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Technology and Design:
The Relationship Between Developments in Technology and Product Design

by

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Introduction: A Theory of Design Based on New Technologies and Materials.

Tech+nol+o•gy

- the application of mechanical sciences to industry or commerce.
- the methods, theory, and practices governing such application.
- the total knowledge and skills available to any human society for industry, art, science, etc. (Collins English Dictionary).

This thesis examines the relationships between the form of designed products and developments in technology during this century. A product's technological environment influences the way it looks in essentially two ways. Firstly, the discovery or invention of new technology dictates the early form products take; such as the telephone, which was introduced and then subsequently redeveloped as technological advances allowed. The second important influence comes from the application of an image of new technologies which gives the product an impression of modernity or advancement. This is essentially styling, and can be seen in the constant influence of futuristic imagery in car design.

Developments in new materials and electronics this century have allowed the introduction of complex products with no physically functioning mechanisms. This thesis examines the significant problems - and some solutions - of assuming an identity for these immaterial products, especially modern digital units with no previous design history. This leads to another question of recent changes in product design due to technological advancement; the transition from hardware to software as individual products are integrated as software into visually uninformed processors such as Personal Computers.

The introduction of Computer Aided Design (CAD) and Computer Aided Machinery (CAM), as the latest development in manufacturing, must also be considered as they will undoubtedly effect the future of consumerism and the design process.

Architects, designers and engineers do not design from first principles, but from the problems at hand. Examples, models, paradigms, and solutions from the near or distant past, have always played an important role in the process of design. Just as Art Deco was partially derived from ancient Egyptian art, Arts and Crafts was characterised by Medieval and Gothic references and Classicism borrowed principles found in Roman and Greek antiquity, design has always found inspiration and familiar comfort in the past.

Since the industrial revolution machines have transformed life and brought vast increases in productivity and it's difficult to overstate the importance of the machine to our culture, both as technology and as an idea. The "machine aesthetic", one of the most important tenets of Modernism, can be seen not only as expressing this great project, but actually of being its product.

> The notions of choice and variety in the design and styling of products which we now take for granted were considered unnecessary, outdated and socially divisive by those committed to the Modernist vision of technological progression (WHITELEY, 1993, p.7).

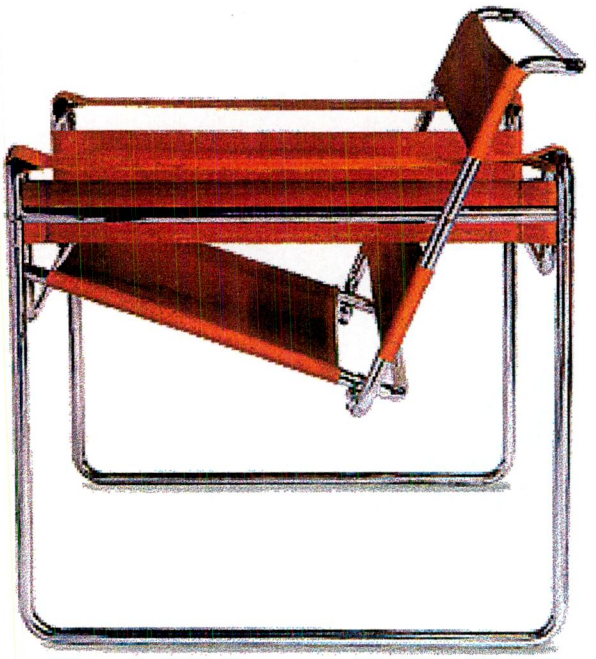
Reyner Banham's judgement that the dictum form follows function was an "empty jingle" (Banham, 1960, p.320) is not normally disputed, despite recent attempts to substantiate such judgement a basic, rather puzzling question remains: how could an empty jingle ever have preoccupied several generations of architects and designers?

We know the appeal this Modernist vision had on designers, it promised to introduce a union of both functional and aesthetic worlds. Each and every function was to have one - and only one - solution proper to it, and, consequently, only one proper form. In other words, what functionalists called "functional forms" were forms that were at the same time both functionally and aesthetically perfect. It was therefore considered reprehensible to arrive at forms other than those that were intrinsic to "functions". Allegedly, the modernist designer was now employing neither old forms nor devising new forms but uncovering and revealing the ones inherent in the problems at hand.

Since such functional forms cannot, by Functionalist definition, be produced for the aesthetic preferences of users, it cannot happen that some will like them, others be indifferent to them, and yet others positively dislike them. One could safely assume that since such forms are not developed in order to appeal to anybody in particular, they will please everyone in general, regardless of social or cultural background. Functional forms simply do not appeal to taste, because they are a matter of truth, and truth cannot pander to taste, from the standpoint of the new architecture the question of taste was therefore considered out of date. Functional forms were creating a common visual language across a variety of boundaries, including the time-boundary: as such forms were not related to any fashion they could not go out of fashion either. They would not age, because they were timeless. This vision offered the designer a new, exciting and flattering role: making him a vehicle of the zeitgeist, it abolished his previous status of an expert servant catering for the mostly common demands of users. The profession was now given a new sense of purpose, creating a strong sense of solidarity.

Because of its close architectural affiliation, the chair was often used as a vehicle for personal design philosophy expression. One of the first and finest examples of modern tubular steel furniture, the 1926 Wassily (B3) chair, articulates in material from, the Modern Movement's fundamental ideas about materials, construction and space. Inspired by bicycle construction, Marcel Breuer's (1902-81) reworking of a traditional club armchair has become a classic symbol of the Modern Movement with its image of lightness and space.

The cubic proportions and the contrast between the steelwork's fluidity and the tautness of the canvas straps find perfect expression in this structure. This chair, which paved the way for many other experiments with abstract form and the machine aesthetic, show clearly how materials and construction became symbols in their own right.



Int.1 1925 B3 (Wassily) Chair

Of course the machine did not make Modernism, it was also a reaction against the exuberance of Victorian ornament which itself was made possible by industrialisation.

> It was the widespread desire on the part of the consumers for ephemeral styling or historicizing ornamentation and surface decoration that attracted the scorn of the design reformers of the early twentieth century. ...[they] sought increasingly to establish a design vocabulary and syntax which was compatible with the realities of modern mass-production technology, exploring the possibilities of new materials and forms which were infused with what they saw as the 'true spirit' of the twentieth century (WOODHAM, 1997, p.18).

The emergence of Modernist architecture and design was fundamentally a result of outer formative forces: the combination of new materials, new technologies, and a new age. There is also the Modernist claim that their architecture was an expression of historical necessity through external ideas such as technological utopias, totalitarian ideas of the 1920s and 1930s and a reaction against traditional styles and ornamentation. But essentially, huge technological advances opened up future design possibilities so revolutionary, they inspired the whole basis of Modernist ideology and "style".

Technological change and the Design Process.

In his book, Design since 1945, Peter Dormer compares new technologies and materials as being "like clay", saying:

> Clay is a hugely malleable, versatile media - it can be sculpted, thrown on a wheel, dried into dust and force-blown into moulds by automated equipment, press moulded and, in its new forms, used for the blades of knives, the heat shield of space-shuttles or the components of an automobile. In short, it can take any form required of it. A lot of new technology is similar in its freedoms; high technology can be dressed, not in new design but in old. Technology gives designers the freedom to rework past styles ad infinitum - that is why it does not dictate its own aesthetic (DORMER, 1993, p.52).

