

Международный год к 100-летию Г.С. Альтшуллера
The International Year dedicated to the 100th anniversary
of G.S. Altshuller

Совместный вебинар Саммита разработчиков
ТРИЗ и MATRIZ Official

Joint webinar of the TRIZ and MATRIZ Official
Developers Summit

20-21.03.2026



G.S. Altshuller
Founder of TRIZ, science
fiction writer

20.03.2026
200 Days left

**The International Year of Genrich Saulovich
Altshuller.**
100th anniversary of his birth

15

1926

October

2026

Deperation in Directions

A New Method for Resolving Physical Contradictions

Alex Lyubomirskiy , TRIZ Master
Chief Scientific Officer, GEN TRIZ, LLC



Content

- Introduction
 - Goals
 - Initial situation
- Separation in Directions
 - Theoretical basis
 - Inventive Principles
 - Examples
- Results and Conclusions
 - Results
 - Conclusions



Goals

- To identify another way to resolve physical contradictions
- Formulate a key question for this method
- Identify the Inventive Principles applicable to this method



Initial Situation: Existing Typical Methods for Resolving PC

- Separation of conflicting demands
 - Separation in Space (the key question is “where?”)
 - Separation in Time (the key question is “when?”)
 - Separation in Relation (the key question is “for whom?”)
 - Separation in Directions (the key question is "in which direction?")
 - Separation by System Levels (key question missing)
- Satisfying conflicting demands
- Bypass

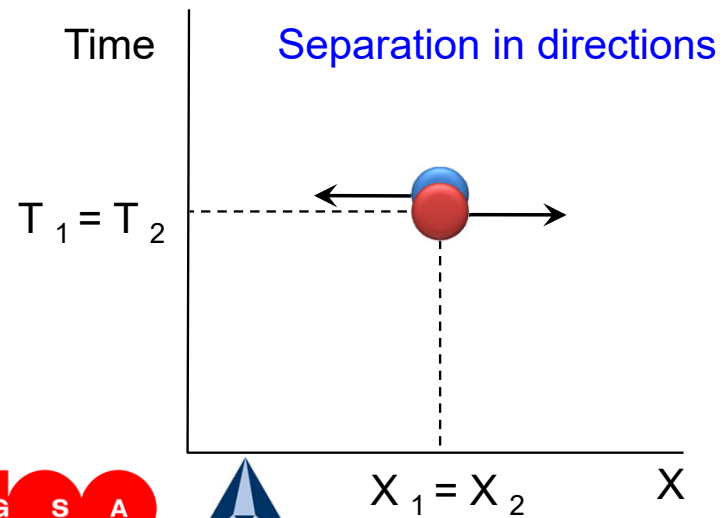
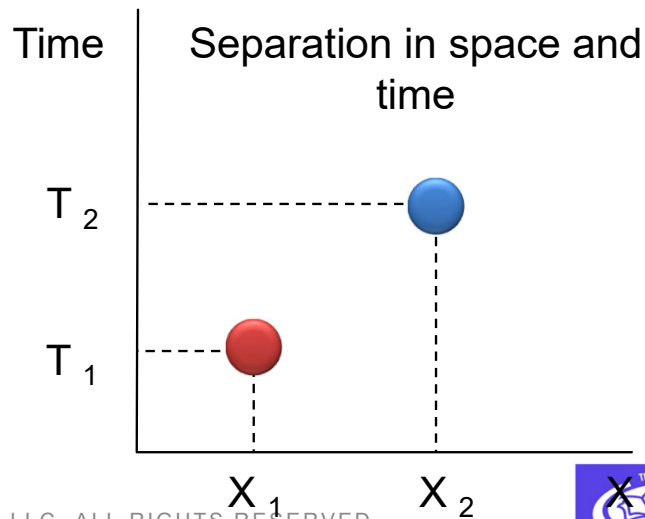
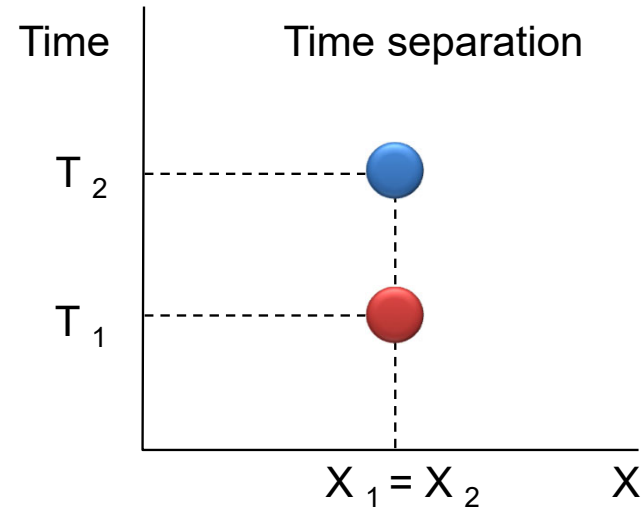
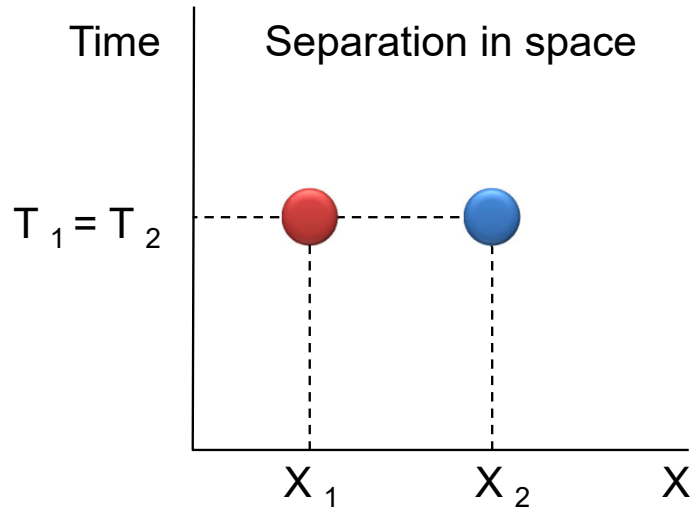


