

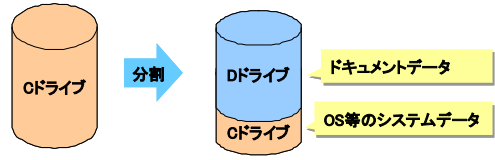



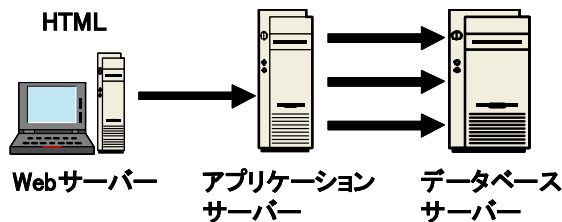


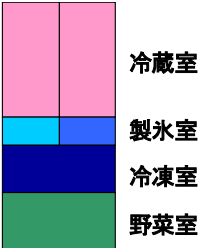




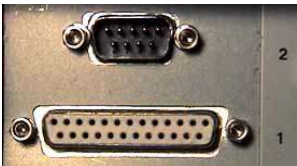
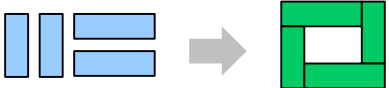
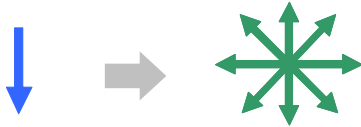

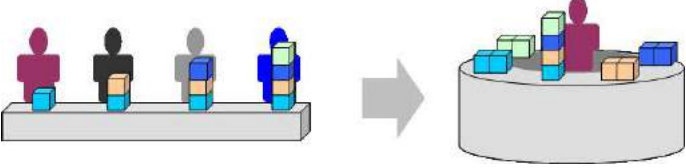
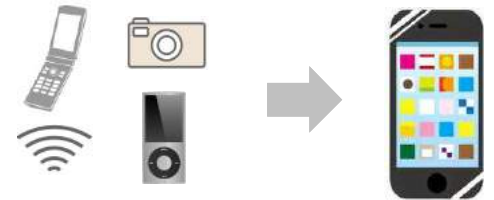
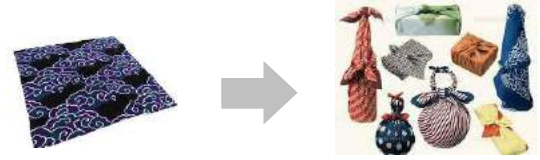
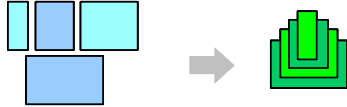
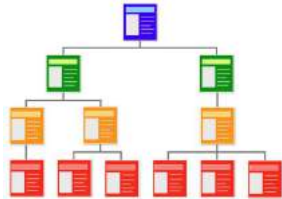





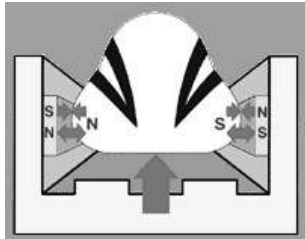
Invention Principle	1 Segmentation Divide into two or more	Invention Principle	2 Taking out Move to another place and select
Summary & Image	<p>「5. Principle opposite to the combination principle. The idea that the object and the system are divided into a small unit and the processing is tried smoothly. The level of division is thought to be primitive, to the molecular level. For example, the powder particles of cosmetics, it is possible to increase the penetration rate and proportion to the skin if subdivided.</p> 	Summary & Image	<p>「5. The principle opposite of “combination principle” is almost the same idea as the separation principle of physical contradiction like “want to lengthen” and “want to shorten”. Remove harmful parts or extract useful parts. For example, it is separated from other cells by irradiating radiation to cancer cells only.</p> 
Sub principle & Illustrated	<p>AThe idea of dividing objects or systems into parts or divisions To prevent the bloated backup capacity, Pctc.HddandSd dTo、Osor application and document data.</p>  <p>bThe idea of making a system that is easy to assemble and disassemble. Scissors that can be easily separated at disposal. At the time of disposal, by pressing the tip of the negative screwdriver to the gap of the handle portion, it is possible to easily remove the blade portion from the handle portion.</p>  <p>Document REF.: Hasegawa Cutleryhp</p> <p>CAn idea to increase the degree of division To penetrate the pores and wrinkles, to adsorb sebum and dirt, to generate ultra-fine bubbles that are divided into micro nanometers from the shower.</p>  <p>References:(Ltd) Tanaka Metal Mfg.hp</p>	Sub principle & Illustrated	<p>AThe idea that one of the multiple functions of a system is a system that can separate them if they are unnecessary or harmful. (One) Depending on the resource by sealing the garbage Do.</p>  <p>(Two) WebImproved processing performance by distributing the system in three tiers. .</p> 
Different fields Case	<p>Hw: Multiple pistons in a car engine Sw: Packet Communication system Business: Division of organizations such as function and business unit</p>	Different fields Case	<p>Hw: Air back for passenger protection of automobiles Sw: Allocate communication equipment for each frequency band Business: Prep and high School advanced classes</p>



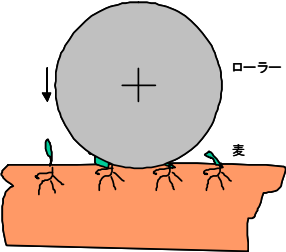



Invention Principle	<h3 style="text-align: center;">3 Local Quality</h3> <p style="text-align: center;">Changing some shape to something different</p>
Summary & Image	<p>The idea to improve performance by changing the material and the function locally. For example, it is not the entire air-conditioning, but only the individual room which is used is cooled, and energy consumption is reduced.</p> 
Sub principle & Illustrated	<p>A The idea of changing objects, systems, and external environments from homogeneous to heterogeneous</p> <p>By increasing the gripping area of the bicycle grip, the load of the impact etc. is distributed, the angle of the wrist which hits the grip is kept properly, and the tiredness of the hand is prevented.</p>  <p>b The idea of making each part of an object or system locally optimized</p> <p>Refrigerators are optimized for refrigerated rooms, freezer chambers, vegetable rooms, ice chambers, and other conditions in line with local purposes.</p>  <p>C The idea that each part of an object or system can perform different functions</p> <p>Hammer has the ability to spank nails and pull nails.</p> 
Different fields Case	<p>Hw: Surface Treatment and coating Sw: Shared development system equipment for development Business: Niche strategies and Target marketing</p>

