

LIUC – Università Cattaneo

---

# **VALUE ENGINEERING**

**Carlo Noè**

**Scuola di Ingegneria**

e-mail: [cnoe@liuc.it](mailto:cnoe@liuc.it)

## ❖ **VALUE ENGINEERING**

Systematic application of known techniques for:

- identifying the functions of a product or service
- assigning an economic value to the functions
- ensuring the required functions at the lowest possible total cost

*Society of American Value Engineers*

# ❖ VALUE ENGINEERING AND ANALYSIS

## VALUE ENGINEERING

creative discipline and organized for the optimization of the value of a product **under development**

## VALUE ANALYSIS

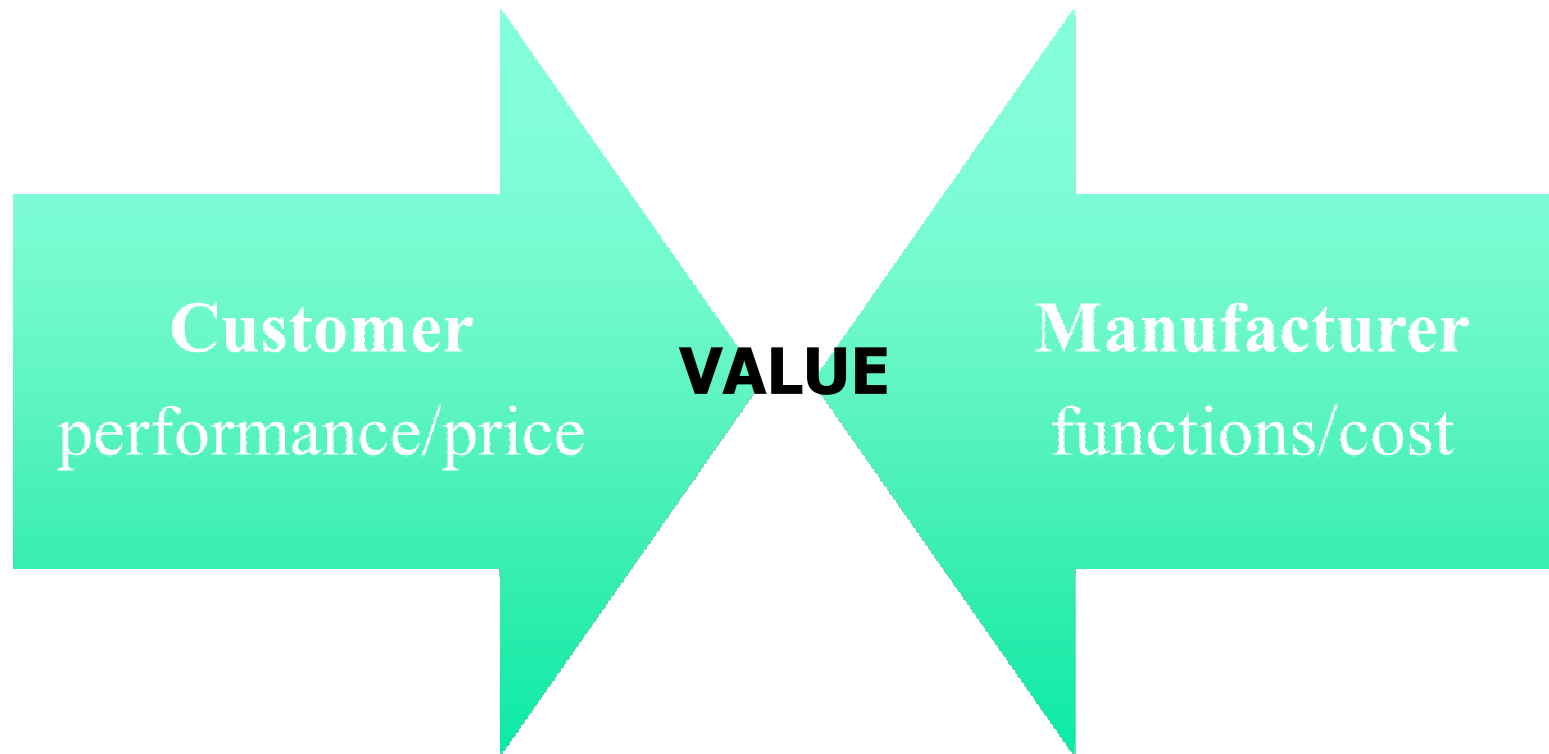
creative discipline and organized for the increase in the value of a product **already developed**