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Theoretical Basis



Recommended Inventive Principles for Resolving Contradictions

- Principle of Asymmetry
- Use of Composite Materials
- Principle of Parameter Change
- Principle of Spheroidality
- Transition to Another Dimension
- The Principle of Color Change (Permeability Change)



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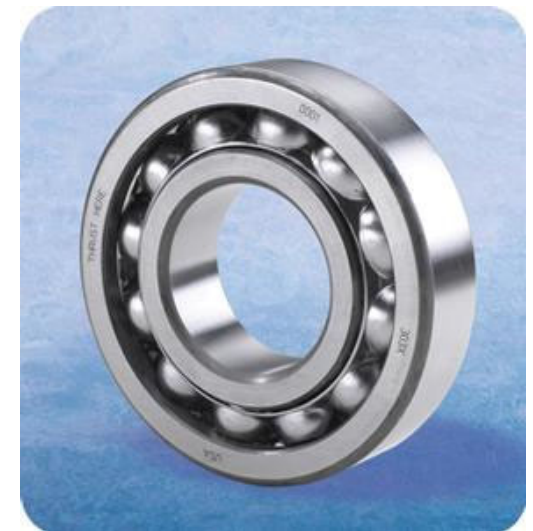
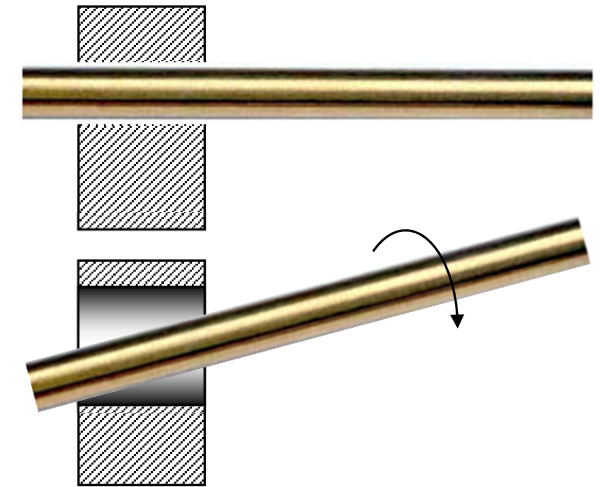
Harpoon