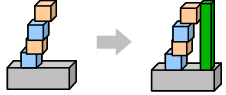
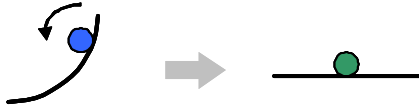
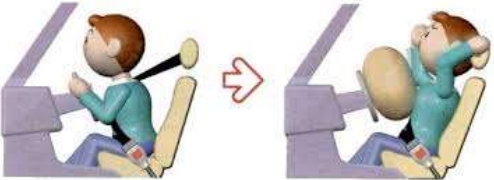


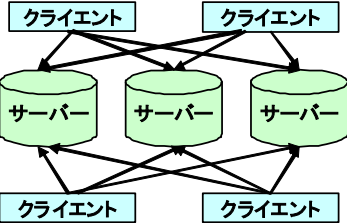
Invention Principle	<h3 style="text-align: center;">4 Asymmetry</h3> <p style="text-align: center;">Deform, Fool proof</p>
Summary & Image	<p>By asymmetric design, the idea to ease the beauty and work, or to design a fool-proof (Bakayoke). For instance PcThe connector of the information equipment is a reverse insertion prevention design for damage prevention and safety.</p> 
Sub principle & Illustrated	<p>A An asymmetric approach to the symmetrical shape of an object or system</p> <p>The key is asymmetric in order to limit the opening and closing attached to the object or structure.</p>  <p>b The idea of changing the shape of an object or system to match external asymmetry</p> <p>The spout of canned coffee and canned beer is applied to the principle of leverage, and the hole of spout is made an asymmetric (rugby ball type) shape so that it can be opened with a small force.</p>  <p>C An idea to increase the degree of asymmetry</p> <p>The connector makes an asymmetric complex shape or pin arrangement to guarantee accurate assembly or to design a fool proof (Bakayoke).</p> 
Different fields Case	<p>Hw: A ruler with several different measurement scales Sw: System test Exception handling test Business: Right handed, left handed glove</p>










Invention Principle	5. Merging Connect, bind	Invention Principle	6 Universality Can be diverted, multifunctional
Summary & Image	<p>This principle¹ Divided principle,² Contrary to the separation principle, the idea to increase the effect by connecting. For example, combined pencil and eraser, it becomes a pencil with eraser.</p> 	Summary & Image	<p>The idea of stone birds. For example, Furoshiki can can anything. In addition, many multifunctional products of home appliances, this idea is seen.</p> 
Sub principle & Illustrated	<p>AThe idea of physically connecting or combined the operation or function of multiple objects</p> <p>The progressive glasses are those made by combining and connecting the function of the lens for the myopic, myopia.</p>  <p>bConsolidation or combined mindset so that work can be processed concurrently</p> <p>From a long line production method, combined with a number of people and a one-man cell production system, to be able to respond flexibly to fluctuations in productionRu。</p> 	Sub principle & Illustrated	<p>AThe idea of eliminating the need for other systems by having multiple functions in an object or system</p> <p>(OneSmartphones have many features such as phone, camera, internet and music.</p>  <p>(TwoFuroshiki can wrap almost everything.</p> 
Different fields Case	<p>Hw: Multicolor ink Cartridges Sw: System test Exception handling test Business: Ninazy Effect</p>	Different fields Case	<p>Hw: Charbo (ballpoint pen and sharp pencil) Sw: Object-oriented design Business: Share your office desk at the free address desk</p>





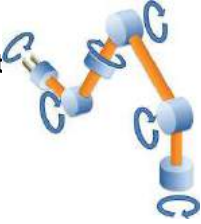
Invention Principle	7 Nested Doll Matryoshka, layering
Summary & Image	<p>The idea of the typical image of Russia doll Matryoshka that housed dolls in many stages in the doll. For example, a bento box, an antenna, a mold, etc. become this idea.</p> 
Sub principle & Illustrated	<p>AThe idea of putting an object or system in another</p> <p>WebThe structure is a multi-layered link.</p>  <p>bAn idea that allows an object or system to pass through a hole open to another</p> <p>The seatbelt is wound from a rectangular hole and stored inside the seat. ◦</p> 
Different fields Case	<p>Hw: A cash dispenser installed in the bank</p> <p>Sw: Opening of private shops using the Internet mall</p> <p>Business: Specialty stores installed in department stores</p>


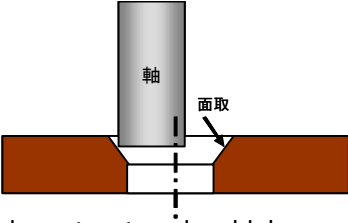

Invention Principle	8 Anti-weight To balance, to harmonize
Summary & Image	<p>The idea is to use other objects to reduce the weight, to balance the use of Air Force, buoyancy, etc. For example, the balance scale is a typical case.</p> 
Sub principle & Illustrated	<p>AThe idea of using lift to reduce the weight of an object or system</p> <p>Unlike the lift of an airplane, the airship uses a gas that is lighter than the air to obtain a static buoyancyRu.</p>  <p>Document REF.: www.airship.com</p> <p>bThe idea of using aerodynamics, fluid mechanics, buoyancy and other forces to reduce the weight of an object or system</p> <p>The linear motor car utilizes the magnetic levitation force. When the superconducting magnet of the vehicle passes at high speed, the electric current flows to the ground and the guide coil automatically, driving up the vehicle and emergingDo.</p> 
Different fields Case	<p>Hw: Car Tires</p> <p>Sw: User interface to make the computer easier to handle</p> <p>Business: breakeven</p>