## ❖ VALUE ENGINEERING

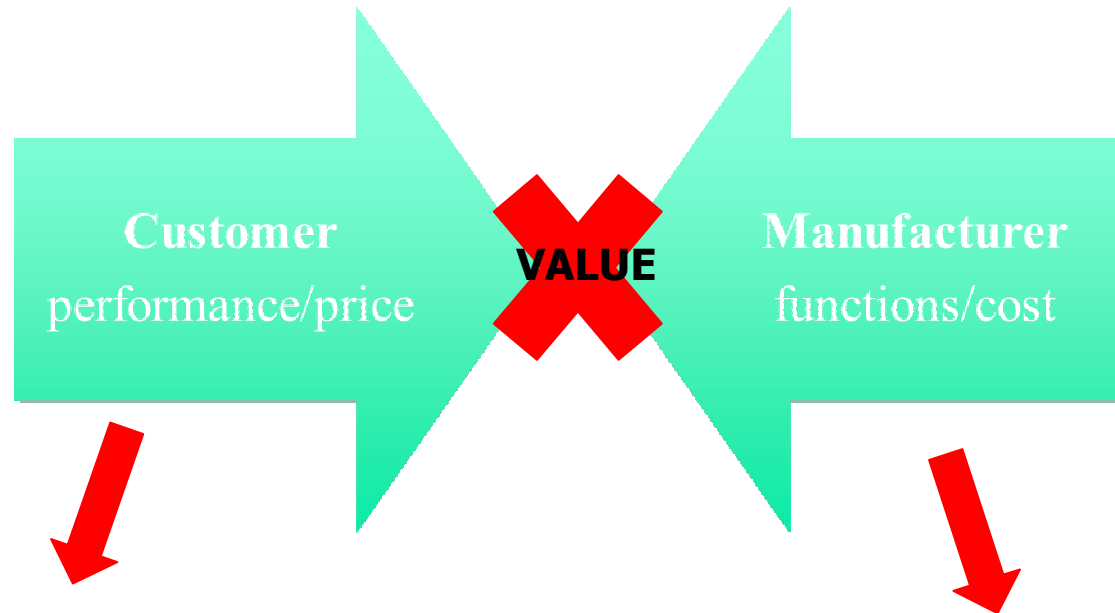
The idea is developed in 40s by Lawrence D. Miles (*Techniques of Value Analysis and Engineering*, McGraw Hill, 1961), manager at General Electric, immediately recognized by U.S *Navy Bureau of Ships* in 1954.

From that moment the developement was not confined to the manufacturing industry

# ❖ VALUE ENGINEERING



# ❖ VALUE ENGINEERING



**unsatisfaction,**  
due to lack of performance

**costs** for performance offering  
that provide **not needed**  
performances

## ❖ VALUE ENGINEERING

The analysis starting point consists in playing the role of the **customer** that, when buying a product, asks himself:

Which functions am I buying ?

Which functions do I really wish or need ?

Is there an existing product satisfying these characteristics at a lower price ?

## ❖ VALUE ENGINEERING

The **manufacturer**, in order to effectively set the new product design, should ask himself:

What is it? (product description)

What does it do? (function identification)

How much does it cost? (give costs to functions)

Is it possible providing the same functions with another product? (creative process)

