

target**I**nvention

**OTSM-TRIZ**

**The concept of System in TRIZ**

# The concept of a System

B.R. Gaines

**The system is what we define as a system**

**A system** is a set of elements or relations that are naturally connected with each other into a single whole, which has a property that is absent in individual elements or in their unorganized aggregates (**integrative property**).



Alexander Bogdanov

# The concept of a System

7) **A system** is an order due to the planned, correct arrangement of parts in a certain connection (Brief Dictionary of Foreign Words).

8) **A system** is a subordinate complex interconnection of parts, expressing in its contradictory tendencies, in its continuous movement, the highest unity - a developing organization (I. Shmalhausen).

9) **A system** is a reflection in the consciousness of the subject ... the properties of objects and their relations in solving problems of research, cognition (Chernyak Yury).

**A system = A mental Image**

10) **A system** is a technical device, which is a set of interconnected structures, machines, mechanisms serving a single purpose.

**A system = A machine**

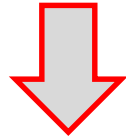
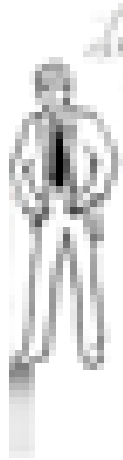
**A system = A mental Image**

~~A system = A machine~~

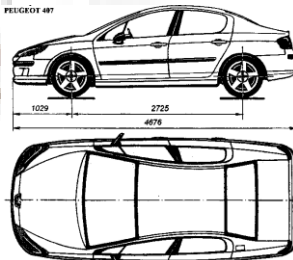
# The System in Engineering

# The System in Engineering

A machine  
(object of study)



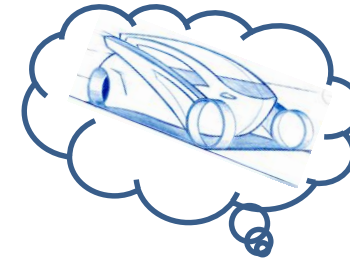
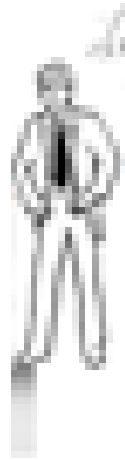
Different  
material  
models



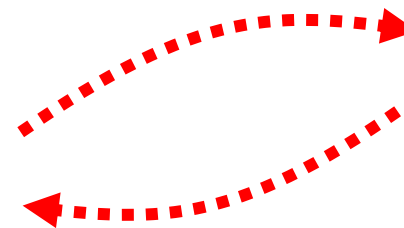
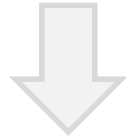
Analysis of object for improving

# The System in Engineering

A machine  
(object of study)

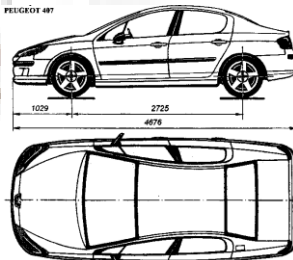
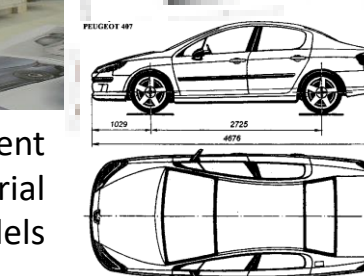


A system as it is  
(mental model)

