

BASIC DESIGN AND INNOVATION IN THE INDUSTRIAL CERAMIC SECTOR

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ABSTRACT

The purpose of this study is to show how the basic design principles and fundamentals proposed by the Modern Movement, which are still valid under the name of Basic Design trends, have continued to have an impact on innovation and new product design in recent years. The cases specifically covered here are from the ceramic industry and include ceramic tiles and other ceramic items for Architecture.

In order to do this, it was necessary to go back to the origins of design as a subject and its teaching; as well as the history of ceramics in architecture and the ceramic industry itself. This retrospective view, supported by a wider, rougher look at what is involved in the business today; knowledge of the meaning of the term "innovation" and a study of cases that are considered innovation, have made it possible to establish relationships and reach the following conclusions:

Basic Design is a methodology that gives us an understanding of form and a specific experience with it, resulting in original, unique solutions products and projects.

Basic Design is a constant source of creativity and innovation when developing new products, in our case, in the industrial ceramic sector.

1. INTRODUCTION

The invention of machines in the 19th century significantly changed the concept of mass production and gave birth to a new discipline, industrial design, and with it, new educational proposals that sought to lay down the principles of this activity. This was when the so-called preliminary or basic courses came into being, which are nowadays known as Basic Design. Since these earliest initiatives, which were marriages of craft techniques and industry that attempted to satisfy the new mass society's hunger for objects, something very significant has changed. Today's social and economic situation has changed and we now focus our attention on cultural and economic values from the point of view of new technologies, characterised by innovation.

The European Commission designated 2009 the "European Year of Creativity and Innovation", under the slogan "Imagine. Create. Innovate". The EU did this to draw attention to creativity and innovation as methods for solving the social and economic problems facing Europe in an increasingly competitive, globalised world.

That context defines the scope of this study, which aims to illustrate the connection, between basic design and the development of new products in the industrial ceramic sector, which has been observed throughout many years.

In order to establish some valid reference parameters, the most significant contributions made in the Basic Design area which have had and continue to have an impact, which it is fair to say are the first school in the teaching in this subject: Bauhaus, a term which means "construction house", the purpose of which was to build habitats suitable for human beings, thus its influence moved from planning to architecture itself and design of everyday object design. This objective is not so different from today's, although circumstances and the social-economic context have changed substantially.

This point has been summarised, reducing the number of basic design principles to six, Nature, Shape, Structure, Texture, Material and Colour, taking into account that these respond to wider concepts analysed in the study. Obviously, they all refer to the formal aspect of the object, but their adaptation to the current setting also needs to be considered because, as Chaves^[1] says, "designers now choose languages rather than shapes" and "their creativity lies not in originality of the form, but on finding the right language". So, what is Basic Design, if not a language?

2. STATE-OF-THE-ART

As our study shows, the most obvious objective of these teachings has been to give students a basic language for developing their creative capacity, but within a rational methodology.

According to Marcolli^[2] "it is a question of recognising the basic elements of form, the constitutive, primary elements. Morphological, semantic, fixed and variable elements that give specific, functional value to the essential basic form and which, arranged in a specific way, through formal composition, modulation and selection procedures and by modifying their relationships, form a language, a lexicon and, in other words, communicate of the content of the discourse.

In this context, the so-called Basic course has stayed faithful to the initial programmes. The main task in hand is to find a suitable response to the current situation and decisions that depend on it; however, subjective preferences, motivated by differences in psychological makeup, will always be inevitable and even desirable. Notwithstanding, there is a need to understand the complexity of the functions reached by design in the advanced, post-industrial society and to create synergies between industry logic and the economy through applied creativity that should be subject to the conditions imposed by society and the surroundings.

Basic design activates perceptive sensitivity and manual dexterity and this, in turn, boosts creative expressiveness and a higher level of innovation in troubleshooting. Training in mastery of specific knowledge, principles, strategies, habits, attitudes and values as an educational activity is needed to develop the discipline of design. So, is Basic Design an optimum, useful resource for project design and therefore a source of information in professional practice?