New technologies, especially plastics and electronics, disconnected the traditional arguments of the Arts and Crafts movements, which concerned with the truth to materials and integrity of design. This practice of honesty, of not forcing materials into unsuitable forms, collapsed. Modernists had hung an ethical as well as aesthetic ideology on the old framework; when technology knocked the framework down, it demolished Modernism's materialist ethics at the same time.

The relationship between design and technology is not one sided. Technological developments do not determine what the manufacture wants to produce, nor do they rigidly determine the shapes a designer creates. The restraints on form, style and function have been loosened by new materials and electronics. The inspiration for form may reside in the physical properties of a material. The British designer Robin Day (b.1915) wrote on the conception of his Polyprop chair:

> The invention of polypropylene seemed to me to offer exciting possibilities for the development of a new chair. Its low cost, great strength, and suitability for injection-moulding made it ideal for mass-produced one-piece back and seat, which could be mounted on various frame-types for different purposes (LAMBERT, 1993, pp 40-41).

Aside from physical material changes the designers brief has also been effected by micro-electronics in several ways:

- The miniaturisation of components has allowed objects to become smaller and can turn the object into a curiosity - the external form no longer having to follow the decree of the internal mechanisms.

- Miniaturisation and new materials, especially plastics, have in some instances, devalued products - thus cheap small products such as calculators and radios are approaching the status of the ball-point pen in terms of availability and disposability. The designer is therefore no longer working to develop a precious object.

- The third impact is on the design process, the influence of computer-aided design and manufacture have changed not only the speed of production, but altered the actual behaviour of designers, allowing them to quickly visualise any form in three-dimensions both on screen and physically as SLA (Stereo Lithographic Apparatus) models. The comparative ease of defining regular shapes "on screen" was apparent in early computer generated products, however, more powerful and sophisticated 3D modelling programs, such as Pro-Engineer, now allow easier generation of complex sculptural and organic forms.

Chapter 1: The Relationship Between Form and Technology.

Most products designed this century owe their existence to technological advancements, however the development and subsequent re-development of a product need not be due to technological improvement in its own domain. Either a product develops due to a physical or electronic advancement in that field, or it is re-styled to associate itself with a separate technological event or change. Early developments of the Telephone and the Television Remote Control demonstrate both of these patterns of evolution.

The Telephone

The apparent visual simplicity of this enamelled brass Candlestick telephone (c.1914) is misleading, the unit also requires a separate bell-set, containing the induction coil, capacitor and ringer to operate, it's visual form derives from the practical necessity of keeping it's transmitter upright. The Candlestick was the original compact desk telephone, however advancements quickly allowed this assembly to become a more unified form. In 1933 the American industrial designer Henry Dreyfuss (1903-72) collaborated with engineers from the Bell Laboratories to develop the Bell 300 telephone. Designing from the inside out, his theories concerned less with styling and more with the relationship between the machine and its user, detailed tests were carried out to ensure the unit would be easy to operate. In his belief for a machine to be efficient it had to be adapted to people, he derived his theories into a study of ergonomics and anthropometrics.

1.1 - 1914 Candlestick Telephone

1.2 - 1937 Bell 300 Telephone

An indisputably good piece of industrial design, the Bell 300 is often described as timeless. Released in 1937 the functional and quietly stylish telephone became a small American icon. Initially die-cast it was later produced in Bakelite and in similar plastics as the new materials became more commonly available. Its sharply sculpted design remained in production for over 20 years.

However, what Dreyfuss achieved may now be seen simply as a highly rational expression of what a non-digital telephone handset had to do. Why should a telephone look or feel any other way? For a long time it rarely did, after all, Dreyfuss's design was predated by the comparable Siemens Neophone, designed by Jean Heiberg (1884-1976) in 1930. It was the subsequent electronic advances of digital exchanges and push-button dialling which allowed for the exploration and application of new physical forms.

1.3 - 1930 Siemens Neophone

Had telecommunications developed at even a fraction of the rate of computer technology the Bell 300 would probably have been lucky to stay in production until

1939. There is little doubt the Bell 300 is a stylistically successful, functional and ergonomically sound piece of industrial design and it's status as a design icon is evident given the pace at which the telephone became a natural part of American daily life. It's success was nonetheless greatly inflated by a hiatus in communications development which allowing the unit time to be more closely and thoroughly incorporated into a developing society. The development of the telephone contrasts with the re-styling of the following remote controls.

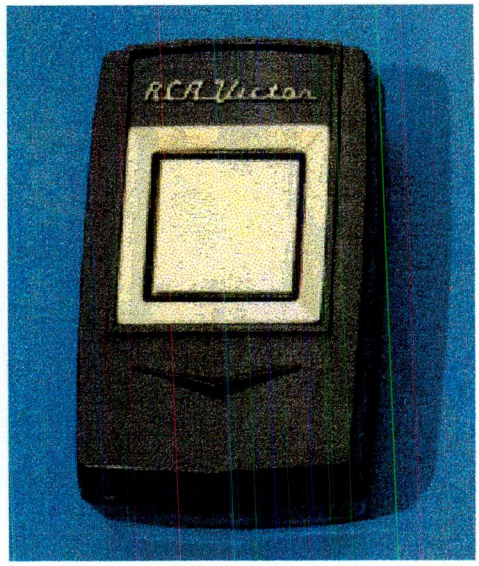
The Remote Control

Remote controls have become such a standard supplement to so many consumer products - from TVs and stereos to garage doors - that we practically feel amputated without one. Excepted readily into American homes the evolutionary history of this particular prosthesis closely follows the technological progression of its time.

Television had introduced a new popular culture to the masses, science-fiction was becoming a growth industry which captured peoples imagination, creating new aspirations for the future. In conjunction, science-fact was placed firmly in the hands of the people, what's represented in the changing forms of the following domestic remote controls is nothing less than the mythological powers of technology itself.

Taken as periodic examples from the Thomson Consumer Electronics' archive they reveal a surprising range of forms and functional systems through which this indispensable implement of *homoconveniensis* has passed during its forty-something years of existence. (The French firm Thomson acquired RCA and GE consumer business in 1987, it manufactures 21 million remote controls each year.) As an object lesson in user interface design, few generic items could serve better than the TV/VCR remote control; here, in remarkable diversity of case materials, design and button arrangements, is an almost Darwinian struggle to combine the forces of engineering, ergonomics and sheer status symbolism.

"The Cyclops", from 1959, has the now radical-looking simplicity of a single button, it performed three simple functions - On, Off and channel changing. The remote used an electronic ultrasonic oscillator which transmitted a "silent signal" (and reportedly alarmed domestic pets). With scrolling gold-look lettering for the "RCA Victor" logo, and a gentle curvature to the brown IMPC casing it is an object in search of an image - trying to be futuristic but not sure how. The Cyclops is a souvenir of an era when TV had yet to shed its cocktail-cabinet facade. Advertised as the "Wireless Wizard" the unit was sold with RCA's lowest priced TVs.