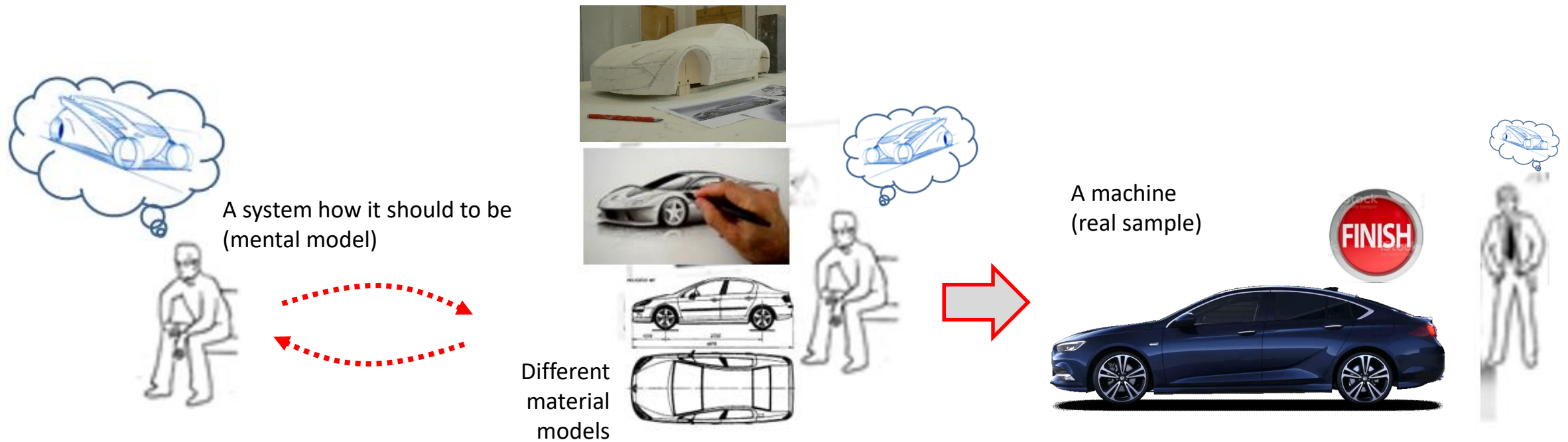


Analysis of object for improving

Different  
material  
models



# The System in Engineering



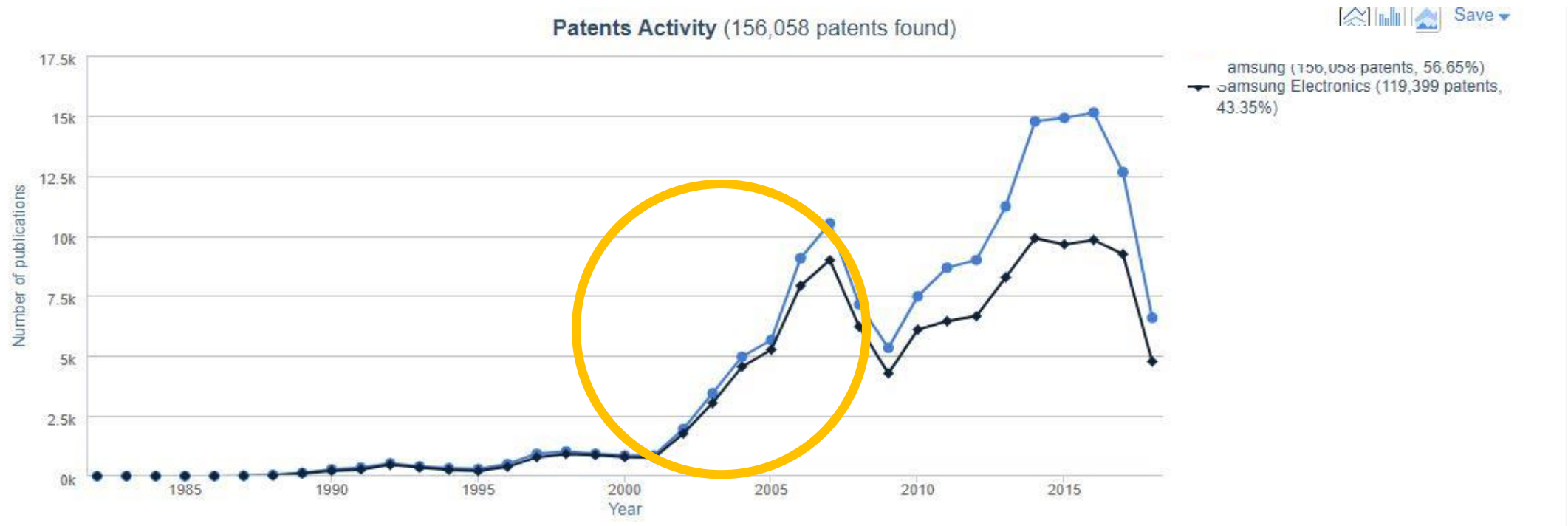
Synthesis of improved object

# How to use System in TRIZ

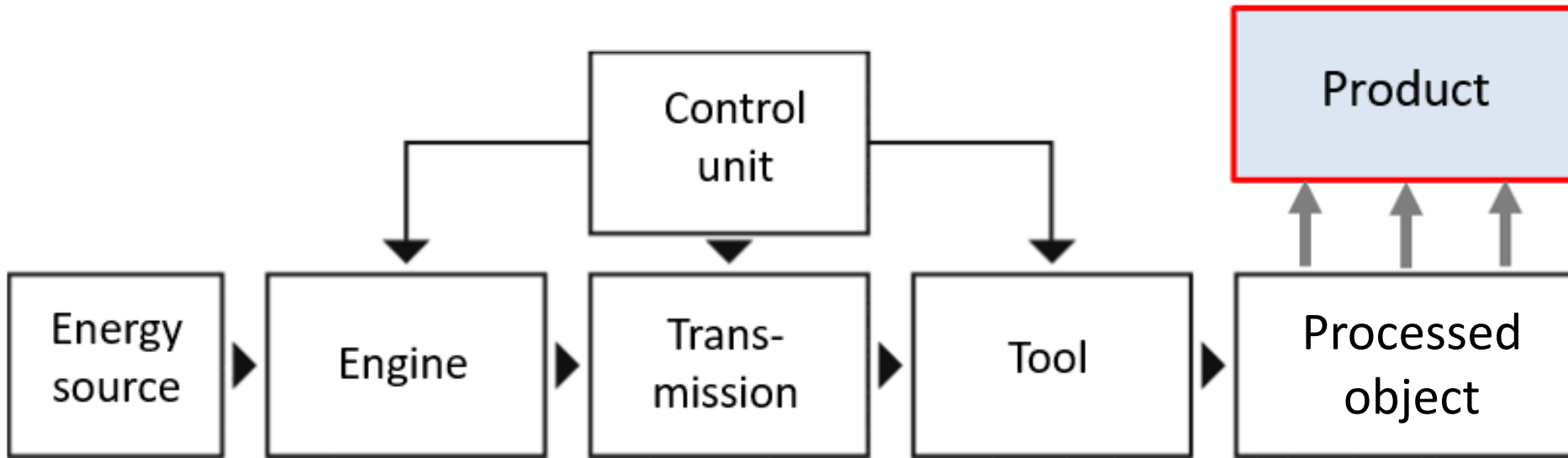
## Success TRIZ at SAMSUNG

From 2000 till 2007 Year amount of patents increases:

- For the company from 0,8K per Year till 13,75K (about 14 times)
- For SAMSUNG Electronics from 0,8K per Year till 9,0K (more than 14 times)



# How to use a System in TRIZ



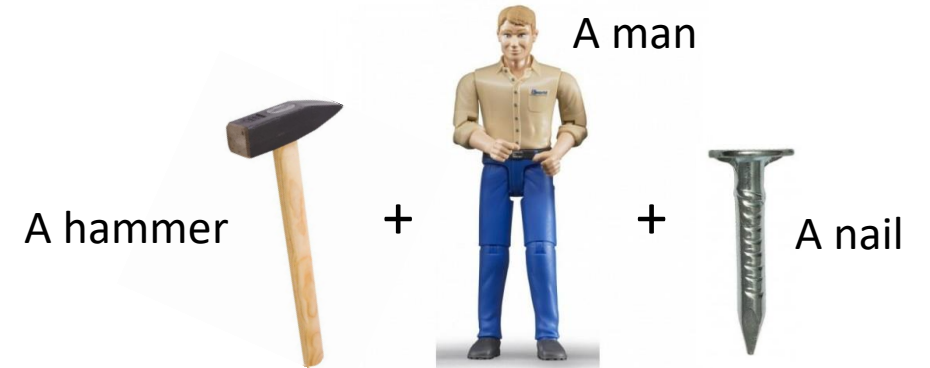
Full structure of a (technical) system

# How to use a System in TRIZ



Integrative properties (goal):

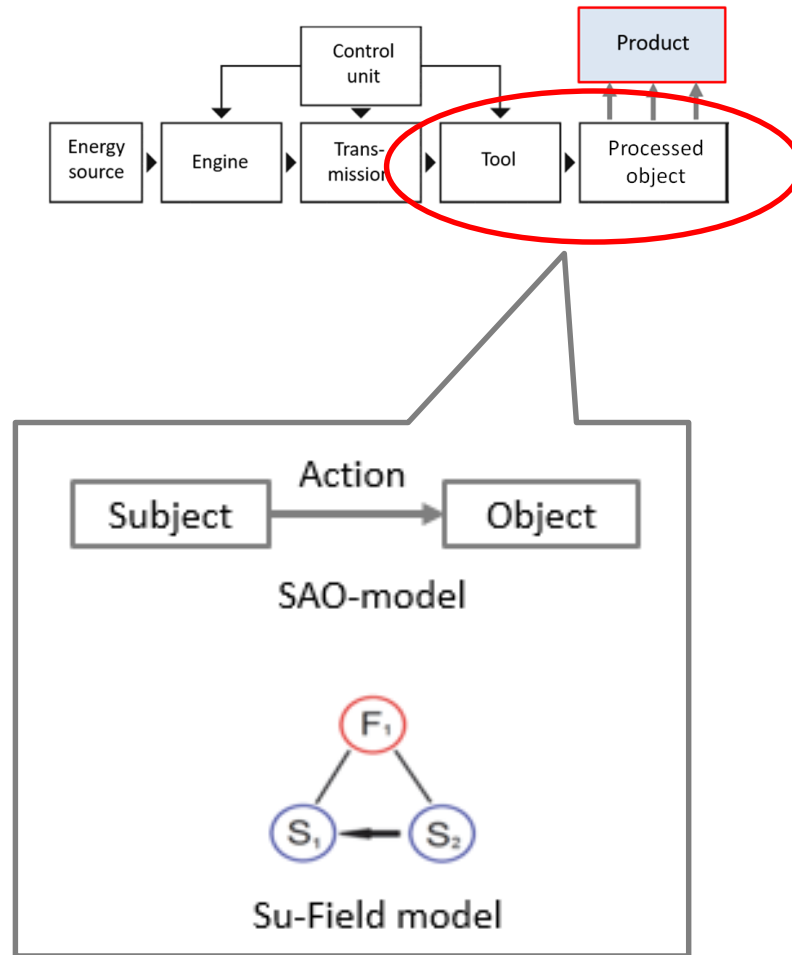
**An one piece hammer structure**



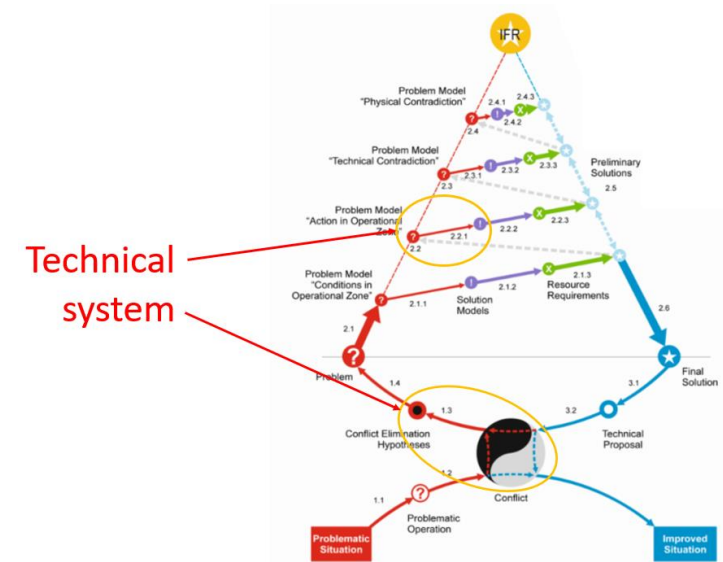
Integrative properties (goal):