To answer these questions, it is necessary to ask ourselves what we mean by Innovation. In the light of existing and on-going research into this topic, we will take a brief, overall look to help us to understand the breadth of the term its meaning in this study.

According to the Spanish Royal Academy, the word "innovate" means (Latin origin. Innovare) Change or alter something, introducing novelty"

Obviously, innovation has a lot to do with invention, which is the act of finding or discovering something new that was not known before. But an invention need not necessarily be an innovation; for this to be so, it must have market success. In other words, there must be an objective market capable of assimilating or not assimilating a new product or process. Therefore, the term innovation is associated with creation, novelty, discovery or invention, but is different from these in that it involves insertion in social media. It is understood as a series of scientific, technological, organisational, financial and commercial activities, designed to generate higher profits and competitive advantages for the company; actions that

strengthen and transform the status prior to the productive and commercial phase of an organisation.

The third edition of the Oslo Manual^[3] defines innovation as the introduction of a new, or significantly improved result (goods or services) of a process, a new marketing method or organisational method, in the company's internal practices, the organisation of the workplace or external relationships and divides innovation into four areas: product, process, market technique and organisation.

But, innovation processes differentiate between one sector and another. Every sector behaves differently because each sector responds to different markets and demands. Therefore, innovation is marked by aspects and features of the sector value chain.

For the purposes of this study, innovation means converting ideas into new or improved products valued by the market.

The cases presented show that the latter is the purpose; regardless of whether they come from an innovation regarding a product, process or even a market technique; this sector seeks to introduce new or slightly improved products in the market.

2.1. Design and Innovation

The contribution of design thinking to the creation of innovative solutions is based on an understanding of users' known and latent needs.

Design is a creative process that seeks to solve problems and limitations in an original way and to define new concepts. From this it can be deduced that it is a factor that generates differential attributes that constitute values appreciated by consumers.

Form is what we see and experience from design and, therefore, what defines innovation itself is what we see in it, in other words, our perception.

We must not lose sight of the idea that there can be no innovation unless users accept and assimilate the new creation and its introduction into the structure of society. Therefore, innovation is increasingly focuses on people, customs and even on "joint creation with the user". In this context, companies that look to the future are already warning of the potential of studies that analyse consumers in a real context, supported by new technologies: Design Labs.

Design production has changed as society has evolved and has set new needs and challenges. These are the basis for innovation. The most important thing contributed by the design idea is based on a renewed way of looking at the world and a new way of interpreting existing needs. Behind every design product is reflection on the need which, to a greater or lesser extent, consists of a reinterpretation of people's needs, desires, tastes and longings.

According to MacDonald^[4] "it is its role as a bridge between technology and art, ideas and purposes, culture and commerce, which is important now. Contemporary redefinition of design".

The speed at which technological innovation has taken place since the invention of the microchip has made a formal contribution; we have witnessed progress in microchips and nanotechnology and the development of new materials.

Cultural values help users to relate to products and to form emotional links. The fact is that we have seen that the purpose of an object need not be strictly practical or functional and what is really important to users is their relationship with it, so that design seeks to make a sensorial, playful, nostalgic connection, ... with the object - *interactive design; emotional design*. According to recent research carried out by Norman^[5], "products that make us feel good are easier to manage".

We look for human qualities in the object, which materialise in the manual work done with materials, as a result of genuine or apparent craftsmanship^[6].

Production runs are increasingly small, individualised and customised. This has given users a growing role in the design process, which has become more open, individual, imprecise and flexible. There is even talk of joint conception with users^[7] - a design that comes from the user.

On the other hand, users want accessibility, considering all users equally, regardless of their capacity or disability - *universal design or design for all*.

Nowadays, however, most of all, good design should consider the product's potential impact from start to finish, ecodesign, design for sustainability or sustainable design.

With regard to style, these are eclectic times. To paraphrase Chaves^[8], innovation has been the only, genuine cultural product of an "anything goes" mass and consumerism society.

But according to Monaña, "users and consumers want something more than mere functions: they want values." And design has great potential for creating and communicating values.