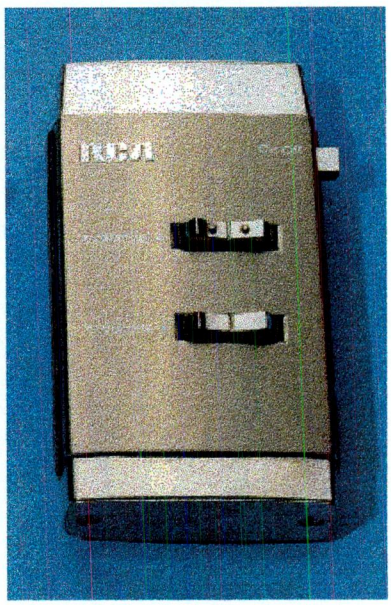


1.4 - 1959 RCA "Cyclops"

Apparently styled as a megaphone the 1960 "Bonger" projected five commands to the TV. Remote channel changing , and the power it exerted, was becoming a more tactile experience. The brass-plated ribbed "his" and "hers" volume and channel controls emitted a satisfying p-yang when depressed and the unit is surprisingly heavy for its size. Customer Remote Keyboards (CRKs), as they are known technically, were beginning to develop as appliances in their own right.

1.5 - 1960 RCA "Bonger"

This 1977 "Cigarette Case" electronic remote control confirms the evolution from TV accessory to self-conscious technological contraption. The unit treads a fine line between retro and futurism; its sleek aluminium case, padded "leatherette" back and side-mounted On/Off trigger combine to make it part cigarette case, part lighter and part transistor radio. Two pimples on the channel rocker switch distinguish it from the volume control without the inconvenience of looking away from the TV screen.



1.6 - 1977 RCA "Cigarette Case"

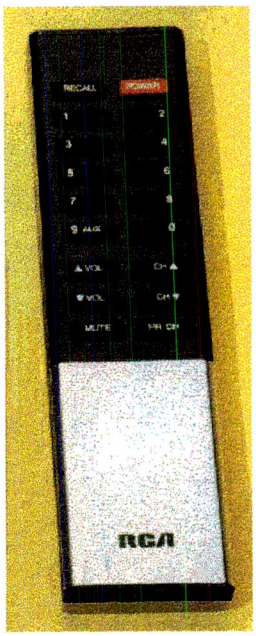
Also available in 1977 was the "Lifecraft" which reflects the pneumatic approach to number-crunching as viewers attempt to deal with increased channel choices, hence the likeness to desk-top adding machines or early calculators with legible digits each on their own raised cell. The "Control Centre" graphics and unified keypad enforce an impression of applied technology and data-subordination. RCAs first attempt at ergonomic design is a two-fisted affair, its hefty black bumper of urethane foam acts as a shock absorber for the delicate electronics within while the moulded trough around the underside provides finger grip.

1.7 - 1977 RCA "Lifecraft"

By 1981 Television control is no longer enough, dominance was essential. The U.S. was in a Cold War and the home become a battery of communications equipment. Techno-paranoia had really arrived with this "Digital Command Center", the first remote designed to operate diverse RCA equipment. Using infra-red technology it operated the TV, VCR, and Videodisk. The CRK32 has so many keys (76) half of them are concealed under a tinted lexan plastic shield, its gunmetal plastic case with aerodynamically rounded flanks complete it sophisticated, 007 style facade.

1.8 - 1981 RCA "Digital Command Center"

The "Bat" from 1983 is identifiable as an icon of the '80s, its Spartan clarity of rectangular keys against the black ABS plastic column and brushed silver base recall the precision design of other objects: Krups coffee makers, Braun calculators and Bang & Olufsen hi-fis were designed peers. The style incorporates technology as a logical necessity, rather than advertising itself as an advanced tool or device.



1.9 - 1983 RCA "Bat"

The RCA/Thomson curve of evolution the remote control starts out with a basic single activating model, crescendos toward a veritable NASA style mission control console, then gradually descends toward the joy-stick type minimalism of the current ProScan 97 Control. The surfeit of keys was no doubt considered purely logical at the time and portrayed a technologically advanced unit, but how many were truly necessary? The social anthropology of remote control use is now closely observed and units are designed to strict user-interface guidelines, e.g. a unit width of 60mm is ideal and 38-

42 buttons leave the user neither overwhelmed or deprived. However, the technology involved in producing Remote controls has changed little since 1959, from ultrasonic to infra-red to radio controlled-devices. The units were nevertheless, deliberately styled, and restyled, to closely follow technological developments in other fields. This application of a 'cover', which relates the product to a technological advancement within their own popular culture is purely to stimulate greater product awareness among consumers and increase sales.

It is obvious today that the aesthetic component of a product often plays a bigger role in market competition and the sphere of consumption than its construction or use. The consumer is conditioned to identify design language through media, advertising and familiarity within groups of products. While the product language information is streaming in to the consumer the same information often reaches him via other channels, i.e. via advertising for the corresponding product form. In this way multiple signals, which have synchronised with each other, maintain an agreement on the desired understanding of the product information.

This makes the objects in the consumers domain seem like "signs," wordless elements of a kind of language whose regularity and effect do not become openly recognisable at any time, but connect various products whose only real link is passing fads. The advantages of manufacturing a product within a recognisable group is some of the visual meanings become evident to the consumer. The effect being that a consumer will purchase a product without fully understanding its additional benefit, indeed the only benefit to the actual product may be in influencing its own sale

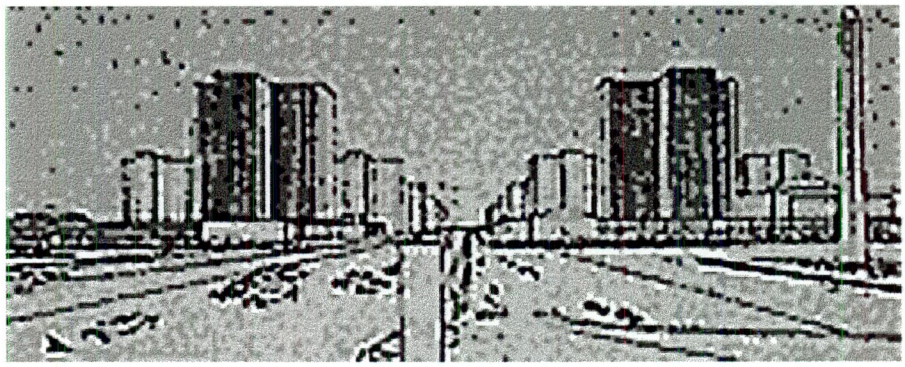
Chapter 2: The Influence of Futuristic Imagery on Product Design.

> It seems to be at those times when technological revolutions are imminent that the future exerts its most pervasive influence on the shape of designed objects. This is a slightly different process from designing for a abstract future, for it may be rooted in 'real' technology which has yet to express itself. ... the result is an imminent world of tantalising possibilities, glimpsed but not yet focused (VICKERS, 1991, p.34).

The act of looking forward and imagining the future, how life will be with all the objects that will exist, what they will do for us and how this will affect our lives and shape our society all combine to form the concept called technological futurism. Future fantasy design is a 'super aesthetic'. The designed object takes on an appearance related to imaginary of the future. Industrial designers wrap the object with a form that ignores its current condition, instead they look towards a different time and place.

This vision, constantly driving many designers this century, is forward thinking, striving for a utopia delivered by technological progress and industrial development. Certain themes of transportation, communication and leisure regularly appear. The future is a place where we can sit back and will enjoy life, spectators to our environment.