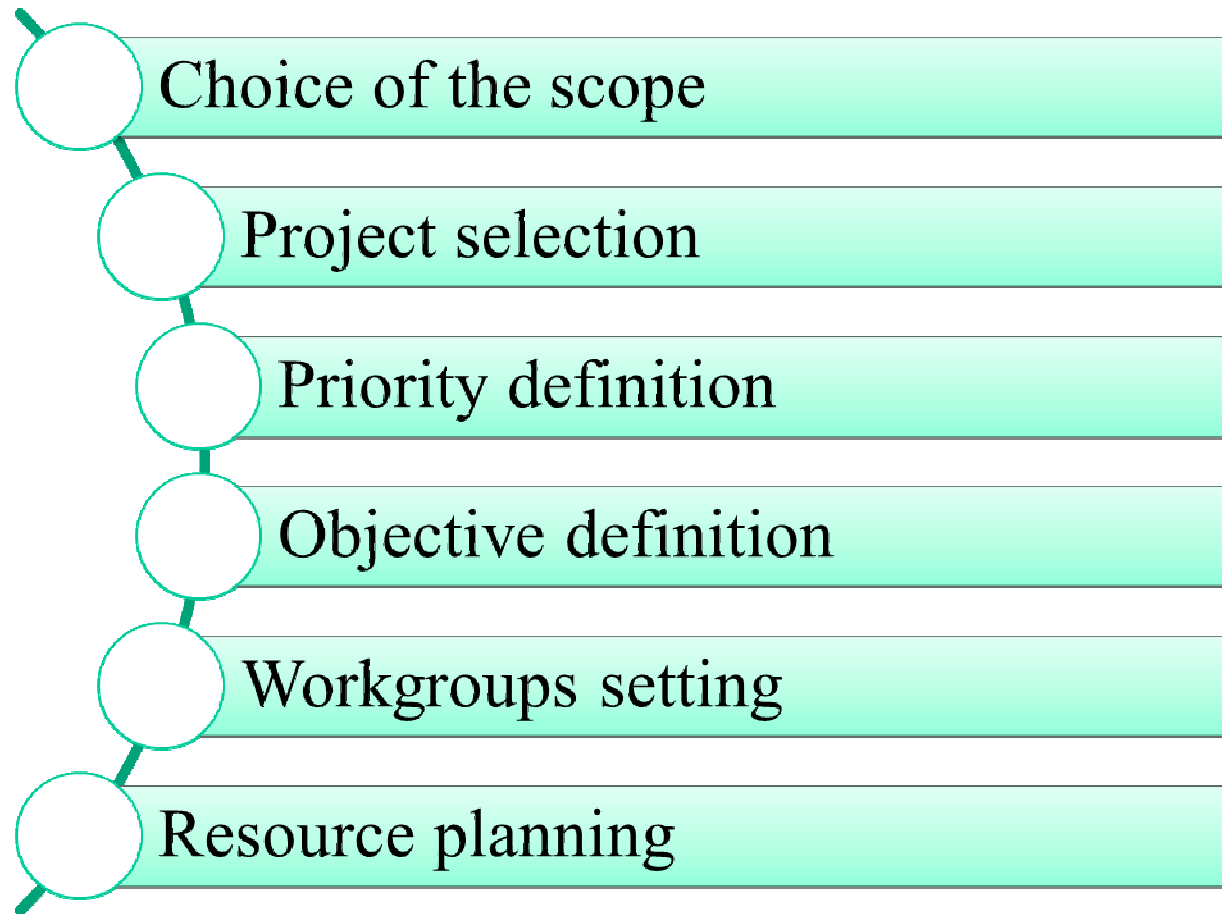
How much would it cost? (value research)



## ❖ WORKPLAN

- 1 • Setting of the study
- 2 • Info and documents collection
- 3 • Functions and costs analysis
- 4 • Search for alternatives (creative phase)
- 5 • Alternatives evaluation
- 6 • Detailed presentation of alternatives
- 7 • Implementation of the project