**A hammered nail**

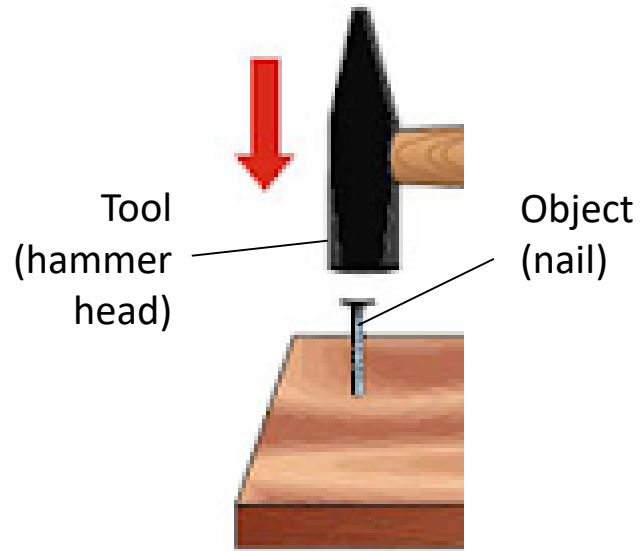
# How to use a System in TRIZ



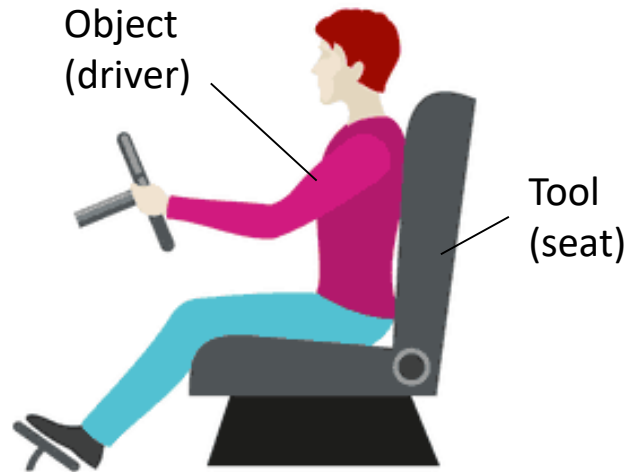
A structure of Functional System



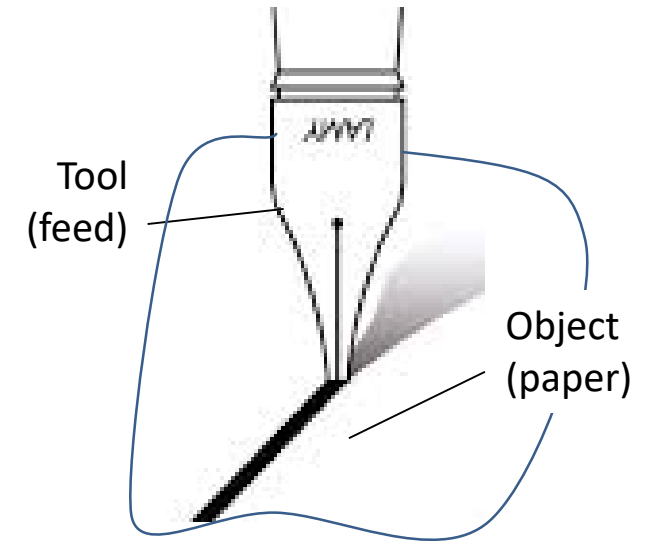
# How to use a System in TRIZ



SAO:  
Hammer head ----  
impacts ---- nail



SAO:  
Seat of a car ----  
moves ---- driver



SAO:  
Feed ----  
marks ---- paper

Functional technical systems

# How to use a System in TRIZ

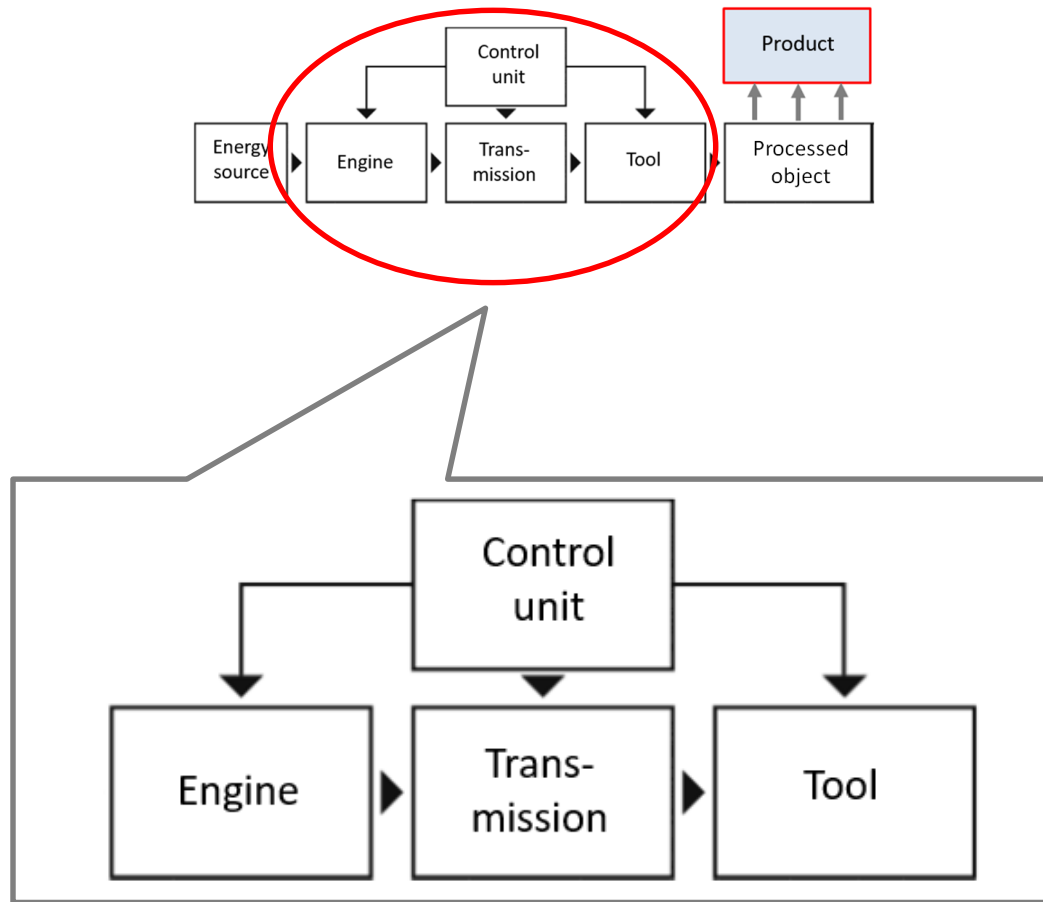


SAO:

A teacher ---- teaches ---- students

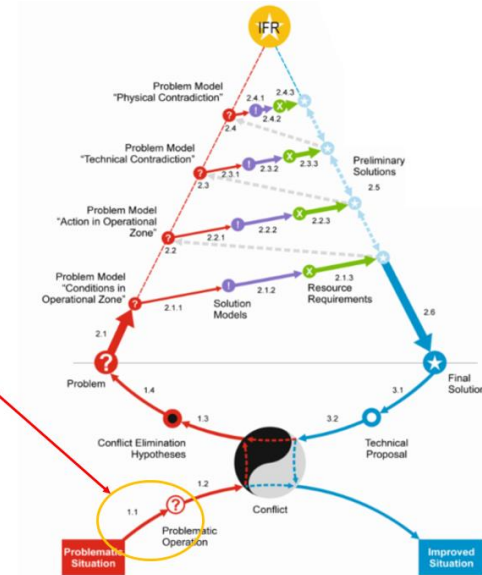
Functional non-technical system

# How to use a System in TRIZ

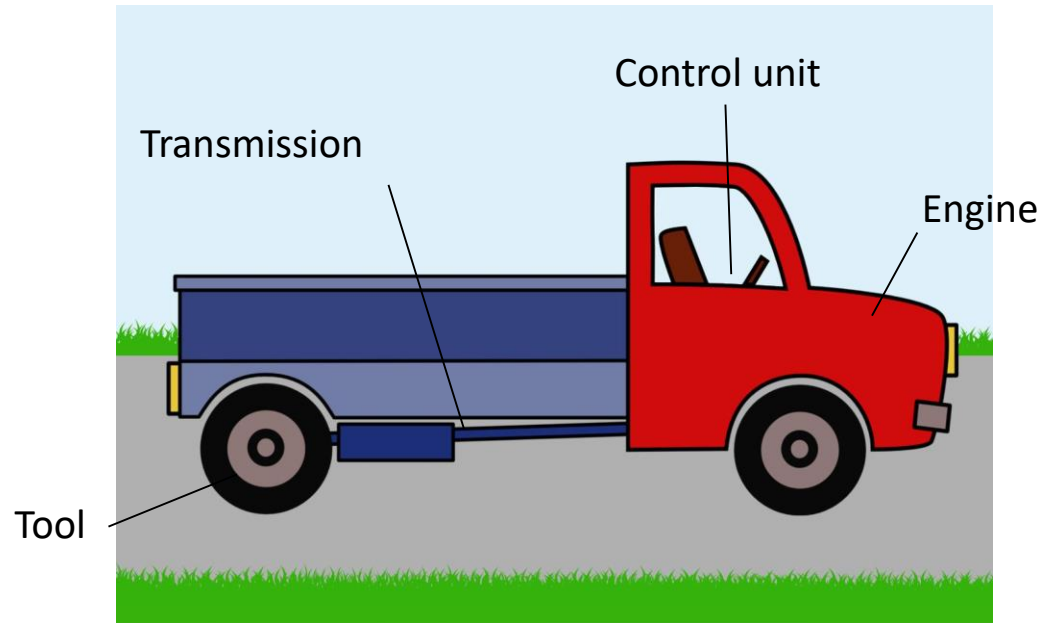


The structure of a Potentially Workable Technical System

Technical system



# How to use a System in TRIZ

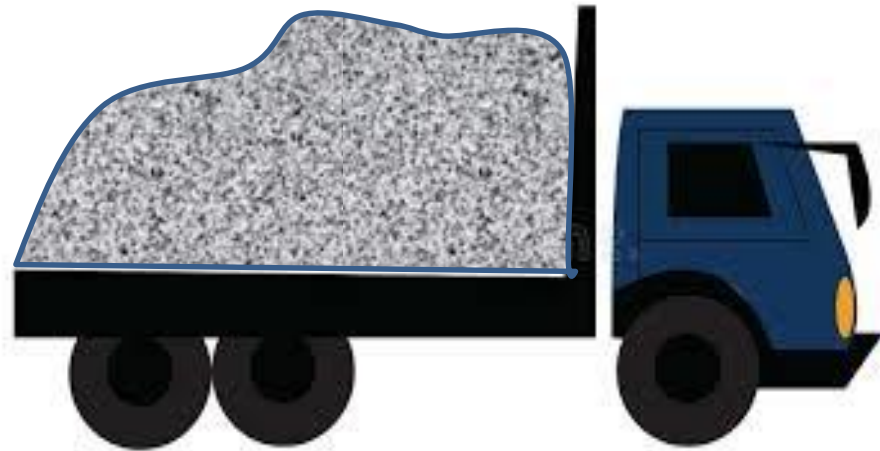


A truck

The structure of a Potentially Workable Technical System

# How to use a System in TRIZ

**Main Useful Function** of a truck:  
Transportation of cargo



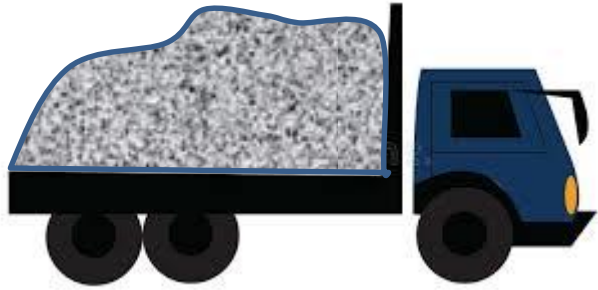
The structure of a Potentially Workable Technical System