- Physical Contradiction:
 - The harpoon must be narrow and sharp to easily penetrate the whale's body, BUT it must be wide and blunt to get stuck in it well.
- Separation in Time:
 - The harpoon is narrow and sharp *when* it moves forward, and it is wide and blunt *when* it is pulled back.
 - Inventive Principle: The Principle of Dynamics (divide an object into mutually movable parts)
 - Solution: Folding harpoon
- Separation in Directions:
 - The harpoon is narrow and sharp in the direction of throwing (from the tip to the handle), and it is wide and blunt in the direction of pulling (from the handle to the tip)
 - Inventive Principle: Principle of Asymmetry (make an object asymmetrical)
 - Solution: Barbed harpoon



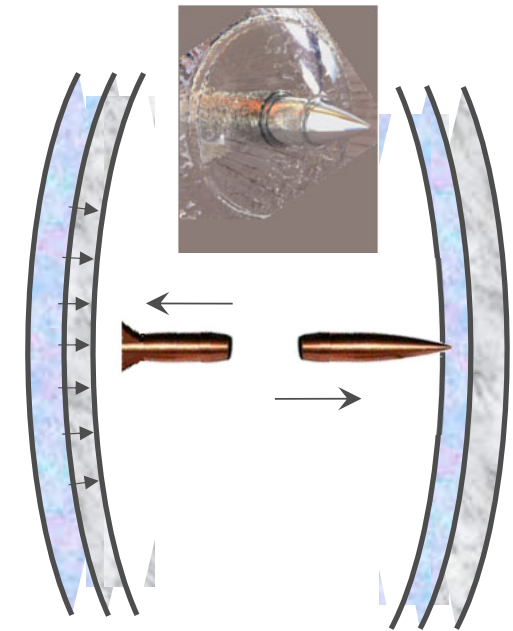
Bearing

- Physical Contradiction:
 - The bearing must have high resistance to movement to hold the shaft tightly, BUT the bearing must have low resistance to movement so as not to interfere with the rotation of the shaft
- Conventional separation methods are not applicable
- Separation in Directions:
 - The support has high resistance in the radial and axial directions, and it has low resistance in the direction of shaft rotation.
 - Inventive Principles: Principle of Spheroidality, Principle of Mediator
 - Solution: Ball bearing



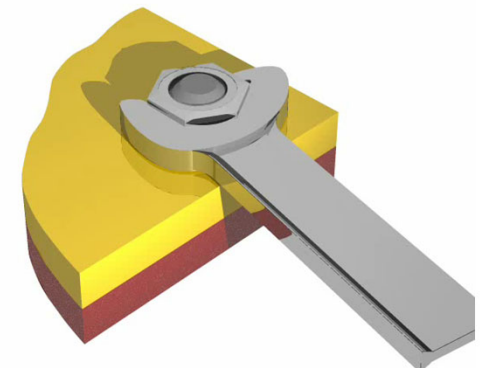
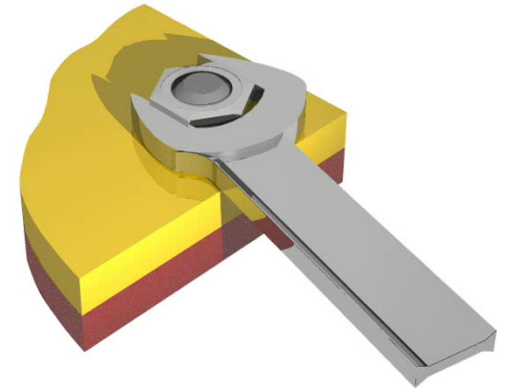
One-way Bulletproof Glass

- Physical Contradiction:
 - Glass must be strong enough to stop gang bullets, BUT it must be weak enough not to stop police bullets.
- Theoretically, it is possible to apply separation in time or in relation, but solutions based on these methods have not been found
- Separation in Directions:
 - The glass is strong in the direction from the bandits to the police, and weak in the direction from the police to the bandits.
 - Inventive Principles: Changing Parameters (making the distribution of object parameters uneven); Composite Materials
 - Solution: One-way bulletproof glass consists of an elastic and a brittle layer. When fired from the outside, the brittle layer distributes the pressure onto the elastic layer, thus stopping a bandit's bullet. A police bullet, fired from the opposite direction, easily penetrates both layers, one after the other.