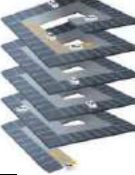





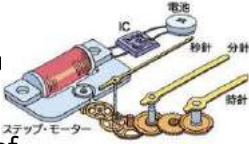

Invention Principle	<h2 style="text-align: center;">9 Preliminary anti-action</h2> <p style="text-align: center;">Give an anti-force, to offset the glitch</p>	Invention Principle	<h2 style="text-align: center;">10. Preliminary Action</h2> <p style="text-align: center;">Reduce latency by preparing what is necessary in advance</p>
Summary & Image	<p>The idea of picking the bud of the problem beforehand before the problem occurs. For example, in the case of bending of the steel sheet, spring back phenomenon occurs and slightly back. It should be given a strong anti-correspondence force in advance as a countermeasure, to adjust the dimensions.</p> 	Summary & Image	<p>The idea is to give the action of the operation etc. beforehand, and to perform the function smoothly when necessary. For example, a reservation timer and a flashlight during power outages are equivalent to this.</p> 
Sub principle & Illustrated	<p>AThe idea of doing the opposite and reducing the harmful effect. Tread the growth of the stalk leaves temporarily, but the development of the root improves, and it becomes strong against the harm of frost.</p>  <p>bAn idea to give an object an anti-reactive force and offset the adverse stress</p> <p>In order to reduce the shrinkage after sewing/washing, I keep the dough (cloth) of denim or the like in advance shrink.</p> 	Sub principle & Illustrated	<p>A The idea that the desired action for the body or system should be prepared before it is needed</p> <p>In an oven or oven toaster or grill, in order to prevent the uneven temperature in the chamber, when cooking, keep the temperature of the warehouse up to the temperature suitable for each purpose.</p>  <p>bThe idea to be prepared in advance to be able to operate immediately when necessary.</p> <p>Instant ramen, so that you can eat immediately if you pour hot water, keep the noodles in a state of boiling dried beforehand.</p> 
Different fields Case	<p>Hw: The wither process to reduce the internal strain of castings Sw: Software design Bug out Business: antibacterial-coated socks</p>	Different fields Case	<p>Hw: Production line Assemblies Sw: CaeSimulation Design by Business: Envelopes with pre-glue</p>





Invention Principle	11 Beforehand cushioning Think back, risk	Invention Principle	12 Equipotentiality Power and energy conservation, potential
Summary & Image	<p>The idea of the risk response measures considered the worst case. It is also a close approach to the principle of anticipating reaction. Fail-safe to control the failure of parts and systems to the safety side (Fail safe). The design also becomes this principle. For instance, File data from the dvd and back up to the cloud.</p> 	Summary & Image	<p>The idea is that the spring is stretched according to the weight of the part and always supplies the parts at a certain height. For example, tray serving equipment of the cafeteria is a representative example.</p> 
Sub principle & Illustrated	<p>AThe idea of introducing an emergency backup to compensate if the object's reliability is potentially low (One) Air bag, to relieve the impact of the collision, the signal from the sensor sensing the impact via the control unit, to ignite the gas generator, the bag is inflated instantaneously by gas.</p>  <p>Resources: Ministry of Transport hp</p> <p>(Two) Other notes in advance so that you can erase the data incorrectly, usb, dvd Back to the cloud, etc.</p> 	Sub principle & Illustrated	<p>A Changing the working conditions and structure of an object or system to reduce or balance the effect of tensile/compressive forces (One) Air balancer can be elevated or lowered lifting in the lever or push operation of the operation handle. Also, it is possible to keep the lifting object close to weightlessness by automatic control of the air pressure when switching the balance lever.</p>  <p>Document REF.: Endo Kogyo(Ltd) HP</p> <p>(Two) Depending on the amount of access on the Internet, the server is distributed and the load optimized.</p> 
Different fields Case	<p>Hw: Airplane Oxygen Inhaler Sw: Dual system with fault response Business: Contingency plan (Emergency response plan)</p>	Different fields Case	<p>Hw: The gate of the canal to match the height of the ship Sw: Temporary Internet file disk space settings Business: Understanding investment balance through portfolio analysis</p>




Invention Principle	<h2 style="text-align: center;">13 The Other way round</h2> <p style="text-align: center;">Take the opposite of a problem as a chance</p>	<h2 style="text-align: center;">14 Sphericity–Curvature</h2> <p style="text-align: center;">Use of centrifugal force to make three–dimensional</p>
Summary & Image	<p>The idea of doing the opposite of conventional ideas. As a way to bring about innovative ideas, TRIZ it is also a principle that people do not know how to use.</p> 	<p>The idea of encouraging a three–dimensional idea from a straight line and a planar idea. For example, curves, circles, or to utilize the shape of the ball, etc., or to utilize the rotational motion and centrifugal force.</p> 
Sub principle & Illustrated	<p>A The idea of using the opposite action to solve the problem</p> <p>The upside is that the wet side of the umbrella comes inside, so you can close the umbrella after riding in the car.</p>  <p>b The idea of fixing moving objects or moving fixed objects</p> <p>A moving sidewalk located at the airport etc. I thought that the sidewalk should move instead of the airplane coming to the vicinity.</p>  <p>C The idea of reversing an object, system or process</p> <p>The cleaning method of the bottle in the factory makes the bottle upside down and injects water from the bottom. Afterwards, the water is discharged by the natural fall.</p>  <p style="text-align: right;">Document REF.: Hiro–Machine(Ltd) HP</p>	<p>A The idea of turning the edge of a straight line or a flat surface into a surface</p> <p>The shape of the mask, to prevent the invasion of bacteria such as fine viruses, and three–dimensional shape to match the surface of the face.</p>  <p>b The idea of using rollers, balls, spirals, and domes</p> <p>Ballpoint pens, embedded steel balls at the tip, to prevent the too of the ink, to supply the ink smoothly.</p>  <p style="text-align: right;">Document REF.: Zebra(Ltd) HF</p> <p>C The idea of switching between linear motion and rotation</p> <p>Ball screw, linear motion rotation motion, or can be converted to a linear motion rotation movement.</p>  <p>D The idea of using centrifugal force</p> <p>The washing machine uses centrifugal force to dehydrate.</p> 
Different fields Case	<p>Hw: Metal parts subjected to shot peening blowing armed</p> <p>Sw: Relationship between classification and search in file management</p> <p>Business: Apply medicine to termite bait, without painting the drug</p>	<p>Hw: liquid coating device using centrifugal force (spin)</p> <p>Sw: Windows OS In 3dGui</p> <p>Business: Google Earth A solid map of</p>


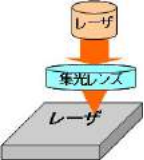

Invention Principle	15. Dynamics Add flexibility to the process	
Summary & Image	<p>The idea of making the shape, the process, and the characteristic of the thing and the system easy to move. For example, Tsistobaloon (elongated balloons) can freely change the shape. In addition, you can increase the degree of freedom if you make a robot multi-joint.</p> 	
Sub principle & Illustrate d	<p>AThe idea to change the characteristics and processes of objects and systems to find the optimum operating conditions</p> <p>The height of the steering wheel of the car can be tailored to the optimal state for the driver.</p>  <p>bThe idea of splitting objects and systems to make them relatively athletic</p> <p>The magic Hand has become a multi-joint structure, it can be flexibly stretched to fit the position you want to grip.</p> <p>References: Bandai(Ltd) HP</p>  <p>C The idea of increasing mobility and adaptability of objects and systems</p> <p>The folded display can be folded and effective for downsizing.</p> <p>References: Samsung hp</p>  <p>D An idea to increase the amount of free movement</p> <p>In order to increase the amount of axes of the articulated robot, more freedom is increased.</p> 	
Different fields Case	<p>Hw: Shape memory alloy/form stabilized fiber (shirt)</p> <p>Sw: Failure-aware duplex system</p> <p>Business: Folding Umbrella</p>	