## ❖ SETTING OF THE STUDY



## ❖ INFO AND DOCUMENTS COLLECTION

Needs, performance requirements and customer opinions

Design evolution

Production means

Regulations and laws

Control/test criteria

Management control

## ❖ FUNCTIONS AND COSTS ANALYSIS

The function is what makes a product (service) for use / sell

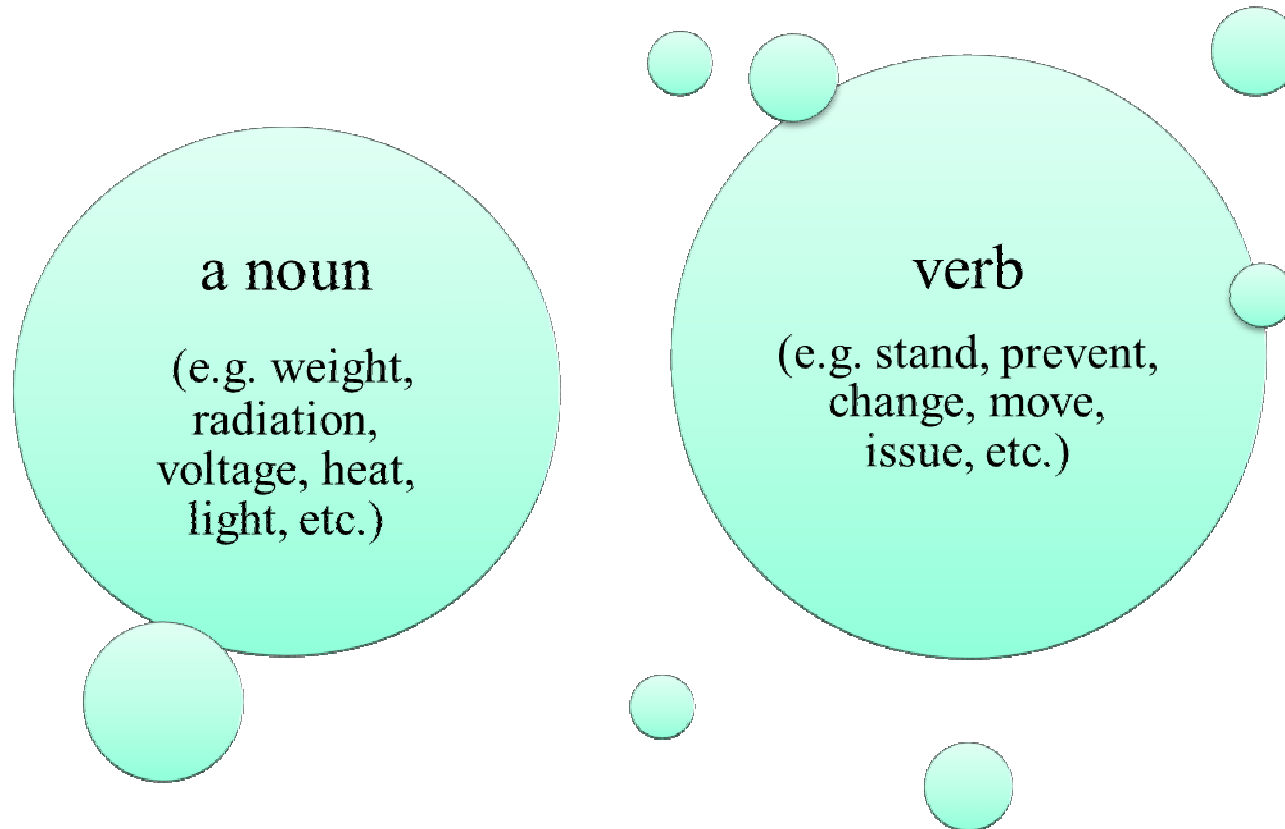
Determination of the **relationships** between features and cost

Function **classification**

Identification of the functions **performed** by the product **desired** by the client

# ❖ FUNCTIONS AND COSTS ANALYSIS

## FUNCTIONS IDENTIFICATION



NOTE: The number of words used to describe the function is inversely proportional to the understanding of the concept that expresses

# ❖ FUNCTIONS AND COSTS ANALYSIS

## FUNCTION CLASSIFICATION

**PRINCIPAL**

- performs specifically for the primary purpose of the product or service

**SECONDARY**

- fulfills a complementary need

**OBLIGED**

- responds to an OBLIGED technical constraint or responds to a regulatory imposed constraint

## ❖ **FUNCTIONS AND COSTS ANALYSIS**

### **FUNCTION CLASSIFICATION**

Each object can perform several functions, the classification between primary and secondary may depend on your point of view.

The same functions can be performed by multiple objects.

