QUALITY ASPECTS OF DESIGN

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1. INTRODUCTION

Is the quality of ceramic paving and tiling limited by design? Is quality the servant of design or vice versa? Does good design produce good quality?

It is evident that questions like these require an explanation before we answer them.

It has been, and still is, common to give answers like the following: "We have good products but they need better design ...", "We'll have to incorporate more design...", "such and such a product is very mediocre but it is well designed..."etc. This is the starting point: that is, the conception of design as "something" which is added to an already created product. From this point of view the first question is fully valid in that we are talking about adding a final touch to a product which has previously been developed, and this is a distortion of the concept.

On the other hand, it is equally true that the quality of a product should be understood as its capacity to satisfy the consumer while maintaining profitability. In this view design is understood as only a part of the quality of a product.

In this presentation I will try to put design into its appropriate context, which is as an integral part of quality, as previously defined, and not solely as a limiting factor related to the appearance to the consumer. To achieve this, that is to be able to answer NO to these questions or to answer that THESE QUESTIONS ARE NOT APPLICABLE, I will demonstrate the current degeneration of the concept of design and attempt to show the serious problems created by it, which unfortunately lead to asking this kind of question, and even worse, to answering them in the affirmative.

To not admit that there exists a conflict between the Production and Design Departments would be to simply close one's eyes. But this assertion is based on the definition of Production as the sum total of men, machines and products which "make-manufacture" the product, and Design as the sum total of men machines and products which add the colour, decoration and certain finishing touches to it.

A look at the reality of the situation, will show us that tiles using the same fabrication process, the same material done by the same people give us good results or catastrophes depending on the addition of enamel or a particular serigraphed design. The following comments are typical: "Model A comes out really well but with the way the artist has retouched the design, we have a lot of trouble producing Model B" (Production says). "Sure, but Model A doesn't sell and Model B does", (Design or Commercial says). This is the origin of the conflict, since on the one hand production considers design as an addition and, Design, on the other, considers it an aid to ensure the commercial success of the product.

The usual way we use the word "design" indicates that we associate it basically with "conception". Another way of looking at it is that which refers to the sum total of the PROJECT from conception to the end; that is, operational procedures, production instructions and final technical and aesthetic result.

This schema may be simplistic but it is basically true and generally accepted. At least this is confirmed by my own experience and that of others.

This conflict has a solution which is easy and always profitable. In order to explain it, we are going to consider the process in inverse order, that is, to describe the final ideal situation in order to later define the successive steps needed to achieve it.

With regard to the importance of the subject, it is sufficient to point out that all published studies indicate that 30% of the costs attributable to lack of quality are produced in fabrication but the remaining 70% are caused by deficiencies in the design or initial planning. If in our sub-sector of ceramic pavement and tiling we attribute 15% of total cost to lack of quality we are then discussing 8 to 10% of the total cost as dependent on good management of design, without even taking into account damage to the image of the company, quality of service, etc.

II. MARKETING MIX. THE PRODUCT

The general evolution of a company tends to be concentrated around the concept of long term profitability, and expansion as the most feasible means of achieving this aim.

THIS EVOLUTION IS ATTAINED BY PRODUCT DEVELOPMENT AND MARKET RESEARCH:

The Marketing-mix deals with the four main variables of demand (Fig 1):

* Products Policy
* Price Policy
* Advertising and Promotional Policy
* Distribution Policy

Any variation in these variables may change the others and therefore cause a modification of company policy. Thus it is necessary in the first place to DEFINE OBJECTIVES:

Product:

* Quality and presentation
* Range of Products
* Brand Image
* After Sales Services

Prices:

* Prices and discounts to customers
* Financing of Sales

Advertising and Promotion

* Budget
* Public Relations
* Promotion
* Advertising

Distribution:

* Identification of channels of distribution
* Points of sales (Retail outlets)
* Transport, Distribution and Warehousing

IN THIS FIRST GENERAL SKETCH OF THE POLICY OF ANY COMPANY WE SEE THAT ONE OF THE FUNDAMENTALS OF THE POLICY IS THE PRODUCT. A VERY IMPORTANT PART BUT NO MORE THAN A PART, NONETHELESS.

Since the Product is the fundamental part of what is offered, this should have a series of specific characteristics (Fig 2).

So far we have only defined the Product generically and it is precisely when we get past this stage that design has a special significance. Therefore, from this point on, we will call the Product a PROJECT.

PRODUCT INNOVATION depends on Marketing Research, followed by the process of Research and Development of products, taking into account technical aspects, whether or not the same technology is used, product function, cost of quality, range, differentiation, phase and generation of the product in the market. . .