Invention Principle	16 Partial or excessive actions Handle roughly, overlook	
Summary & Image	<p>From the beginning 100% Instead of aiming for 70%, 80% Thinking about it and going well. For example, when we announce a brand new product to the world, we will develop a test marketing proposal to use.</p> 	
Sub principle & Illustrate d	<p>AWhen it is difficult to do exactly, the idea to solve the problem by tentatively deciding the degree of "little" or "a little more" and problem solving</p> <p>(One)In the assembly work of the parts, if you put the surface arrangement on the part that is inserted or inserted the shaft, it is possible to insert the axis easily by about positioning. For example, the insertion portion of the foot of the parts of the printed circuit board is also surface preparative is made.</p>  <p>(Two)The airplane's boarding bridge is a structure in which you can stretch, swivel, and move up and down according to the position of the passenger port of each model. The end in contact with the aircraft has become a bellows, it is closely adhered to the shape of the aircraft. To fit the size of the airplane, the positioning while making a tentative decision.</p> 	
Different fields Case	<p>Hw: Finishing after rough machining by machining</p> <p>Sw: Fuzzy Search</p> <p>Business: Problem solving in the order of high incidence</p>	




Invention Principle	<h2 style="text-align: center;">17 Another Dimension</h2> <p style="text-align: center;">Change the three-dimensional, multifaceted</p>	Invention Principle	<h2 style="text-align: center;">18 Mechanical Vibration</h2> <p style="text-align: center;">Inspire or empathize</p>
Summary & Image	<p>From a point or a straight line, Two Dimensional, 3 The idea of increasing the dimension and degree of freedom. In addition, it is almost the same as one of the separation principles of the solution of physical contradiction. and the 13 The principle of reverse conception is similar to this idea. For example, the window glass bonded to the multilayer film becomes the strength of dozens of times, it is possible to improve the security function.</p> 	Summary & Image	<p>The main idea is to use vibrations such as mechanical vibrations and ultrasound. Moreover, the vibration is strengthened, and the problem is solved by making it resonate with other vibrations.</p> 
Sub principle & Illustrated	<p>A Objects and systems, Two Dimension or 3 The idea of moving in a dimensional space The spiral staircase It is the one that the dimension space is used efficiently, and the floor area can be small.</p>  <p>b The idea of arranging objects and systems in multiple layers, not just single layer The parking lot is placed in a multi-tiered parking space.</p>  <p style="text-align: center;">Bibliography: Daiwa Leasing(Ltd) HP</p> <p>C The idea of changing the direction of an object or system The selfie stick of the smartphone can turn the smartphone around in almost all directions.</p>  <p>D The idea of using the other side of an object or system The two-sided mounting board has an electronic component on both sides (example of a tuner board).</p>  <p style="text-align: center;">References: PPlate. com HP</p>	Sub principle & Illustrated	<p>A An idea to oscillate or vibrate a thing The hammer drill rotates the drill while adding the impact before and after to pierce the concrete etc.</p>  <p>b The idea to increase the number of vibrations to the ultrasonic level Ultrasonic washing machine, to get rid of dirt to every corner, in the number of ultrasonic vibrations, the glasses, the washing of the watch line .</p>  <p>C The idea of using the resonant frequency of an object The speaker of the bus reflex method makes the sound near the resonance frequency which comes out from the rear side resonant to the port, and the richer bass can play.</p>  <p>D The concept of using piezoelectric transducer Quartz Watches Ic Quartz built into the chip (Crystal) The clock is driven accurately based on the frequency from the oscillator.</p>  <p>E The idea of using a combination of ultrasound and waves High-frequency induction heating is a method of heating or melting metal with joule heat generated by the eddy current of electromagnetic induction. It is used for brazing, dissolution, quenching, annealing, etc. Dissolution of the high melting point metal, no oxygen, there is a merit such as can be used for dissolving in the vacuum.</p> 
Different fields Case	<p>Hw: Wiring and piping in a spiral shape, such as for a robot Sw: Webby Hierarchical view Business: A rice bowl that can be transported in multiple layers for delivery</p>	Different fields Case	<p>Hw: Musical Instruments Sw: Program Load Test Business: A ballpoint pen that has a relaxing effect with small motor innards</p>


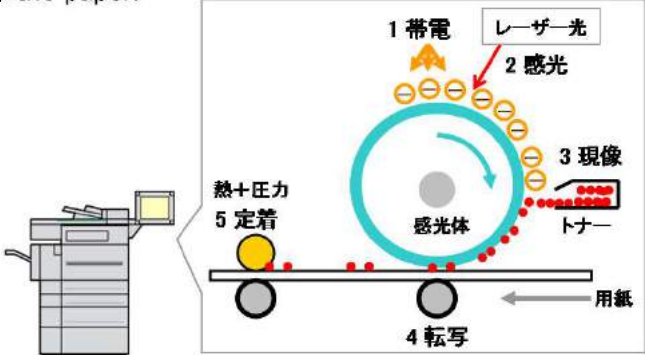

Invention Principle	<h2 style="text-align: center;">19. Periodic Action</h2> <p style="text-align: center;">Give rhythm, repeat</p>
Summary & Image	<p>The idea is to perform a constant movement periodically, and to change the strength and degree of the cycle. For example, walking in a trot is not fun in a constant rhythm, so walking, walking, or skipping is a slow walk.</p> 
Sub principle & Illustrated	<p>AThe idea of changing a continuous action to a periodic or pulsed action The hot water wash toilet is to generate a rhythmic flow. It has the effect of a small amount of water, and it is possible to water saving. References:Toto(Ltd) HP </p> <p>bThe idea of changing the degree and frequency of periodic motion The operation of the massaging ball of the massage vessel can set the periodic operation according to the preference of the person who uses it.  Document REF.: Daito Denki Kogyo(Ltd) HP</p> <p>CUse a pause between actions to perform another action In order to be able to carry out transmission on a single transmission path by arranging several different digital signals in time, the time division multiplexing (Tdm :Time Division Multiplexing)。 On the other hand, each channel is assigned a frequency division multiplexing used in analog signals (Fdm : Frequency Division Multiplexing)。  References:PC Online HP</p>
Different fields Case	<p>Hw: Water jet bus using pulsating water Sw: Virus scanning program behavior settings Business: Root Sales</p>

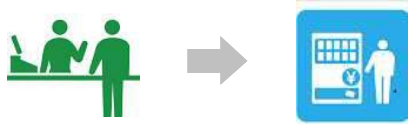
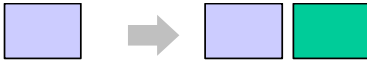