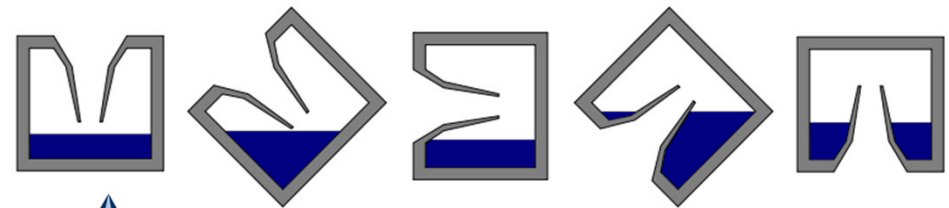
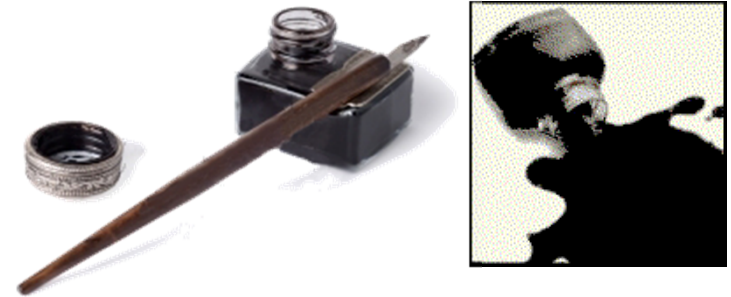
Wrench

- Physical Contradiction:
 - The head of the wrench should grip the nut tightly to tighten it effectively, BUT it should not grip the nut tightly enough to prevent it from coming loose when the wrench is turned back.
- Separation in Time:
 - The head of the wrench grips the nut tightly during tightening and releases it during the return stroke.
 - Inventive Principle: The Principle of Dynamics (divide an object into parts that are movable relative to each other)
 - Solution: Adjustable wrench
- Separation in Directions:
 - The head of the wrench grips the nut tightly when turned clockwise and releases it in the opposite direction
 - Inventive Principle: The Principle of Asymmetry
 - Solution: Asymmetric Wrench



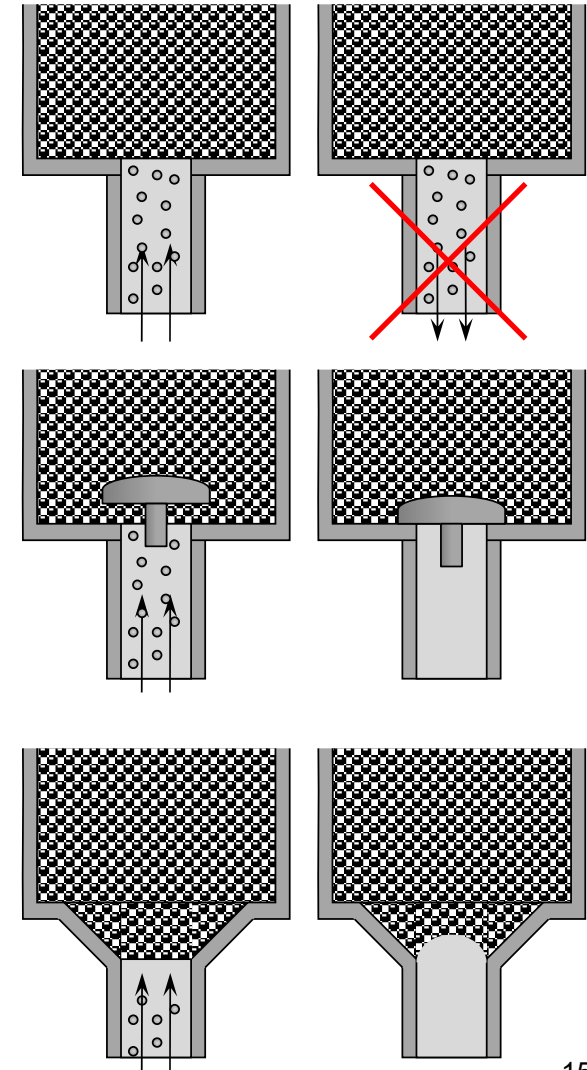
Spill-Proof Inkwell

- Physical Contradiction:
 - The inkwell should flow easily to allow for refilling and refilling the pen, BUT it should not leak to prevent spills if knocked over.
- Conventional methods for separating contradictory properties are of little use (for example, separation in time leads to the idea of a removable lid, but this is inconvenient)
- Separation in Directions:
 - The ink tank allows ink to pass in and does not allow it to pass out
 - Inventive Principle: Principle of Asymmetry (make an object asymmetrical)
 - Solution: Internal cone prevents leakage



