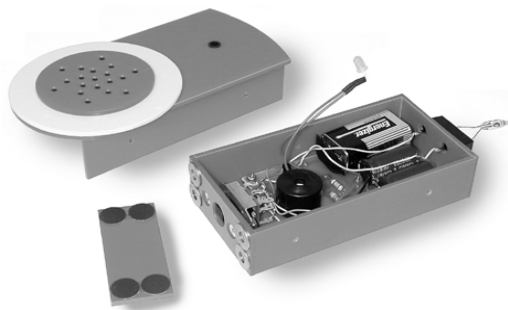


**THE TECHNOLOGICAL PROCESS:
from original idea to final recycling**

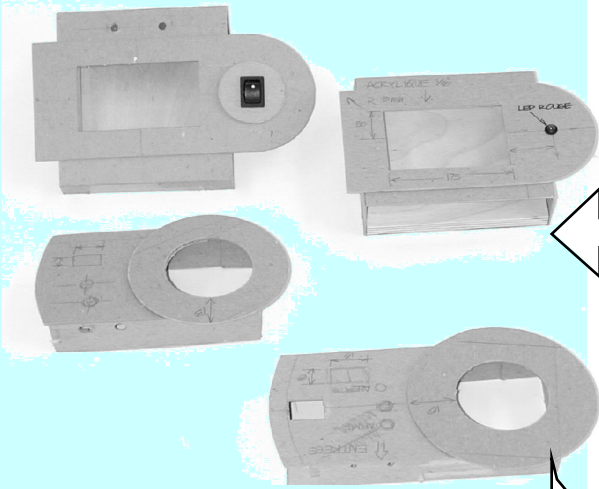


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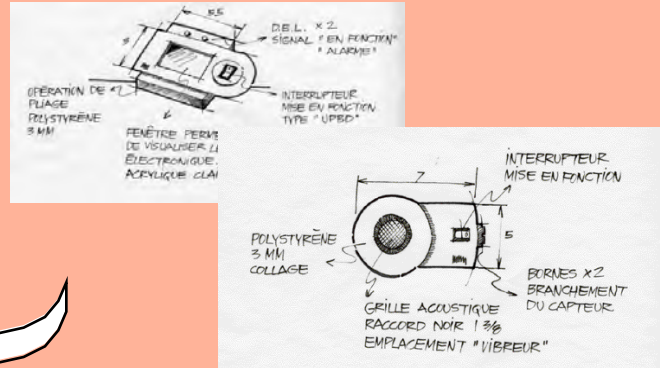
FROM IDEA TO PROTOTYPE

Example: designing a compact alarm system

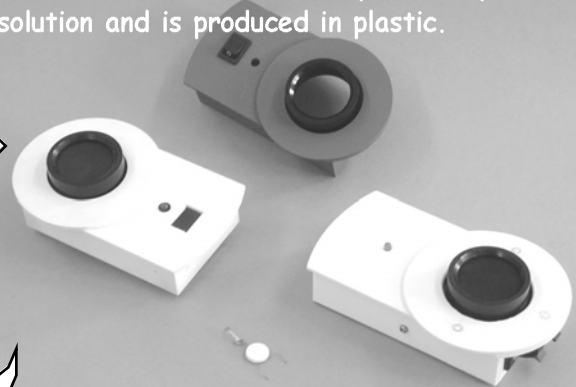
After consulting an electronics specialist, the designer makes a number of cardboard models.



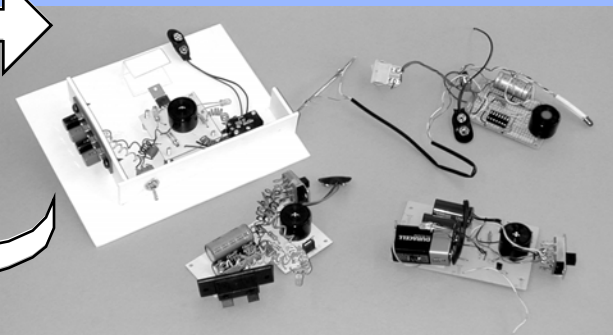
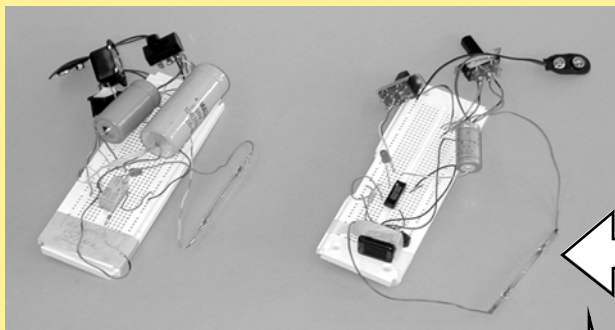
The designer first draws sketches of the cases on paper.