III. RESEARCH AND DEVELOPMENT

Research and Development imposes a functional structure, on the human resources as well as on other means. This structure should take into account the connection between Production, Sales and Administration with the Management of Research and Development, who will all collaborate in studies of the phases of development of the product once it is conceived as such through creativity and the start up of the research project.

AT THIS POINT THE PRODUCT HAS BEEN DEFINED AND IS IN THE HANDS OF RESEARCH AND DEVELOPMENT.

Once the product is defined, a development plan is drawn up which specifies the means or resources to be used, the dates on which the materials, methods and finished plans on which production will be based will be available. An analysis of values, tests and trials, data banks, industrial protection etc will also be included in the plan.

The criteria will be as follows:

1. To obtain a product which meets the specifications laid down in the initial specification sheet, and that the fabrication process should be practical and admit the possibility of revisions and adjustments.

2. To attain or surpass the desired level of quality.

3. To achieve minimum cost after the specifications have been met and sufficient quality has been achieved.

THE PRACTICALITY OF A DESIGN-PROJECT DEPENDS BASICALLY UPON MARKET ACCEPTANCE, THE SALES GENERATED AND THE RESULTING COST.

The Department of R+D or the Technical Department will draw up and carry out the Development Plan (Fig 3).

At this point it may be convenient to recapitulate what has already been said by putting together the three different tables which will give a global view of:

a) Why is a new product conceived?
b) Where is it conceived?
c) Where is it developed?
d) How is the development carried out?
e) What should be considered?

In this way the design, or project, is thought of as a whole from the very inception of the product in terms of Marketing Mix up to the actual production, along with all of the additional factors which have been mentioned.

The limitation of the graphic or purely aesthetic aspect of design inevitably leads to problems which are reflected in any of the prime elements of the Marketing Mix and will affect the cost. If, in the best case, we encounter no problems whatsoever, we must consider that this is basically by chance.

On the other hand, using a structure similar to the one which we have delineated, it is obvious that there will be no motive for the conflicts described earlier because it proposes a shared process with clear allocation of responsibilities and joint approval of the final product.

IV. HOW DOES IT WORK ?

Finally, by way of illustration, we will present a concrete example of how this process actually works.

DESIGN CONTROL PROCEDURE

INDEX

1. OBJECT

2. SCOPE

3. DOCUMENTATION

4. RESPONSIBILITY

5. PLANNING AND REALISATION

1. OBJECT

The object of this procedure is to define the system used by AZUYDE to ensure control and verification of design activities.

2. SCOPE

This section deals with all design activities, aesthetic as well as technical, and other activities which affect the control of product design.

3. DOCUMENTATION

- Quality Control Manual
- U.N.E. Spec
- 66.902-86
- B.S. 5750
- I.S.O. 9002-85

4. RESPONSIBILITIES

The person responsible for the application of the directions in this document is the Head of the "Design Department" under the supervision of the Head of the Quality Control Department.

5. PLANNING AND REALISATION

In order to consider and approve new projects, a "Design Committee" has been created, made up of:

- General Management
- Sales Department
  - National
  - Export
- Production Department
- Design Department
- Quality Control Department

This Committee meets regularly (every two weeks) in order to study and define proposals for new projects. It also draws up the directives or policies to be followed by the Development Department.

Phases of all new projects:

1. Definition by the "Design Committee" of the sales profile .
2. Definition by the Design Department of the graphic and technical characteristics (specification of new product).
3. Production of prototypes
4. Study to be approved by the "Design Committee".
5. Industrial test (pilot production run)
6. Modifications and/or approval

Phase 1. In its regular meetings, the "Design Committee" considers and proposes guidelines for the whole company regarding design.

Phase 2. The Design Department, prepares the following in accordance with the directives of the "Design Committee" :

- Drawings
- Technical specifications

The technical specifications for each particular project include the following:

- General Description
- Characteristics (Dimensions, materials, finish, colour, special characteristics)

Phase 3. Using the data from the drawings and description of characteristics, the Head of the Design Department plans the production of various prototypes for consideration and approval. These prototypes are made in the laboratories of firm laboratories.

Phase 4. The Design Committee meets to study the different prototypes submitted by the Design Department. When the different prototypes have been evaluated, approval for a production test run is given or withheld.

Phase 5. Production Test Run

Once the prototypes are approved by the Design Committee, the Design Department, together with Production, prepares the specifications, methods and plans for the trial production run.

Using all the data which it has been given, the Production Department sets up a production line for a test and makes the trial run.

Phase 6. Modification and/or Approval

Once the trial run has been made, the results are evaluated by the Design and Production Departments to determine whether the project is viable. If the result is favourable the new design goes into production and the Sales Department is duly informed.