Design now does more than characterise the objective, it also reflects the context, the value it reflects, its aims and the ethics it represents. In this context, design depends on the manner in which society, culture and the environment interact. It is held that multi-disciplinary dialogue and interdisciplinary work are the best way of tackling its complexity.

Each and every one of these questions influence, demarcate and identify what is nowadays considered "innovation". These are all new ways of highlighting products, processes or services; but at the root of the question, communication of the object is largely dependent on its appearance, and this is based on rules or

basic design elements which are a constant source of innovation, or at least that is what we intend to show here.

2.2. Creativity

With regard to the creative process, in general, there is a tendency to believe while the original idea or spark is something random and a result of improvisation, later work done to put that idea into production requires a lot of hard work. More importantly, creative workers are considered professionals who use methods and techniques, rules that assume a mastery of a language or a type of discourse. According to this, would it be fair to say that if processing well-learned 'habits' has a great influence on creative capacity, experimentation and repetition with certain methods, techniques, guidelines and rules have the same effect on the creative process?

Several studies link intensive design-generation capacity with the success of new products and new designs. It might be deduced, therefore, that it is a good idea to provide more creative training.... Knowledge of the basics is the basis for the use of creative thought, whose purpose is development of innovative products.

3. THE INDUSTRIAL CERAMIC SECTOR

Since the appearance of sun-dried adobe in 3,000 BC and the subsequent invention of fired brick as the basic building block for construction, ceramics have been used in architecture and town planning, adding durability, artistic beauty and colour. They have been used by numerous cultures, each with their own styles, shapes, colours and sizes... Islamic, Mudejar and Modernist architecture were milestones in the history of ceramic architecture and their success was due, to a great extent, to revaluation of cultural elements and consideration of the materials *per se*, and even, in the final case, recovery of the craftsman's handiwork^[10].

Diversification of production and progress in technology have made it possible to enhance characteristics and features, thus opening the way to new uses and applications.

The tile, or any type of ceramic covering, may be considered a basic unit of repetition, a module, capable of being used to create numerous, varied compositions. The basic principles of Design on Form-Structure are absolutely suitable for the needs of such a product and can be a source of innovation for developing new products, as will be seen in the cases presented below.

4. METHODOLOGY

When selecting the cases, it was decided that the products analysed would belong to either the industrial or academic design areas, the latter being Basic Design as a training activity. The cases are considered innovative in one of these areas because they are award-winning projects or products in Spanish and international competitions and because of their media and social repercussions. These awards and the appreciation of those granting them, juries with recognised prestige, guarantee innovation, as such.

The industrial area is represented by projects that have received awards from the Spanish Ceramic Tile Manufacturers' Association (ASCER) Ceramics Architectural Awards and the Alfa de Oro Awards to Industry granted by the Sociedad Española de Cerámica y Vidrio (SECV). The academic area is presented through Awards in the Ceramics category granted in the CEVISAMA INDI International Design Competition. These are the result of work done on projects that begins in the classroom and is recognised by society through these competitions. The projects in both areas for the five years have been studied, this being understood as a significant period in the search for innovation in this industrial sector.

Therefore, this is a qualitative evaluation in which the approach to the project is as important as the policy for recognising its innovative nature. Therefore, the objective knowledge generated by the study is key to identifying variables and their presence or absence in each case. To do this, design variables already discussed were taken:

BASIC PRINCIPLES
Nature
Shape
Structure
Texture
Material
Colour

These cases are presented, described and analysed according to the method described because this will allow the information obtained in each case to be related to the study variables in parallel. Therefore, the basic design elements and characteristics involved in each case are identified and are then explained based on the theories studied and the abovementioned arguments and contributions.

4.1. Innovation in Architecture: *ASCER Ceramics Architectural Awards*

The "Tile of Spain" awards, sponsored by ceramic sector association ASCER, aim to draw attention to works that are interesting from an architectural or decorative standpoint and which raise awareness of the use of Spanish-made ceramic tiles, their characteristics and properties and the quality of the way in which this material is reinterpreted in recent new, architectural and decorative projects.

