graduation tower design that will suffer huge financial losses.

## REFERENCE

1. РД Министерства топлива и энергетики РФ РАО, «ЕЭС России» 34.20.501-95 Правила технической эксплуатации электрических станций и сетей Российской Федерации– 15-е издание, перераб. и доп. – М.: СПО ОР-ГРЭС, 1996.–160 с.

2. Cooling tower // Wikipedia / URL: [https://en.wikipedia.org/wiki/Cooling\\_tower](https://en.wikipedia.org/wiki/Cooling_tower) (датаобращения: 10.10.2016)

3. Теплоэлектроцентраль// Wikipedia / URL: <https://en.wikipedia.org/wiki/Теплоэлектроцентраль> (дата обращения: 10.10.2016)

4. Получение Электроэнергии Из Воздуха//Технологии будущего / URL: <http://informatik-m.ru/6-/poluchenie-jelektroenergii-iz-vozduha.html> (дата обращения 10.10.2016)

5. Принцип действия тепловых насосов// Отопление и утепление частного дома или квартиры своими руками / URL: <http://plusteplo.ru/otoplenie/sistemy-otopleniya/teplovoj-nasos/princip-raboty-teplovogo-nasosa.html> (дата обращения 10.10.2016)

6. Генератор торнадо// Vortexenergy / URL: <http://www.evgars.com/true.htm> (дата обращения 10.10.2016)

Da-un Jeong, Medical IT Convergence Engineering, Kumoh National Institute of Technology; Jin-ho Jeong, Department of Mechanical System Engineering, Kumoh National Institute of Technology; Min-soo Kim, Department of Mechanical System Engineering, Kumoh National Institute of Technology

## AUTOMATIC WATERING CONTROL FLOWERPOT

### **Abstract: Automatic watering control flowerpot**

**Background** The difficulty of managing water supply to flowerpot often causes plants to wilt or rot.

**Methods** Using the TRIZ thinking, the flowerpot can tell by itself when the water is needed and get hydrated on its own

**Result** Designed automatic watering control flowerpot using water supply stick and signal bar.

**Conclusion** It has enough market value because it can make convenience of flowerpot management of consumers and make various appearance designs.

### **1. Introduction**

#### **1.1. Necessity of solution**

Many people buy flowerpot to make their home fresh and produce clean air. But many people forget the timing to watering the flower and do not know the amount of water that has been given. It can cause plant wilt or rot. To solve this problem, there is 'The Roly-poly pot' of Professor Sang-Min Bae. This pot informs the water supply period to tilt itself. However, the second problem is the soil in the pot pours when it is tilting may arise. We solved this second problem using TRIZ thinking.

#### **1.2. Definition of Assignment**

To solve the problem, we defined the problem through system function analysis. From the time perspective, we analyzed the process in which the flower pot absorb water and causes it to tilt. It was confirmed in the past, a flowerpot with sufficient water absorbed water over time and changed the weight of the flowerpot as water is absorbed. Therefore, the goal of our research is to let the pot receive moisture substances without tilting the flowerpot due to the weight change, and to supply the water by itself. And we have come up with final solution to this goal.

### **2. Derivation Solution**

#### **2.1. Ideal Final Resolution and Derivation of contradiction**

The ideal solution for problem of flowerpot are not only inform of the time when hydration is necessary, but also can supply moisture by itself when the water is running out. At this time, the tilted flowerpot should be required in order to let us know the time for watering. However, there is a physical contradiction that tilt the pot should not occur in consideration of the pouring soil and plants.

#### **2.2. Utilization of Resources**

As a result of analyze the resources that can be used to solve the physical contradiction, it was possible to utilize the weight change of flowerpot corresponding to the moisture content for the internal resources of the system. We were able to

select the scale for the external resources of the possible system. However, when we analyze the material field using these two resources – scale and weight, flowerpots and scales can inform themselves of the water shortage by utilizing the mechanical field-by measuring the weight changes. But the effect of water supply to the flowerpot is insufficient. Therefore, we try to solve the sufficient action by introducing a new field – the water supply stick.

## 2.3. Derive-Solution

### 2.3.1 The process of the first solution: Water Supply System

The first solution is informing the flowerpots water shortage and make it possible for the flowerpot to absorb water through ‘a water supply stick’ that is shown in Figure 1. (a). By using the water supply stick, water supply will flow to the flowerpot through the capillary phenomenon. Inside of the water supply stick is filled with the water membrane filter due to smooth capillary phenomenon, and this is shown in Figure 1. (b)

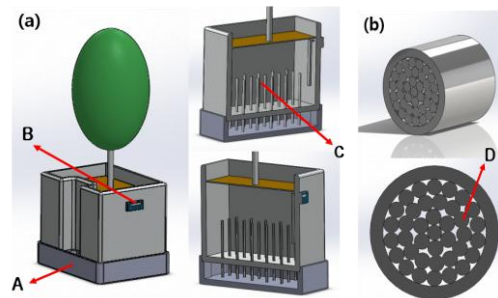


Figure 1. The first solution; (a) flowerpots with only water supply stick; The water trap; A, Hygrometer; B, Water supply stick; C, (b) Section of the water supply stick; Water membrane filter; D

However, this is merely a function of automatic water- supply and lack of a function to directly notify the time when plants need to supply water. Also, the second problem may occur such as rotting roots cause of continuous water-supply.

### 2.3.2. The process of the second solution

In order to solve the second problem of the first solution, we derived a second solution as shown in **Figure 2**.

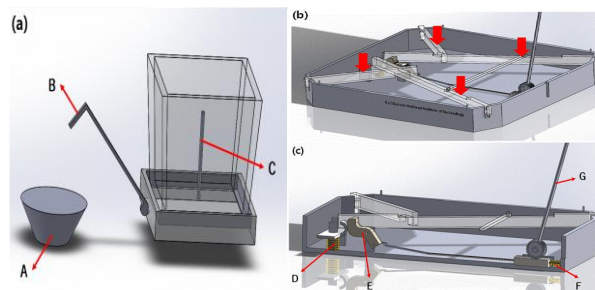


Figure 2. The second solution; (a) Feature of the second solution; Water bowl; A, Signal bar; B, Water supply stick; C, (b) Detail drawing of the second solution, (c) Section of the second solution; Vertical spring; D, S-frame; E, Horizontal spring; F, Signal bar; G

According to Figure 2. (a) flowerpot was designed so that the weight change due to the water change causes the up and down movement of the signal bar(b). And accordingly the water is transferred to the water supply stick(C) via the capillary phenomenon. For

understanding the detailed driving principle, the cross section of the second solution is shown in Figure 2. (b), (c). This was designed to raise and lower the signal bar via the interaction of each spring and S frame, depending on the degree of loading according to the moisture content of the flowerpot.

### **(1) Measure pot's weight according to water change**

The lever principle was used to measure the weight according to the water changes in the automatic watering control flowerpot. Then, we made it possible to measure changes in these weights through the four links present inside the flowerpot. The detail drawing of these second solution is shown in Figure 2. (b).

### **(2) A weight change in the plant growth**

According to weight change of the flowerpot, it is necessary to consider not only weight change due to absorption of water but also weight change due to growth of plants. For this reason, by using the elastic coefficient adjusting device for the vertical spring(D) in Figure 2. (b), not only the weight changes of moisture substances but also the change in weight due to the growth of the plant. Various weight changes according to the type of flowerpots also I made it possible to correspond.

### **(3) How to supply enough water to the signal bar**

In order to supply enough water from the signal bar, the design of the C-shaped ring connected to the top of the vertical spring in Figure 2. (b) was changed with a rounded C-shaped ring. As a result, there was no immediate reaction to the change in weight due to the water of the flowerpot. By induced a delayed reaction, water could be supplied to the flowerpot through the signal bar.

### **2.3.3. The Final Resolution**

The final solution that came out through the process described above is shown in Figure 3.

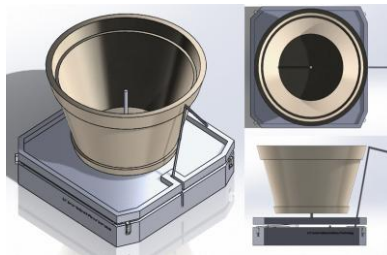


Figure 3. The final resolution of automatic watering control flowerpot

## **3. CONCLUSION**

Currently, the size of domestic and overseas smart agricultural markets is continuously increasing, and its perspective is bright as well. Therefore, by introducing the automatic water supply control system, this automatic watering control flowerpot into the plant factory system has the opportunity to reduce the manpower and increase the production. In addition, since this automatic watering control flowerpot can be manufactured with a 3D-printer, it will be possible to give consumers the convenience of plant management at low cost. Also, it will be possible to match a variety of consumer preferences when producing the signal bar of the automatic watering control flowerpot with various design.

## APPLICATION OF TRIZ EVOLUTION TO "IRON" SYSTEM ANALYSIS

In everyday life we are constantly surrounded by things that seem to be always with the person! For example, device for ironing clothes or, as we call it, iron. Every morning, we switch it on to manage with the tucks appeared on the pants or shirt. At this moment, we are unlikely to think that evolution of irons is moving.

Far back in the past, when the modern iron was not yet, clothes ironed with help of stones. Further development of this system is mechanically deadlocked.

The main branch of development followed the path of the working body heat. For example, the stone could lead to the hot rod. From hot rod moved to the means at hand – a brazier of coals. But sparks flew out of brazier and left holes on clothes. Applying the law of harmonization of parts of the system there was the classic form of iron with a pointed nose and a handle, which is heated by an external device. So there was a cast-iron (Fig. 1).



Figure 1 – The first cast-iron

But it was very heavy and the handle is heated to require a lot of time to repeat-heating, the system was divided into sub - make removable handle and a number of working bodies (one works, some heated). In the iron with a removable handle also have drawbacks – take up much space. Switched to the iron with the internal heating system, the first of which was the iron with pipe. For increasing traction we need a big pipe, but flying sparks, leaving holes on clothing and the smoke pollutes the cloth. When the ergonomics and dynamism to make a hole in the hull, and a hinged lid. Then Irons took a step back - heated by an external source. The heated element is inserted into the case, transferring heat to the sole. An undesirable drawback of this iron was the need for additional tools to replace the bar. At the same time natural gas has become widely used. Evolution returned from the internal source of heating energy, but due to the combustion of gaseous fuel. But gas is not so safe, also it was a

very difficult and delicate system, breaks often, so moved to the liquid-fuel alcohol. However, its main drawback was the high cost of fuel. People moved to a new type of the battery to heat water within the enclosure. Iron was an iron and a kettle in the same system, with the heat from an external source.

With the proliferation of electrical networks the first electric iron appears (Fig. 2). The energy coming from an external source is converted into energy heat soles.



Figure 2 – The first electric iron

Since then, physical operating principle of the iron has not changed, only functional and ergonomic properties were changed – such as electrical safety. There was a thermostat, added cover soles, improved a water supply, there was an additional function – steam. To improve mobility system irons switched to the internal battery.

Of course, the irons have undergone many changes. All of these changes support the demand for the system, but if you look globally – a form of iron is almost unchanged since the 18 century and up to now, as well as the principle of action – smoothing plications smooth hot surface. The energy source has not changed for 150 years.

Is not it time the emergence of a new system with a new physical principle of action has come (Fig. 3). The desired effect will give us another system, such as a washing machine.



Figure 3 – A new system with a new physical principle of action

Usually it linen only smooth clean. It is possible to consider the creation of a washing machine, which would be in addition to washing and drying would also ironed linen (Fig. 4).