Invention Principle	<h2 style="text-align: center;">20. Continuity of useful action)</h2> <p style="text-align: center;">Eliminate waste, continuity</p>
Summary & Image	<p>The idea is to increase efficiency by continuously performing the same operation and process. For example, the automatic supply system and the like of the material wound to the "spur car" and roll-like to be utilized in order to make a constant rotational speed is equivalent.</p> 
Sub principle & Illustrated	<p>AThe idea that all parts of an object or system always work with sufficient load The spring is continuously produced under a certain load condition and is a uniform product.  Document REF.: Husehatsu Kogyo(Ltd) HP</p> <p>bThe idea of eliminating all unnecessary and intermittent behavior Air conditioning with automatic cleaning mechanism of filters and ultraviolet rays works without stopping the cooling function.  Document REF.: Panasonic(Ltd) HP</p>
Different fields Case	<p>Hw: Cardiac pacemaker Sw: WebChat system Business: Instant Adhesives</p>

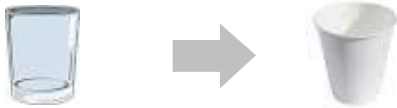
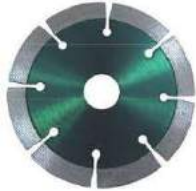

Invention Principle	<h2 style="text-align: center;">21. Skipping</h2> <p style="text-align: center;">Instant processing, separating in time</p>
Summary & Image	<p>The idea is to process things at high speeds and let them finish before the adverse effects come out. It also includes “separating by time” of the solution of the physical inconsistency. For example, soft foods such as bread and rice balls, but deformed when cut slowly, if cut at high speed, can be cut cleanly without deformation.</p> 
Sub principle & Illustrated	<p>AThe idea of running very fast and removing harmful side effects (OneLaser marking, melts the surface by irradiating a laser beam to the object, sear, peeling, by discoloration, etc., and print the product name, serial number and the like. For high-speed processing, it does not cause heat deformation or damage to the object.</p>  <p>BThe ultrasonic knife becomes an ultrasonic vibrator where the blade generates an ultrasound, and the sharpness is more than normal using a knife by vibrating at high speed. It is used for chocolate, cake, etc.</p> 
Different fields Case	<p>Hw: Impact molding of aluminum etc. to the final shape in one shot Sw: Image compression Technology Business: Online product Management system</p>



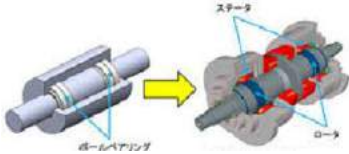
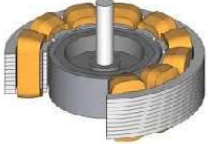
Invention Principle	<h2 style="text-align: center;">22. Music in diaspora</h2> <p style="text-align: center;">Finally get the effect, reverse</p>
Summary & Image	<p>The idea of controlling poison with poison, which can be changed into something useful by the treatment of harmful action. For example, you can use a vaccine that is poisonous to vaccinations, or use nitroglycerin as a medicine for heart disease.</p> 
Sub principle & Illustrated	<p>AThe idea of transforming harmful environments and getting useful effects Strong winds are generally harmful and will be beneficial to wind power.</p>  <p>bThe idea of adding another object or behavior to neutralize or eliminate harmful effects Vibration and noise are reduced by preventing vibration and noise from vibrations and noise sources.</p>  <p>CThe idea of increasing harmful factors until they are not harmful The cyber knife, without damaging the normal cells, can aimed cancer cells and the like. The radiation therapy device which is attached to the first of the robot arm moves freely around the body, and can be irradiated by a pin point.</p> 
Different fields Case	<p>Hw: Corgeneration (Power generation by using waste heat) Sw: Program Bug Test Business: Weak adhesive Force post-it</p>




Invention Principle	<h2 style="text-align: center;">23. Feedback</h2> <p style="text-align: center;">Check, review</p>
Summary & Image	<p>The idea is to detect whether the reference value is high or low and control it to close to the reference value. For example, in the control circuit, feedback control for keeping the reference value is a representative example.</p> 
Sub principle & Illustrated	<p>a The idea of introducing feedback to improve process and action</p> <p>The notification feature of the smartphone displayed in numbers on the top right. This is also a kind of feedback function.</p>  <p>b If you are already using feedback, you can change the degree and requirements</p> <p>The notification feature of the smartphone displayed in numbers on the top right. This is also a kind of feedback function.</p>  <p style="text-align: center;">References: Wikipedia HP</p>
Different fields Case	<p>Hw: Thermostat Sw: Spiral model of system development design Business: Feedback on personnel assessment results in person training</p>



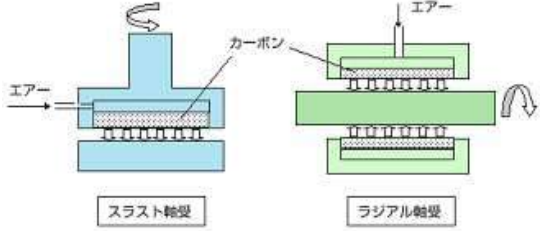
Invention Principle	<h2 style="text-align: center;">24. Intermediary</h2> <p style="text-align: center;">Tie and combine temporarily</p>
Summary & Image	<p>When things cannot be carried out directly, the idea to carry out via intermediaries etc. For example, the marriage consultation office which looks for the mediation trader and the marriage partner of the real estate is equivalent to this principle.</p> 
Sub principle & Illustrated	<p>a The idea of putting intermediaries or intermediate processes between substances, systems or actions</p> <p>The ink of the laser printer, after development, the transfer photosensitive drum on the paper is adhered to the paper, giving a positive charge from the back of the paper, and transferring the toner to the paper.</p>  <p>b A temporary combination of materials that can be easily removed</p> <p>Water jet processing is about 400MPa pressurized to, by injecting from a small diameter nozzle, is a method of cutting the object. In order to increase the workability, I use an intermediary (abrasive).</p> 
Different fields Case	<p>Hw: Catalysts used for chemical reactions Sw: Personal Computer User interface Gui Business: Internet Auctions</p>