The competition was created in 2002, and changed its name to “Ceramics for Architecture and Interior Design Awards”, to widen the concept of tiles beyond the limitations suggested by the term and covers ceramics as a material for use in all areas of architecture and design.

A great deal of publicity has been given to the award-winning projects in specialist magazines, therefore, we include here a brief explanation of their direct relationship to the study variable which will be presented and described with images.

- 9th ASCER Ceramics Architectural Award: CASP, 74 residential building in BARCELONA / Jaume Bach, Eugeni Bach – Bach Arquitectes.

The building programme consists of 27 homes, whose street-facing façade comprises fixed panels created with special porcelain tiles positioned vertically on a stainless steel frame, as well as sliding aluminium blinds, the purpose of which is to give privacy and the necessary control over lighting. Tiles are made with extruded porcelain tile with through-body colour, fired at a temperature of 1,250°C. These 120x80 mm rectangular tiles are glazed randomly with glossy, transparent glaze, the shiny and matt tiles giving variation and a vibrating effect to the façade. Texture inspires the solution provided by the product, which as Munar^[11] would say, raises awareness of the façade.

- 8th Ceramics Architectural Award: *Seafront promenade on the Poniente beach in Benidorm* / Carlos Ferrater y Xavier Martí from the OAB studio.

The new seafront promenade was the result of establishing certain rules, one geometrical and one a modulator. Therefore, the design of the tiled pavement is based on two considerations: the first is recognition of the cultural heritage of Arab ceramics, which is extremely well-established in the Levant zone. Inspired by the ceramic pavement of the Alhambra, a small coloured tile is used to give spatial structure to the surface. It is a small tile, triangular and snub, which is drawn by the circular piece and defines the ensemble as a geometric ceramic tapestry. The second is the colour. Benidorm is a city for leisure, where the festival culture is part of the tradition of the place; therefore the glazed tiles create a fun space, where colour identifies each of the zones on the Promenade. Shape, structure and colour inspired the project.

- 7th Ceramics Architectural Award 2008: *Spanish Pavilion at Expo Zaragoza 2008* / Francisco Mangado.

The building, which imitates a natural forest ecosystem, modifies its surroundings by moderating the climate and providing protection. Nature is the heart of this concept. Nature we should conserve, and this is the aim of sustainable architecture, and Nature which has also been a source of inspiration for the project in its quest for new formal and ecological solutions. What's more, both the “climatic” functioning of the building and the materials used, which include cork and ceramics, are natural. Because of this, it is fair to say that this project is an example of sustainable architecture and a bionic model, given that it is based on a natural

assumption that is not limited to reproducing the metaphor, the visual image and aesthetics, but also the functioning of the forest, with the same principles and effects. Total imitation nature means the transposition of the most important aspects of a natural element and, therefore, it is a bionic model.

- 6th Ceramics Architectural Award 2007: *Color Revolution* / José Durán.

The colour wheel seems to inspire “Color Revolution”, which develops lineally, along the street, in six basic colours. Light is an essential factor in the way colours are perceived, but another basic element that plays a part is texture: tactile texture, obtained from the relief of the tile itself, which comes from its use as an outdoor pavement; and visual, which stems from the 90° modulation of the tile, which causes variations in the perception of colour generating optical effects, drawing attention to the surface. Two of the basic rules or principles of Design, colour and texture, stemming from knowledge of the material; a play on shine and colour, as its author suggests.

- 5th Ceramics Architectural Award 2006: *Castilla la Mancha Archive in Toledo* / Guillermo Vázquez Consuegra.

The basic cube shape and modular subdivision have served as a basic element of representation to transit the meaning foreseen in the project approach.