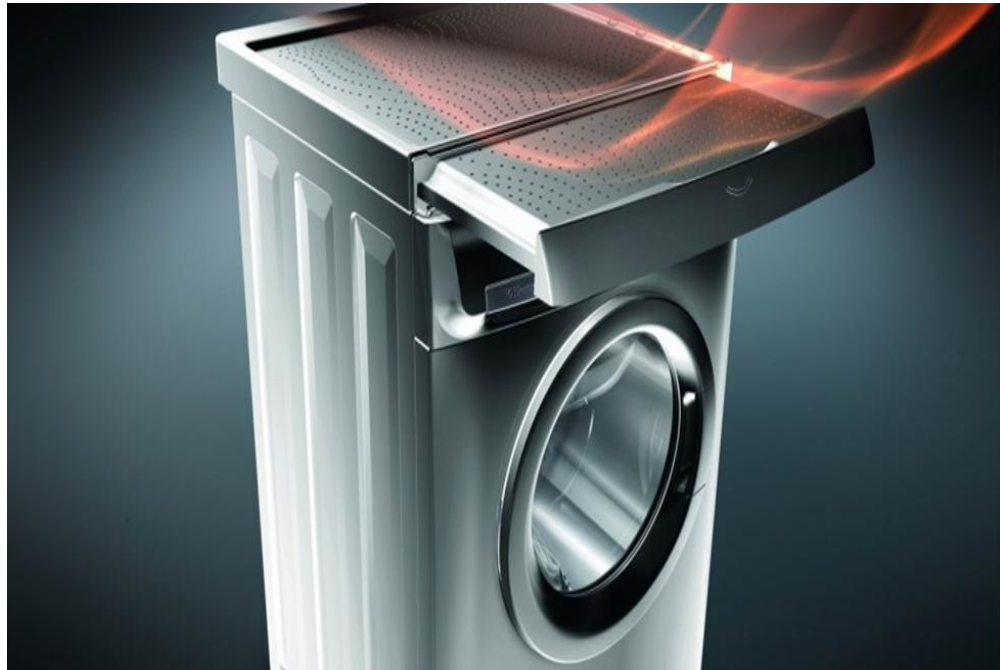


Figure 4 – A washing machine «3 in 1»

Or iron will be liquid – you should jet a little and all the problems are solved. The cloth consists of longitudinal and transverse fibers. Washer-induced tucks and it is determined by the bending of various fibers (Fig. 5). If chemists create a mixture that, falling onto the fabric, creating internal pressure of the fibers under the action of which they (the fiber) straightened and fix it in this position, instead of irons we use cans, sprinkle of them on clothes, we smoothed it.

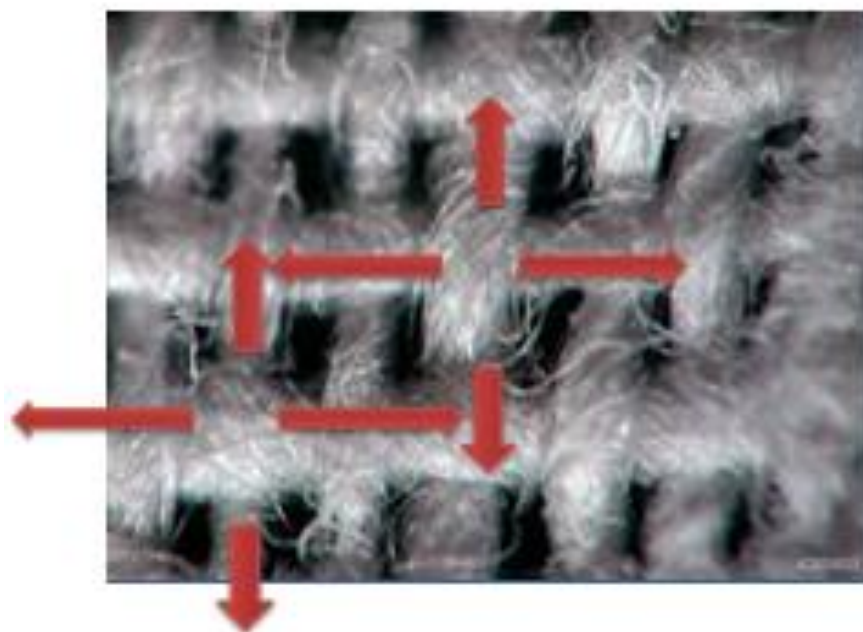


Figure 5 – Interaction liquid and cloth

Until that happens, we can develop not only IRON system but related systems.

**Contradictions:**

1) In order to iron, you need an iron and ironing board, but usually ironing boards take a lot of storage space and operation.

2) Iron should be hot while ironing and cold all the rest of the time.

**Idea:** The transition from solid board to the flexible mat (increased agility). Temperature effect achieved thanks to two elements (Fig. 6).

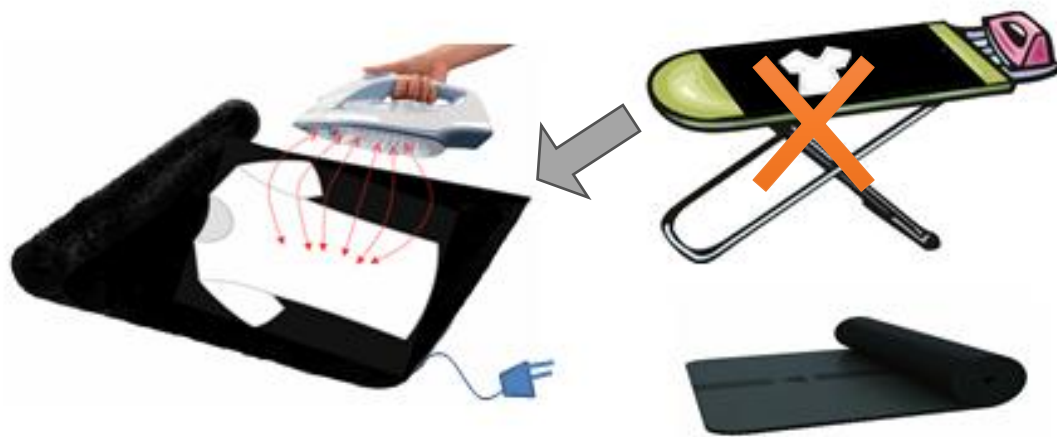


Figure 6 – Smart iron

**Decision:** Mobile mat, which is connected to the network and stand-alone iron. The interaction occurs between induction current and the surface between the pad and the iron heats up.

JEE-WAN YANG, Department of Nano-Optics Engineering; HYUN-SU AHN, Department of Electronic Engineering; EUN-HEE MYUNG, Department of advanced Materials Engineering. Korea Polytechnic University

## TRAVELSICKNESSPREVENTIONMODE

### **1. Research Purpose and Background**

Nowadays, almost people using smart device wherever they are. So they also using smart device in public transportation. The final aim of “motion-sickness prevention mode” is solve motion-sickness that occurs due to using smart device on public transportation like moving car.

### **2. Investigate the cause of the problem**

To solve this problem, we have to find out “Motion sickness”. 'Motion sickness' has occurs from discordance between 'sense of balance' and 'vision'. Suppose to situation ‘using smartphone in moving car’ that we are going to solve. The reason of motion sickness is collide ‘moving balance information’ with ‘fixed vision information’. Vestibular organ detects a movements of car and delivery balance information to our brain. However delivery fixed vision information to our brain. So, the problem is ‘moving balance information’ and ‘fixed vision information’

### **3. Problem solving**

To solve this problem, we have to synchronize 'valance information' and 'Vision information'. So we are think of first solution, It is that remove cars movements, finally make fixed situation. Using this method, our first solution is 'moving car seats'. The spring under the seats, offsets car's movements, so it can makes smooth using of smart device on moving car over not occurs motion sickness.

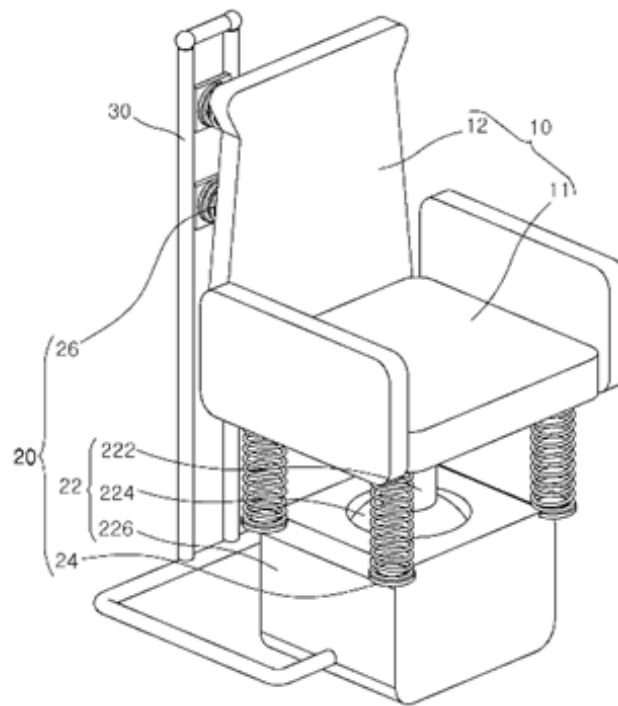


Figure 1 – solution 1

#### 4. Judgment of effectiveness

We had checked this solution, but this solution have some weakness. First, this chair need more cost than before. Second, this chair has occurs decrease number of seats. Because of this moving chair have more volume than before. So we consider that this solution is inefficient. So we needed to find out next solution.

#### 5. Final solution

So solution is moving the display parts in accordance with the movement of the car. Using gravity sensor, it seems to frame in the air. It has advantages that it doesn't need additional cost because it use gravity sensor in smartphone. Also, it has switch 'on/off'. It has a little disadvantage. Some part of display will hide but it is so small. Therefore this ideality is bigger small than 1.

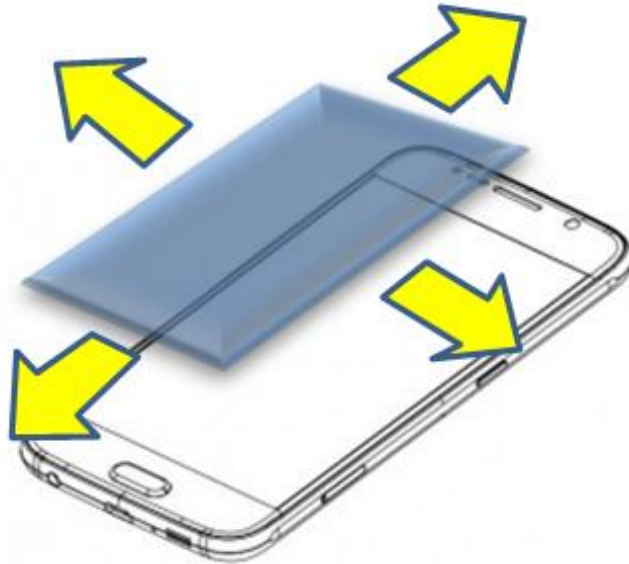


Figure2 – solution 2

## 6. Conclusion

Overall, the advantages of this 'A little display parts small than before' are less than the negative effects. Also, the use of a gravity sensor doesn't cost an additional fee to apply. By apply simple software to the previous smart devices, this invention helps to solve the problem that we mentioned above. Therefore, I considered that this is the best solution.

## THE IDEAS OF WAVE PROPULSION BASED ON TRIZ

### 1. The problem

In accordance with international maritime convention MARPOL there is a systematic tightening of the emissions of marine vessels. In this regard, necessary transition from fossil fuels to cleaner energy sources.

Besides, the ship in the ocean often meets the waves. Their energy causes pitching and stresses from the shock waves. To reduce pitching the different dampers is used. But they are either bulky (tanks and gyroscopes), or often broken from shock waves (stabilizers) or not enough effective (bilge keels). In addition, reducing pitching, they increase the load of waves on the ship (Fig. 1).



Figure 1 – Wave impact

### 2. The analysis of laws of development of technical system

#### **The law of transition to managed resources, and improves manageability.**

The development of technology goes in the direction of the use of resources with a higher level of organization. To ensure effective utilization of wave energy it is necessary to provide management the wave energy flows, with irregular at the time and place of interaction with the hull.

#### **The laws of completeness and harmonizing of system parts.**

The ship as cybernetic system is consisting of two coupled subsystems (movement and stabilization) with main parts (control, engine, transmission and working element – Fig. 2).