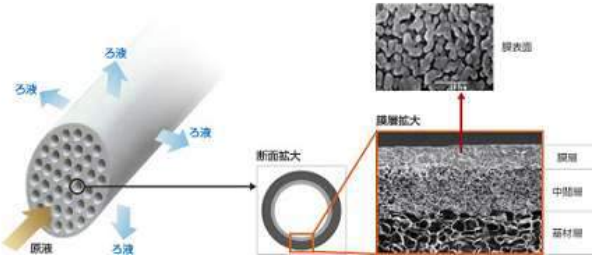

Invention Principle	<h2 style="text-align: center;">25. Self-Service</h2> <p style="text-align: center;">Instant processing, separating in time</p>	Invention Principle	<h2 style="text-align: center;">26. Copying</h2> <p style="text-align: center;">Make a copy of something that is cheap</p>
Summary & Image	<p>The idea is to achieve the function that you want automatically, and prepare it to do the work smoothly. TriZTools' Self-X It is almost the same idea.</p> 	Summary & Image	<p>The idea is to substitute for the real thing by using something alternative or optical copying. For example, it is the meaning of sending photos and pictures instead of seeing actual landscapes or people.</p> 
Sub principle & Illustrated	<p>A The idea that the object and the system perform self-service by adding supplementary support function.</p> <p>The automatic door detects the person with the sensor and automatically opens and closes it. It is exactly self-service itself.</p>  <p>b The idea of using waste resources, waste energy, and waste materials</p> <p>Cogeneration makes use of waste heat for hot water and heating.</p>  <p>References: ENEOS HP</p>	Sub principle & Illustrated	<p>AA simple, inexpensive alternative to expensive, fragile objects</p> <p>Virtual reality allows you to experience the pseudo-computer screen.</p>  <p>References: Frontier Consulting hp</p> <p>b The idea of replacing an object or motion with an optical copy</p> <p>To measure the size of a dangerous animal, the scale and the animal take a picture together.</p>  <p>スケール</p> <p>C The idea of using infrared or ultraviolet wavelengths</p> <p>Shing that induce insects use ultraviolet light.</p> 
Different fields Case	<p>Hw: Automatic Core Sharpening Pencil</p> <p>Sw: Automatic saving function of word processing software</p> <p>Business: Card Automatic billing system</p>	Different fields Case	<p>Hw: Simulators for automotive and aircraft training</p> <p>Sw: To reduce the number of prototypes CaeSimulation</p> <p>Business: Vtrand internet training</p>


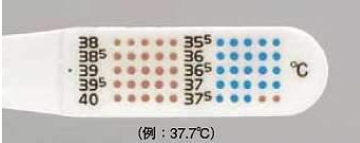


Invention Principle	27. Cheap short-living Objects Disposable, free wear
Summary & Image	<p>The idea of using disposable Cairo, disposable cameras, paper cups and other inexpensive disposable products.</p> 
Sub principle & Illustrated	<p>AAn idea to replace expensive objects and systems with low-life objects. (OneFor concrete cut saw, inexpensive industrial diamond is coated as compared to the diamond.</p>  <p>Document REF.: Ohmi Kogyo(Ltd) HP</p> <p>Two)Disposable paper pajamas and paper underwear for travel can be disposable, not a return luggage.</p>  <p>Bibliography: Rakuten Mall hp</p>
Different fields Case	<p>Hw: Industrial diamond-coated tools Sw: InternetIdUse of the free email address as Business: 100Yen Shop Products</p>


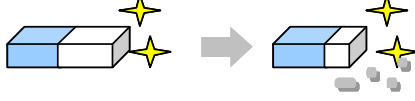
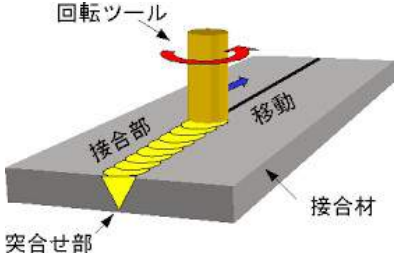

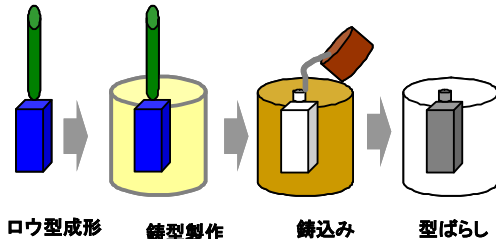

Invention Principle	28. Mechanics substitution/Another Sense Replacing the senses, changing the
Summary & Image	<p>The idea of replacing conventional mechanical systems with other places. For instancecd, wirelessLanIt has come to be applied to a lot of recent appliances such as.</p> 
Sub principle & Illustrated	<p>AThe idea of replacing mechanical means with visual, auditory, taste, tactile and sense of smell</p> <p>Fingerprint and retina authentication are used as security measures instead of keys.</p> <p>References:TechCrunch HP</p>  <p>bAn idea to interact with an object or system using electrical, magnetic, and electromagnetic fields.</p> <p>The conventional ball screw is substituted for the magnetic bearings of the non-contact structure for noise control and high-speed rotation.</p>  <p>CThe idea used in combination with ferromagnetic body activated by the field</p> <p>If the ferromagnetic material such as amorphous is used as the core material of the motor, it is possible to reduce the size of the motor.</p> 
Different fields Case	<p>Hw: Mri(Magnetic resonance device) Sw: SecurityIdAs fingerprints, retina, vein Business: I HCooker</p>

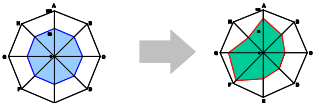



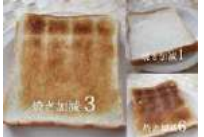

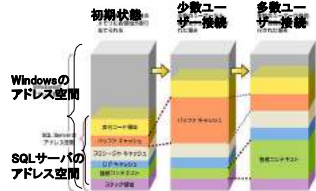
Invention Principle	<h2 style="text-align: center;">29. Pneumatics and Hydraulics</h2> <p style="text-align: center;">Soft, shock absorbing</p>
Summary & Image	<p>The idea of replacing it with fluids such as air pressure, water pressure, and hydraulic fluid. For example, pneumatic cylinders and hydraulic cylinders replace a screw-type mobile device with a fluid.</p> 
Sub principle & Illustrated	<p>AThe idea of using fluids such as gases and liquids instead of solid parts</p> <p>Hover craft is emerging by continuing to blow a large amount of air from the top under the hull.</p>  <p>b The idea of using air pressure, water pressure, and hydraulic pressure to buffer function</p> <p>Insole using a gel, it is effective in cold material, cushion material and the like.</p>  <p style="text-align: center;">References: For M HP</p>
Different fields Case	<p>Hw: Air Curtain / Dome Stadium</p> <p>Sw: Speed control and trajectory display of mouse pointer on PC</p> <p>Business: Underwater Rehab</p>