Gestalt studies tell us that horizontal lines give our visual perception a feeling of lightness and stylization of shape. Arheim^[12] reminds us that “the dimensions and optical measurements originating in our perception prevail over proportions and metric measurements”. The tiles are laid out horizontally, reducing the scale of the box and bringing it closer to the user, while at the same time evoking the image of a pile of documents, which the users of the archive have in their minds. Its structure and shape give it this metaphorical meaning. The different volumes of the tiles play with light and shade, offering changing, diverse images depending on the weather and natural light. This use of ceramics is reminiscent of the bricks made by the Romans and even more so of the examples seen in Mudejar architecture. Form, Structure and Texture to raise awareness among users.

- 4th Tile Awards in Spain 2005: Spanish Pavilion at the AICHI Expo / Alejandro Zaera (FOA).

This spectacular façade has been designed on the basis of research done by the architect himself on tessellation of patterns on the surfaces of façades, the challenge of which was to find an irregular geometry that produces a homogenous repeated pattern, which has been achieved through the use of three different hexagons.

Considering the contributions of Marcolli^[13], it can be affirmed that the origin of this geometry is found in topographical transformations, which preserve properties of the form that are not subject to deformation, through procedures of tension or partial cut and folding. Following Marcolli, phenomenological methodo-

logy allows us to draw parallels and coordination between parties in an ensemble through orientation in space and spatial orientation. It is the laws of symmetry that give the parts of the composition their balance.

Once a modular design has been obtained, a great number of variations can be created through combined development and symmetry, translatory and rotatory. This is the basis of the method, basic Design principle, used to obtain the repetitive pattern on the façade. In this way, the wall ensemble resembles an uneven membrane, an effect strengthened by the use of a wide palette of harmonious colours in warm tones.

- Tile of Spain Awards 2004

1. *Santa Caterina Market* / Enric Miralles and Benedetta Tagliabue –EMBT–.

The ways in which shapes and colours are used are essential factors in the description and final perception of the roof, where ceramic tiles are like gigantic coloured pixels that represent and are inspired by the shapes and colours of an enormous Mediterranean still life featuring the fruits and vegetables traditionally displayed at the market.

Arnheim^[14] wrote: "Perceiving an object means finding something sufficiently simple and understandable in a form". He showed us that perception starts with grasping of outstanding structural features. The limits that distinguish the shapes of objects derive from the eyes' ability to distinguish between areas with different lighting and colour.

Another outstanding feature is the regular, hexagonal, predominant structure made predominantly of hexagonal tiles. The hexagon is an optimum situation of stress and balance. If we put several circular or spherical items on one plane, as densely as possible, each of these is surrounded by another six, thus forming a nucleus. Whether from a mathematical point of view or that of operative research in the Basic Design field, the relationships found in cell aggregation processes reveal three, flat regular structures comprising an equilateral triangle, a regular hexagon and a square through the join of the centre points of the spheres, respectively. The three shapes generated using this method grow according to the secondary or medial lines and give rise to a second series of modular structures. The second hexagonal grid is formed by the triangular grid; the hexagonal from the triangular and from the square, another square. The modularity principal is what makes the hexagon a particularly interesting choice.

2. *Peñíscola Conference Centre* / -Paredes Pedrosa Arquitectos–.

The umbracle revives the nature of open space, perforated by light and air; a transition area, cool and shady during the day and magical at night, always provided by ceramic latticework. The use of three-dimensional ceramic items used in traditional architecture and in last century's Modern Movement are also recovered. The way the latticework is built is worth a mention. Ceramic pieces are alternated

following the basic pattern of the composition. The basic, repetitive structure of the square changes in proportion as it shifts, as does the distance between the modules, explains Wong^[15] in *Design Basics*.

4.2. Innovation in the Classroom: CEVISAMA – INDI Ceramic Awards

INDI, whose name pays homage to Innovation and Design (innovación y diseño in Spanish) which are its sources of inspiration. Among the activities making up the programme is the *International Industrial Design Competition*, aimed at students studying at Spanish or international schools of design, architecture, engineering or fine arts.

The jury looks at projects suitable for industrial production, judging several aspects such as innovation, design and creativity, simplicity, the surprise factor, the versatility of the pieces, their functions and capacity to implement and to give new uses and applications to the pieces, as well as technological ease and production of products.