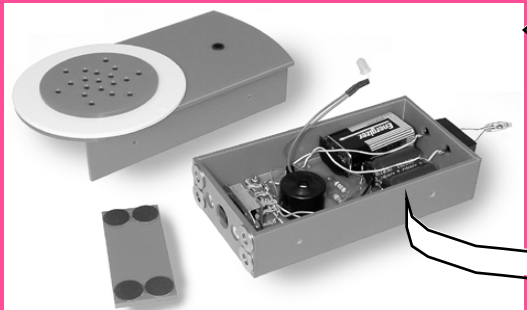
One model is selected as a potentially viable solution and is produced in plastic.



Meanwhile, the electronics specialist tests a number of possible solutions. The circuits are tested on test boards before being assembled on printed circuits..

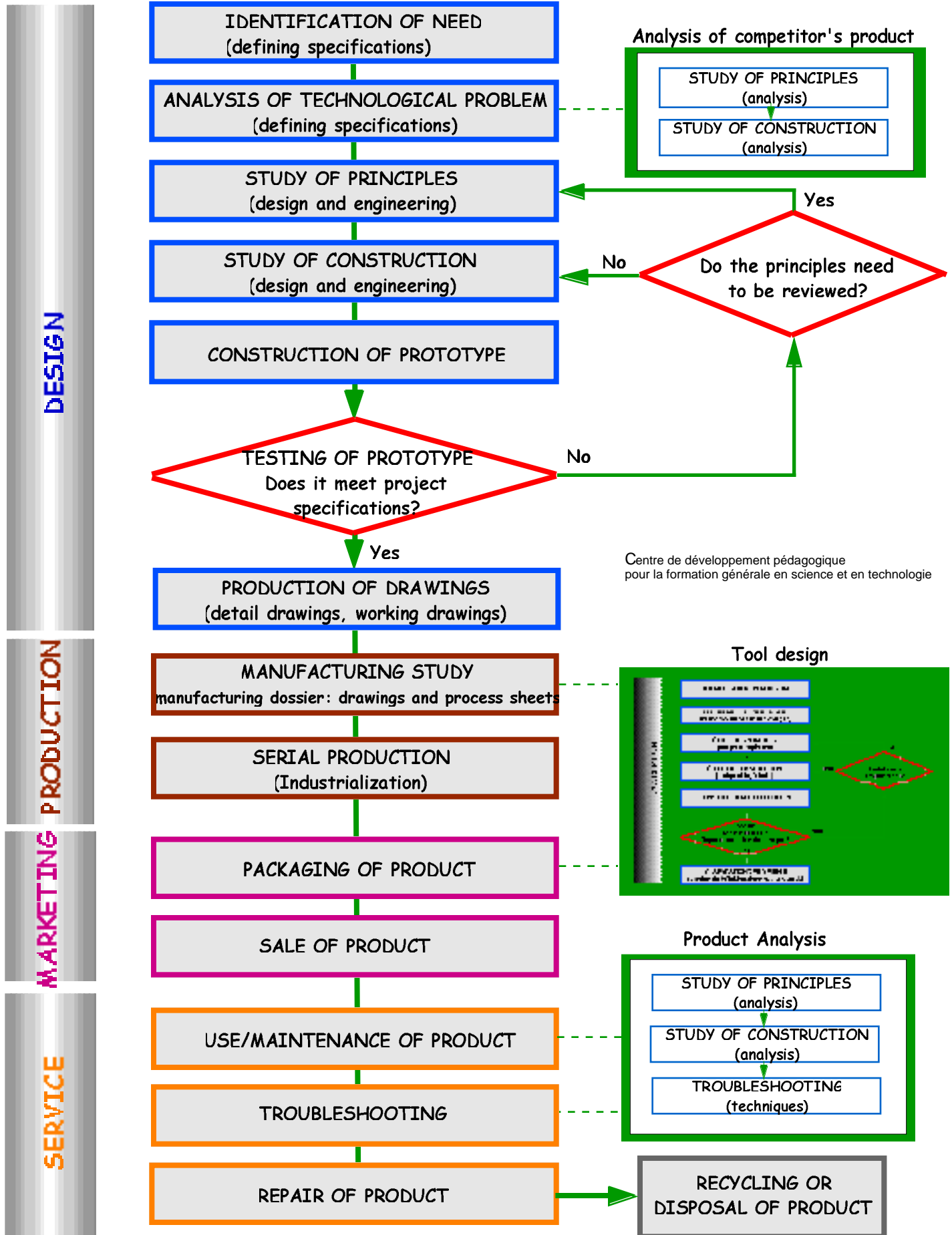


Finally, the prototype constructed meets all of the criteria listed in the specifications.