If the result is unfavourable, the problem is evaluated and the modifications necessary or the possibility of inviability is studied.

All the measurements of quality will be fixed according to the requirements of the Quality Control Department, which will be notified when the new product is included in the catalogue.

All these procedures can be illustrated using the schemas in Figures 4 and 5, which give a graphic idea of the steps to be carried out.

The following is a specific example of this procedure:

EXAMPLE

1) Definition of Product

"In our product range we should include one or two lines which base their commercial appeal on technical qualities, even if the finish must be determined by trends in current demand".

1.a. The Sales Department's request is analyzed in the Design Committee:

* Production: "We must not forget that we are now obtaining BIIa products. On the other hand the granular glazes give good results as far as abrasion is concerned but we do have certain problems with bubbles. Also, when we tried to lower absorption we discovered some disadvantages, deformations and longer cycles.

* Design: "The decorative possibilities of the granular glazes are limited and the texture too exclusive. There is a wide range of colours and sizes of granular glaze available on the market but they always limited because each one is exclusive to a single supplier".

* Management: "It's true that this sort of model gives good results where classification is concerned, but only when they are plain and don't have serigraphic designs. Also the market is already beginning to be saturated. On the other hand the cost of enamel is double or triple that of the rest of the materials.

* Export Sales: " If we limit these products to what is generally called "granites" we can forget about making good export sales because there is no great demand for this sort of material".

* Laboratory: "These enamels are different to the ones which we are currently using and if we add the additional factor of the granular glazes, we are going to increase dispersion, stock, controls etc while, on the other hand, Management has been insisting that we limit costs.

* Etc.

TAKING INTO ACCOUNT ALL OF THESE OPINIONS VOICED IN THE DESIGN COMMITTEE, THE R+D DEPARTMENT DRAWS UP A NEW PLAN WHICH IS SUBMITTED TO THE DESIGN COMMITTEE FOR APPROVAL. THE MAIN LINES ARE:

- The spray-dried clays needed to produce this product should not provoke distortions either in the installation or in the process.
- The process should remain unchanged throughout the production run.
- The enamels used should be compatible with a number of other lines.
- The product can be decorated like other lines.
- The final texture should not be limited only to "granites".
- The final product will be classified BI and PEI IV
- The lines should be finished in time for the next trade fair.

After the approval of the plan, the R+D Department starts work along four fundamental lines:

* Study of the variables of raw materials which affect the porosity measurement of the ceramic bodies. * Study of the variables in the process which influence the porosity measurement of the ceramic bodies. * Study of the variables which affect the abrasion resistance of the glazed surfaces. * Study of granular glazes in the market. Particle size measurement, colours, effects, applications, decorations under and over cover, etc.

The results of the first two studies permit us to:

- Opt for new compositions (confirmed and tested) or - Make small changes (confirmed and tested) in the process to obtain the same results.

The company interest leads to choose the second option.

The results of the remaining two studies permit us to:

- Obtain smooth enamels (matte and satin) which give the desired characteristics when applied to any of the bases.
- Widen the range of granular glazes and combinations which will produce the desired characteristics when applied to the above mentioned enamels.

- Broaden the range of decorations (tried and tested) from plain serigraphs, raised design, protected airbrush, granular glaze spraying, etc, etc.

This should give us a double result: the inclusion of some of the new type of lines as the Sales Department have proposed or alternatively a gradual changeover of the entire range of the company's lines in the new direction (excluding some lines because of their special configuration).

THE DESIGN COMMITTEE DECIDES TO PROCEED WITH THE PREPARATION OF DIFFERENT LINES, IN VARIOUS FORMATS, INCLUDING THE WHOLE RANGE OF FINISHES AND DECORATIONS, IN ORDER TO BE ABLE TO TAKE A DECISION.

The R+D and Quality Control Departments together with the Research and Development Department and the Laboratory develop the new lines.

All these lines are then produced on a pilot scale by these departments with the collaboration of Production.

The results are evaluated and presented to the Design Committee for its conclusions.

THE DESIGN COMMITTEE DECIDES DEFINITIVELY WHICH LINES TO LAUNCH.

An industrial production run of each line is made and the results are evaluated.

THE DESIGN COMMITTED DECIDES TO INCORPORATE THE LINES IN THE NEW PROMOTIONAL PROGRAM.

In Figure 6 a schema of the whole process can be seen.