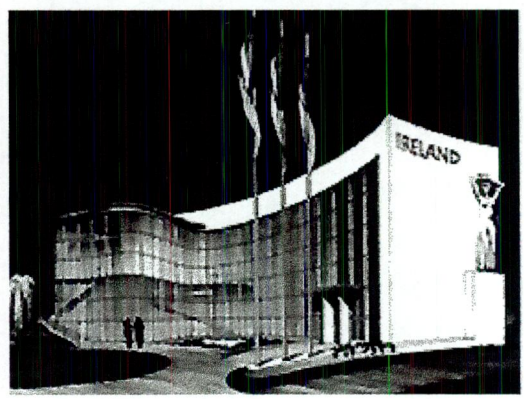
The city has been the centre for futuristic visions. Le Corbusier's (1887-1965) ideas in 1935 for a future city shows a continuation of this desire to re-design the world on a grand scale. Modern architecture, as we know, is associated with lightness in construction, illumination and simplicity of form. Similarly, in these futuristic visions are themes of hygiene and cleanliness, technology, automation and convenience. Organised mass transportation was visualised by Le Corbusier and ultimately implemented.



2.1 - Le Corbusier City Vision

Architecture is often specifically designed to cause wonder and admiration among spectators, the predominance of a man-made environment where a limited presence of nature is allowed, but strictly controlled. Implied in these visions, is that for this future society to be possible, not only will day-to-day life be transformed, but the economic, social and political reality will have changed.

The Irish Pavilion for the 1939 New York World Fair was another pure form of modernism. While a great deal of politics was played out behind the scenes with Ireland being originally offered a site with the rest of the British Commonwealth. This was the first appearance of Ireland as an independent country at an international trade fair and the Government of the day was determined that the building must have a modern and high quality yet recognisably Irish character. It was also the lead up to the Second World War and the Irish Government would have been keen to promote itself as a sovereign state wholly unconnected to Great Britain in order to maintain its policy of neutrality.



2.2 - New York World Fair, Shamrock Building

The Architect, Michael Scott (1905-1989), had first played with using traditional Irish vernacular architectural styles like beehive huts and thatched buildings, however he finally produced a shamrock shaped building constructed in steel, concrete and glass,

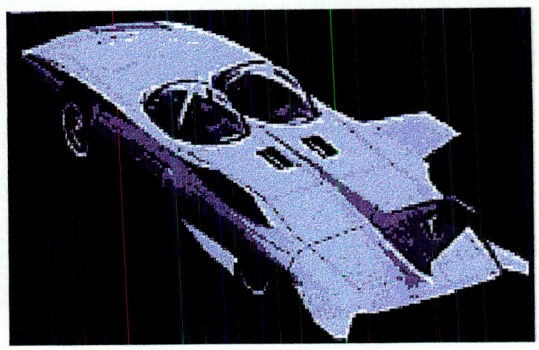
whose curving organic outline gave it a cosy feel and made it very popular. Selected by an International jury as the best building in the show, it was known as the Shamrock Building by the tour buses that toured the fair. This use of curtain glazing is a fore-runner of Scott's bus station concourse at Busáras. Although the building was largely white in the plaster work and glazing bars, the columns around the doorway were green, and the concrete slab surmounting them was orange thus bringing in the colours of the Irish tricolour. He felt that a national style or character was in the use of materials, its function and climate not the external shape of the building.

The Worlds Fairs have often also provided important opportunities for future fantasy design and thinking on a large scale. The 1939 NY Worlds Fair, with the GM pavilion by Bel Geddes (1893-1958) and the Ford Pavilion by Walter Dorwin Teague (1883-1960), is typical. The Futurama exhibit by Bel Geddes (it is claimed 5 million people viewed it), together with Teague's Democracity, were pivotal images in the development of industrial design activity. They did not invent futurism, but in 1939, Teague, Bel Geddes, Dreyfuss and Loewy (1893-1986) crystallised it's vision and presented it as the promise of technology, capitalism and the role of the humble, yet vital industrial designer. A legacy that has subsequently dominated design.

2.3 - New York Worlds Fair, Poster

Earl, (1893-1969) who typified this style, presumed that the future would be a time when everyone would drive jet cars of some sort and used his fascination with the twin booms of Kelly Johnson's Lockheed P-38 to inform the future of technology and therefore that of aesthetics.

Earl's 1958 Firebird was controlled by a joystick, his Pontiac Bonneville had a rear-mounted spare tyre made to look like a jet exhaust. This is not about style or beauty, this is pretence. The mythical 'fins' in American cars were not creative artistic references to the jet age, they pretended to be a functional component of the car's aerodynamics, to impress an observer with the car's apparent performance. Harley Earl was impatient for that future, so he designed and built it with vigour.



2.4 - Harley Earl 1958 Firebird

Conventionally, it's fun to look at futuristic concepts of the past, because they were so bad at predicting future styles as they turned out to be, we can see that the concepts were locked in the design trends of that particular time. However, a "future fantasy" viewpoint shows that it was the other way around: The day to day designs of that particular time were actually derived from the same visions of the future evident in the concepts.

Future fantasy is not just an American phenomenon, French car manufacturer Citroën, for example, launched the astonishing futuristic DS in 1960, designed to look and act like it floated on air.

2.5 - Citroën XM concept

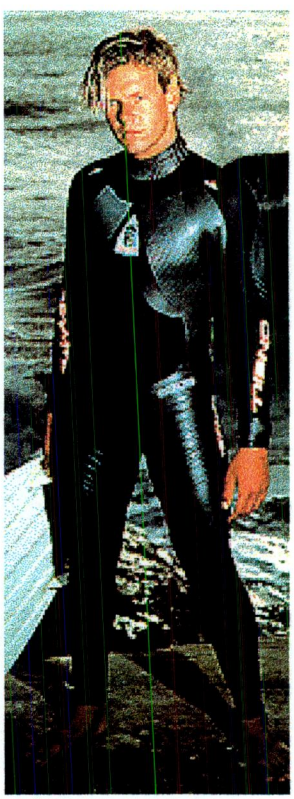
A current version of the DS is the XM. An early XM concept by Giuseppe Bertone (b.1914) is a good example of 1970s rectilinear future fantasy style. Follow the development of the large window area depicted in this concept drawing, by camouflaging conventional steel pillars in black and tinting the windows dark, it

appears like one continuous glass area. The rear view of the car shows another technical accomplishment, the mysterious disappearing indicator light. A popular future fantasy trick.

2.6 - 1996 Citroën XM

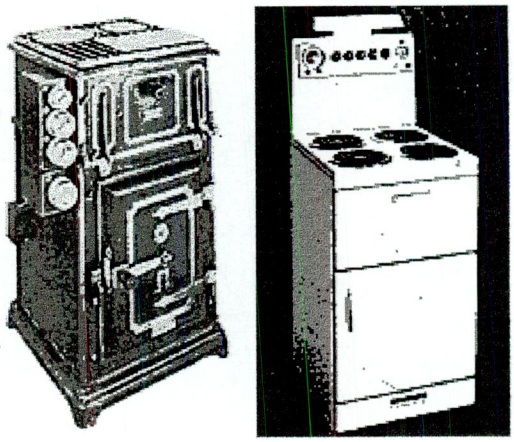
Citroën went to great lengths to keep these innovative details; engineers, stylists and marketing people united to create illusions. Not because it has some abstract beautiful quality, but because of the mental references triggered by the effect of the design.

It is perhaps understandable that transport design would succumb to future fantasy imagery, with its close association to the concepts of progress and technological development. But the style can also be found in the most incredible incarnations. Luigi Colani (b.1928) was almost single-handedly responsible for the recent incarnation of future fantasy style. His work with Canon popularised the current biomorphic style which simulates possible futuristic machine-organism hybrids and genetic engineering. Any product that benefits from an association to 'high-tech' - the biomorphic rucksack and this 1996 O'Neill 'Animal' wet-suit - is given the treatment and testifies to the style's appearance in all aspects of modern life.