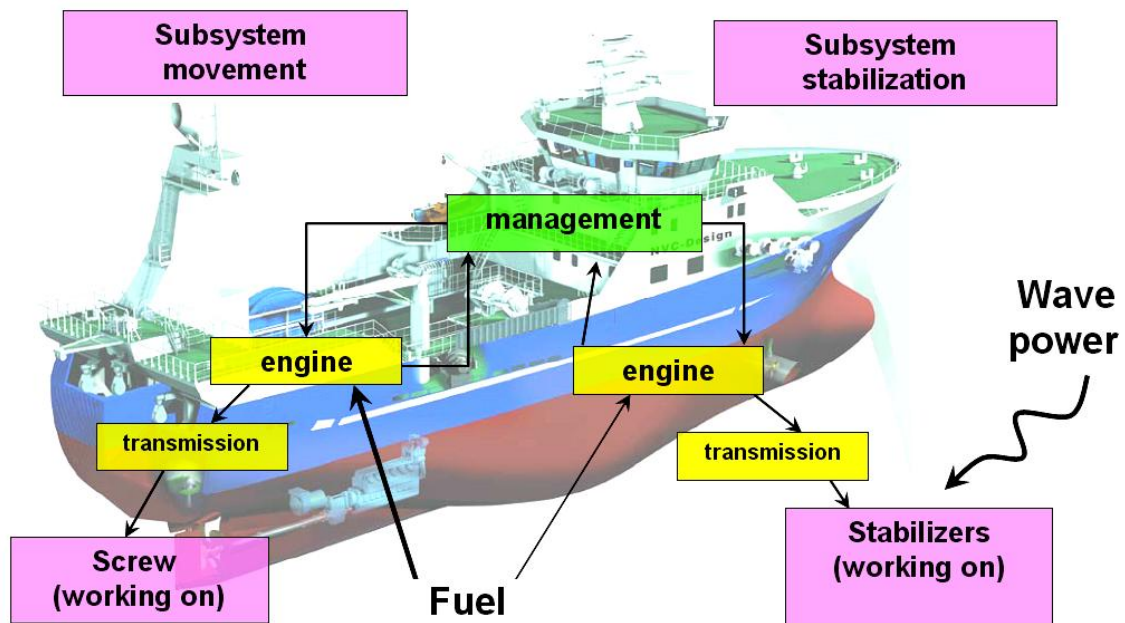


Figure 2 – Ship as system

The sea waves are source of harmful mechanical energy. It is necessary to convert wave energy to useful. Then we can remove redundant elements (stabilizers, fuel and others) and simplify system (Fig.3).

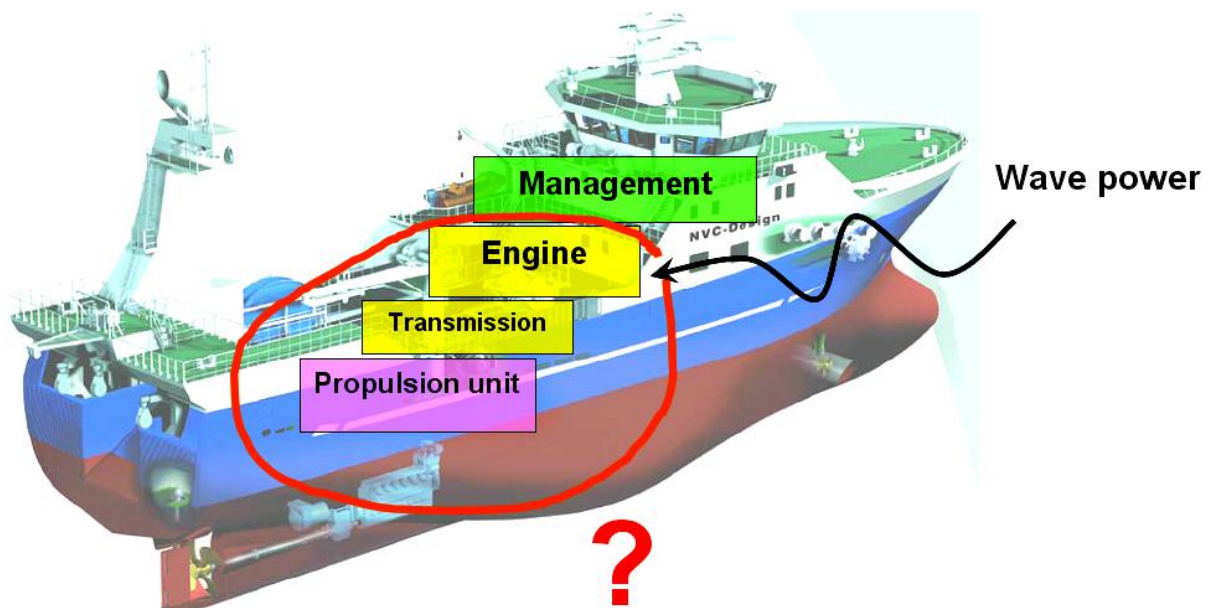


Figure 3 – The harmonization of system parts

**The law of increasing degree of dynamism of the system.** In conditions of dynamic external environment (sea waves) the ship must also dynamically (quickly) to respond to waves. The ship shall not impede the surrounding dynamic environment (through its inactivity and consumption of internal resources) but to use this medium (as in Aikido is to use the opponent's strength for its purpose).

**The laws of transition to managed resources and improve handling.** The development of technology goes in the direction of the use of resources with a higher

level of organization. To use unmanaged wave energy you need to control her. But how?!

**The law of “energy conductivity” in a system.** A wave energy converter (propulsor) needs to increase the energy conductivity of the system, thereby increasing efficiency and reducing "loss" of energy (more precisely, the involvement of the other mechanical energy – from waves, turning the harm to profit and eliminating the loss of heat energy of fuel).

**The law of transition to super-system.** Traditional fin stabilizers are elements of the system "ship". They regulate the inertial properties of the ship as an oscillating system. Go to the super-system: “waves – wave energy converter – ship“.

**The law of transition from macro to micro level.** The pressure of waves is randomly distributed on the surface of the ship. It is impossible to accumulate by any one device. "The trap of energy waves" must have a lot of parts – "little peoples – valves", receiving the pressure of waves from different directions in different points of the ship surface (Fig. 4).

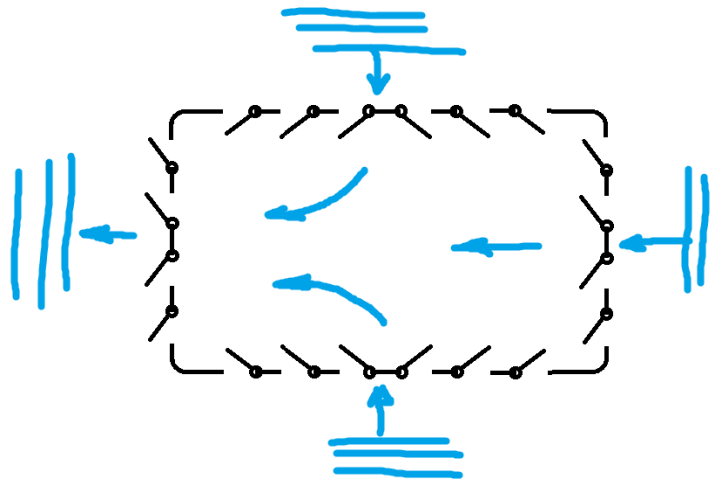


Figure 4 – The many "little peoples – valves" directs waves energy

### 3. The statement of the problem

The main function of the system (ship) is to move forward. The goal is shipping in a given direction with reasonable speed. Therefore, **the ideal final result:** the ship itself is moving from the influence of waves. Wave energy is spent not on pitching, but on the motion of the ship forward.

Let's evaluate wave's power on example. A typical cargo ship of 100 m length has the engine power of 3000 kW. Medium wave in the open sea in the middle latitudes has a power of 30 – 50 kW per 1 m of the wave front. On the length of the ship will receive:  $30 * 100 = 3000$  kW. Thus, for many types of ships wave energy will be enough to replace traditional engines.

The energy of the waves is to receive by all (almost all) surface of the hull and redirect (with forming water flow) from the nose to the stern, forming propulsion. But this implies a **technical contradiction:** the entire hull surface must transform harmful external wave energy into thrust. But in this case the hull will not be able to perform its basic functions – will reduced the cargo capacity, buoyancy, etc. (Fig. 5).

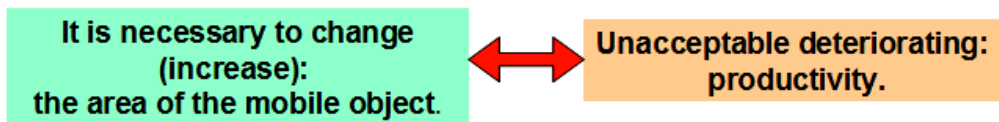


Figure 5 – The technical contradiction

We used well known matrix of **40 inventive principles** to solving technical contradictions [Altshuller G.S., 1973]: 1) select from matrix the feature to improve: area of the mobile object; 2) select the feature to preserve: productivity; 3) the ways to overcome contradiction is received.

#### 4. The problem solutions

The first way is “principle 2 – taking out” (to separate an interfering part or property from an object, or to separate only necessary part of an object). This part of the hull is the receiver of energy waves (Fig.6). The energy of the waves is received and converted into thrust by underwater part of the hull – by system of valves connecting underwater hulls with a above-water part. This ship modification is the catamaran with small waterplane area.

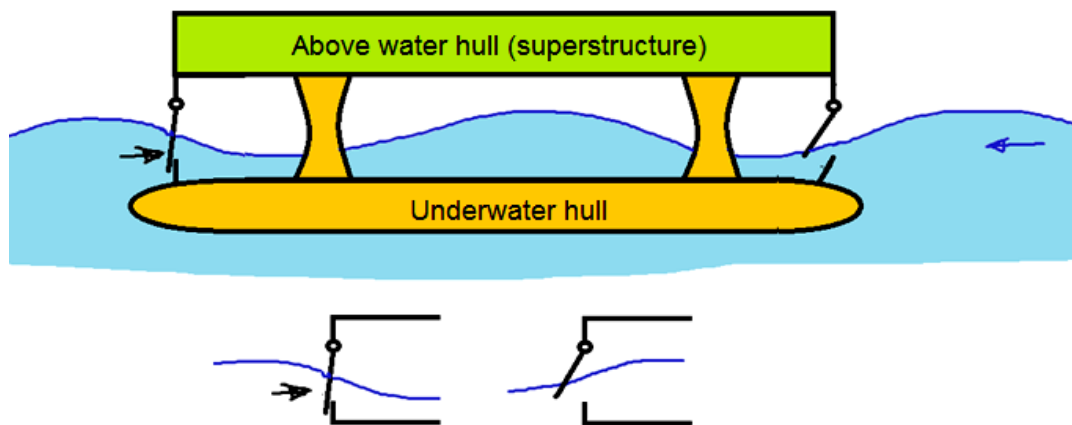


Figure 6 – The first idea of technical solution

The second way is “principle 26 – the copying” (instead of an unavailable, expensive, fragile object, use simpler and inexpensive copies; also change the copies scale). Many valves in the lower part of the ship pass water up at the top of the wave and release water only through the stern on the bottom of the wave (Fig. 7). Instead of multiple valves is possible to use special materials waterproof in only one direction.