Fig.1

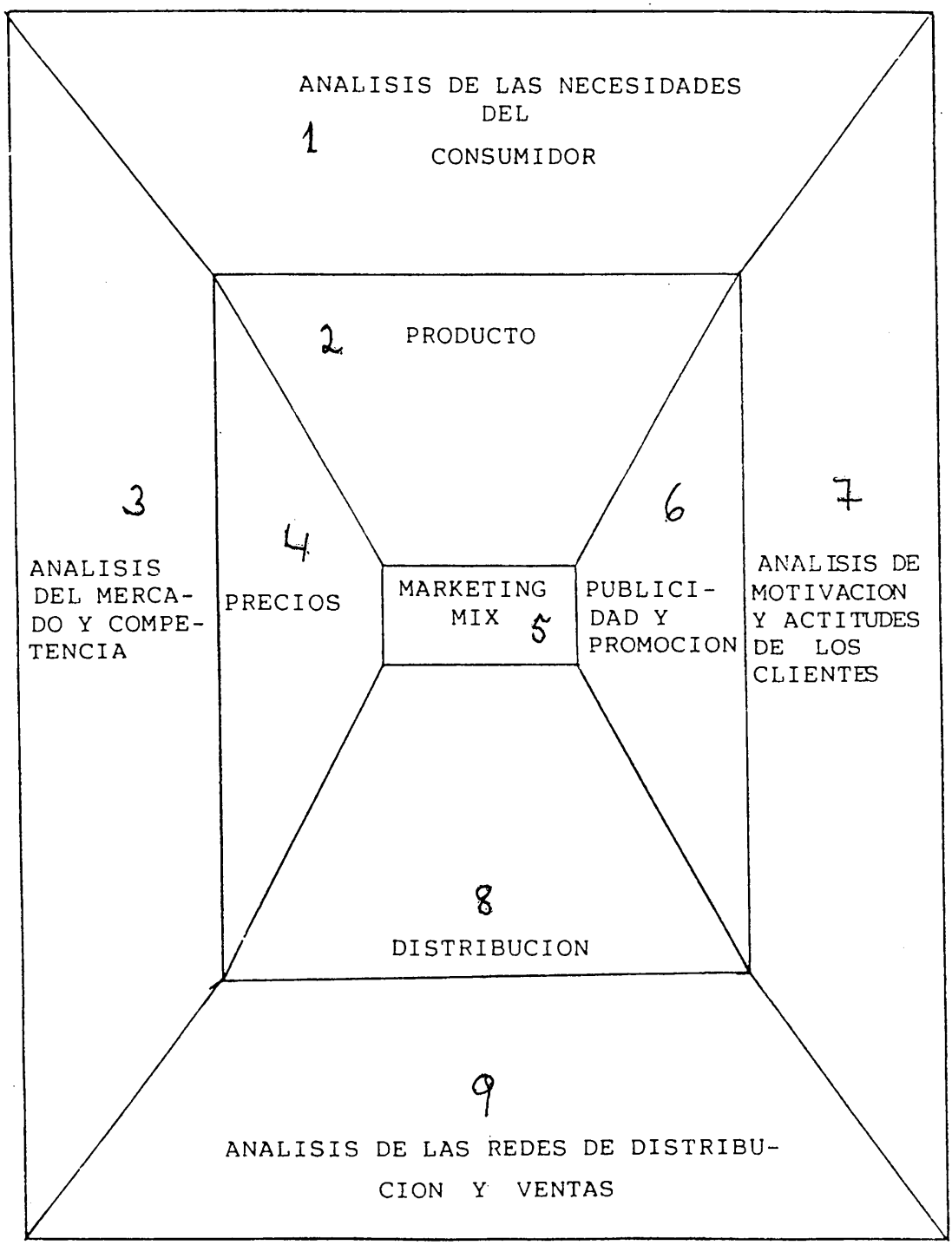

Fig. 1

1. Analysis of the consumer's needs
2. Product
3. Analysis of market and competition
4. Prices
5. Marketing Mix
6. Advertising and Promotion
7. Analysis of client motivation and attitudes
8. Distribution
9. Analysis of the distribution and sales network

Fig.2
CARACTERISTICAS DE LOS PRODUCTOS

1	FUNCIONALES	34 MATERIALES	35 AUREOLARES	36 COMERCIALES	37 ECONOMICAS	38 EVOLUTIVAS
2	Básicas	Internas 7	Imagen 12	Demanda 17	Coste Marginal 23	Fase 31
3	Extras	Externas 8	Simbolismo 13	Producción 18	Coste Medio 24	Generación 32
4	Calidad	Componentes 9	Mito 14	Distribución 19	Coste Mínimo 25	Competencia 33
5	Versatilidad	Fases 10	Estímulo-clave 15	Publicitaria 20	Coste funcionamiento 26	
6	Regulación	Elementos 11	Rito 16	Asistencia 21	Utilidad 27	
				Post-Venta 22	Imagen-precio 28	
					Precio-oferta 29	
					Precio-venta 30	