- First prize Ceramic Category A CEVISAMA Indi 2011: White Tiles / Anna Andersen Na, Royal College of Art, London.

This proposal draws attention to and reinvents the texture-structure on the back of the tile, providing an option for stock recycling.

- First prize Ceramic Category B CEVISAMA Indi 2011: *Alchemy: Water, Sun and Earth* / Manuel Bañó Granell and David Galvañ Sopeña, Universidad Cardenal Herrera CEU.

The appropriate use of ceramic materials proposes a new take on a proposal that revolves around sustainability.

- First prize Ceramic Category A CEVISAMA Indi 2010: *Rebellious Fonts* / Naia Illanes Calpe, Universidad Internacional de Cataluña.

Hexagonal in shape, the structure and the relationships created serve to support the typographic language to stimulate interaction with the user.

- First prize Ceramic Category B CEVISAMA Indi 2010: *Gamusino* / Gonzalo Herrero Delicado, M^a Angeles Peñalver Izaguirre and Luis Navarro Jover, Higher School of Architecture of Alicante University.

The essence of ceramic is interpreted, giving it a decorative use for both day and night and integrating it into nature. Nature and materials inspire the project.

- First prize Cerámica CEVISAMA Indi 2009: *I-Con* /María Amat Busquets, Higher School of Architecture -Universidad Internacional de Cataluña.

According to the author, among the aspects that influenced the design of I-Con were basic, simple geometry of the tile that plays with the light reflected on the curved surface and its symmetrical arrangement, that facilitates installation

and support of the pieces and adds to this the use of colour to enrich and personalise the final result.

- First prize Cerámica CEVISAMA Indi 2008: *Dry-shadow brick* / Juan Miguel Martínez Díez, Escuela de Arte y Superior de Diseño de La Rioja.

Brick whose bioclimatic qualities are enhanced by their 45° visible side, protruding over the brick that supports it during construction. The sloping face helps water to flow away in a curtain along the façade, permitting constant hyperventilation and drying. In the meantime, the shadow cast by the brick over the façade shelters the building from the blazing heat of the sun. This element is outstanding for its simplicity, which derives from repetition and symmetry and another even simpler, the equilateral triangle. This modular elements configures, when repeated, an efficient, “economic” structure, characterised by functionality and the decorative richness it gives to the parapet, giving what Munari^[16] called “raised awareness” to the surface.

According to André Ricard^[17], reason and imagination, technique and art can be merged in an attempt to conserve beauty where it is most difficult: in utility. Creativity can be stimulated when faced with the challenge of achieving optimum functionality of the product. According to this, it is fair to say that the dry-shadow brick’s shape gives it a functional, the challenge of achieving optimum functionality from the product.

- First prize Cerámica CEVISAMA Indi 2007: *Rótula* / Gonzalo Martínez, Higher School of Architecture Universidad Internacional de Cataluña.

The build-up of equal modular elements poses the problem of the joints between the modules. The joints or nodes. According to Marcolli ^[18], in the phenomenological field, objects are organised according to an established law – modular structure – and a logic from the connection – regions and nodes. The composition of objects in the phenomenological field lies in the design of the nodes, the insert being the constructive principle through which two shapes are joined, allowing partial insertion of one into another.

- First prize Cerámica CEVISAMA Indi 2006: *Life* / Salvador Mallén Civit, San Carlos Fine Arts Faculty (Valencia).

Particularly interesting in this project is the effect achieved through combined developments and symmetry that give rise to different types of “raised awareness” of the covered surface.

- First prize Cerámica CEVISAMA Indi 2005: *Ceramic Air* / Andrea Palau, Escola d’Art i Superior de Disseny de Castellón.

Based on an understanding of the material, its aesthetic qualities and technical specifications, an original solution has been achieved, practical and sensorial to a new approach, where the porous nature of the material is key to the proposed use and where the texture generated by ordered repetition of simple shapes has

an important role. Based on this, a psychological relationship is generated in response to an interesting, attractive, seductive or moving configuration. This is proven by an author who has studied emotional relations with the object. As Donald A. Norman says^[19]: "The public is far less interested in whether a product works well or not on in what it does than in its external appearance and the feelings they experience when using it."