# How to use a System in TRIZ

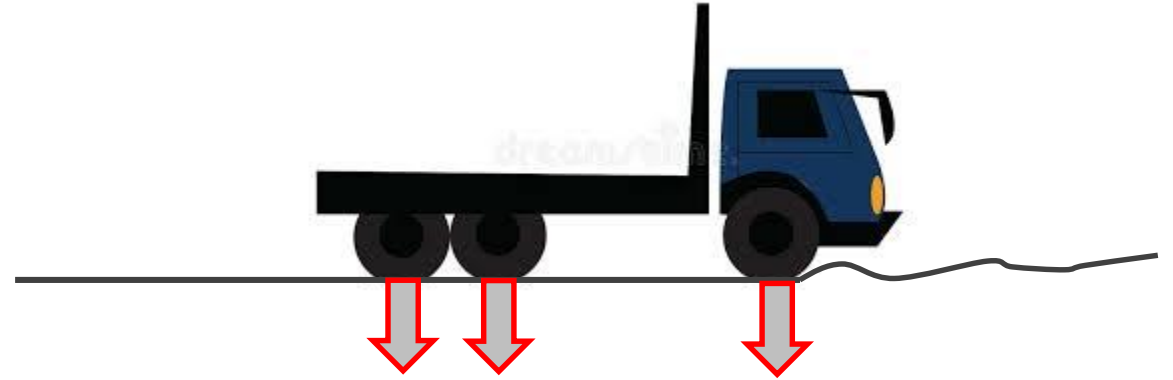


A truck as a part of a system for gate knocking

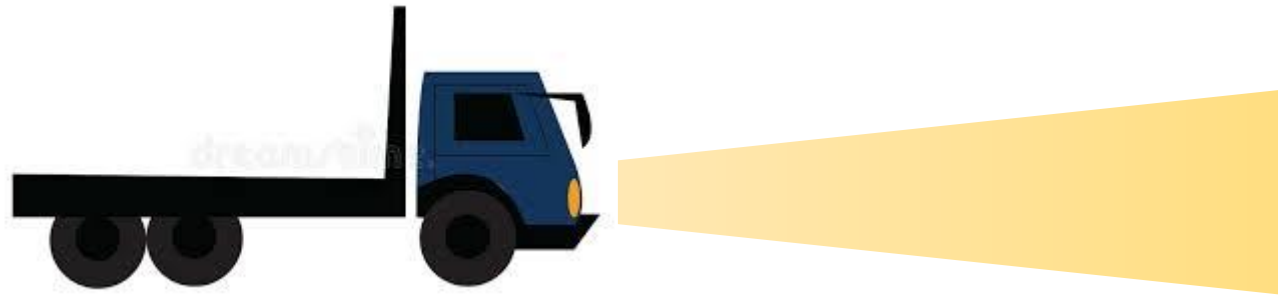
# How to use a System in TRIZ



A truck as a part of a system  
for transportation of load

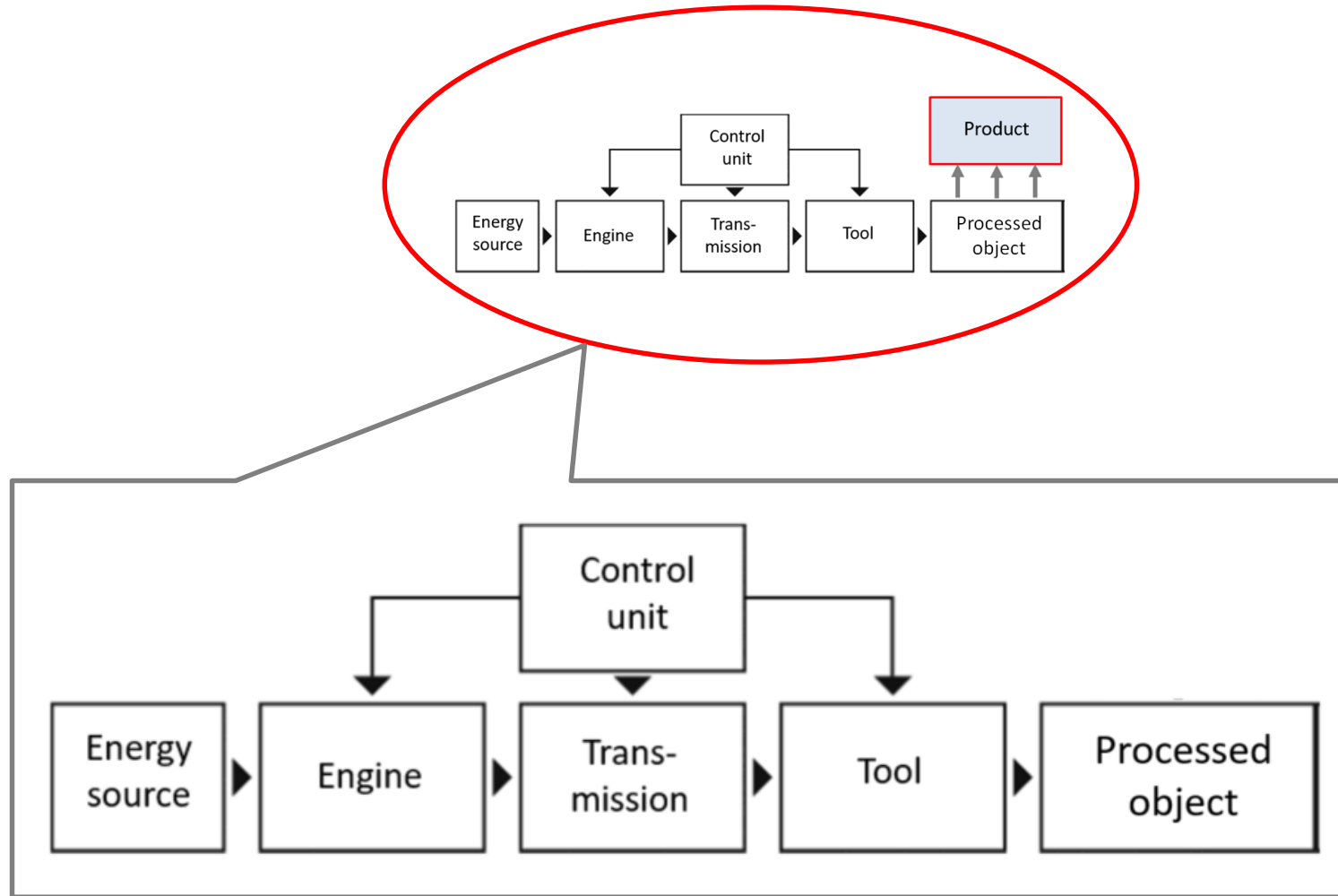


A truck as a part of a system  
for compaction of ground surface

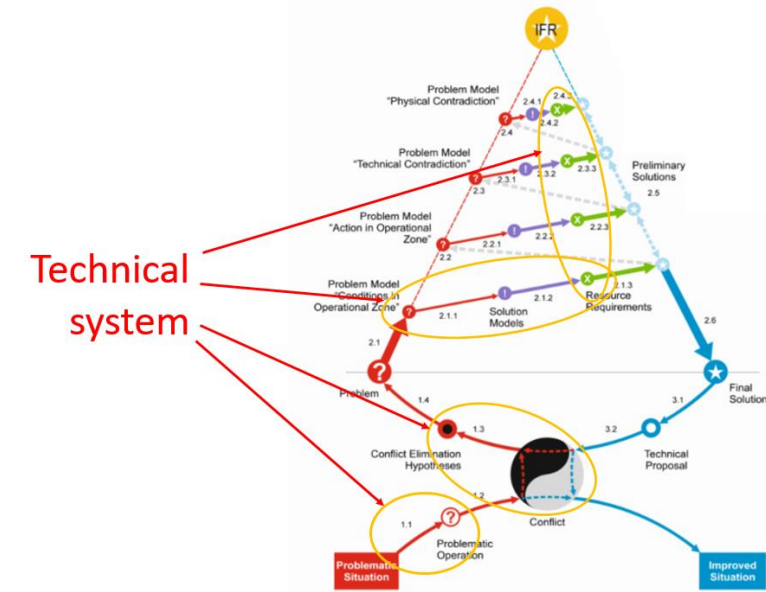


A truck as a part of a system for illumination

# How to use a System in TRIZ



The structure of a Functioning System



# How to use a System in TRIZ

Engine  
(muscles of operator)

Control unit  
(a brain with information)

Transmission  
(an arm and  
handle of a saw)



Energy source  
(meal and air)

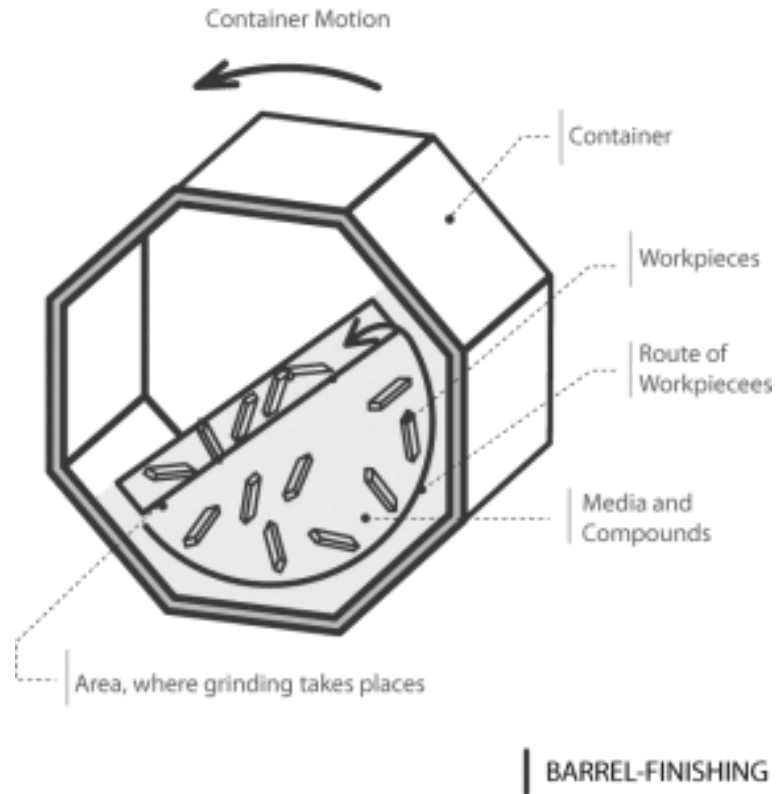
Processed object  
(a board)



Tool  
(blade of saw)

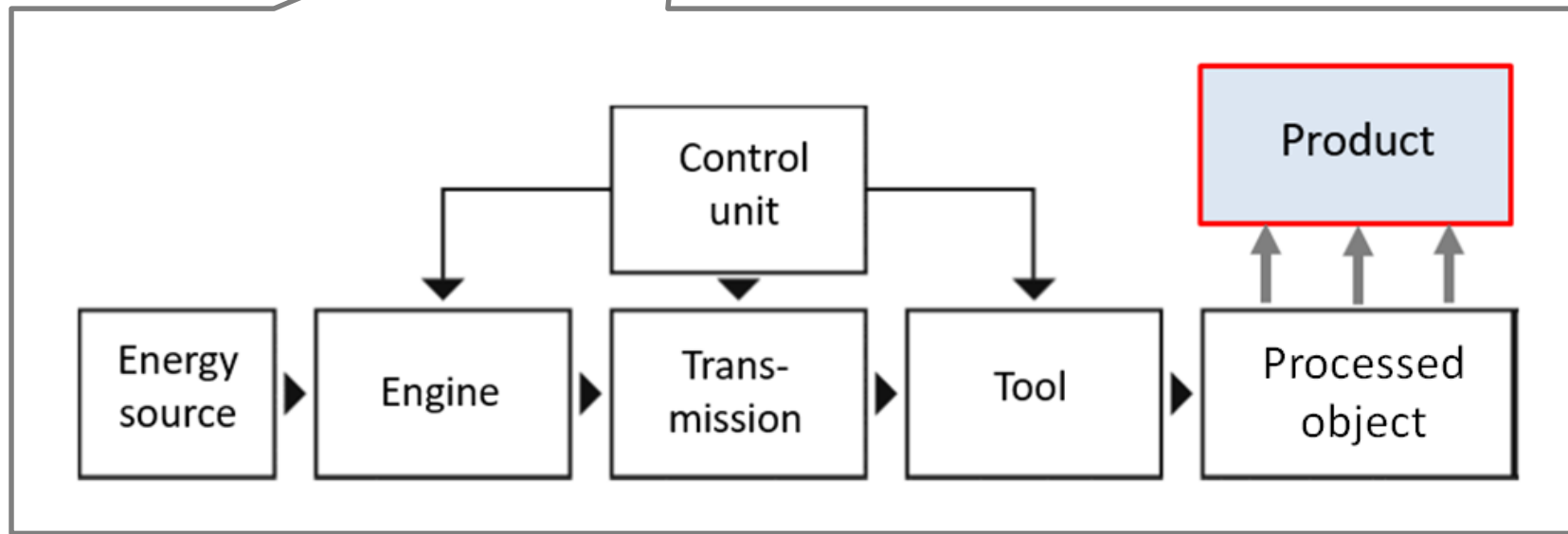
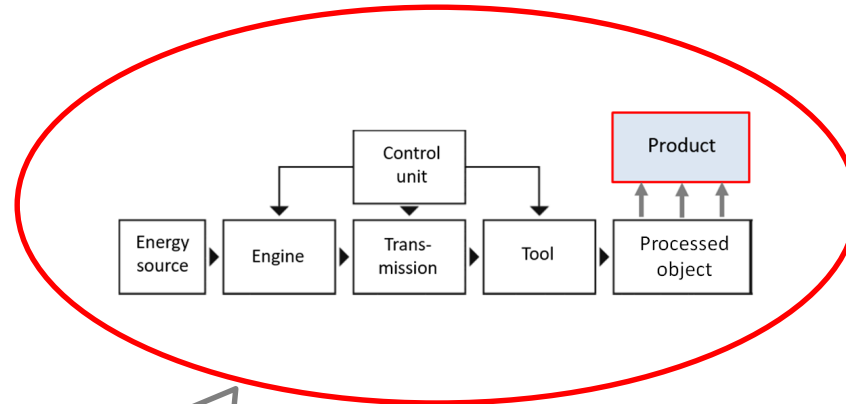
A saw-cutter