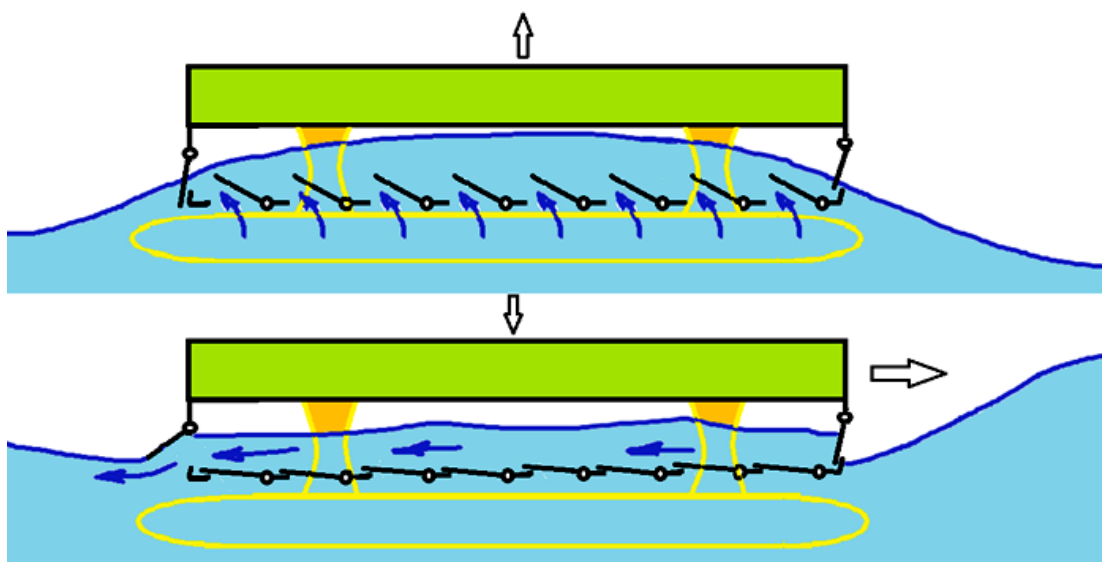


Figure 7 – The second idea of technical solution

## REFERENCES

Альтшуллер, Г.С. Алгоритм изобретения. -М.: Московский рабочий. 1973.  
 Altshuller G.S. Algorithm of invention. – М.: Moscovskyrabochy. 1973.

Jung-woon Lee, Department of Optical Engineering; ok-gihuang, Department of Mecanical system; ji-hoon Kim, Department of Mecanical system; seong-ook Kim, Department of Medical IT fusion Engineering. Kumoh National Institute of Technology

## CONTACT LENS CASE WHICH DISTINGUISH THE FRONT AND THE REAR OF THE LENS

### Abstract

#### Background Abstract

Contact lenses can easily overturn due to the fluidity of the material and are difficult to distinguish from reversing. Also, wearing an inverted lens can cause eye irritation and damage.

#### Methods Abstract

The problem of reversing lens is prevented from turning over through the lens case, which is a peripheral resource.

#### Result Abstract

It is possible to reduce the cause of overturning through the lens case and to easily distinguish the inversion.

#### Conclusion Abstract

A user wearing a contact lens can improve the problem of lens overturning through the lens case and use it safely.

## 1. Problem

### 1.1. Problem information

We're trying to solve the problem is distinguish the front and the rear of the lens to difficult.



Figure 3 – [ministry of health and welfare of korea, korean academy of medical sciences, U-Jin saint Mary's Eye Center]

Next on, This picture in internet is distinguish the front and the rear of the lens.

Thus, If distinguish lens by pressing a hand, lens may be damaged and Hard to be identified by the user who low sight difficulties.

So, If contact lenses from overturn, Not secured in the eye is exactly and Cause corneal damage and pain.

So, We are addressing those problems, contact lens users ultimate goal is to ensure that they can use safely.

## 1.2. Problem analysis

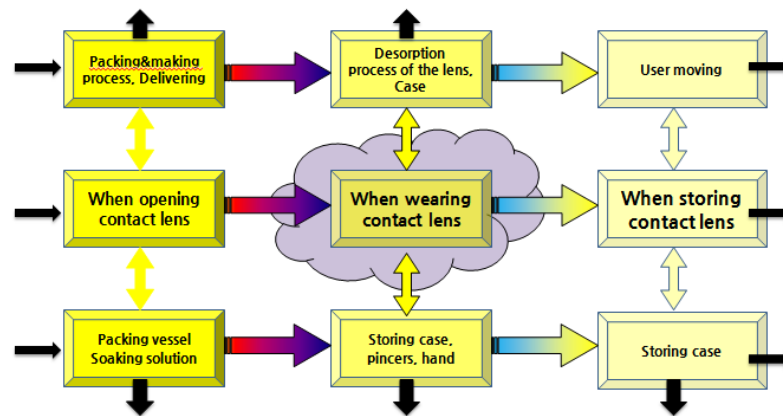


Figure 4

Next on, time and space to problem through its 9window, looked up.

First, before we open a lens case, overturning not between manufacturing processes, and delivery process. Second, be not overturning occurs during the user to hold the lens. Lastly, be not during the user to hold the lens, the overturning occurs. But, for the first one is manufacturing must be very precision. Even if overturning occurs is likely to be very low overturned. Even because defective product is overturned if overturning occurs. In the case of the first and the third user moving in the lens case, it was found that the lens was not inverted even if it was shaken by applying a large force to the lens case and putting the lens into the lens case.

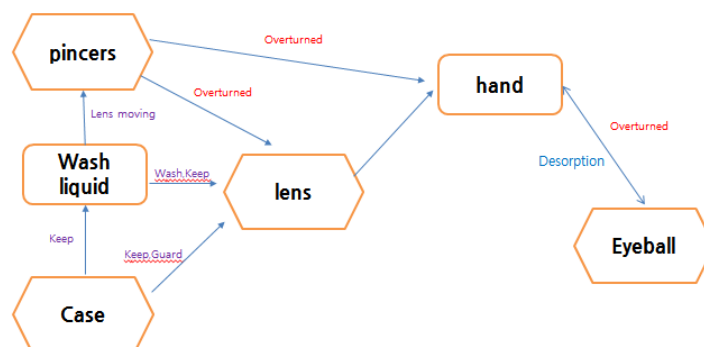


Figure 5

The following figure is a functional diagram showing the system for attaching and detaching the lens to the eye. As you can see, when you wear the lens, take the lens out of preservative in the case with pincers. In this case, since the lens surface is rounded, the difference of forces on the front and the back can cause the

overturning of the lens, and it is also happened when the lens is moved by fingers. When removed by hand, the lens is also overturned.

## 2. Derive solution

### 2.1. IFR

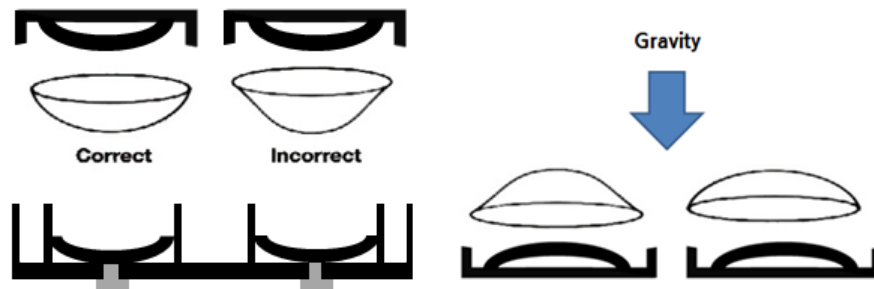


Figure 6

The top surface is a spherical surface similar to the eyeball, which prevents the lens from turning when placed in the case and bottom of base side that soaking solution is filled install drain to sink water.

If this way make, lens attach curved side due gravity when lens case overture after multiple.



Figure 7

Curvature of cover side make convex lens to expand edge, also user easily look at expanded edge to draw guideline and overtured lens make distinguishable through guideline.

### 2.2. Solution assessment

The solution from the IFR step was to avoid the use of lens pincers by inserting drainage ducts and to minimize the occurrence of lens overturning by placing a spherical surface similar to the eyeball. In addition, the top surface of the case is formed into a convex lens shape so that even if overturning occurs, it is easily distinguishable. The cost is similar to that of the conventional lens case.

## 3. Conclusion

The above solution minimizes lens overturning and makes it easy to distinguish even when turned upside down so that contact lens users can safely use it.

## INSTRUMENTS OF TRIZ FOR ANALYSIS OF THE "CHILDHOOD" SYSTEM

For the uniqueness of the concepts we introduce the basic definitions.

**Childhood** is a stage of human development prior to adulthood that characterized by intensive growth of the body and the formation of higher mental functions. By international standards enshrined in the UN Convention on the Rights of the Child, childhood is the period of life from birth to the age of the youth (under 18 years).

By the age periodization accepted in pedagogy, childhood is the period up to 11 years, which includes: infancy - up to 1 year; early childhood - up to 3 years; preschool age - up to 7 years; primary school age - up to 10-11 years.

**Society** is the current situation in the process of historical development of a relatively stable system of social connections and relationships between people on the basis of joint activities aimed at the reproduction of the material conditions of existence and needs; The society is supported by virtue of customs, traditions, laws and so on.

The system "Childhood" was considered from the point of view of the system of laws of development of technical systems.

**System** – Childhood.

**System property** - Maintain and develop society.

**Influenced subject** - Society.

**Main useful function** (this is the path to the goal, the process of the basic functioning of the system) is to form the future of society.

**Main functions** (main functions ensure compliance of MUF of the system, they can't be less than the number of elements in the system):

1. Maintain and improve the health of society;
2. Improve the education of society;
3. To develop the spiritual and moral qualities of society;
4. To develop the culture of a society.

According to the law of system completeness:

The necessary conditions for the existence of the system are at least the minimum operability of the major parts: a working body, transmission, engine and control system; presence of material, energetic, information and, on their basis, functional connections between these parts of the system (fig. 1).

**The source of energy** is the instinct of procreation.

**Engine** is the interest of the society in the preservation and development of their potential.

**Transmission** is the health-care, education, training, and organization culture and sport systems.

**The working body** is the resources, reserves and opportunities of children;

**Influenced subject** - Society.

**Management body** is a policy in the interest of childhood, the activities of non-profit organizations, mass media etc.

**External control** is the moral norms and principles of the society.

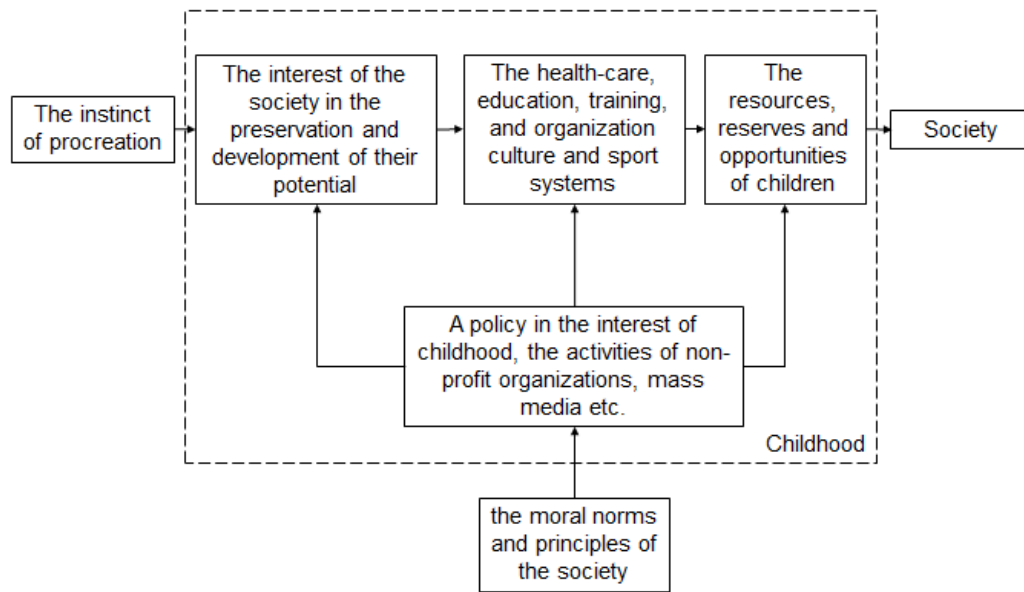


Fig. 1 – System completeness

The point of view of the system operator:

Supersystem – Society;

System – Childhood;

Subsystem - babies, preschoolers, junior high school students, etc.

Next, consider the system horizontal of childhood.

*Childhood under primitive system.*

**Undesirable effects** – the death of children because of the lack of a child's status in society.

**Contradiction** – an increase in the number of children in the society is unacceptable degrades their controllability.

**Method of resolving the contradiction** – **splitting up**: society to families. children managed by the head of the family. Patriarchal authority in the family.

*Childhood in the Ancient World*

**Undesirable effects** – the occurrence of the slave trade, particularly the sale of children, to improve the financial situation of the family.

**Contradiction** – with an increase in the number of children in the family the number of abandoned children is unacceptable increase.

**Method of resolving the contradiction** – **Taking out**: setting up shelters, abandoned children "taken out" from the unfavorable environment.