4.3. Innovation in Architecture: ALFA DE ORO AWARDS

The Sociedad Española de Cerámica y Vidrio (SECV) has been giving the Alfa de Oro awards every year since 1977, to draw attention to products, processes, machinery and equipment from the Ceramic and Glass sectors which is outstanding due to its technological and/or artistic innovation, and criteria of functionality and utility in products for use in the bathroom and kitchen.

Therefore, many of the products and processes honoured with an Alfa de Oro at the international event CEVISAMA receive their awards based on their level or scientific or technological innovation, the result of continuous research. Others, though fewer, because of formal innovation which, on most occasions is due to scientific or technological advances.

In any case, these fall within the scope of this study if we take into account that, as Wingler^[20] said, since the beginning of Bauhaus the Preliminary Course consisted of:

1. Basic technical learning, particularly based on training in the use of different materials and instruments.
2. Basic formal training, based on theory and practical work and supported by the analysis of formal elements.
3. Scientific disciplines: The basic laws of mathematics, physics, mechanics and chemistry in relation to practical activity and with logical knowledge of the meaning of number and measurement, material and shape, force and movement, proportion and rhythm, for figurative processes.

Nowadays it is held that multi-disciplinary dialogue and interdisciplinary work are the best way of tackling its complexity.

Among all the cases studied, the following are mentioned here:

- Alfa de Oro Awards 2011

SIERRAGRES: *Sierravent* is a load-bearing wall with extruded stoneware pieces on which the wall tiles are installed without metal structures, allowing air to flow through and making it a ventilated façade.

- Alfa de Plata Awards 2010

NATUCER: *Life Arq* is an architectural programme for extruded ceramic tiles. Each Life Arq tile can be applied to indoor or outdoor walls, dividing walls and walls in general.

- Alfa de Oro Awards 2009

CERACASA: *Bionictile*® is a new line of bionic ceramic products that imitate nature, creating “forests of tiles” in cities that reduce pollution and help to purify the air. The *Bionictile*® process uses photocatalysis to transform nitrogen oxide (NOx) emitted by cars and heavy industry into harmless NO3 thanks to the effect of ultraviolet rays that contain solar radiation. It continues to work indefinitely thanks to the enhancers included in the TiO2 composition. What’s more, when it rains or there is a lot of moisture in the air, the residue, which is inoffensive and sticks to the material, dissolves, regenerating a high percentage of the initial photocatalytic activity.

TAU CERÁMICA: *Civis’Agora*® is a construction tiling system for public spaces and the product of research done by TAU in collaboration with IBV and ITC with which it developed the structural design of the relief behind the tile. By calculating finite elements, the optimum distribution of strengthening ribs can be established to reduce the risk of breakage in the different load situations analysed, establishing the final design of the rear relief of the tile, which is called Strongrib.

- Alfa de Oro Awards 2007

CERÁMICA MAYOR: *Baguete* tiles offer a formal solution to fitting and constitute a new concept and innovation, in this case for the installation of ventilated façades.

- Alfa de Oro Awards 2005

TAU CERÁMICA: *Dry System*, a versatile system for dry installation of ceramic tiles using a simple assembly system.

5. RESULTS

Cross referencing the study variables with each case has given these results.

5.1. Innovation in Architecture: *ASCER Ceramics Architectural Awards*

A1: *CASP 74, residential building*

A2: *Seafront promenade, Poniente beach in Benidorm*

A3: *Spanish Pavilion at Expo Zaragoza 2008*

A4: *Color Revolution*

A5: *Archive of Castilla-La Mancha*

A6: *Façade of Spanish Pavilion at Expo Aichi 2005*

A7: *Santa Caterina Market*

A8: *Conference Centre in Peñíscola*

	A1	A2	A3	A4	A5	A6	A7	A8
Nature			X					
Shape		X			X	X	X	X
Structure		X			X	X	X	X
Texture	X			X	X	X	X	
Colour		X		X		X	X	
Material	X	X	X	X	X	X	X	X

In these projects, the basic principles are found primarily in the approach to the project, we might almost say in all cases. Their influence on innovation is therefore excellent. In all cases the Material has been considered because it has been used in an excellent way, is suitable for the project and, therefore, for optimisation of the material-function of use relationship.