Drying of Granules in a Fluidized Bed

- Physical Contradiction:
 - The nozzle must allow the pellets to pass through so that the air can deliver them to the fluidized bed, BUT it must hold the pellets so that they do not spill out.
- Separation in Time:
 - The nozzle is open when feeding granules and closed when servicing the dryer.
 - Inventive Principle: The Principle of Dynamics (divide an object into parts that are movable relative to each other)
 - Solution: Self-adjusting plug
- Separation in Directions:
 - The nozzle passes granules in the forward direction and holds them in the reverse direction
 - Inventive Principle: The Principle of Spheroidality
 - Solution: Conical nozzle



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Results

- A new method for resolving physical contradictions has been discovered:
 - Separation of contradictory properties in directions (the "anisotropy principle" or "trap principle")
- The key question for this method was identified:
 - In which direction?
- A theoretical basis has been developed for this method.
- The following contradiction resolution Inventive Principles have been identified that are of use to this method:
 - Principle of Asymmetry
 - Composite Materials
 - The Principle of Changing Object Parameters
 - Principle of Spheroidality
 - The Principle of Transition to Another Dimension
 - The Principle of Color Change
- Many examples have been found illustrating the application of this method.
- A solution to a practical problem obtained using this method is given.



Conclusions; Next Steps

- Conclusions:
 - Apparently, the proposed method of resolving physical contradictions by dividing them into directions actually exists.
 - There is a whole class of problems that can be solved by this method.
 - The proposed method should be included in standard teaching methods and programs.
- Next Steps:
 - Find more examples
 - Solve more practical problems using this method
 - Specify the list of Inventive Principles compatible with this method
 - Try to identify new methods for resolving physical contradictions



Questions and Answers



СПАСИБО ЗА ВНИМАНИЕ!

**ALEX LYUBOMIRSKIY, TRIZ MASTER
CHIEF SCIENTIFIC OFFICER**

M: 1.617.304-5704

ALYUBOMIRSKIY@GEN-TRIZ.COM

GEN TRIZ

31 GILBERT STREET, NEWTON, MA 02465

WWW.GEN-TRIZ.COM



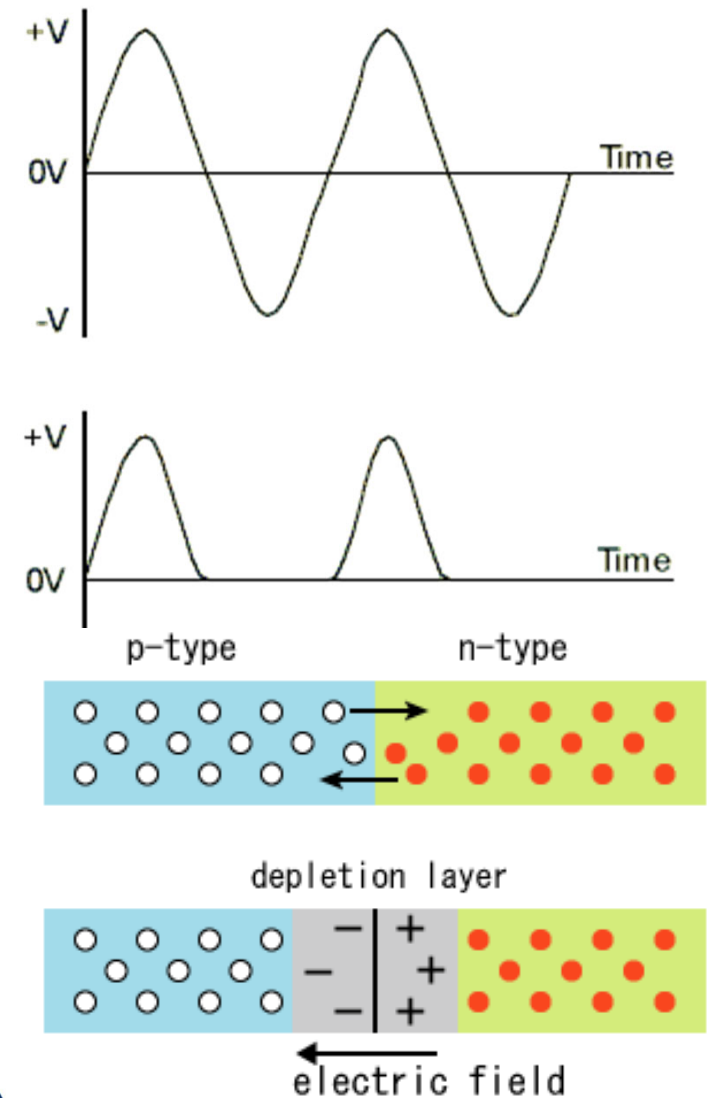
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- Additional Examples (11 pieces)