Fig. 2

1. Functional
2. Basics
3. Extras
4. Quality
5. Versatility
6. Regulation
7. Internal
8. External
9. Components
10. Phases
11. Elements
12. Image
13. Symbolism
14. Myth
15. Stimulus-key
16. Rite
17. Demand
18. Production
19. Distribution
20. Advertising
21. Service
22. After-Sales Service
23. Marginal Costs
24. Average Cost
25. Minimum Cost
26. Operating Cost
27. Profits
28. Image - price
29. Price - supply
30. Price - sales
31. Phase
32. Generation
33. Competition
34. Material
35. Intangibles
36. Commercial
37. Financial
38. Development
39. Characteristics of the products

Fig.3

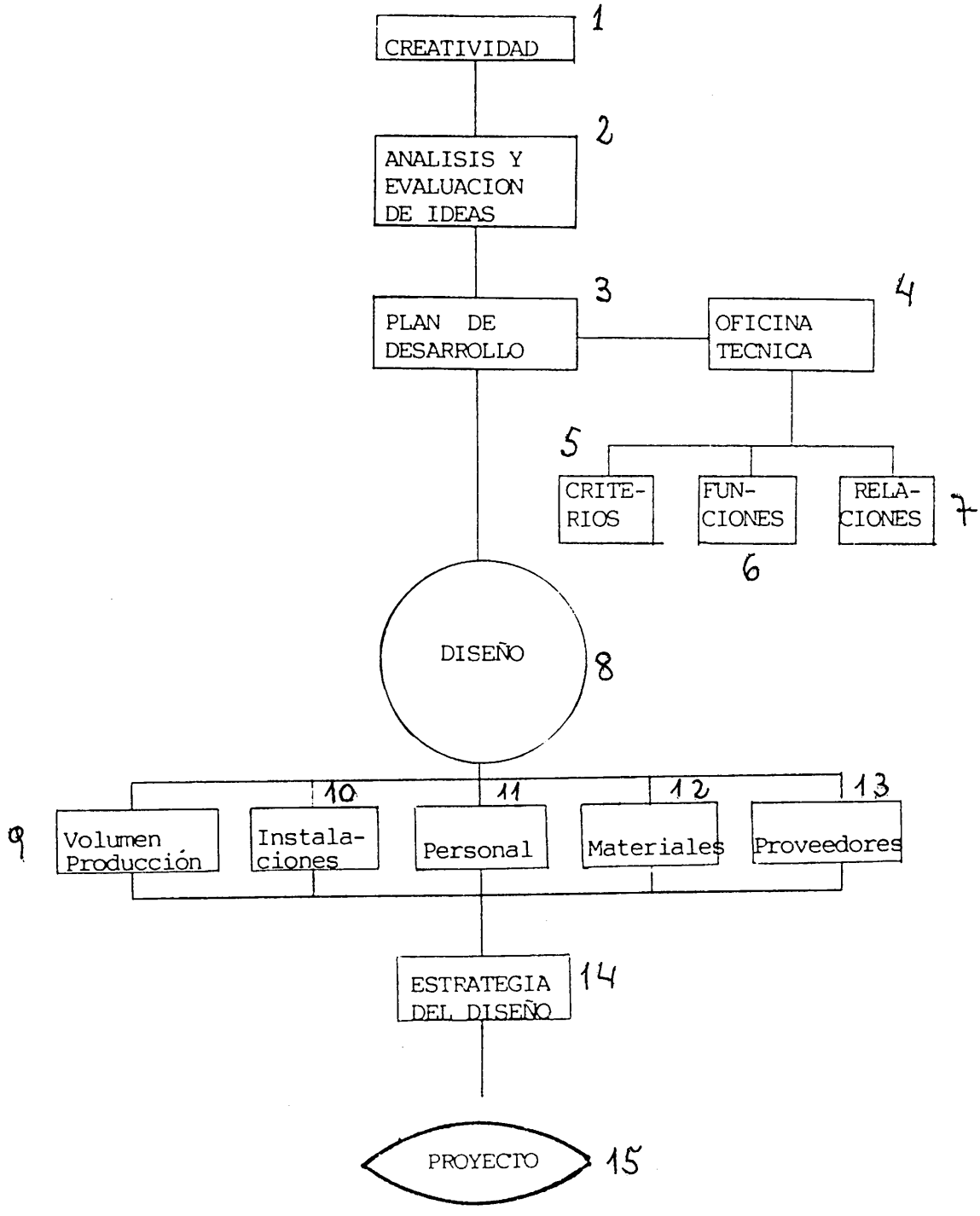

Figure 3

1. Creativity
2. Analysis and evaluation of ideas
3. Development plan
4. Technical Office
5. Criteria
6. Functions
7. Relations
8. Design
9. Production Volume
10. Installations
11. Personnel
12. Materials
13. Suppliers
14. Design Strategy
15. Project