*Childhood in the Middle Ages*

**Undesirable effects** – limited abilities because of the impossibility of changing the kinds of activities.

**Contradiction** – with an increase of the kinds of activities controllability of the system unacceptable degrades.

**Method of resolving the contradiction:**

1 **Universality:** manufacture provide training opportunities, provision of works and material benefits so culture develops;

2 **Mediator:** create laws governing all spheres of society.

#### *Childhood in Modern Time*

**Undesirable effects** – using child labor in all sectors because of the lack of manpower and cheapness.

**Contradiction** – with an increase in the number of unemployed children their abilities are unacceptable degrades (they no longer teach at work).

**Method of resolving the contradiction** –

1 **Splitting up:** general education became compulsory for all; Before you start working you need to get a degree;

2 **Universality:** nursery schools, high schools, universities etc. perform such different functions as upbringing, education, development of culture.

#### *Childhood in industrial society*

**Undesirable effects** – seclusion of children from their families because of the permanent employment of children and parents (on learning / work).

**Contradiction** – if there is no any employment then the development of society slows down.

**Method of resolving the contradiction** – **Mediator:** development of information technology has affected the fact that children can keep in touch with their parents.

#### *Childhood in the Information Society*

**Undesirable effects** – deceleration of the development of child's personality because of the immersion of children in virtual reality.

**Contradiction** – when restricting the use of children information technology to create a virtual reality, is unacceptable worsen adaptation of children the skills to changes in information technology.

**Method of resolving the contradiction** – **Mediator:** increasing the degree of individualization of education and training by attaching to every child spiritual mentor.

As a result, is constructed TRIZ-evolutionary map (fig. 2)

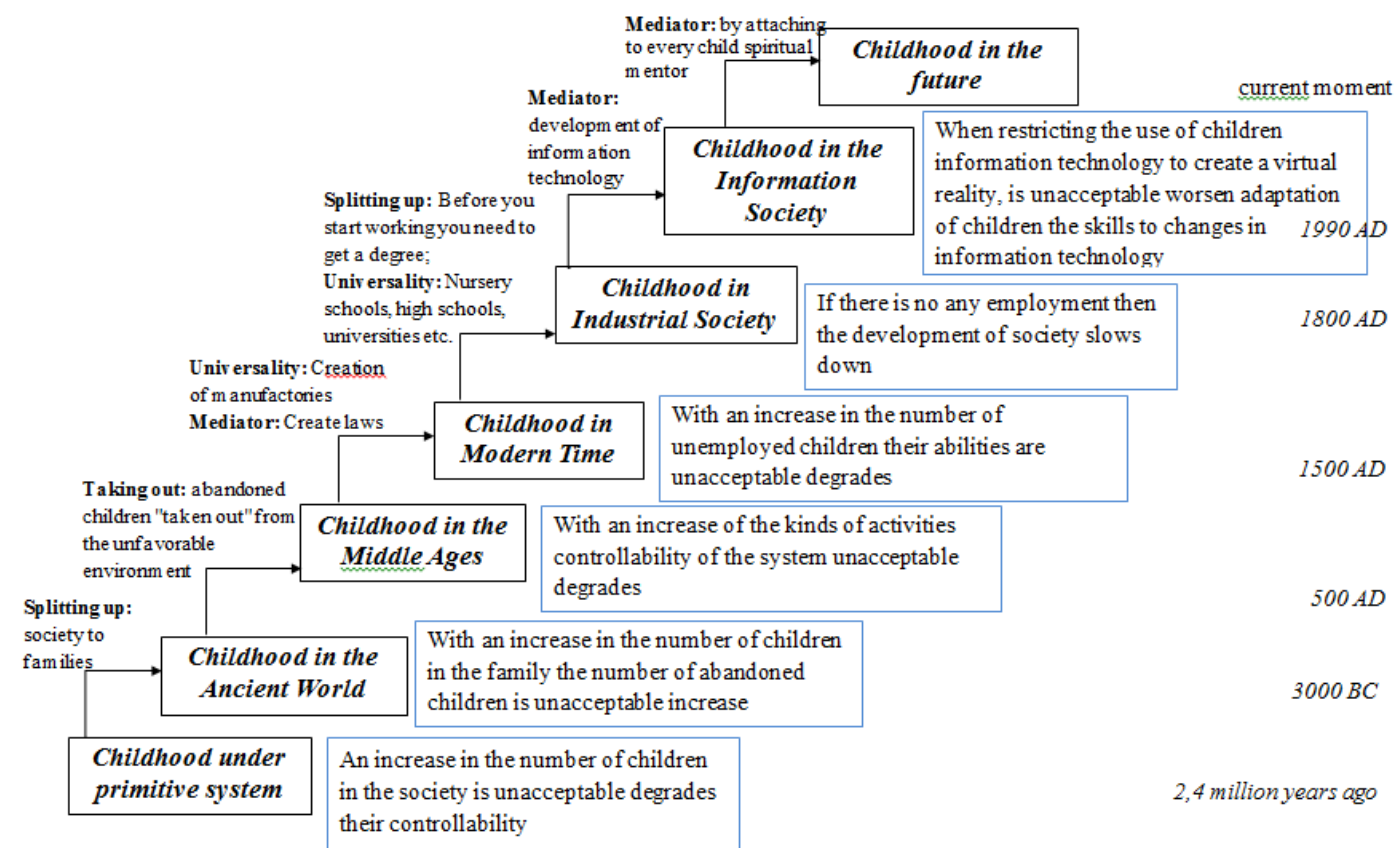


Fig. 2 –TRIZ-evolutionary map

## REFERENCE

- 1 Kodzhaspirov G. M., Kodzhaspirov A.Yu. Pedagogichesky dictionary. – M.: Academy.–2000.–176 pages.
- 2 Sociology: encyclopedia/ Comp. by A.A. Gritsanov et al. Minsk, Interpresservis; Knizhnyj Dom, 2003.
- 3 Pyzhikov A.V., Tkach O.P., academician RAS Fursenko A.A., Khvostov D.O. World History. Encyclopedia. The 14 volumes. – M.: Olma-Press.
- 4 Berdonosov V, Redkolis E. TRIZ-evolutionary approach: didactics // ETRIA World Conference TRIZ Future 2014. Global Innovation Convention. – October 29-31, Lausanne, Switzerland.
- 5 Berdonosov V.D., Zhivotova A.A. – Application of the TRIZ-Evolutionary Approach to Studying Knowledge Fields Using the Example of Python/Django Web-Development Tools Analysis

## AIDS FOR STUDENTS WITH VISUAL IMPAIRMENTS

Receiving higher education (including university education and graduate school education) in the Korean society where the university entrance rate has risen to 70 to 80% is a natural right of students equivalent to 70 to 80 of 100 students. Many students have the right to gain knowledge while studying for admission.

It is important to study mathematics at entrance exam and college education. With the advent of "artificial intelligence" and Big Data, mathematics in the 21st century is becoming increasingly important. However, there are people who are having difficulty studying this important mathematics and who do not have a chance to go to college. Because of the nature of mathematics based on comprehension and computation, mathematics is one of the main causes of abandonment for students with visual impairments. If the main cause for students to give up mathematics is not 'math difficult' but 'no or little visual ability', it's a big problem and we have to solve this problem.

The French geometric Bernard Maurin, who lost sight at the age of six, mentioned two techniques that make the blind more proficient in mathematics. The first is 'mental arithmetic' and the second is 'space imagination'. In 2010, Korea Education Academy introduced Braille information terminal to improve its mathematical ability to a certain extent, but Braille information terminal can be a great help only for 'mental arithmetic'. So we needed a device that could help 'space imagination'. So we designed the idea.

We wanted a special method other than an inefficient learning method that uses magnets, wooden sticks, etc. This can greatly exceed the efficiency of learning. We solve the information gap that can happen to the visually impaired, so that we can draw and complement the imagination of the space and implement the graph of various functions.

This the learning assistive technology device consists of a square bar divided into multiple cells containing iron balls and magnet bars. This device is driven by magnetic force. With different extruded marks on the side of the board, users can recognize rows and columns, and users can start with the x and y axes (or the y and z axes, or the x and z axes) . The graph is drawn by the magnetic force of the magnet bar and curves and shapes are drawn as needed. At this time, it is necessary to display the graph by setting the value of the axis set by the user (the inter-cell interval value of the axis and the actual value corresponding to the specific cell) to the user's head. It is the principle that returns to the original state by the pressure of the non-magnetic substance attached to the fingertip or the rod. With this device, you can understand function concepts using tactile data, not visual data, through iterative learning that recognizes function graphs. Coordinate values can also be transmitted to the PC via the sensor at the bottom of the board (hall sensor responding to magnetic force). To modify the data in the graph, press the reset button. It is designed to modify the data transmitted within the network. In the future we expect to draw graphs from the PC to the device and display various functional graphs on the board.

Students with visual impairments can also use mathematical models and graphs of various functions at the same time. Students with visual impairments have access to mathematics using the software benefits of the information age. In the future, if a function graph aid is used as a learning tool for a student with visual impairment, a visually impaired student can create a functional graph to better understand the function and solve the problem more quickly. In addition, I expect that the disparity of mathematical understanding with Jing'an students will be greatly reduced.

Functional graph learning assistive technology devices can improve mathematical access through continuous development and development in modern societies where mathematical and geometrical knowledge is essential and eliminate the information gaps for the visually impaired.

```
void setup() {
  Serial.begin(9600); //마두이노 시리얼 통신 연결
  pinMode(A0, INPUT); //analog 0번 핀을 첫번째 input으로 지정 - 각 핀에서는 센서를 통해 input을 입력 받을 수 있음
  pinMode(A1, INPUT); //analog 1번 핀을 두번째 input으로 지정 - 각 핀에서는 센서를 통해 input을 입력 받을 수 있음
  pinMode(A2, INPUT); //analog 2번 핀을 세번째 input으로 지정 - 각 핀에서는 센서를 통해 input을 입력 받을 수 있음
  pinMode(A3, INPUT); //analog 3번 핀을 네번째 input으로 지정 - 각 핀에서는 센서를 통해 input을 입력 받을 수 있음
  pinMode(A4, INPUT); //analog 4번 핀을 다섯번째 input으로 지정 - 각 핀에서는 센서를 통해 input을 입력 받을 수 있음
}

void loop() {
  delay(100); //지연시간 100ms
  int a0 = digitalRead(A0); //a0이라는 변수를 지정하고, 그 변수에 A0핀을 통해 인식된 input 값을 대입 (input은 0또는 1로 존재) - 제대로된 입력은 0(HIGH), 평시는 1(LOW)
  int a1 = digitalRead(A1); //a1이라는 변수를 지정하고, 그 변수에 A1핀을 통해 인식된 input 값을 대입 (input은 0또는 1로 존재) - 제대로된 입력은 0(HIGH), 평시는 1(LOW)
  int a2 = digitalRead(A2); //a2이라는 변수를 지정하고, 그 변수에 A2핀을 통해 인식된 input 값을 대입 (input은 0또는 1로 존재) - 제대로된 입력은 0(HIGH), 평시는 1(LOW)
  int a3 = digitalRead(A3); //a3이라는 변수를 지정하고, 그 변수에 A3핀을 통해 인식된 input 값을 대입 (input은 0또는 1로 존재) - 제대로된 입력은 0(HIGH), 평시는 1(LOW)
  if(a0==0){
    Serial.println("(0,0)"); //A0핀에 input이 제대로 입력 되면, A0에 해당하는 좌표값인 (0,0) 출력
  }else if(a1==0){
    Serial.println("(0,1)"); //A1핀에 input이 제대로 입력 되면, A1에 해당하는 좌표값인 (0,1) 출력
  }else if(a2==0){
    Serial.println("(0,2)"); //A2핀에 input이 제대로 입력 되면, A2에 해당하는 좌표값인 (0,2) 출력
  }else if(a3==0){
    Serial.println("(0,3)"); //A3핀에 input이 제대로 입력 되면, A3에 해당하는 좌표값인 (0,3) 출력
  }
}
```