SIMPLIFIED TECHNOLOGICAL PROCESS

(conception, production, use, and disposal of the technical object)



DESIGN

IDENTIFICATION OF NEED

This step is usually initiated by the client (e.g. an individual, an industry, the military, a government, a scientist). The client may have a technical object manufactured according to his or her needs, or the need may also be anticipated by a marketing firm on behalf of a high-tech company or industry that wishes to produce a product for potential customers.

ANALYSIS OF TECHNOLOGICAL PROBLEM

The first thing to do is to take inventory of what is already available to avoid reproducing an existing product. Analyzing competitors' products is also essential to improve on existing products. The client submits his or her specifications, indicating the details and conditions of what the designer is to deliver. If the client does not clearly define his or her needs, the designer may suggest specifications that the client may alter or approve as is. The specifications include all information needed to design an object that meets the client's initial need. The specifications may include assessment criteria for each of the requirements or constraints. These criteria will be used to compare the various solutions and decide which one will ultimately be developed.

STUDY OF PRINCIPLES (design and engineering)

This step consists in determining the principle(s) of operation. The designer uses a hypothetical-deductive method. A number of hypotheses may be put forward, but only one will ultimately be used. The designer makes use of all old and new knowledge that science and technology have to offer to meet the need. It is in this and the following step that the designer either analyzes the competition's solutions or builds on existing solutions in other applications to apply knowledge in another field. The process is not as linear as the above diagram indicates. The study of principles is often conducted at the same time as the study of construction, and designers are often already thinking about how to mass-produce the object well before they study the manufacturing process. The object begins to take shape in sketches and the functional relationships between its main components become apparent.

STUDY OF CONSTRUCTION (design and engineering)

This step essentially consists in translating the operating principles into concrete form, i.e. shapes, sizes, materials, connecting parts, processes, etc. Here, too, the designer works from hypotheses. The best ones are selected on the basis of experiments using proven techniques and the conditions in the specifications.

CONSTRUCTION OF PROTOTYPE

Rarely is only one prototype made. Usually, a number of prototypes or progressive prototypes are produced. Each prototype is usually an improvement on the previous version. Prototypes are never perfect; they represent a satisfactory compromise given the circumstances.

TESTING OF PROTOTYPE

Does the prototype meet project specifications? This is the question that needs to be answered at this stage. The prototype is tested at various stages in its development. Sometimes only a part (subsystem) of the prototype is tested and, other times, a particular material. The prototype is often built at the same time as the two previous steps. Ultimately, it must meet the customer's expectations as closely as possible (i.e. it must function as initially intended).

0 - Etude de l'état mécanique :
indiquer, pour chaque liaison, si elle est démontable ou indémontable.

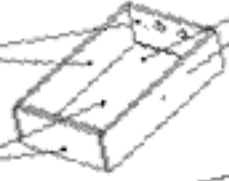
Sous-ensemble : **C**

Boîtier

Définition : Un boîtier est un contenant dans lequel on retrouve les éléments principaux d'un mécanisme ou d'un système.

Liaison démontable

Liaison démontable



Liaison indémontable

Fonction : Permet de fixer le circuit imprimé, l'élément principal et la borne à ressort.

Sous-ensemble : **D**

Couvercle

Définition : Le couvercle est une pièce qui ferme le boîtier et qui contient certains éléments mais qui ne se peut pas installer sur le fonctionnement de l'objet.

Liaison démontable

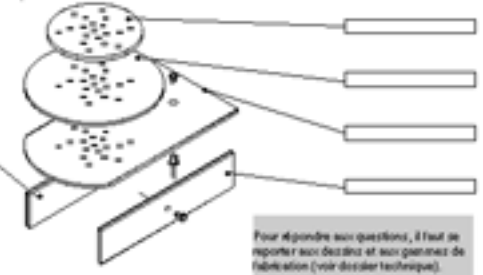
Liaison indémontable



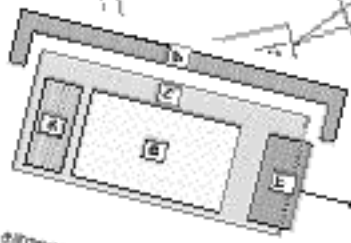
Le couvercle se démonte le boîtier sous

proposée pour le poste n° 3 (repères 8 et 9)

Tracer seulement les pièces 8 et 9 sur le dessin ci-dessous en inscrivant leurs noms et leurs repères.