Fig.4

ETAPAS DEL DESARROLLO DE UN PROCESO DE FABRICACION 1

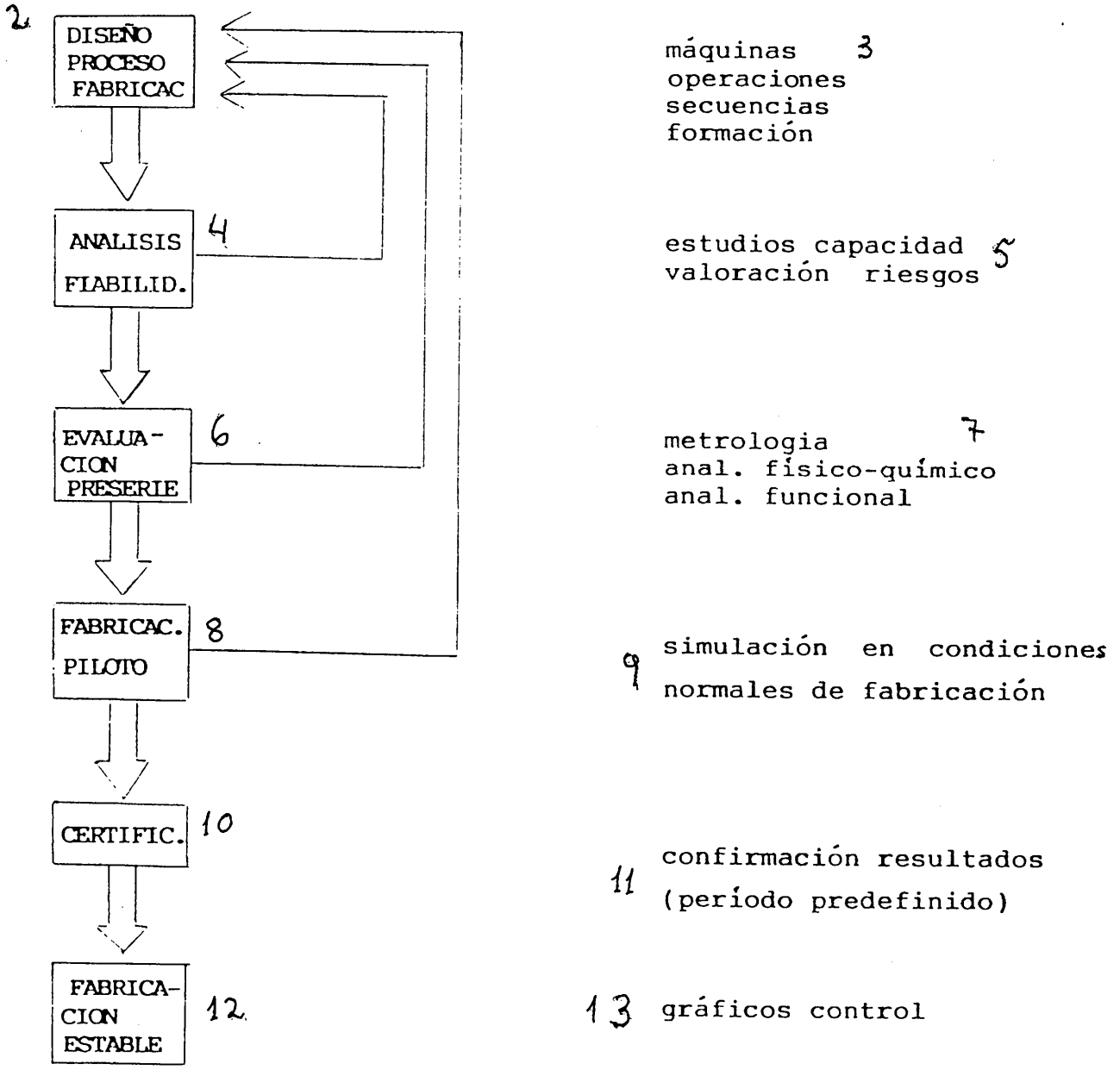

Figure 4

1. Stages of Development in the Fabrication Process
2. Design Fabrication Process
3. Machines / operations / sequences / forming operations
4. Reliability Analysis
5. Capacity studies / Risk evaluation
6. Pre-production evaluation
7. Measurement / Physical-chemical analysis / Functional Analysis
8. Pilot Production Run
9. Simulation of normal fabrication conditions
10. Certification
11. Confirmation of results (pre-defined period)
12. Stable fabrication
13. Drawing Control