Figure1 – Code for software

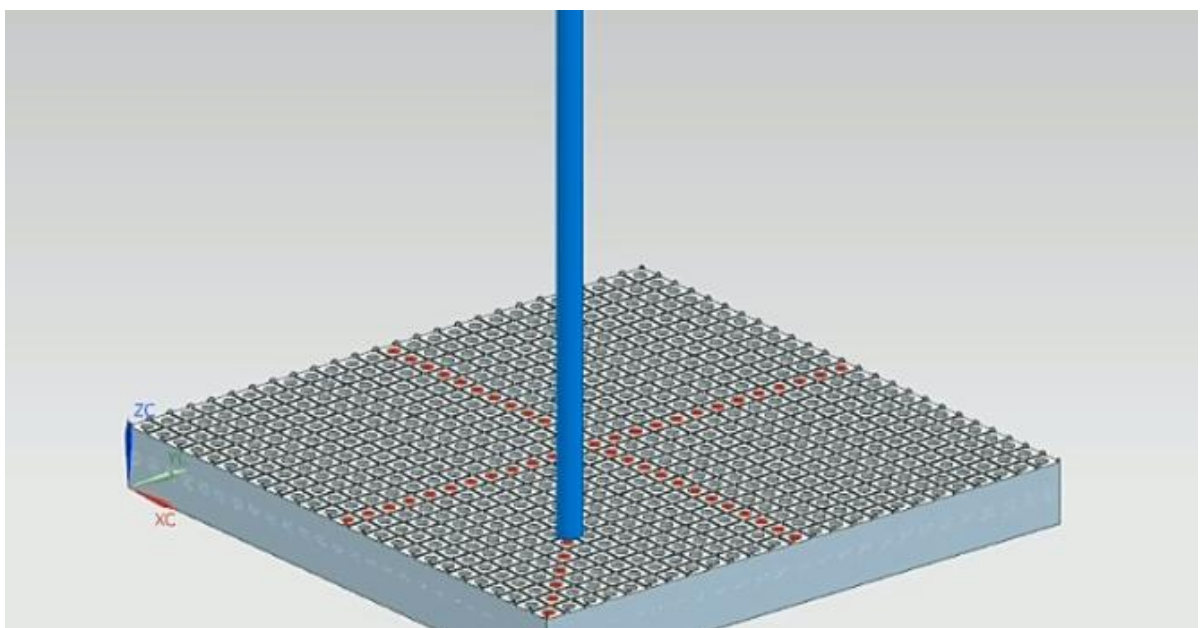


Figure 2 – prototype

UDC 686.862.6

Scherbatiuk E.A., pupil; Galiulina D.R., student; Scherbatiuk G.A., senior teacher

Komsomolsk-na-Amure State Technical University

## EXTENDING THE LIFE OF THE MARKERS.

In carrying out the project, we would like:

Applying the TRIZ-based technologies to make changes in the design of markers, to prolong their lifetime and improve the consumer properties.

To do this, we

- consider marker with melancholy view of the system and functional approach;
- applying CARIZ form a new image of the marker.

The marker (Felt-trip pen for the board) –tool for drawing lines on the surface of the white board that can be easily erased.

It is often used in schools.

According to the standard marker should put a line of at least 300 meters before he stops writing. But 300 meters is how many days? If you write a lot, then 5-6, and then we throw out and buy a new one.

How to make that one marker was enough for the entire semester?

How to reduce costs for markers?

From the perspective of a systematic approach to quality marker works influenced by the following factors:

- work with an open cap;
- the volume of material that we write;
- a man (how he writes, closes or does not close the cap when the token is not needed);
- manufacturing technology.

Therefore we allocate productive parameters such as:

- operation without cap;
- color + brightness;
- line thickness;
- line length.

The function on the principle of action: the marker leaves the ink layer on the surface of the board.

The marker consists of a casing with a cap, a porous core, a colorant, and a pen. Super system for the marker: the hand of man white smooth board.

According to the system operator can see that the working body of the solid went into a liquid state.

The next stage of development – line projection assumes a considerable complication of the technical system (projectors), and it is not always convenient.

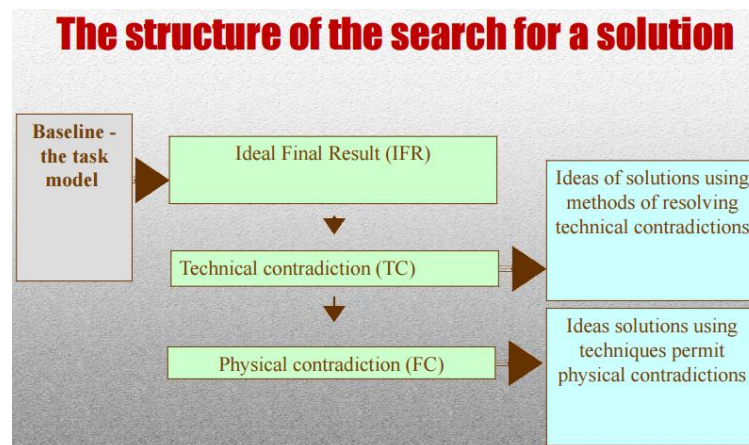
Therefore, we will make changes to the existing design of the marker.

Ideal final result:

- the marker knows when it is necessary to fill;

- colorant itself falls on the feather without interruption;
- filling is instant itself.

To solve the problem, we used a simplified, children's algorithm for solving the problem (CARIZ).



To clarify the problem to answer questions:

**“Where?”** Manifestations of undesirable situation;

**“When?”** Under any circumstances (at a moment);

**“What?”** The undesirable situation which parameters of the technical system (technology) out of the norm, and what it affects.

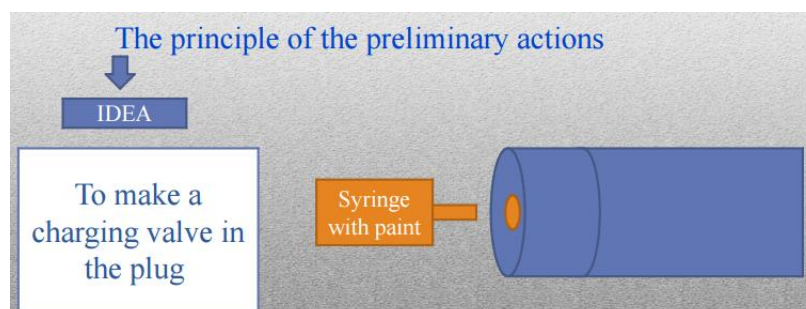
Clarifying the task 1.

**“Where?”** The plug body, a porous tube, paint.

**“When?”** Filling marker.

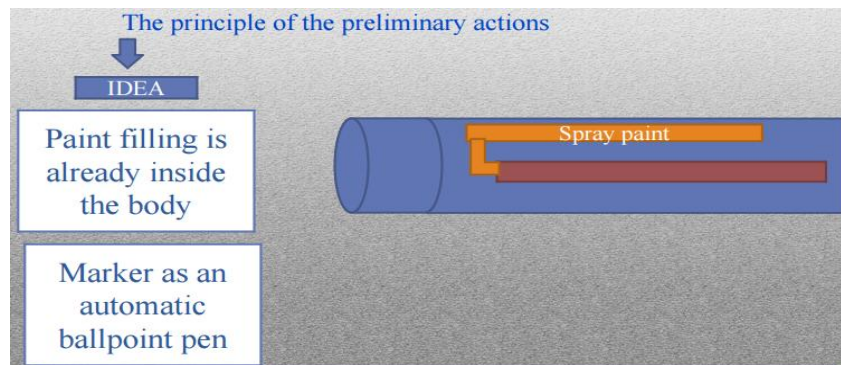
Technical contradictions 1.

In order to fill a marker cap should be open, but it is made welded to the safety of children.



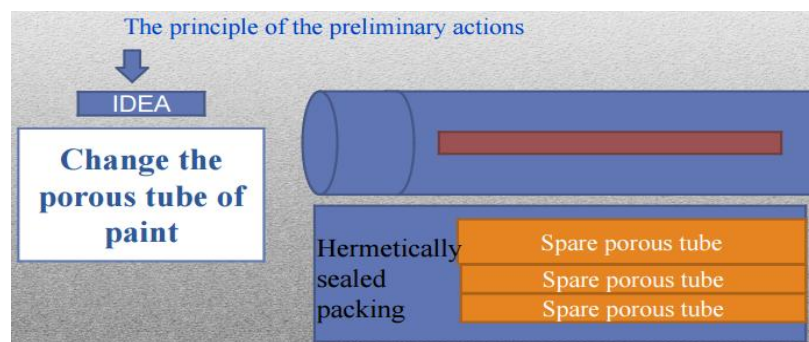
Technical contradictions 2.

In order to fill a marker cap should be open, but it is made welded to the safety of children.



### Technical contradictions 3

In order to fill a marker we should add some paint, it is dirty, or requires additional devices.



Clarifying the task 2.

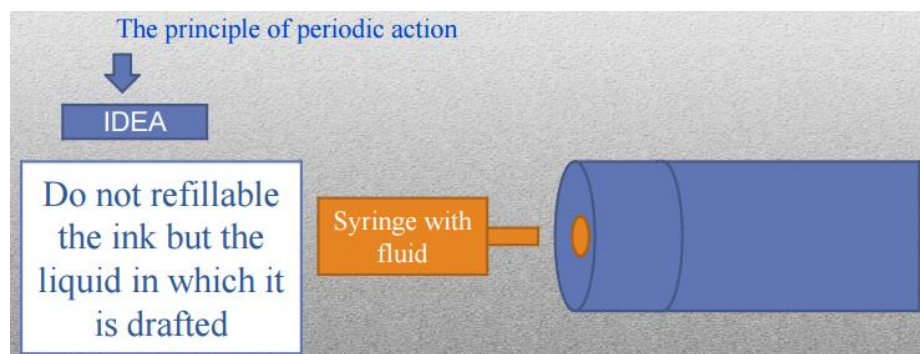
**“Where?”** The plug body, a porous tube, paint.

**“When?”** Filling marker.

**“What?”** Marker dries faster than colorant ends.

### Technical contradictions

If the colorant is in a marker sufficiently, it can be used for a long time, but an aqueous or alcoholic base may leak if there will be much of them.



Clarifying the task 3

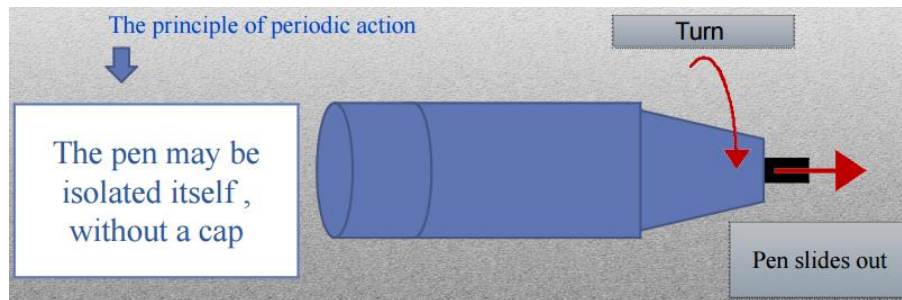
**“Where?”** The porous tube, pen, paint.

**“When?”** While using marker.

**“What?”** Marker dries up when the pen is not capped, i.e., when we write or think, what to write.

### Technical contradictions

Alcohol evaporates quickly when the base cap is open, but close in tiny periods between using is uncomfortable. (Action time is comparable with the time intervals when we do not write)



## A COMB TO DRY WET HAIR

Every morning, most people spend a lot of time drying their hair. Especially women have a hard time before going to work. We solved the problem using ADRIGE.