5.2. Innovation in the Classroom: *CEVISAMA – INDI Ceramic Awards*

C1_a: *White-tiles*

C1_b: *Alchemy*

C2_a: *Tipografías rebeldes*

C2_b: *Gamusino*

C3: *I-Con*

C4: *Dry-shade bricks*

C5: *Sign*

C6: *Life*

C7: *Ceramic Air*

	C1 _a :	C1 _b :	C2 _a :	C2 _b :	C3:	C4:	C5:	C6:	C7:
Nature				X		X			X
Shape					X	X	X		
Structure	X		X		X	X	X		
Texture	X		X		X	X	X	X	X
Colour									
Material		X		X		X			X

5.3. Innovation in Industry: Alfa de Oro Awards SECV

S1: *Sierravent* by Sierragres

S2: *Life Arq* by Natucer

S3: *Nanoglaze* by Kerafrit

S4: *Bionictle* by Ceracasa

S5: *Light Tile* by Revigres

S6: *Civis Agora* by Tau

S7: Vidres

S8: Cerámica Tres Estilos

S9: *Ecoker* by Bestile

S10: *Emotile* by Ceracasa

S11: Fritta

S12: *Baguete* by Cerámica Mayor

S13: *Grip-system* by Vernis

S14: *Bronce* by Vidres

S15: Macer

S16: *Dry system* by Tau

S17: *Inkcid* by Torrecid

S18: Quimicer

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18
Nature				X														
Shape		X										X						
Structure	X	X				X						X				X		
Texture		X				X							X					
Colour		X				X						X		X			X	
Material	X		X		X		X	X	X		X		X	X	X			X

All the projects in the architecture and classroom awards are understood to have stemmed from the application of basic design principles, therefore can be considered positive results of research.

Finally, we present the results relating to the industry. Most of these cases involve technological advances and, therefore, experimentation with materials. It is fair to say that these products are based on experimentation base the scientific disciplines described by Wingler^[21] which are as follows: The basic laws of mathematics, physics, mechanics and chemistry in relation to practical activity and with logical knowledge of the meaning of number and measurement, material and shape, force and movement, proportion and rhythm, for figurative processes.

Also worth a special mention is the Civi's Agora project by Tau, which applies finite calculations to formal design on the rear of the tile for the purpose of achieving optimum mechanical resistance.

The industry focuses on architectural projects to launch new products on the market. In this sense it is worth pointing out that it is precisely the products that are considered most innovative, according to the prizes granted, are those based on formal questions, and in the case of study, the basic principles of design and their influence on defining the product can be perfectly identified.

6. CONCLUSIONS

Basic Design is a constant source of creation and innovation for developing new products, in this specific case, in the industrial ceramic sector.

Its influence has been well-known in works that require order, logic and functionality, as has been seen in the most innovative architectural projects in recent years, as well as others that have emerged from the industry's efforts into industry to respond to present and even future market needs.

This statement is also verified in the academic area, where it can also be confirmed that "Basic Design constitutes a methodology which provides knowledge and specific experimentation with form". Obviously, it is individual peculiarities, talent and temperament, which guides the creative process and allows totally different methods of self expression, the result of which are original, unique solutions. However, in the beginning there is a method, which is the springboard for experimentation.

We can therefore conclude that innovation is not an end in itself, but a means for creating value, productivity and sustainability, which is associated with creativity. The challenge is to stimulate creativity and show that knowledge of the basics, including aspects that may seem obsolete, distant and ridiculous to technicians, still offer solutions to the current needs of society and continue to drive innovation.

This study adds value to pedagogy and Basic Design practice which may also be an inexhaustible source of innovation in other fields of Design.

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