Fig.5

UN SISTEMA DE CONTROL DEL PROCESO

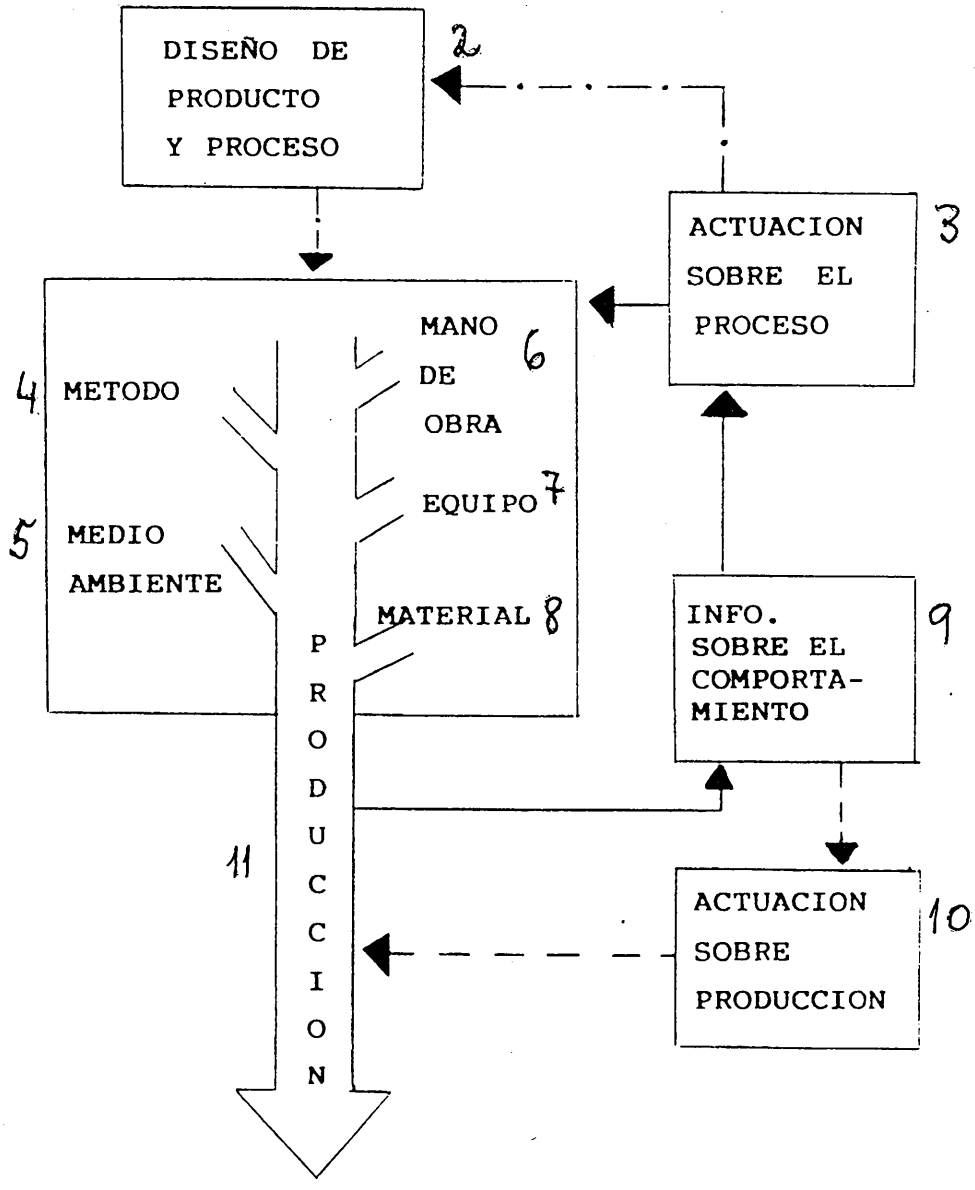

Fig 5

1. A PROCESS CONTROL SYSTEM
2. DESIGN OF PRODUCT AND PROCESS
3. FACTORS AFFECTING THE PROCESS
4. METHOD
5. ENVIRONMENT
6. WORK FORCE
7. PLANT
8. RAW MATERIAL
9. INFORMATION ON BEHAVIOUR
10. FACTORS AFFECTING PRODUCTION
11. PRODUCTION