Diode Rectifier

- Physical Contradiction:
 - A rectifier must have low resistance to conduct electrons in the forward direction, BUT it must have high resistance to stop electrons in the reverse direction.
- Theoretically, it is possible to apply separation in time (transistor) or in relation (good solutions have not been found)
- Separation in Directions:
 - The rectifier has low resistance in the forward direction and high resistance in the reverse direction.
 - Inventive Principles: Changing Parameters (making the distribution of object parameters uneven); Composite Materials
 - Solution: PN junction



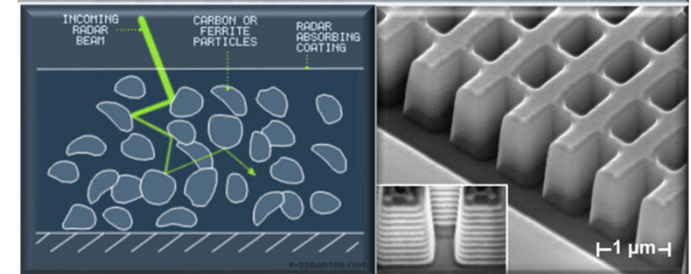
Stealth Technology 1

- Physical Contradiction:
 - The reflected signal must be weak to avoid detection by the aircraft, BUT it must be strong due to its natural properties
- Conventional methods for separating conflicting properties are not applicable
- Separation in Directions:
 - The reflected signal is weak in the direction of the incident signal (and therefore in the direction of the receiving antenna), and it is strong in all other directions
 - Inventive Principle: Transition to another dimension (tilt or reorient an object)
 - Solution: Faceted aircraft body shape



Stealth Technology 2

- Physical Contradiction:
 - Electromagnetic radiation must be weak to prevent detection of the aircraft, BUT it must be strong due to its natural properties
- Conventional methods for separating conflicting properties are not applicable
- Separation in Directions:
 - Electromagnetic radiation is strong in the direction of the aircraft and weak in all other directions.
 - Inventive Principles: Changing Parameters, Composite Materials
 - Solution: Microstructured material absorbs incident radiation



Catamaran and Trimaran

- Physical Contradiction:
 - The ship must be narrow to reduce water resistance, BUT it must be wide to ensure good stability.
- Separation by System Levels:
 - All parts of the ship are narrow, but the ship as a whole is wide
 - Inventive Principles: Homogeneity (to combine several homogeneous parts)
 - Solution: Catamaran/Trimaran
- Separation in Directions:
 - The ship is narrow in the direction of movement, and it is wide in the direction of capsizing
 - Inventive Principles : Transition to another dimension (multi-story structure)
 - Solution: Catamaran/Trimaran



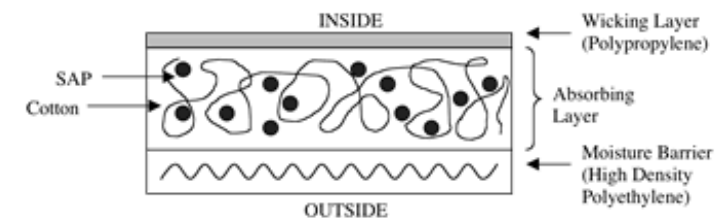
Computer Monitor

- Physical Contradiction:
 - The reflected (or emitted) light should be bright to inform the user well, BUT it should be dim so as not to inform others
- Theoretically, it is possible to apply separation in relation, but good solutions based on this method have not been found
- Separation in Directions:
 - Reflected (or emitted) light should be bright *perpendicular to the monitor* , and it should be dim *in all other directions*.
 - Inventive Principles: Changing Parameters (making the distribution of object parameters uneven); Composite Materials
 - Solution: Anisotropic Filter