## ❖ FUNCTIONS AND COSTS ANALYSIS

### FUNCTION CLASSIFICATION

Component	Function	Principal	Secondary	Obliged
Pencil	Draw signs	x		
Rubber	Delate signs		x	
Bushing	Hold the rubber		x	
	Improve the appearance		x	
Body	Allow the grip and transmit force			x
	Contain the lead			x
	Give info		x	
Paint	Protect wood		x	
	Improve the appearance		x	
Lead	Draw signs	x		



## ❖ FUNCTIONS AND COSTS ANALYSIS

### FUNCTION CLASSIFICATION COSTS/FUNCTIONS MATRIX (costs expressed in € cent.)

Component	Draw segns	Delete segns	Hold rubber	Impr. aspect	Grip & force	Give info	Cont. lead	Protect wood
Rubber		43						
Bushing		15	10					
Body					47	9	38	
Paint				5				5
Lead	120							
Pencil	120	43	15	15	47	9	38	5
Total	292							

## ❖ FUNCTIONS AND COSTS ANALYSIS

### FUNCTION CLASSIFICATION COSTS/FUNCTIONS MATRIX (costs expressed in % of costs)

Component	Draw segns	Delete segns	Hold rubber	Impr. aspect	Grip & force	Give info	Cont. lead	Protect wood
Rubber		100						
Bushing			60	40				
Body					50	10	40	
Paint				50				50
Lead	100							
Pencil	42	15	6	6	16	3	13	2

## ❖ **FUNCTIONS AND COSTS ANALYSIS**

---

### **THE CAUSES OF COSTS NOT REQUIRED TO LEAD THE VALUE DECREASE:**

---

Lack of information

---

Lack of ideas

---

Lack of time

---

Erroneous beliefs

---

Habits and attitudes

---

Changes in customer requests

---

Lack of communication and coordination

---

Specifications and Standards not updated

## ❖ SEARCH FOR ALTERNATIVES (CREATIVE PHASE)

Concepts and alternatives that did not necessarily rely on acquired knowledge or previous experience are formulated. The research is conducted in groups. Among the tools to use, ***BRAINSTORMING*** is founded on:

Freedom from  
psychological  
conditioning

Overcoming habits  
and mental obstacles  
that block the  
creative process

Look for the quantity  
before quality

Prohibition of  
criticism

Exploitation of other  
people's ideas as a  
starting point for  
further proposals

## ❖ ALTERNATIVE EVALUATION

Elimination of  
nonsense ideas



Unification and  
synthesis of similar  
ideas



Choosing the best  
solutions, their  
evaluation and  
comparison on the  
advantages and  
disadvantages,  
feasibility