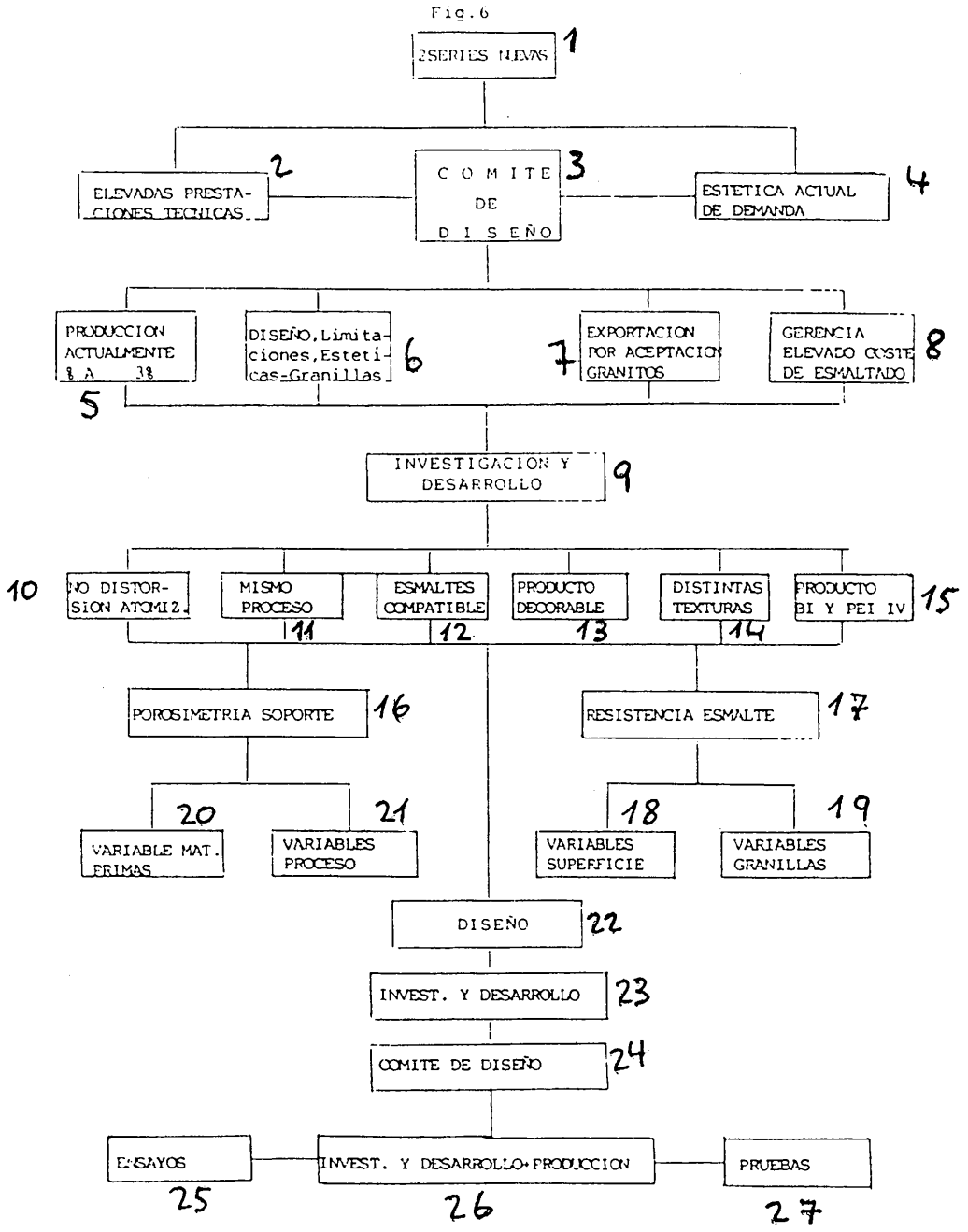

Fig 6

1. NEW LINES
2. HIGH TECHNICAL QUALITY
3. DESIGN COMMITTEE
4. CURRENT AESTHETIC DEMAND
5. PRODUCTION: currently 3% *
6. DESIGN, limitations, granular glazes-aesthetic
7. EXPORT: low acceptance of "granites"
8. MANAGEMENT: high cost of enamels
9. RESEARCH AND DEVELOPMENT
10. ELIMINATE DISTORTION OF SPRAY DRIED CLAY
11. SAME PROCESS
12. COMPATIBLE ENAMELS
13. EASILY DECORATED PRODUCT
14. DIFFERENT TEXTURES
15. BI AND PEI IV PRODUCT
16. BODY POROSITY MEASUREMENT
17. ENAMEL RESISTANCE
18. VARIABLES - RAW MATERIALS
19. VARIABLES - PROCESS
20. VARIABLES - SURFACE
21. VARIABLES - GRANULAR GLAZES
22. DESIGN
23. RESEARCH AND DEVELOPMENT
24. DESIGN COMMITTEE
25. TRIALS
26. RESEARCH AND DESIGN + PRODUCTION
27. TESTS

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