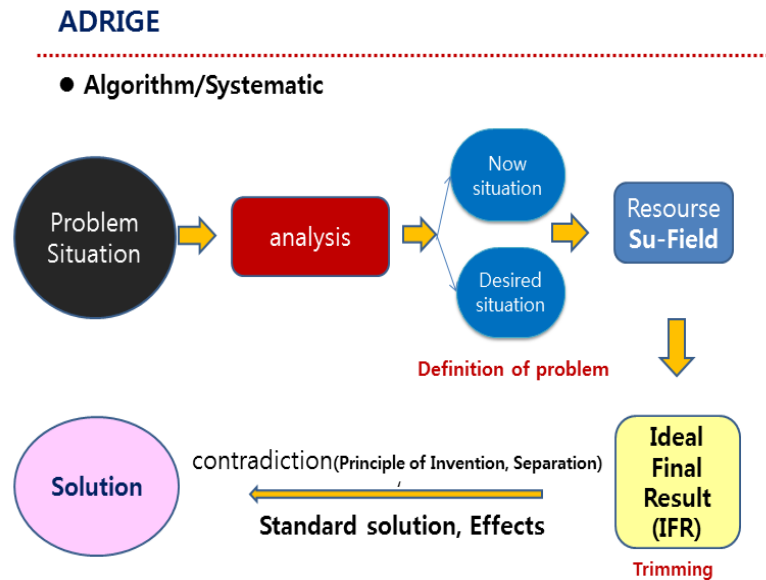


Figure 1

First, I will explain the assignment information. Our title is A comb that will dry wet hair. As I said. It takes a long time to dry hair. So our Target point is Reducing hair drying time. Using drying function comb can reduce thermal damage and drying time caused by the drier.

Next, I will analyze the problem situation through what, when, where and why. "What?" is People with long hair are busy in the morning. Because they have a long drying time. "When?" is Problems arise when you need to dry your hair quickly. "Where?" is Moisture is aggregated on the hair and problems arise. "Why?" is People who have long hair have a lot of moisture.

This is a representation of the system function and process diagram. We analyzed the problem using Root cause analysis. Why is a person with a long hair short on time in the morning? Why does it take a long time to dry hair? Why dose it to take a long time to dry hair if you have a lot moisture? If so, can you use it to increase the surface area? In conclusion, the final goal is to prevent re-agglomeration of hair by moisture.

This is what defines the problem. and This is the way to solve it.

We used MATCEM to explore resources. We analyzed the characteristics of material fields for each of the system, environment and higher system.

The ideal solution is called IFR, which means that the problem is solved by itself.

In chemical field, IFR is to make the comb itself absorb water. In thermal field, IFR is that the comb itself develops heat to dry the hair.

Finally, the solution was derived using the trimming method. First, The comb absorbs moisture. So. Water absorbent material is coated on comb. Second, comb your hair and dry it at the same time. To solve it, install a dryer in the comb.

Using the material-field model and the standard solution to derive the solution.

We found a contradiction in the problem-solving process. The first contradiction is that when a comb is coated with a water absorbent material, the comb becomes thick and does not enter the hair well. In order to solve the contradiction, using the TRIZ method of Nesting, the comb itself is made into an absorbent material.

The second contradiction is that heat is needed to dry the hair, but heat damages the hair. Using extractions to solve the contradiction, instead of applying direct heat to the hair, the comb absorbs moisture from the hair. Then, the heat is applied to the comb to vaporize the absorbed moisture. The solution so far has been to vaporize water by hot lines.

There is a second problem here: once the combs absorb the moisture, they will vaporize with the hot wire inside the comb.

However, the heat is applied to all parts of the comb, In order to solve this problem, it is possible to rotate the comb by 180 degrees after making the heat line into a semicircle shape, and the heat is only transmitted to the part where the hair does not touch, so the heat does not touch the Hair.

In conclusion, turn the comb 180 degrees, Transmits heat only to areas where hair does not reach, thereby evaporating moisture.

This is the final 3d drawing. As you can see, the comb is made of hygroscopic material, the surface that fixes the comb is rotating, and the opposite comb is dried by heat.

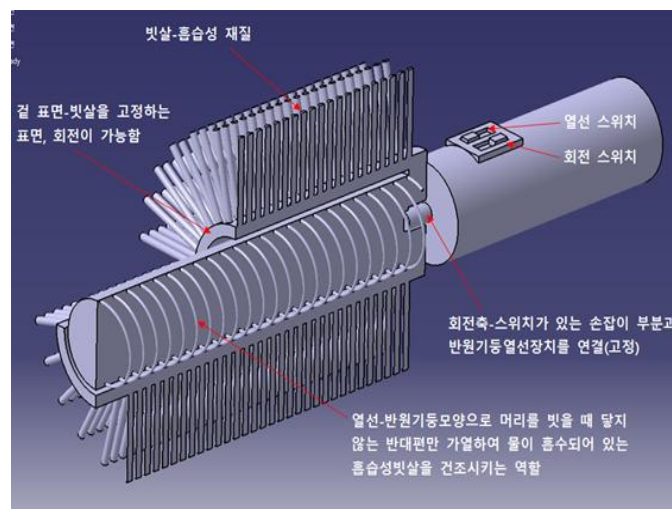


Figure 2

A comb is produced that does not directly apply heat to the hair.

Inorganic fine particles such as silica ( $\text{SiO}_2$ ) are added to poly ethylene based absorbent polymers to form combs with high absorption rate.

Pointed at the tip of the comb to release the hair agglomerated by moisture.

In order to prevent damage to the hair due to direct heat to the hair, a semi-circular heat wire is installed inside the comb and the circular comb is rotated 180 degrees.

## BERTHING CONTAINER CRANES

As known, during cargo operations at ports are often used so-called gantries cranes. An example of this type of device is a truck crane "Gantz".

It is a mechanism that can rotate around its axis by 360 degrees. The presence of four rack portal gives extra stability, while leaving the possibility of movement in confined space.

But it is not always convenient to use, because this cargo crane requiring a very large area for maneuvering of crane boom.

The problem of efficiency of use of the pier territory is very actual in many ports around the world. So now other devices in this class are usually used – container cranes. The advantages of these cranes compared with "Gantz" are following:

- Reduced crane weight and low center of gravity;
- High performance;
- Durable and stable construction.

But progress does not stand still. To date, there are container ships that can hold thousands containers. Loading and unloading of the ships are not only very complex in technical terms, but also a very long in time, even when using multiple cranes.

As known, this significant duration for loading and unloading of container ships is determined by the following factors.

Firstly, there is a human factor. As is known, the human factor plays a decisive role in the implementation of many activities. In our case – unloading containers speed decreases due to difficult control of accuracy at presence of wind and motion.

This is due to the fact that the trajectory of container's unloading at work of "novice" and "experienced" operators are different. "Novice" at first operation lifts the container on "optimum" height and then moves the container and produces downhill onto transport. "Experienced" operators at work takes into account the wind and inertia of the container, and therefore perform the same operation much faster.

Concretize information:

What – container loader;

Where – in the seaport;

When – during container handling;

Why – insufficient capacity of transfer operations.

Let's identify the administrative contradiction.

With the increase in overall size of the vessel increases the execution of freight operations.

Derive technical contradictions.

The first technical contradiction: at increasing of the length of crane boom the time of cargo operations is increases.

The second technical contradiction: at increasing of the length of crane boom the internal stress is increases (problem of strength).

The ideal final result is shown as follows: the performance of container crane is provided itself in the absence of the traditional cantilever boom.

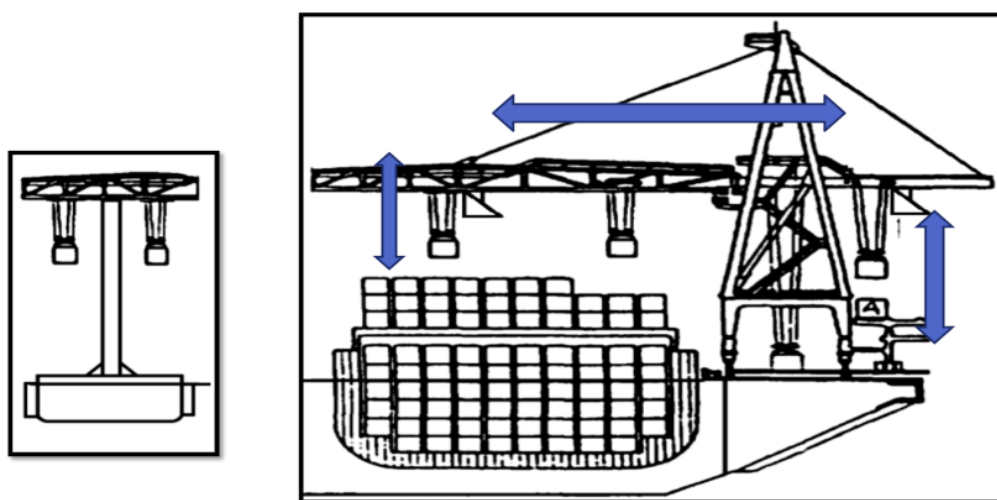
To achieve a ideal final result, it was decided to use one of the methods of TRIZ, namely – 40 standard methods resolve of technical contradictions.

By setting the variables in a program, the following standard methods were obtained:

- the principle of dynamism;
- the principle «Taking out»;
- the principle «anti-weight».

After analyzing the results, it was agreed that.

Establish mechanisms – lifting, moving and lowering operating independently from each other. The principle of operation of each device is as follows: container lifting device – performs only lift the container and its installation on the platform of overexposure. Then the work is accepted, the second device – moving, and transfers the container to a second platform overexposure at this point lifting device is busy already next container. Once the device is set move container to a second platform overexposure, it returns to the "zero" position and the "action" takes the third device – launching. Thus, we get a kind of "container conveyor", which will save time, container unloading (watch picture 1).

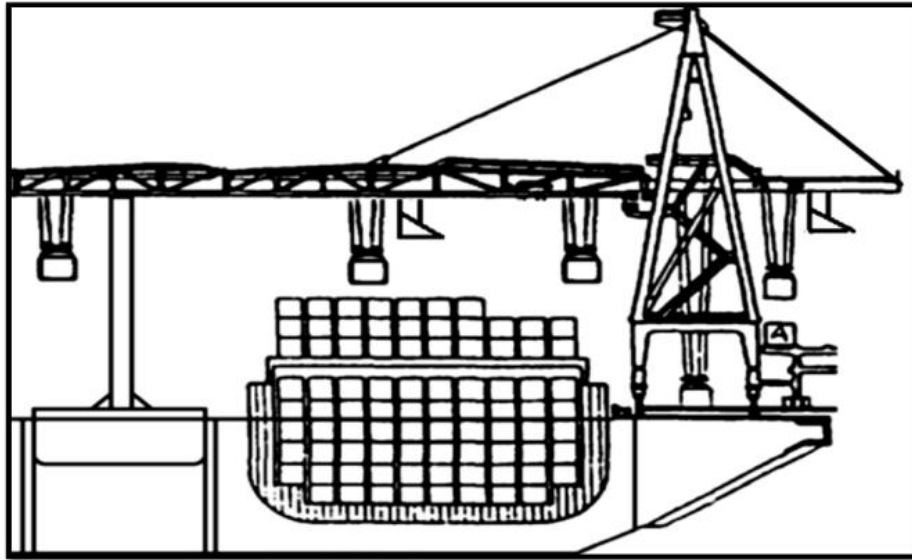


Picture 1 – Engineering solution №1

Using the principle of removal of the detachable boom (taking out) and make it mobile (dynamic principle).

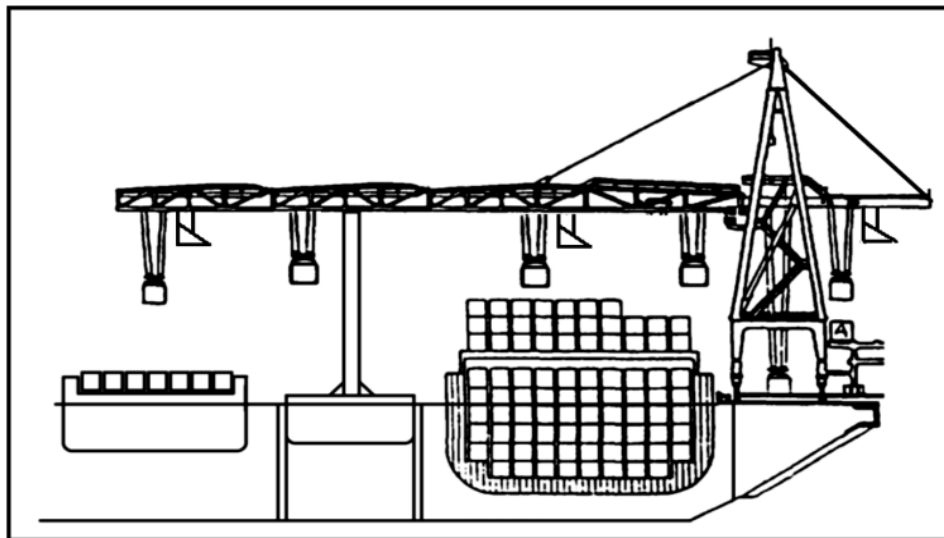
In accordance with the principle of «anti-weight» this part of the boom is supported by an additional support and is located on a floating barge (pontoon).