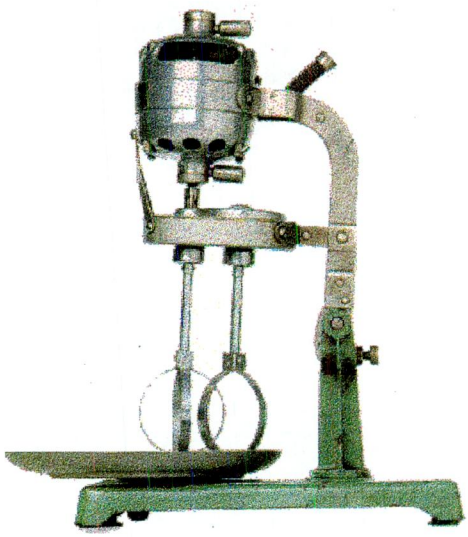
2.7 - O'Neill Biomorphic Wetsuit

Let us look at the development of future fantasy in the kitchen. Adrian Forty claimed, in Objects of Desire (1986), that what distinguished these two electric oven/ cookers was that the new one contained features, especially the control panel, that were of the future. Forty only hints that, in the historical development of Modern design, futuristic symbolism has played a primary role.



2.8 - Two early stoves

Looking at the development of the electric mixer, this early unit provides an important lesson: that of 'form follows function'. It is a purely functional machine whose industrial styling gives it the look of a machine tool and its logic is apparent: It has a beater, with a motor (on top), it pivots back (a pivot is visible on the column), and has a rotating base for the bowl. These are visually apparent features, called the 'logos' of the design, its visual logic.



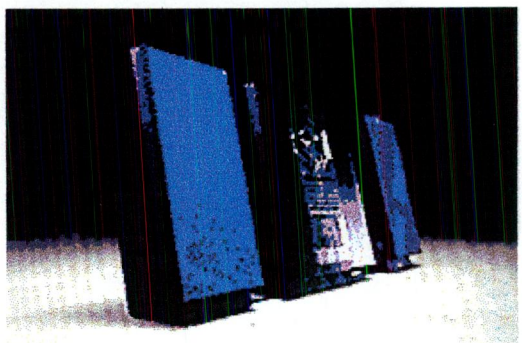
2.9 - 1918 Domestic Mixer

As time progressed, and beaters developed in shape; this logos suffered and was disguised in efforts to hide the machine's simple function and subconsciously imply that the machine had become vastly more complex and capable. Until, by the 1940s, the beater looks like a much more complex machine. It's metal casings rounded form gives the appliance a solid, heavy appearance, which was criticised for identifying housework with labour.

2.10 - 1948 Kenwood Chef

2.11 - 1997 Philips Food Processor

Our current model looks the most sophisticated and capable of apparitions. White, quiet machines for a space age kitchen, light years away from the reality of the animals and vegetables we eat. This futuristic designer kitchenware which we have mistakenly called functional, often conflicts with the aspirations of consumers who (understandably) have often preferred the comfort and nostalgia of the 'country look'.



2.12 - Bang and Olufsen Stereo Unit

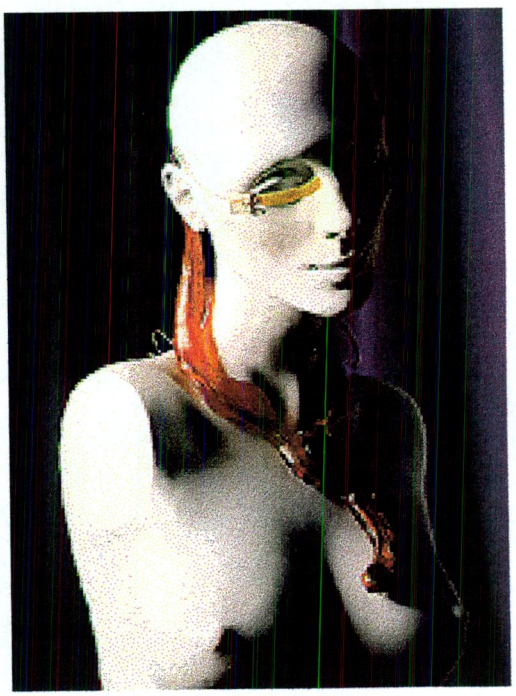
Moving from the kitchen to the sitting room, the products of Hi-Fi manufacturer Bang and Olufsen signify future fantasy. Bang and Olufsen acts in the marketplace as a model product. It is an almost perfect market-leader and designed to look the part. Observers are astonished by its construction and operation, invisible doors, magical lights and displays. You wave your hand and the tape deck opens. The 1996 Bang and Olufsen brochure describes their remote control as: "A fascinating display where numbers and letters appear to be suspended from mid-air", brilliant and mind boggling (a transparent liquid crystal display).

This is not 'form follows function'; this is 'form follows mystery' or 'form follows science fiction'. It is, in my view, a misconception that the 'international style' or the 'Modern style' was neutral or empty. Bang and Olufsen are acknowledged as the epitome of Modern design, and this is true because they continue the very same

overwhelming tradition of future fantasy. And where Bang and Olufsen lead, other brands like Sony, follow, employing similar if toned-down versions of a future fantasy style.

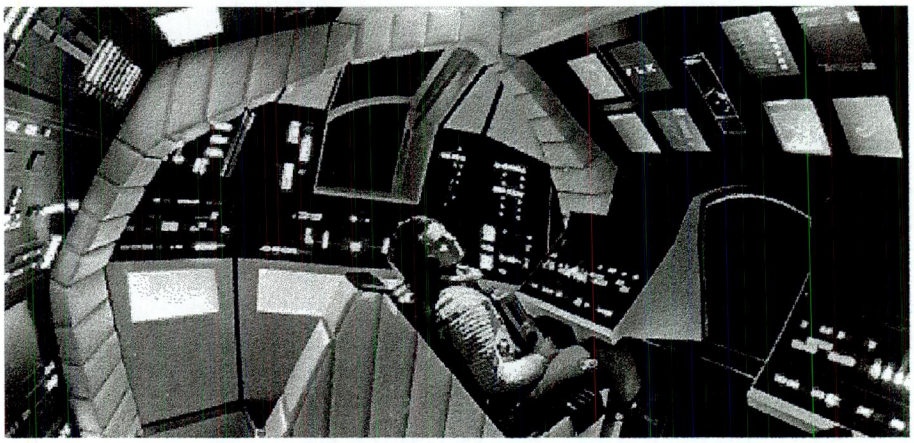
Corporations and their corporate design are awash with future fantasy style. Corporations provide technology, the route to the future. With intergalactic type styles, similarly evocative names and regular references to the next millennium, the market is saturated with companies who need to advertise their up-to-date, advanced nature. The last few years have witnessed an explosion of future imagery, possibly a consequence of the impending millennium (the year 2000 has enormous futuristic associations) as well as the recent expansion of communications technology. "Cyberspace", simply by name is dominated by fantasy.

Computers and Cyberspace are our 'new frontiers' for design imagery. Full of visions of organic worlds and imagined organisms, many ideas are not based on aesthetics, but rather on fantasised proposals of how the machines will be incorporated into our lives. This 1993 "Wearable Information and Communication Port" device (GOLDSTAR, 1993, p.32) by Krohn Design is typical of the 'computer-as-an-extension-of-the-body' approach to computer design which is becoming increasingly popular.