# How to use a System in TRIZ



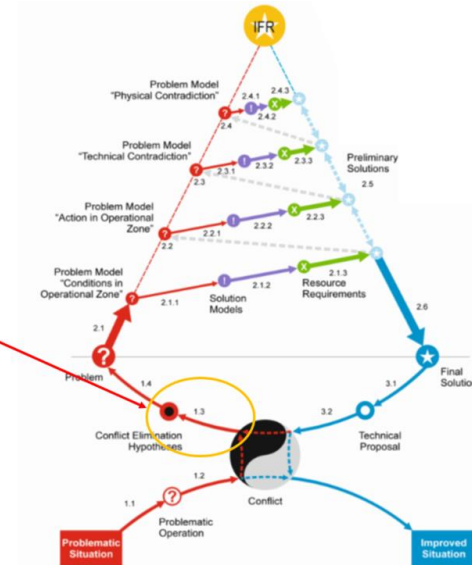
A tumbling machine

# How to use a System in TRIZ

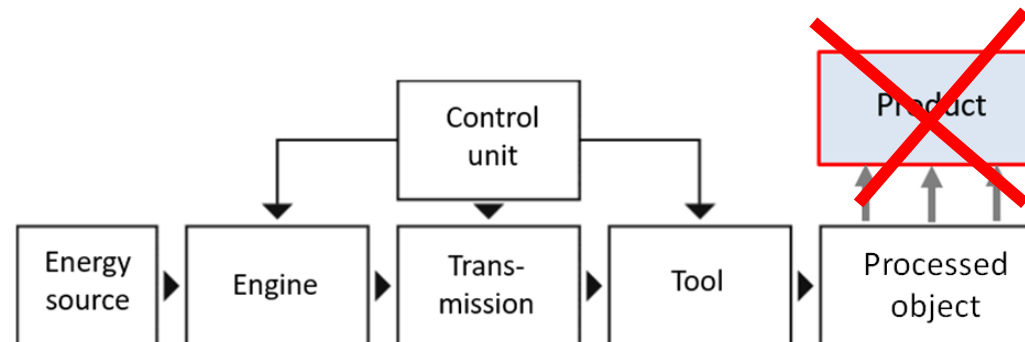
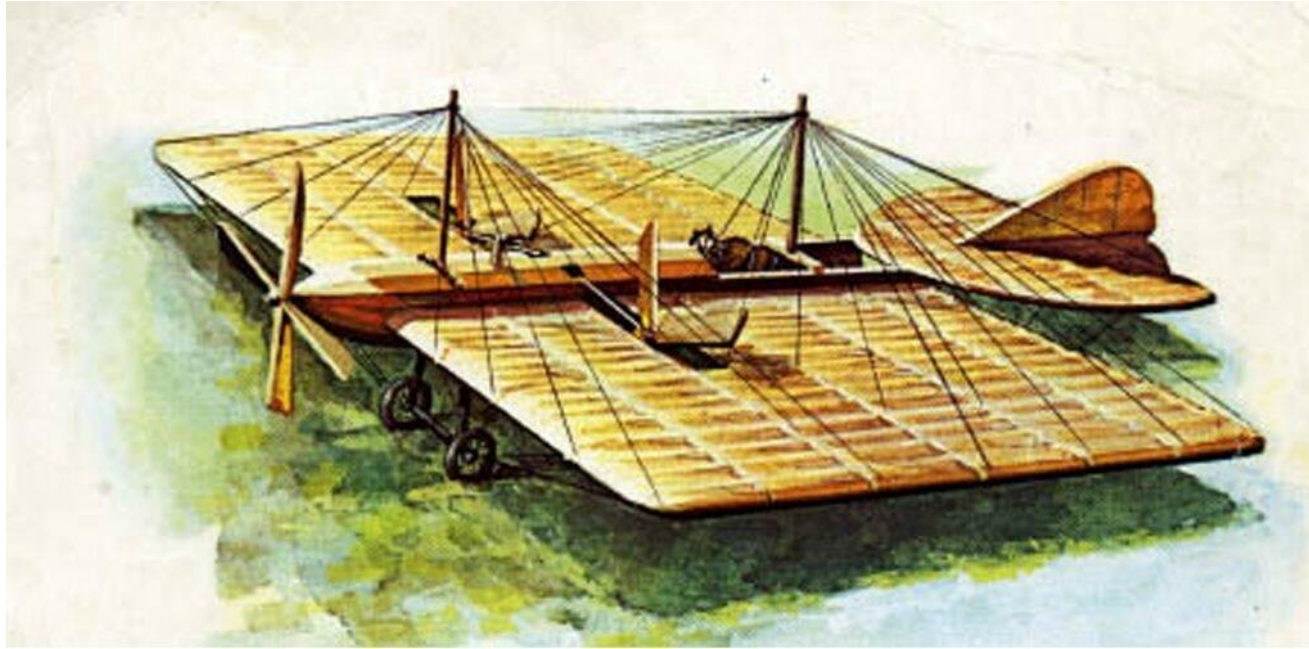