# ❖ ALTERNATIVE EVALUATION

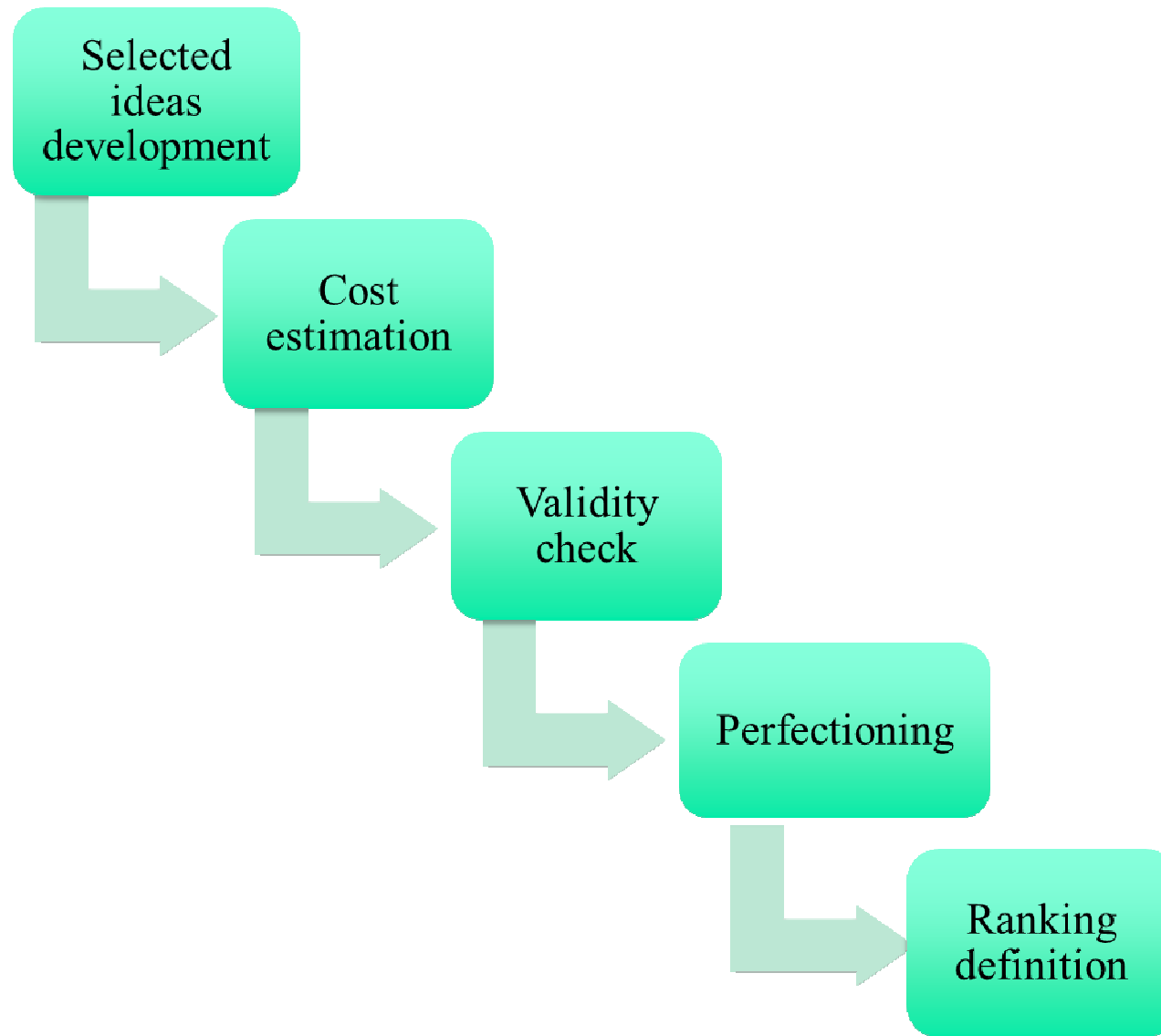
**FEASIBLE ALTERNATIVES IN THE SHORT TERM**  
(to be discussed soon): lack of substantial changes to the current project

**FEASIBLE ALTERNATIVES FOR THE MEDIUM TERM:** need for substantial changes to the current project

**ALTERNATIVES CONSIDERED VALID FOR THE FUTURE** (To be taken from the documentation): The need for comprehensive review of the project

**ALTERNATIVES CONSIDERED UNFEASIBLE**

## ❖ ALTERNATIVE EVALUATION



## ❖ DETAILED PRESENTATION OF ALTERNATIVES

Illustrate the  
"before" and  
"after"