2.13 - Wearable Information and Communication Port

Alternatively we can opt for Apple's original 'white-is-bright' future, sharing the stylistic roots of cinema science fiction, 2001, A Space Odyssey (1968), or the currently more popular computer concept which pragmatically proposes an oppressive BladeRunner (1982) future.



2.14 - A perception of the future in 2001, a Space Odyssey

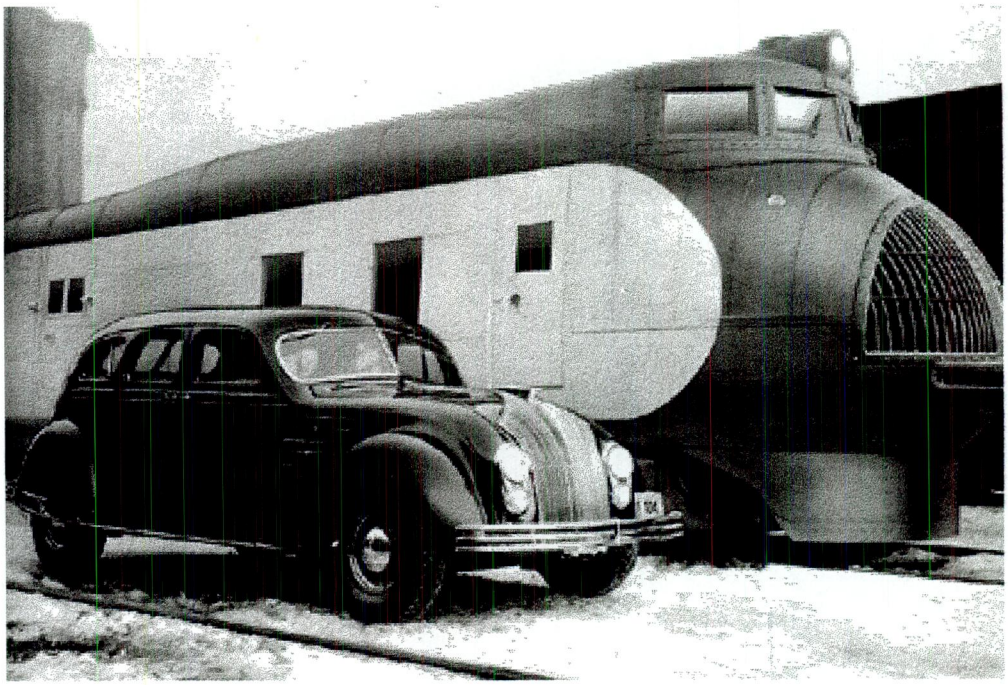
To re-cap, 'future fantasy', is the style that has dominated much of designed products this century. In addition to the style is the notion of 'technological futurism' a concept to describe the social beliefs and ideas behind progress and provide the foundation for future fantasy in design. However, in dramatic contrast to most experience, the late 1990s now find technology for the first time outstripping both demand and popular comprehension. Never before can there have been less motivation for futuristic styling, since the main problem both industry and consumers face is now trying to keep up with the implications of new technological advances. The technological future now looks so exciting and unlimited as to have made inspirational imagery largely irrelevant and inadequate. This has led to trials and experiments in new and less physical methods of influencing forms, the most difficult task being not to provide a visual indication of the products electronic capacity or ability, but to assure the user the products operation is within their capacity.

Chapter 3: Metaphor in Product Design.

Arthur Pulos, author of The Great American Design Adventure (1985) traces the manufacture of products through this century. He emphasises the fact that design is subject to the predatory grasp of commerce and explains that the designer is the humane and aesthetic conscience of industry and alleviation for the consumer. Design has been subordinate to manufacturing since the turn of the century. The machine as the dictator of design has relinquished its position as a mechanical butler for ideas, imagination, experimentation and fantasy. Dieter Rams (b.1932), Enzo Mari (b.1932), Ettore Sottsass (b.1917) and Rodolfo Bonetto (b.1929) are just a few of the Industrial Designers who had very systemic, hard-core approaches and the issues of performance, efficiency, utility, economy and industry, developing competent solid products. The search for new ways of solving problems seems to be the ideology of the time. Creativity was captive within the boundaries of production, manufacturing, and tooling.

At the same time designers not only were bettering of human conditions, but an emphasis also was placed on aesthetic design. Many products originally designed by engineers needed face lifts or cleaning up of forms, or relying on sacred geometry or popular styles to commodity and market objects.

Streamlining, for example, is probably the most prevalent and visually obvious metaphor used in product design this century. Aerodynamic experiments to reduce wind resistance on aircraft in America were subsequently applied to cars and other design work during the 1930s and 1940s, giving objects gentle (and sometimes dramatic) curves free from projections. The 1934 Chrysler 'Airflow' is considered a turning point in streamlining - and indeed American - design history. It established the new formal language for motor cars, a move away from the boxy, upright designs of the 1920s and early 1930s. Unfortunately, the expensive new model and its radical styling were too much for the American public at the time and the car became a financial fiasco for Chrysler. But the car started an extremely important movement.



3.1 - 1934 Chrysler "Airflow"

> Streamlining is a metaphor for progress, and as such has a surprising degree of formal diversity and ambiguity in terms of context. It does not absolutely require maximisation of speed, but is looking to optimise effectiveness; to this extent it has remained entirely up to date
> (ENGLER, Franz, 1991, p.10).

Equated with functional excellence, the style was also used for purely visual effect, by the 1940s society had acquired a sense of the aesthetic refinement known as streamlining and the style often appeared in highly exaggerated and sometimes inappropriate forms.

3.2 - 1945 Electrolux cylinder vacuum cleaner

There is scarcely a single piece of household, kitchen or office equipment in which streamlining actually had anything to do with flow mechanics, nevertheless countless products were now trying to imitate the style. The 1945 Electrolux cylinder vacuum cleaner shown above, for example, used streamlining imagery to present itself as a homogenous sleek unit. The vacuum also benefited from the curved, soft edges which prevented injures, were more comfortable to hold and were easier to clean.

As more functional, less ornamental products with few non-essential qualities were developed. Concerns included improving the physical environment, reduction of hand processes, efficiency of manufacturing, shared tooling, modular systems, ease of assembly and repair, shipping requirements, proficiency of process, ease of use, friendly interface, low-cost product by production expediency. All of these issues, and more, informed the form.

In 1952 the first polyester fiberglass chair to be seen in the low price bracket was manufactured by Hettrick Manufacturing Co. Designed by J.M. Little in 1953 it was featured in the ID Annual as a chair commended for knock-down ease of shipping, minimal low-cost tooling, and interchangeable legs. Semantic, ergonomic, poetic, emotional, aesthetic and experiential issues were not part of the discussion.

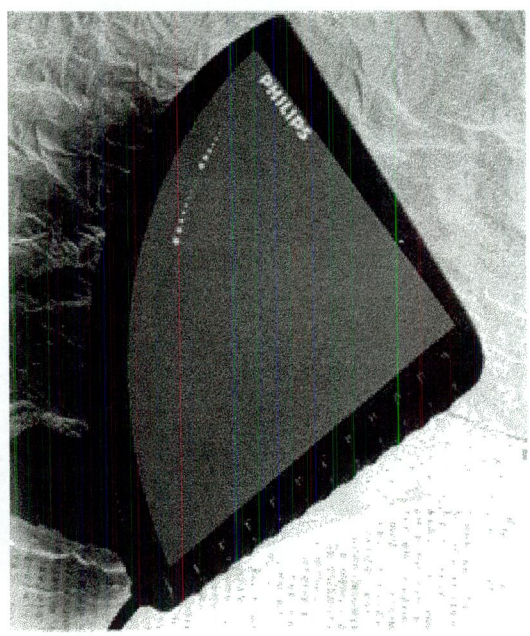
Today the development of products, is based on several important criteria; human experience, social and global issues, economic and political issues, physical and mental interaction, form, imagination, and a rigorous understanding of contemporary culture. However, the products around us have taken on a banality and a certain sameness due to mass-production, lack of interest of Research and Development funds, low-capital investments, and the great mass mechanisation of the 20th century. The result is few ideas and many variations.