Diaper

- Physical Contradiction:
 - A diaper should have low water resistance to absorb liquid well, BUT it should have high water resistance to prevent liquid leakage.
- Conventional methods for separating conflicting properties are not applicable
- Separation in Directions:
 - The diaper has low fluid resistance in the direction of fluid flow and high fluid resistance in the opposite direction.
 - Inventive Principle: Composite materials
 - Solution: Superabsorbent diapers



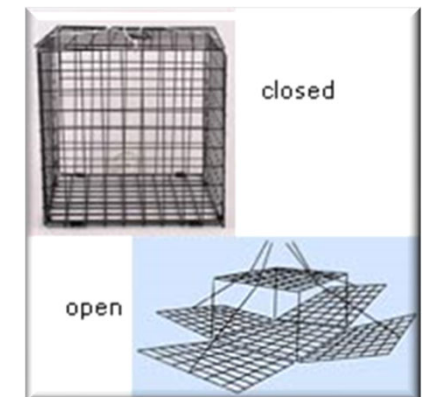
Piggy Bank

- Physical Contradiction:
 - The box must allow coins to pass through well to accumulate them, BUT it must allow coins to pass through poorly to prevent their unplanned removal.
- Separation in Time:
 - The box has a large hole when money is added, and no holes at any other time.
 - Inventive Principle: The Principle of Dynamics (divide an object into mutually movable parts)
 - Solution: Safe
- Separation in Directions:
 - The box allows coins to pass in freely and does not allow them to pass out.
 - Inventive Principle: Transition to another dimension (tilt or reorient an object – in our case, a coin)
 - Solution: Piggy Bank



Crab Trap

- Physical Contradiction:
 - The trap must be able to pass crabs well to accumulate them, BUT it must not pass crabs so as not to release them
- Separation in Time:
 - The trap has a large opening when the crabs enter the trap and no opening when they are pulled to the surface.
 - Inventive Principle: The Principle of Dynamics (divide an object into mutually movable parts)
 - Solution: Folding Trap
- Separation in Directions:
 - The trap easily allows crabs to enter and does not let them out.
 - Inventive Principle: Principle of Asymmetry (make an object asymmetrical)
 - Solution: Cone-entry trap



Hunting Skis

- Physical Contradiction:
 - Skis need to be slippery to glide well, BUT they don't need to be slippery to provide good propulsion.
- There are solutions based on time separation (for example, a flexible ski with a non-slip base), but they are not suitable for hunting skis.
- Separation in Directions:
 - Skis should be slippery in the direction of travel and non-slippery in the direction of thrust.
 - Inventive Principle: Principle of Asymmetry (make an object asymmetrical)
 - Solution: Skis lined with skins (fur with one-sided slope of the fibers)



Clean Room

- Physical Contradiction:
 - A possible crack in the wall should not allow air to pass through to avoid contamination, BUT it should allow air to pass through due to its natural properties
- Conventional methods for separating conflicting properties are not applicable
- Separation in Directions:
 - A random crack does not allow air to enter and allows it to exit.
 - Reception: Changing Parameters
 - Solution: Increased indoor air pressure



Medical Laboratory

- Physical Contradiction:
 - A possible crack in the wall should not allow air to pass through to avoid the spread of dangerous bacteria, BUT it should allow air to pass through due to its natural properties
- Conventional methods for separating conflicting properties are not applicable
- Separation in Directions:
 - The crack does not allow air to escape and allows it to enter.
 - Inventive Principle: Changing Parameters
 - Solution: Low indoor air pressure



Anechoic Room

- Physical Contradiction:
 - The sound must be weak to prevent reverberation, BUT it must be strong due to its natural properties
- Conventional methods for separating conflicting properties are not applicable
- Separation in Directions:
 - The sound should be strong in the direction of fall and weak in all other directions.
 - Inventive Principle: Composite Materials
 - Solution: Structured material absorbs sound through multiple reflections