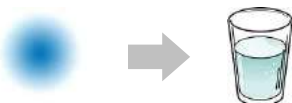


Invention Principle	<h2 style="text-align: center;">30. Flexible Shells and thin films</h2> <p style="text-align: center;">Use soft shells to separate them from harm</p>
Summary & Image	<p>The idea of using thin films or soft shells on a part of an object. For example, instead of coating the film, it becomes a film for or to prevent the strength and ultraviolet rays of the glass.</p> 
Sub principle & Illustrated	<p>AThe idea of using flexible shells and thin films instead of rigid structures</p> <p>Electronic paper is a folding display with a thin film.</p> <p style="text-align: center;">Document REF.: Sony Corporation hp</p>  <p>bThe idea of separating an object or system from a harmful environment using soft shells and thin films</p> <p>Air bearings, because the shaft and bearings are non-contact due to the pneumatic pressure, the wear and rotational friction loss is greatly improved. Suitable for high-speed and precision rotating equipment.</p> 
Different fields Case	<p>Hw: Membrane to remove harmful substances from water purifiers</p> <p>Sw: The sensor network for suspicious security</p> <p>Business: Tea and Japan tea bags</p>


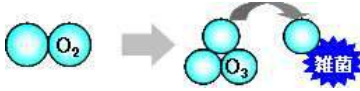
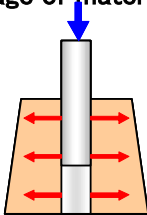
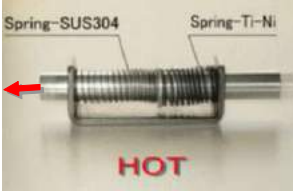


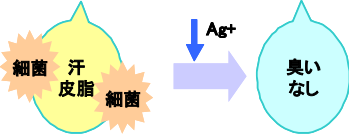

Invention Principle	<h2 style="text-align: center;">31. Porous Materials</h2> <h3 style="text-align: center;">Making use of the gap, making it lighter</h3>
Summary & Image	<p>The idea used to make substances porous or to put air and liquids into porous materials. For example, I add a gas or fluid to a porous material such as a sponge, a paper diaper.</p> 
Sub principle & Illustrated	<p>AThe idea of making an object porous or adding an element of porous matter</p> <p>The ceramic filter of the water purifier is a porous structure, and is used in a wide range of fields, including the raw drug process such as enzymes and antibiotics, mineral water, and the process applications of beverages and foods such as soy sauce.</p>  <p>References: JapanNgk(Ltd) HP</p> <p>bIf the object is already porous, the idea of adding something useful to the hole</p> <p>Medical gauze includes a large amount of air in the porous structure, it is used for the suppression of bleeding, absorption of liquids, etc.</p> 
Different fields Case	<p>Hw: Bearings using porous sintered metal to soaked oil</p> <p>Sw: Data communication using a gap in the frequency band of the radio tower</p> <p>Business: Learning to acquire qualifications using intervals of work</p>




Invention Principle	<h2 style="text-align: center;">32. Worsen Changes</h2> <h3 style="text-align: center;">Change the color and ease of view</h3>
Summary & Image	<p>The idea is to change the color and transparency, to make it easier to identify with the surrounding by putting a color additive or the like. For example, there is a dimming glass or the like for cutting the ultraviolet rays of sunglasses and automobiles.</p> 
Sub principle & Illustrated	<p>AThe idea of changing the color of an object or its surroundings</p> <p>A thermometer that changes color can be measured in a short time by placing it under the tongue. It is easy to use for children and is safe and sanitary.</p>  <p>(例: 37.7°C)</p> <p>Document REF.: 3m hp</p> <p>bThe idea of changing the transparency of an object or something around it</p> <p>The dimming lens changes the transparency by the intensity of the ultraviolet rays.</p>  <p>Document: Eyeglasses, Market hp</p> <p>CThe idea of using colored additives to change the visibility of objects</p> <p>Fluorescent pen is a marker that emits fluorescence in the light of ultraviolet rays.</p> 
Different fields Case	<p>Hw: Camouflage Clothing</p> <p>Sw: WebView sites before and after your visit in design</p> <p>Business: Changing the color of a uniform in a soccer or judo game</p>



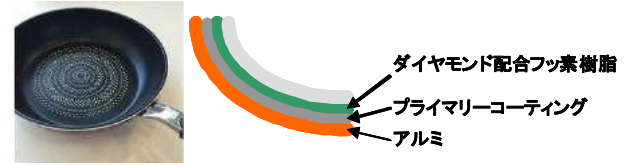
Invention Principle	33. Homogeneity Fit and standardize	Invention Principle	34. Discarding and recovering Make automatic repair or molt
Summary & Image	<p>The idea of combining and utilizing materials with the same properties and characteristics. For example, ice is used to make cold water, and ice melts when it is dissolved.</p> 	Summary & Image	<p>The idea of automatically eliminating and rebuilding used parts. TriZTools' Self-X Almost the same idea. For example, it becomes a function of eraser, capsule type of medicine, grinding wheel, etc.</p> 
Sub principle & Illustrated	<p>AThe idea of making interacting objects with the same material or material of the same characteristics</p> <p>(One Friction welding is bonded Two) It is a welding method which does not need the intermediary material between two faces. Bonding material between the bonding material and the homogeneous welding rod is pressurized while rotating, and melted.</p>  <p>(Two) Windows 10, iOS such as PC and smartphone operating software (Os.). This Os. Application software has been developed to suit.</p> 	Sub principle & Illustrated	<p>AAn idea to remove a part of an object or system that has completed a function, such as dissolving or evaporating</p> <p>Lost wax method of casting, to make a mold by curing the slurry of refractory around the prototype of the low, from the except by melting the wax, to make the casting by flowing molten metal.</p>  <p>bThe idea of recovering a part of an object or system that is consumable or degrading during operation</p> <p>Automatic filling air is automatically supplied to a certain amount of air pressure while rowing a bicycle.</p> 
Different fields Case	<p>Hw: Flower pots made of compost</p> <p>Sw: Co., Or Internet Address Domain Classification method</p> <p>Business: All-aluminium for canned beverages as a processing</p>	Different fields Case	<p>Hw: Containers of biodegradable materials</p> <p>Sw: PC Os and application software override functions</p> <p>Business: Human skin scar recovery</p>