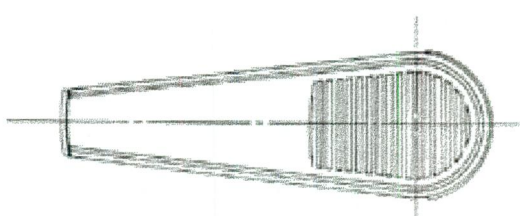
The hyper-explosive 21st century has allowed a corruption of traditional design procedure and globalization of the consumer product has brought an end to the "modern" language of objects. As such, many objects have become endless reiterations of one another, a cloning of clones as we trade spiritual values for material values and originality for simulation. This facsimile policy of design engineering and

marketing is the decline of economic/cultural shaping and the restriction of artistic thinking.

In the late 1980s, while objects, especially furnishings, were in their maturity of the 'High-Design movement' there was little dialogue on new ways of informing physical objects, particularly new digital and technological objects which had no previous syntax or design history. Appropriate theory hardly exists in Industrial Design, unlike art and architecture, where discussions embracing ambiguity, hybridisation, post-structuralism, representation, feminism, deconstruction, post-modern condition and semantics are commonplace, industrial design theory seldom approaches such subjects. The 1987 Phonebook prototype telephone answering machine is a good example of 'product semantics'. By establishing a visual simile with a familiar object, Lisa Krohn (b.1964) demonstrates a strategy for making a complex machine simple to use. One of the problems of modern design, especially with multi-functioning electronic products, is that such machines, because they can do so many things are demanding of our time and concentration.

Schools began to concentrate on object as meaning, using simile, representation, metaphors, symbolism and even remote circumstantial narratives to inform objects. Imagery was a popular device. For example in the book The Meanings of Modern Design (1990) by Peter Dormer, a student designer was asked to design a new hair dryer. He informed his project with words such as 'wind' and 'air.' In turn, the word air references' birds and the hair dryer form become wing-like inspired from a peacock. The result is a fan of a different form. Is this the ideology we must engage to find new forms or is there really any need





3.3 - Groenewege, 1990 Fan Concept

to find new forms, but instead to design products that consist of existing language? Syntax became the inspiration for form.

Another perfect example is the literal fantasy of objects by Guy Dyas, such as his Vacman vacuum cleaner. The concurrence of such searching, as we saw in many design schools, resulted in a few original results and a morass of objects that had little to do with their respective subject. Generally the syntax of simile produced a new method of decorating objects that could never really be explained to the consumer. Sometimes the result is very literal and we end up with objects that border on kitsch.

The giving of form, as we well know, is central to the act of communication and designers pay particular attention to the effects that difference in form can create - the form of an object or message does affect its interpretation. When designers treat form not only as a quality valuable in itself but as a means of shaping the appearance of objects for an appropriate effect, they move deeply into the domain of rhetoric. Furthermore, by developing new objects and presenting them to an audience of potential users, designers directly influence the actions of individuals and communities, change attitudes and values, and shape society. As Misha Black (1910-77) comments:

> Designers should see their place within the social pattern of their country, Industrial design is not a job for pale aesthetics whose aim is only to impress and earn the approbation of their own coterie
> (EVAMY, 1994, p16).

Shaping the appearance of any visual object involves rhetoric. By exposing the intuitive through exploration and analysis, one gains and expands competence and becomes visually literate. A visual rhetoric implies a common body of information that can be taught, learned, and understood to increase control over visual means. Furthermore, it implies a shift away from the aesthetic/stylistic imperative towards a functional/ethical necessary. The aesthetic/stylistic imperative tends to offer perfect models only to be imitated and technically refined: imitation instead of invention. The functional/ethical imperative accepts that all design has social, moral, and political dimensions, and accepts the challenge to make designs that are conceptually, visually,

and functionally appropriate for particular clients and audiences in particular environments. And this, in my opinion, requires designers who show more respect for visual symbolism than for aesthetic doctrines.

The form follows function discussion - now a banality in itself, is completely irrelevant when it comes to sophisticated products with complex functionality, digital componentry, almost mythological objects that engage little interaction, if any. So how do we shape these objects? Inanimate objects do not have meaning, we project meaning on objects. In the 1990s design is the study of the subject that informs the object. Form follows Subject.

The point is that subject is not necessarily an issue of function or necessity driven. Subject may be a philosophical position on contemporary culture, a belief, or dislike of a condition. A subject may be anything as varied as human experience, gathering, behaviour, movement, cultural phenomena, media, sustainability, consumption or digital production. Maybe the subject is exceedingly banal such as reusing existing tooling or tooling modification. These issues constitute a language based on dealing with the subject and not the object.

Long gone are the days in which well designed industrial products in the idealistic sense had to be struggled for and their renown had to campaigned for, and in which pioneers of design were allowed to pin social hopes on their works. Today we live not only in a technically and functionally determined environment, but also in a world of consciously designed technical forms; design has become a language of everyday life.

In the contemporary scenario, the traditionally perceived relationship between objects and cultures has changed. Most objects of recent origin have a very short developmental history in the culture in which they evolved. Equally, objects do not go through the need-driven evolutionary route anymore. Most new innovations in objects are typically sparked by new technologies in search of global needs and markets. The very process of evolution of new objects is no longer culturally specific, nor is the process of design restricted to one culture. It is not uncommon to see new objects developed by cross-cultural teams across the globe. The new objects display global

links by their very design. These objects often have a strong technological base and offer new functions. They have no precedent in traditional cultures nor are there equivalent traditional objects which they replace. Obviously, people have no inherited notions of what such objects should be.

How do people form their notions about these objects? For example, the video camera has rapidly evolved during the last three decades. Yet societies exposed to them, directly or through the media, have reasonably formed notions of what a video camera looks like. With communication media now taking a larger than life role, notions of such new object categories and stereotypes are more likely to be learnt through the media rather than inherited from parents. With rapid changes in the new objects, notions tend to continuously evolve with time. Notions about most short-life objects have to be learnt directly in one's own lifetime and cannot be inherited. This makes the problem of cultural continuity even more difficult. Adopting such new objects also means the transfer of linked notions and stereotypes from another culture. With cross-boarder trade and access to the media becoming common, it is unlikely that notions about objects will remain culturally specific any longer.

Chapter 4: A Design Identity for Non-Mechanical Electronic Products.