Evaluate the  
advantages and  
disadvantages

Propose the  
final choice

Require  
approval

Program  
implementation

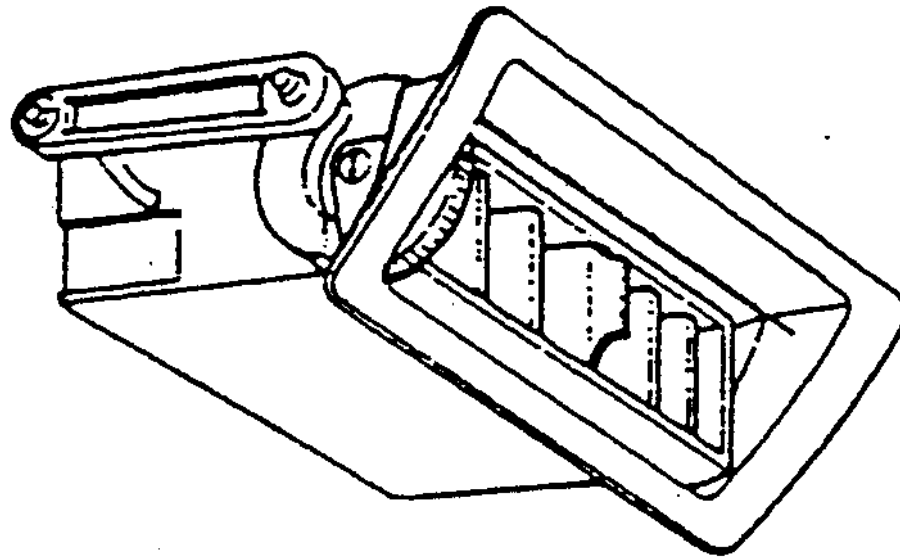
Propose a  
responsible



## ❖ EXAMPLE

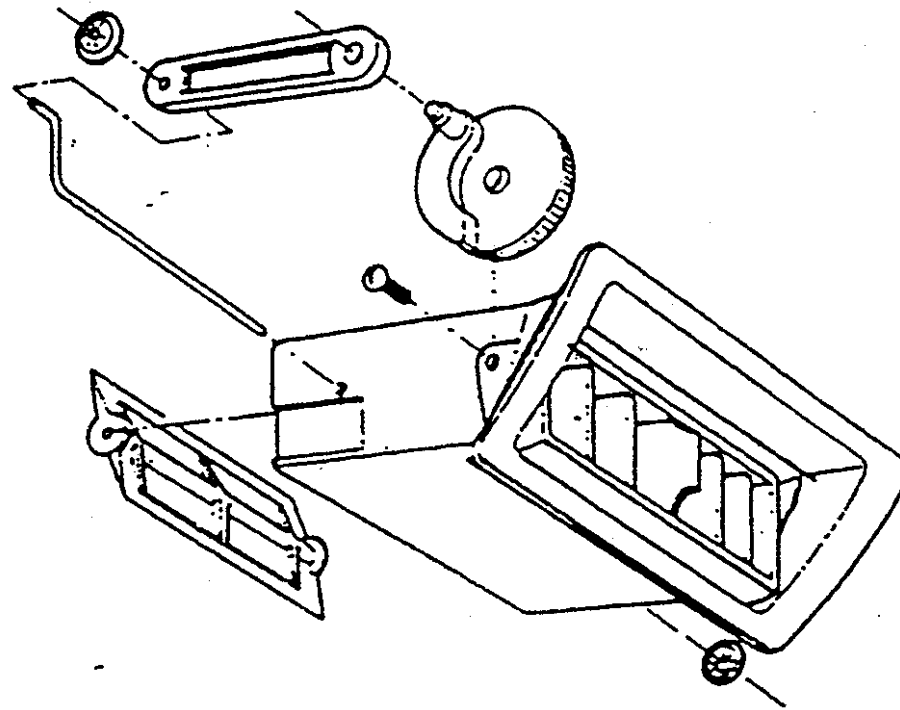
INTAKE AIR FLOW FOR AIR CONDITIONING OR HEATING