Invention Principle	<h3 style="text-align: center;">35. Parameter changes</h3> <p style="text-align: center;">Change the rate, change the condition</p>
Summary & Image	<p>The idea of using the parameters of physical state, density, elasticity, etc. In the phase of gases, liquids, and solids in each material is changed according to the situation. For instance, the one to change the shape and the condition becomes this idea.</p> 
Sub principle & Illustrated	<p>AThe idea of changing the physical state of a substance's gases, liquids, or solids Lng(Liquefied natural gas) is transported in a liquid, it is possible to reduce the volume. </p> <p>bThe idea of changing the concentration and uniformity Concentrated juices make the volume shrink, making transportation easier. </p> <p>CA mindset that changes the degree of flexibility The shoes are vulcanized rubber and change flexibility and durability. The sulfur changes into a strong and resilient rubber. </p> <p>DThe idea of changing the temperature Toast adjusts the baking temperature. </p> <p>EThe mindset of changing pressure In a pressure cooker, you can cook without losing flavor in a shorter amount of time by adding pressure and adjusting. </p> <p>FTo change the other parameters The dynamic memory management of a computer changes the percentage of resources used by the condition. </p>
Different fields Case	<p>Hw: Dry Ice/Liquid oxygen Sw: Percentage of hard disk space per PC drive Business: Portfolio used for stock trading</p>

Invention Principle	<h3 style="text-align: center;">36 Phase transitions</h3> <p style="text-align: center;">diverting/convertng, separating in terms</p>
Summary & Image	<p>The idea to take advantage of phenomena that change by phase change of material. Almost the same idea as one of the separation principles of the solution of the physical contradiction. For example, water and shape memory alloys that change the shape by heat are also this principle.</p> 
Sub principle & Illustrated	<p>AThe idea of using phenomena that occur between changes in volume, loss of heat, and phase change of absorption (One Dry ice is liquefied by pressurizing the carbon dioxide, further the vaporization heat is deprived temperature is solidified by below the freezing point. </p> <p>(Two Heat pump, by adjusting the temperature and pressure of the refrigerant circulating in the compressor and expansion valve, from the water and air in contact with the cold refrigerant, to move the heat to the water and air that is in contact with the hot refrigerant. </p>
Different fields Case	<p>Hw: Steam locomotive Sw: Automatic translation software Business: education system by hierarchy</p>

Invention Principle	37. Thermal expansion Expand Scalability	Invention Principle	38. Strong oxidants
Summary & Image	<p>The idea to use the volume change such as thermal expansion and heat shrinkage. For example, as a familiar presence, there is a thermostat of the electric Kotatsu, heat shrinkage packaging such as miscellaneous goods and food.</p> 	Summary & Image	<p>The idea of Yoshiyou oxygen positively. For example, to inject oxygen in the mouth of artificial respiration, or to suction oxygen to fatigue recovery.</p> 
Sub principle & Illustrated	<p>AThe concept of using thermal expansion and shrinkage of materials</p> <p>Bake fit, Two One of the parts of the metal is inserted into the expanded parts by thermal expansion, it is a method of increasing the bonding strength.</p>  <p>bThe concept of using multiple materials with different thermal expansion coefficients</p> <p>The actuator in the right figure incorporates a stainless spring and shape memory alloy spring to push each other. When the temperature rises, the shape memory alloy springs are stronger than stainless steel, so push the shaft to the left.</p>  <p style="text-align: center;">Bibliography: Mutual Spring(Ltd) HP</p>	Sub principle & Illustrated	<p>AThe idea of replacing atmospheric air and oxygen with increased air</p> <p>Oxygen inhalation (oxygen Kiau) is to artificially inhale higher concentrations of oxygen than air. The oxygen mask of the airplane is an example.</p>  <p>bThe idea of using pure oxygen</p> <p>Hyperbaric Oxygen Treatment Equipment Two Pressure to absolute pressure, 100 Hyperbaric Oxygen treatment apparatus for inhaling % oxygen. Treat wounds in high-pressure oxygen environments and sterilize anaerobic bacteria to help cure them.</p>  <p style="text-align: center;">Document: Tokyo Medical and Dental Universityhp</p> <p>CThe concept of using ionizing radiation and ionized oxygen</p> <p>Silver ions and copper ions have antibacterial deodorant effects. Moreover, there is no toxicity to the human body, it is effective in the sterilization treatment of food and drink.</p>  <p>DThe idea of using ozone</p> <p>The ozone washing machine made it possible to wash the stuffed toy, the back, the hat, and shoes which were not able to be washed up to now.</p> 
Different fields Case	<p>Hw: Bimetal used for thermostat Sw: Global Standard Software Business: Advertising using media etc.</p>	Different fields Case	<p>Hw: Use pure oxygen for high temperature welding Sw: OsVersion up Business: Launching a luxury product brand</p>

Invention Principle	<h3 style="text-align: center;">39. (Inert atmosphere)</h3> <h4 style="text-align: center;">To stabilize and prevent oxidation</h4>
Summary & Image	<p>The idea of using inert gases or vacuum to prevent oxidation by air and oxygen. For example, to prevent the intrusion of air to cover the arc and molten metal during welding. Also, argon gas, by enclosing in a light bulb, to prevent deterioration of the metal filament.</p> 
Sub principle & Illustrated	<p>A The idea of replacing a normal environment with an inert one</p> <p>Vacuum tube, because it does not fly efficiently electrons from the electrode when there is oxygen or nitrogen, it is intended to vacuum the interior of the container (glass or metal, etc.).</p>  <p>b The idea of adding neutral parts or inert elements to objects and systems</p> <p>The absorbing spring is a filler of intricately braided polyester to reduce the audio response of meeting rooms and drawing rooms.</p> 
Different fields Case	<p>Hw: Nitrogen Gas Extinguisher Sw: Virus vaccine software Business: Strengthening internal control (compliance)</p>

Invention Principle	<h3 style="text-align: center;">40. Composite Materials</h3> <h4 style="text-align: center;">Combine, mix</h4>
Summary & Image	<p>To compensate for the drawbacks, the idea of converting homogeneous materials into composite (plural) materials. For example, the composite shafts of a golf club are lightweight and have high strength for axial flexibility and twisting.</p> 
Sub principle & Illustrated	<p>A The idea of converting materials from homogeneous materials into multiple materials and optimizing each material for special requirements</p> <p>(One) The hydrogen tank of a fuel cell vehicle adopts a three-layer structure of a plastic liner, a carbon fiber reinforced plastic layer that secures the strength of the pressure, and the glass fiber reinforced plastic layers to protect the surface.</p>  <p>Document REF.: Toyotahp</p> <p>(Two) As a blackened prevention and wear prevention processing of the frying pan, and is subjected to a fluorine resin and diamond coating.</p> 
Different fields Case	<p>Hw: Fiberglass Resin Sw: 3-tier Client server system Business: Tv, Pc, satellite, Internet and other educational methods</p>