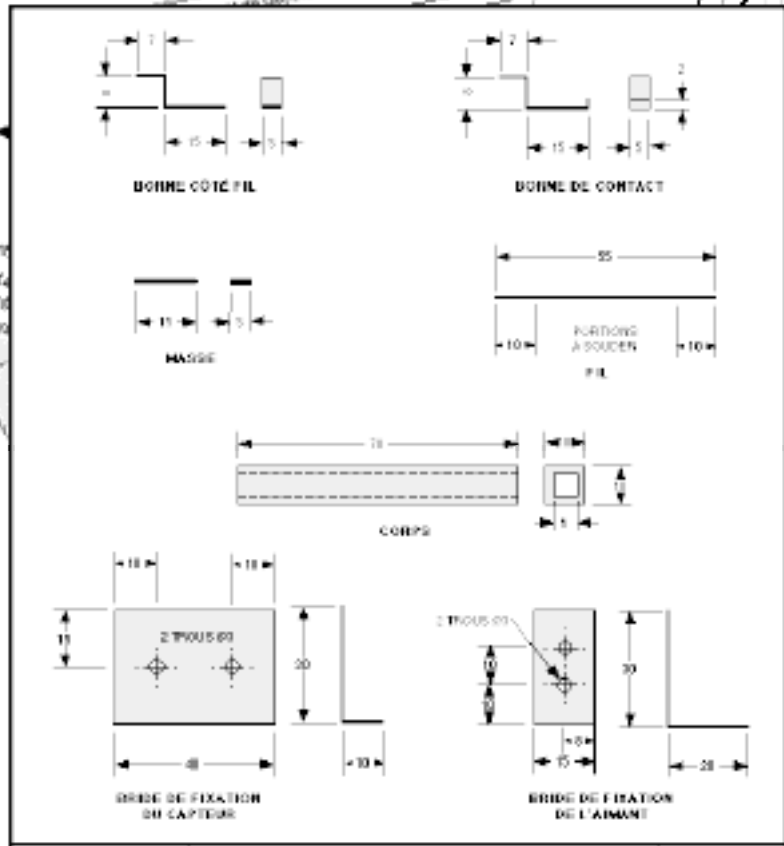


Pour répondre aux questions, il faut se reporter sur descriptif et sur planches de fabrication (voir dossier technique).



A - alimentation
B - circuit imprimé et ses composants
C - boîtier principal

D - couvercle
E - contact
F - capteur de



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PRODUCTION OF DRAWINGS (detail drawings, working drawings)

Even though preliminary drawings may have already been made, in this step final drawings are made for each component. These drawings are called detail drawings. Working drawings of the prototype and its subsystems are also produced. These drawings comply with international standards. Patent applications and product licencing are also undertaken by the official standardizing bodies at this stage.

PRODUCTION

MANUFACTURING STUDY

This step consists in addressing the following concerns: having the right people in place, at the right time, with the right tools and materials to produce the object on time and at the lowest possible cost. Of course, this step applies only to objects that must be mass produced. Unit production is not uncommon (e.g. for roads, dams, buildings, specialized ships or special tools). In this step are put together the manufacturing dossier (i.e. the drawings from the previous step together with process sheets for the manufacture and assembly of the object). The process sheet is a technical document that gives manufacturers the information they need to manufacture the product (i.e. how many units to produce; what to do; what sequence to follow; what techniques, machines, tools and materials to use). This is also the step where special tools are designed that do not yet exist in the industry (each tool is designed using this same method).

SERIAL PRODUCTION

This step includes producing components, conducting quality control and assembling the products.

MARKETING

PACKAGING OF PRODUCT

This step includes presenting the product in as positive a light as possible, designing and developing packaging that is safe for shipping, and writing operating instructions and maintenance guides.

SALE OF PRODUCT

SERVICE

USE/MAINTENANCE OF PRODUCT

TROUBLESHOOTING

All technical objects malfunction at some point. It's only a matter of time!

REPAIR OF PRODUCT

RECYCLING OR DISPOSAL OF PRODUCT