Original design



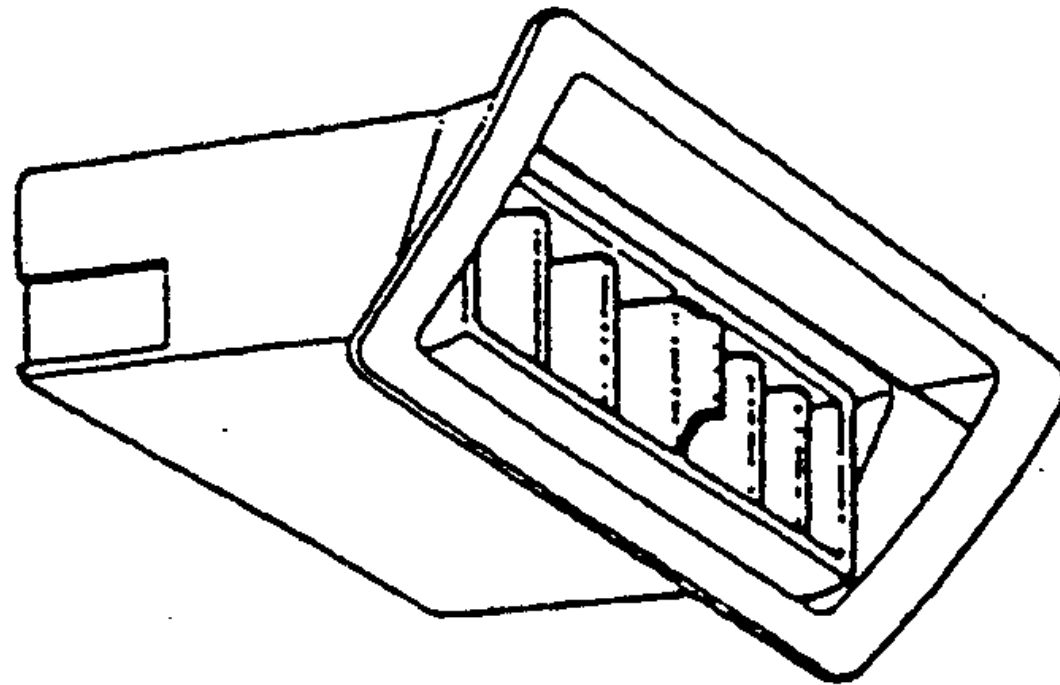
## ❖ EXAMPLE

Exploded original design



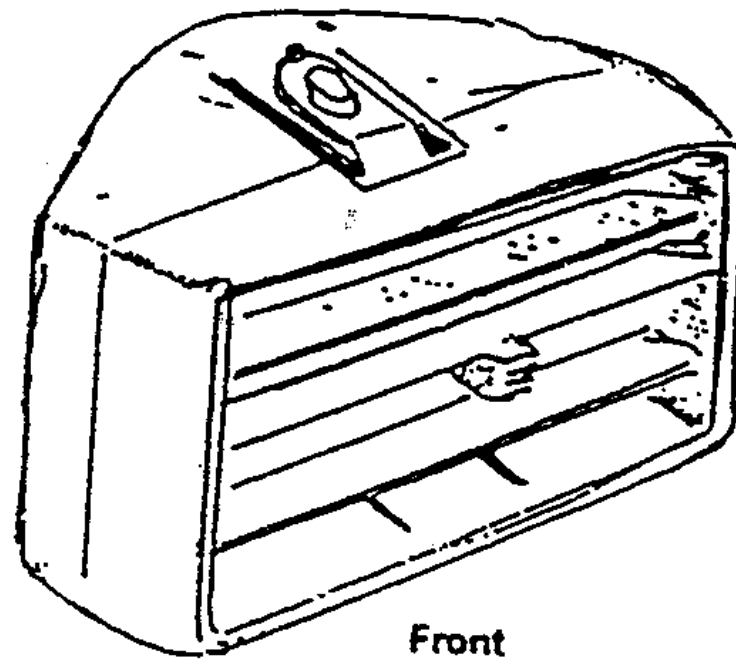
## ❖ EXAMPLE

New design



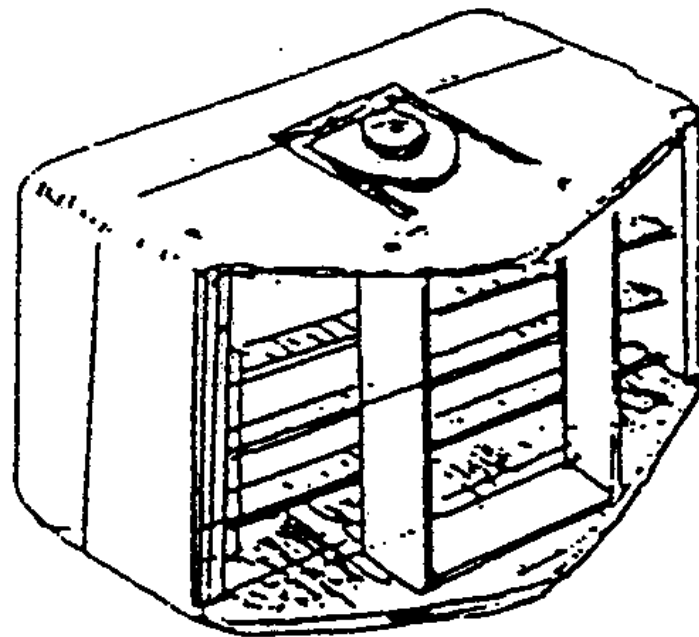
## ❖ EXAMPLE

New model (front view)



## ❖ EXAMPLE

New model (rear view)



Rear