When unloading the large width of the vessel, the mobile suits from the opposite side of the vessel, is fixed vertically movable supports and attaches to the main boom (watch picture 2).



Picture 2 – Engineering solution №2

In developing this proposal, may be placed on a barge cargo area and / or conveyor (conveyor) for the transshipment of containers ashore. This will be provided by an overload of containers from the two side of the vessel at the same time (watch picture 3).



Picture 3 – Engineering solution №3

The result is a crane that can work as a standard – unloading on the dock (transport), and the "two sides" and unloading containers on shore and on the barges, which will be subsequently unloaded cargo other devices.

## HOW TO SOLVE THE ERROR OF DOUBLE TAG OF RFID

### 1. Introduction

#### 1.1. Resarch Purpose & Back ground

Today, Everything is gonna be electronization& automation. The representative case is RFID system. This system is very useful. We can see this system easily in daily life like public transportation. However sometimes you have trouble to use RFID.

For example, you can see this error at using RFID CAD gate “please tag only one card”.

Because you have many cards in your wallet or card holder.

We focus on this error of double tag of RFID.

#### 1.2. Solution direction

We try to solve the problem using TRIZ, keeping the RFID system intactly.

### 2. Cause of problem

Card reader is being confused, because two cards transmit the signal to reader each other.

Reader can't choice which card is activated.

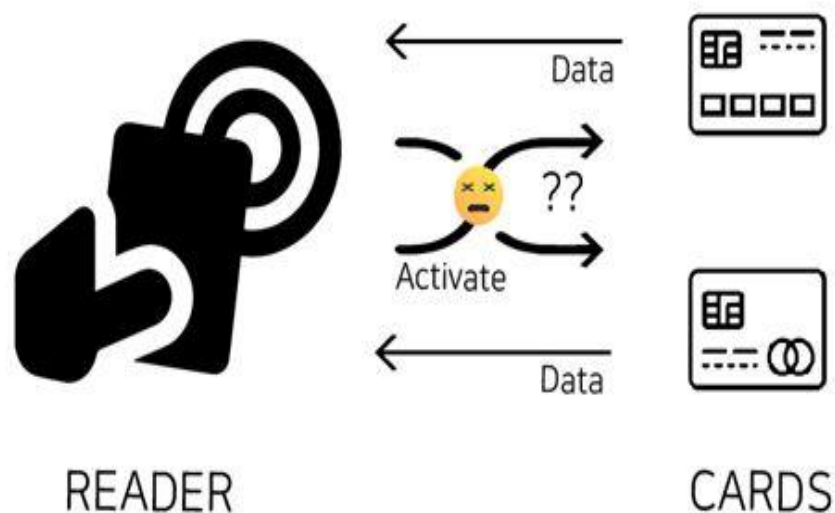


Figure 1

### 3. System analysis

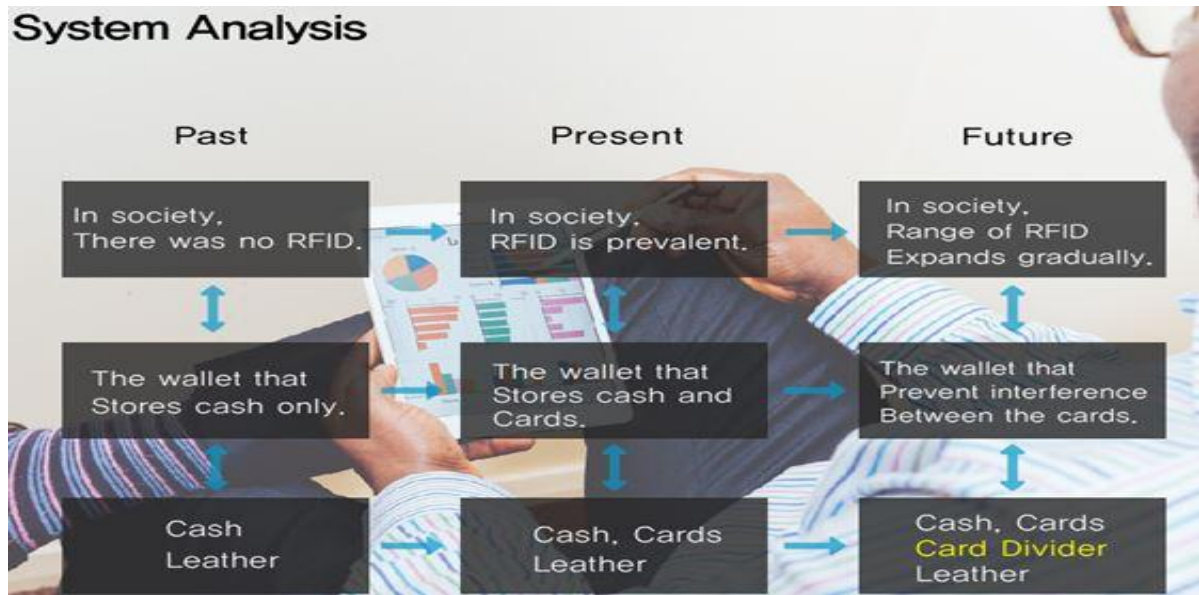


Figure 2

Through System analysis, we realize that society is proceeding to RFID technology and we expect that a range of RFID will expand more and more. However many cards holders get no better yet. To sum up, when you keep several cards in your wallet, to avoid double tag error. We need a advanced card holder.

So, we try to change present card holders by using card divider.

About details of card divider are in conclusion.

### 4. Searching resources

We conclude that if we use only the card holder's inside resources, problem can't be solved never. That is card holder's inside resources can't block the double signal.

Lastly, we put together all of our conclusion. We have to use other resource existing outside of wallet. To solve the problem, we used new material X. New material X is aluminum. Aluminum is characterized by block or reflect the electromagnetic signal. Our idea based on this aluminum's character.

Besides aluminum has a lots of merits which are light, low cost, get easy, simply manufacture. So we conclude using aluminum.

### 5. Su-field model

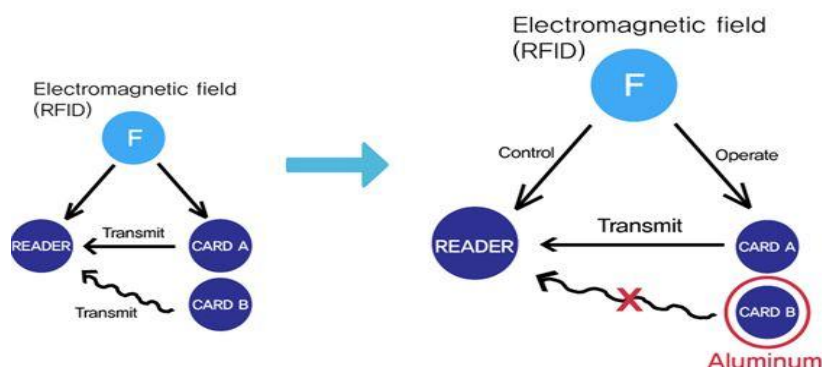


Figure 3

Like this by using the aluminum, blocking the unwanted card's signal is the point.

## 6. Conclusion

We used nesting and preliminary counteraction among 40 inventive principles.

Insert the slight aluminum plate to inside of the existing space between card holder's leather and leather. this is nesting.

Due to inserted aluminum plate unwanted card's electromagnetic signal can be blocked before hand, that is preliminary counteraction.

Once you see the picture ,you will understand what I'm saying easier.

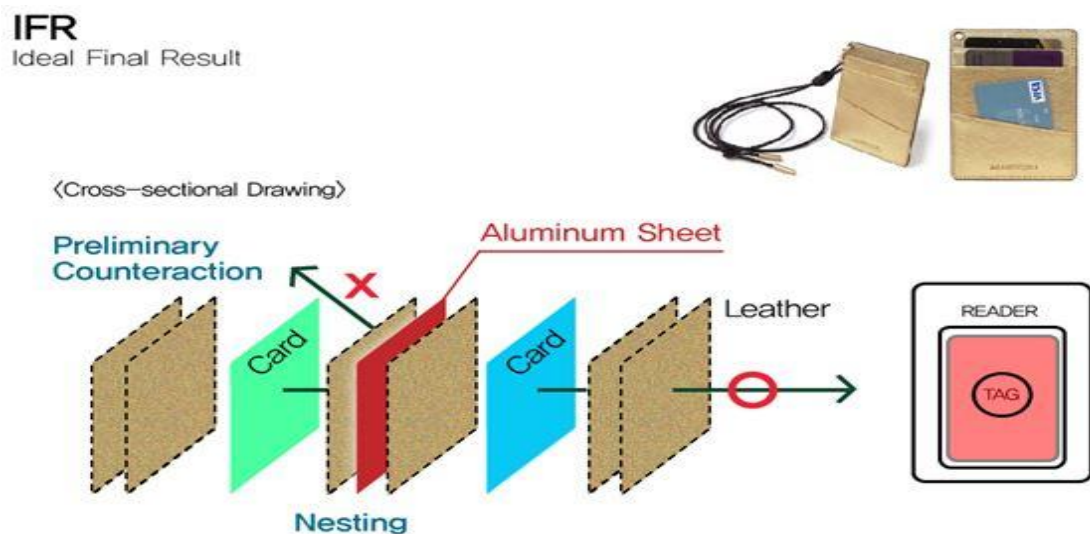


Figure 4

If you want to tag other side card. just reverse the card holder.

Due to blocking the unnecessary signal, this improved card holder or wallet can give option to user. so user can choice the card which want to be tagged.

## REFERENCE

1 Yongwon song, GyeongmoKim, Seunghyeon Gang and GenNaDiIvanov(2014), 『창의성의기술』, 씨네스트, pp 1-216.

## СОДЕРЖАНИЕ CONTENT

|                                                                                                                                                          |    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| LYABUSTINA YU.V., ZVEREV D.A., BERDONSOV V.D.<br>Enhancement of the graduation tower of combined heat and power plant .....                              | 3  |
| JEONG DA UN, JUNG JIN HO, KIM MIN SOO, KIM YUNG TAE<br>Automatic watering control flowerpot .....                                                        | 7  |
| SOLNTSEVA A., SCHERBATIUK G.A.<br>Application of triz evolution to "iron" system analysis .....                                                          | 10 |
| YANG JI WAN, AHN HYUN SOO, MYUNG EUN HEE, SONG YONG WON<br>Travel sickness prevention mode .....                                                         | 14 |
| KRIVONOSOV D., CHIZHIUMOV S.D.<br>The ideas of wave propulsion based on triz .....                                                                       | 17 |
| LEE JEONG WOON, KIM JI HOON, HUANG OK GI, KIM SEONG OOK,<br>KIM YUNG TAE<br>Contact lens case which distinguish the front and the rear of the lens ..... | 22 |
| VLASOVA N., ESKOVA A.V.<br>Instruments of triz for analysis of the "childhood" system .....                                                              | 25 |
| CHOI HA LIM, YU SANG KYUN, SONG YONG WON<br>Aids for students with visual impairments .....                                                              | 29 |
| SCHERBATIUK E., GALIULINA D., SCHERBATIUK G.A.<br>Extending the life of the markers .....                                                                | 31 |
| CHO KYUNG HWAN, KIM KYUNG JIN, RYU YEON HEE, SHIM MIN SU,<br>LEE JIN WOOK, BAEK GI PYUNG, JEON GEUN HYEONG, KIM YUNG TAE<br>A comb to dry wet hair ..... | 35 |
| GRUSHIN SERGEY S., BURMENSKIY A.D.<br>Berthing container cranes .....                                                                                    | 37 |
| LIM JAE KEON, KIM JU YEON, SONG YONG WON<br>How to solve the error of double tag of RFID .....                                                           | 40 |