The structure of a Product Producing System

Technical system



# How to use a System in TRIZ



Mozhaysky's airplane

# How to use a System in TRIZ



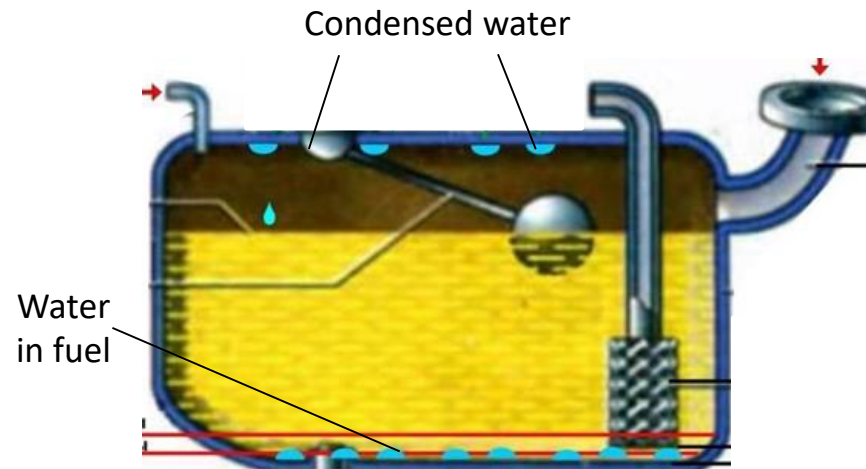
Crack

Harmful product:  
Cracked seem



Destroyed  
tire

Harmful product:  
Destroyed tire

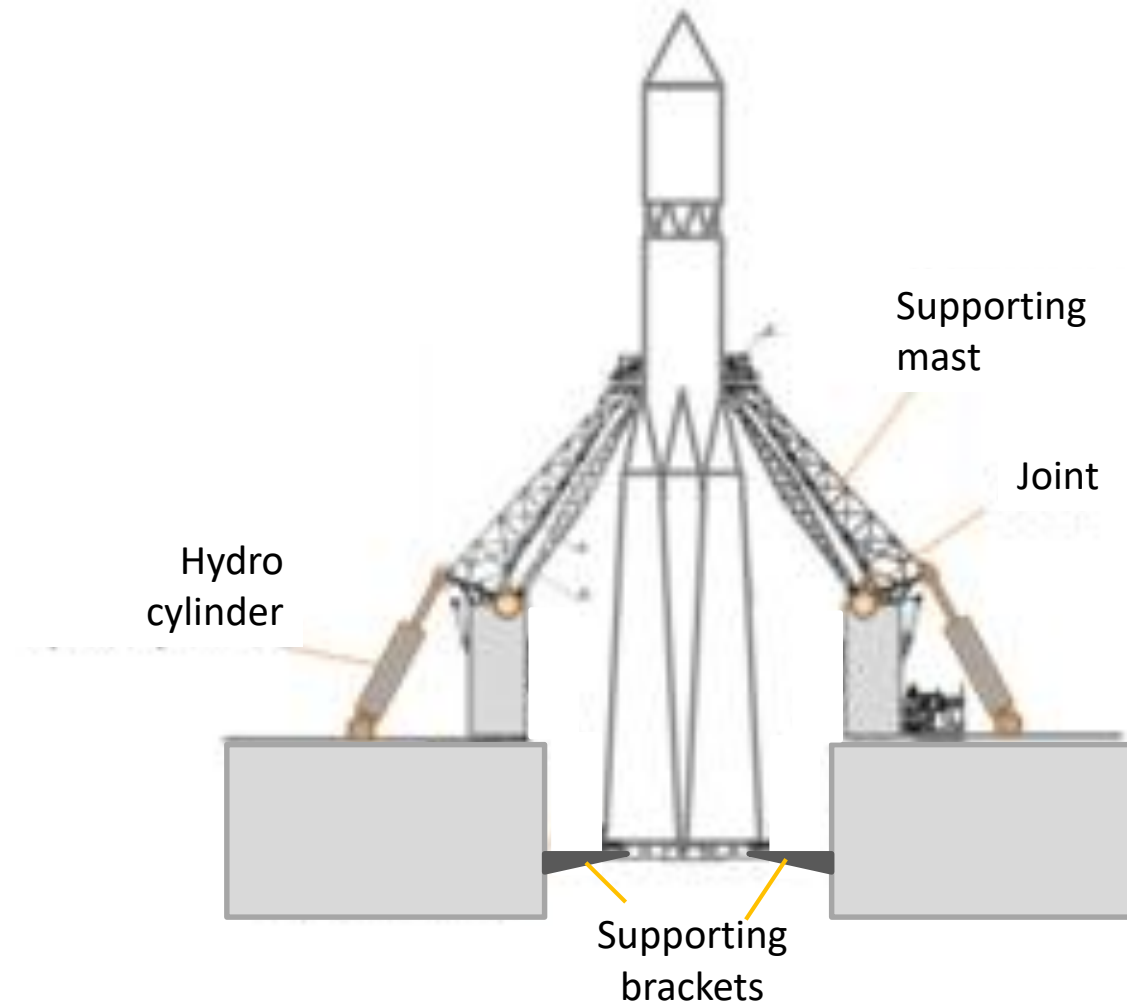


Harmful product:  
Water in fuel

“A Harmful System of Lenyashin” construction always begins from Harmful Product

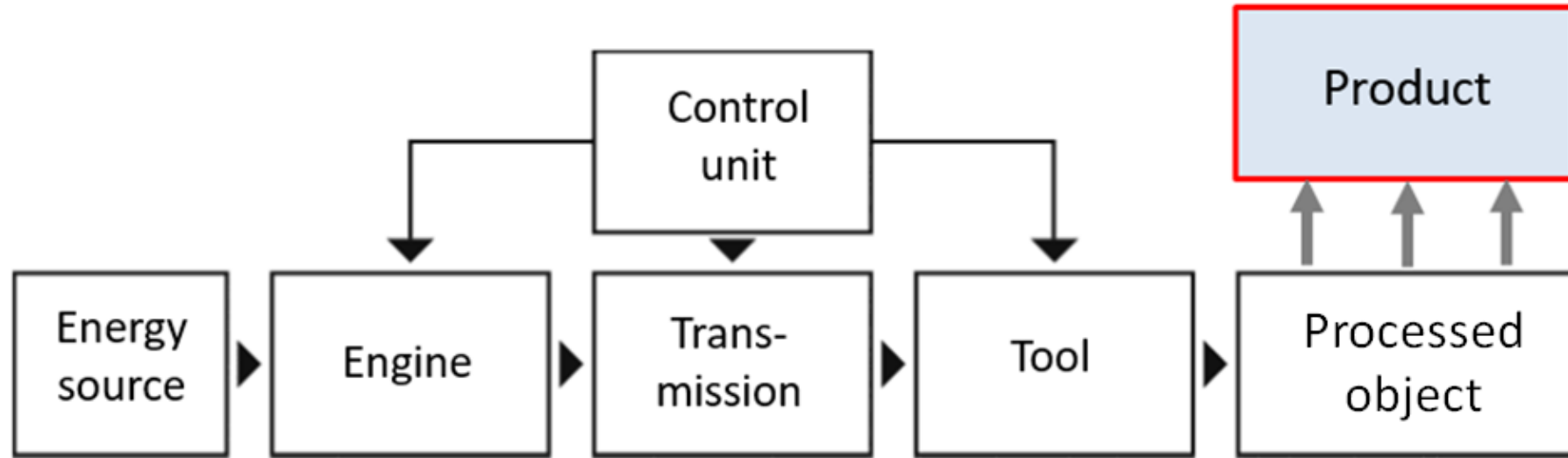
# Example of using Model of Useful System for problem solving

# Example of using Model of Useful System



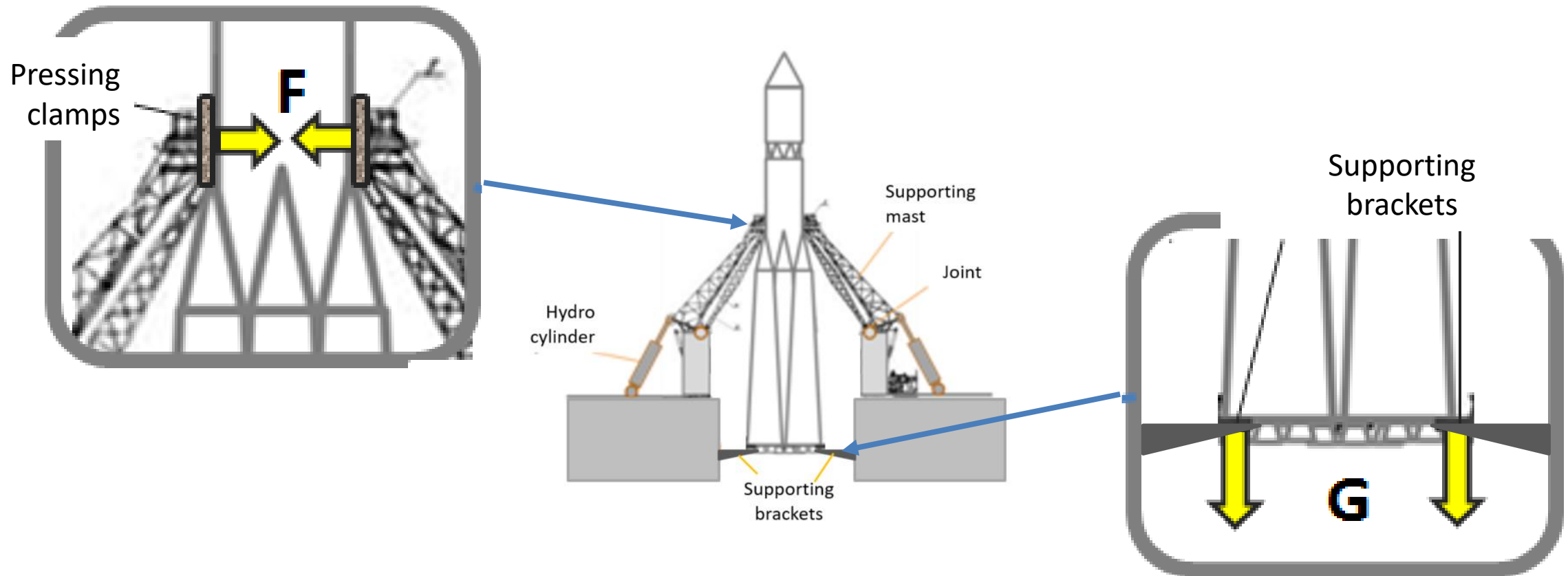
Hydraulic system of opening the supporting masts

# Example of using Model of Useful System



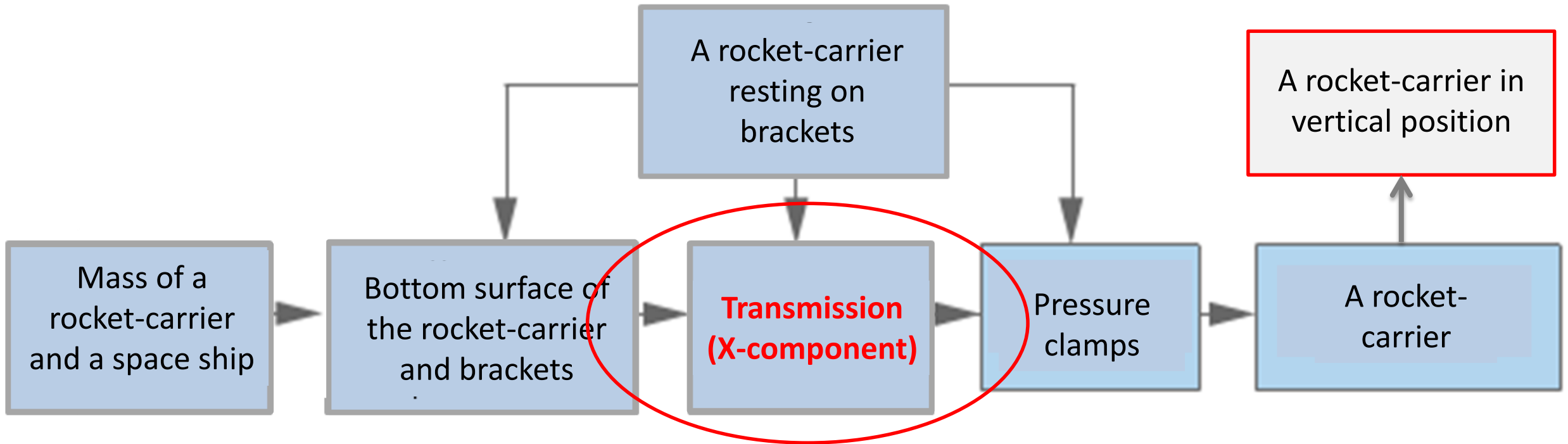
The structure of a Product Producing System

# Example of using Model of Useful System



An engine and a tool of a system for rocket-carrier clamping

# Example of using Model of Useful System

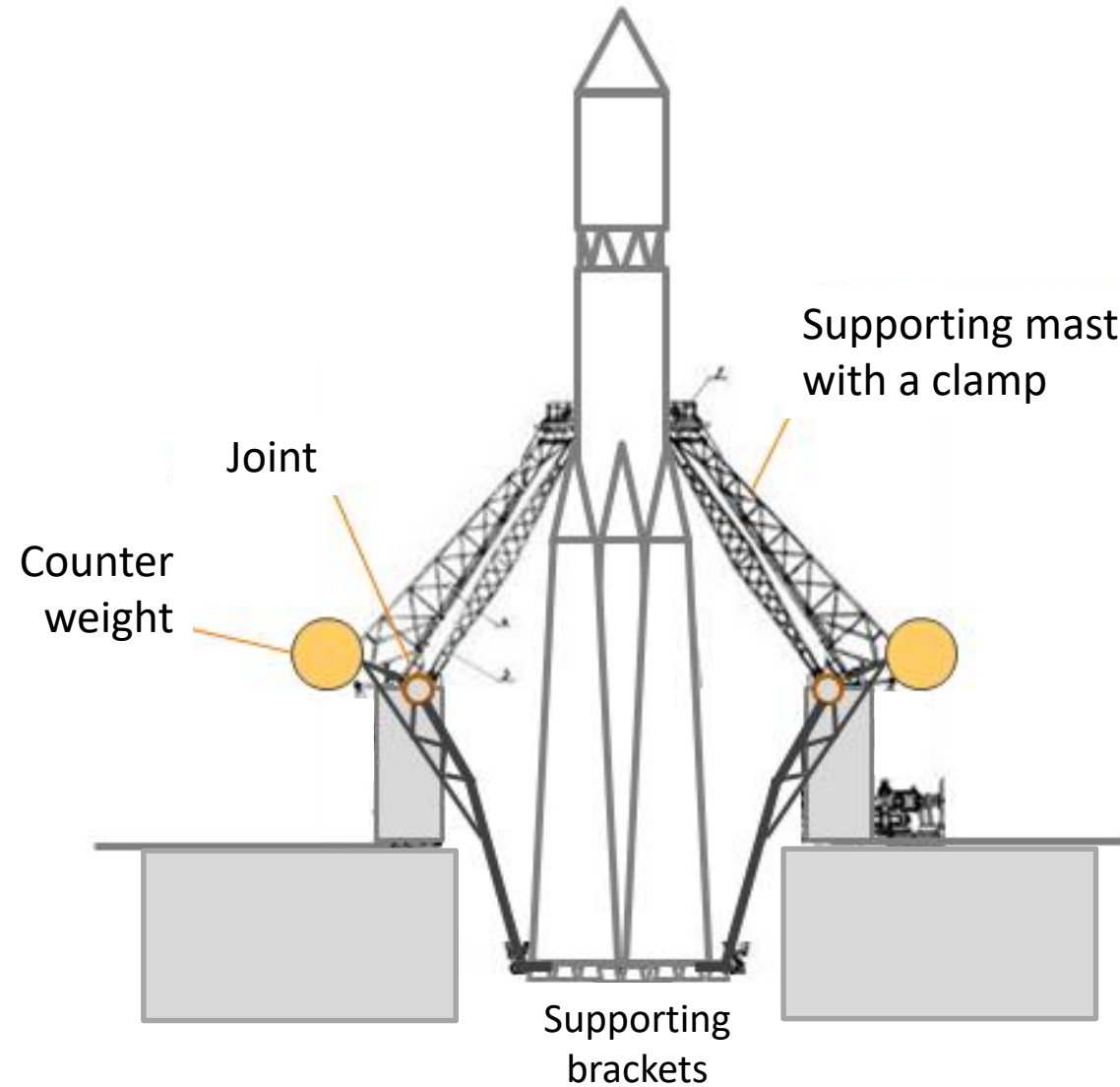


Structure of the PPS for holding the rocket-carrier

## List of requirements for the X-component:

- **What should it do?** To act as a **transmission**, that is, to transfer power from the brackets to the pressure clamps.
- So far, nothing can be said about the **geometric shape**, **the surface**, but the **internal space**, **the material** of this component must withstand a load comparable to the weight of the rocket.
- **Dynamization.** The transmission should provide the following. When the rocket-carrier is mounted on the brackets, and they press down under its weight, the transmission must impart movement to the shoes towards the rocket case. When the rocket is detached from the brackets, the shoes should move away from the rocket case.
- **Controllability.** Automatically by the weight of the rocket-carrier.

# Example of using Model of Useful System



Stabilization of the rocket-carrier with using its mass

# Thank you for your attention!

[www.triztrainer.ru](http://www.triztrainer.ru)

[info@target-invention.com](mailto:info@target-invention.com)

[triztrainer@gmail.com](mailto:triztrainer@gmail.com)

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