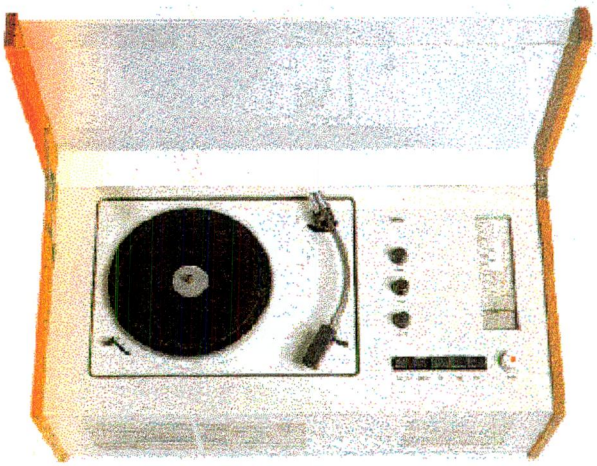
> Those who complain about the effects of television, journalism, advertising and fiction on our minds remain oblivious to the similar influence of design. Far from being a neutral, inoffensive artistic activity, design, by its very nature, has much more enduring effects than the ephemeral products of the media because it can cast ideas about who we are and how we should behave into permanent and tangible forms (FORTY, 1986, p.6).

Since the late 1920s there have always been products that lend themselves to being arbitrarily encased in shells or boxes. Quite frequently these shells and boxes have done little more than safely contain machinery or electrical components, revealing nothing about their workings or operation in the process, but more usually they have been used as convenient surfaces for expressing ideas about the product.

Radio design is, among others, representative of the design of modern appliances. Radios are a case in point for the trend in modern electronic technology toward visual disappearance, although unlike the mechanics of a bicycle or the physical requirements of furniture, electro-technology can be grasped vaguely at best.

During the late 1920s, when their components were first combined in a unified form, radios resembled pieces of furniture, bearing styles and motifs popular at the time, such as this 1930 Art Deco style, Pye radio. Receiver miniaturisation and the introduction of plastics, radically changed the physical requirements, and therefore the appearance, of radios, and allowed them to develop a visual language of their own.

4.1 - 1930 Pye Radio



4.2 - 1956 Braun Phonosuper SK55

Consequently, Hans Gugelot (1920-65) came to be of the opinion that radio needed to be a design not as an element of aural furniture, but as an abstract function described by an abstract geometry, by monochromatic cubes or rectangles. Which he demonstrated originally with his 1956 Braun Phonosuper SK55. This was instantly perceived as the "Good Form" of modern technology.

Almost to prove this notion of visual dissemination, Daniel Weil's (b.1953) 1981 Bag Radio questioned traditional impressions of radio design and construction by displaying it's components within a transparent PVC bag. The exposed workings, combined with quirky splashes of colour did not challenge existing radios, but simply offered an alternative, and not irrational, packaging solution.

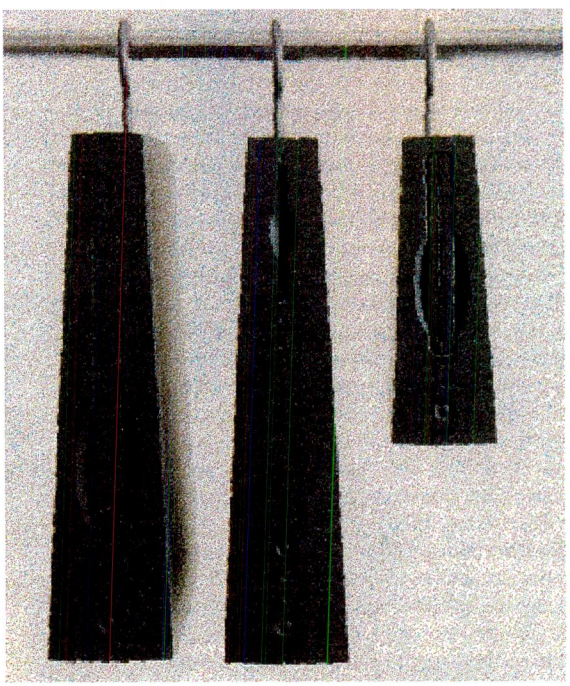
4.3 - 1981 Daniel Weil Bag Radio

The standard underlying design principles of the radio also effect many other products, such as hi-fi, video and computers. Which, when opened up, almost all reveal surprisingly under-populated interiors. Much the same can be said for telephones

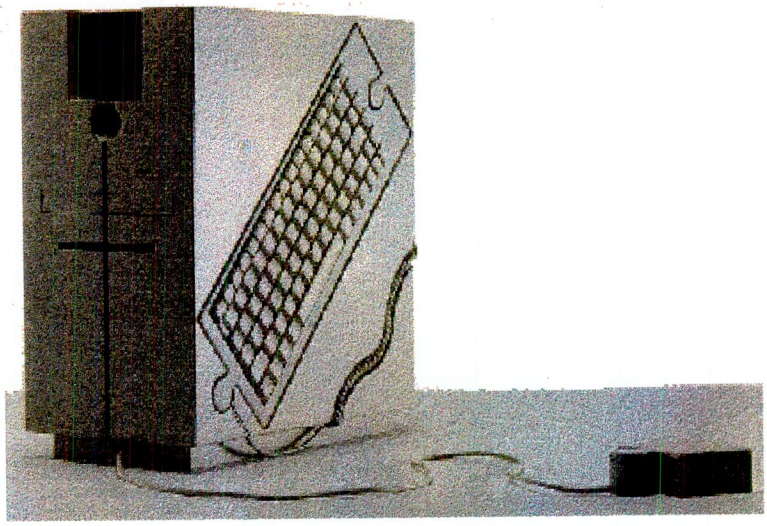
which, even though they started to incorporate more functions, managed to compress its components into a relatively small space. This has freed designers to try infinite variations on what can be done with a handset, taking the emphasis away from the functional components and placing them it on ergonomics and tactility. Ever emphasising to the designer to evaluate the visual message which may be conveyed by an unconstrained external shape.

The various workshops with programmatic titles such as "Active Memory", "Changing the Mind" or "Found Object, Found Material" were preceded by an exact analysis of the Personal Computer which has - apart from occasional experiments with shades of black and blue - hitherto presented itself as a grey box. With the objective hope of discovering new symbolic shapes for the computer, computer manufactures NEC recently held it's "Whitebox exploration" project with IDEO industrial designers in Tokyo. "Computer Design", according to the brief, "is calling to us but it isn't saying anything useful" (ABENDROTH, 1997, p.66). As a result, the Whitebox Project was devised as a means of exploring the relationship between computers and the lives and patterns of their users, both when the computer is in use and when it is not. "It is about expressing the present rather than the future," the brief continues, "life rather than object, human rather than user".

The project allowed each designer to evolve a personal interpretation of the problem, without the normal pressures of manufacturing, marketing and finance. Among the designs was one that adopted a hanging wardrobe as its inspiration. By combining an everyday occurrence - of hanging things up - and computers, an active memory is attached to the object, giving it a more human scale.



4.4 - 1997 NEC "Hanging Computer"



4.5 - 1997 NEC "Jigsaw Computer"

Another design uses the familiar imagery of a jigsaw to unify the computer and its' peripherals as a single self contained block. This braces the product, and provides a utilitarian robustness which lessens the need for excessive packaging while the unit is shipped. The design also presents an object which doesn't mind being moved, changing the traditional feeling of the machines preciousness. While all of the designs developed during the Whitebox project are individual expressions and are commercially unlikely, they are the beginning of interesting ideas which warrant further elaboration. It is exactly this kind of aesthetic and intellectual development which is required within the computer industry. As full of imagination and variety as these designs are, they all unmistakably remain tied to the rectangular shape - probably for reasons of existing production methods.

The current Personal Computer (PC), known to us all, is an exercise in cost efficient packaging; a grey pressed steel case with an injection moulded front fascia houses whichever mechanisms were considered technologically advanced at the time of purchase. This construction is exactly similar, and just as exciting, as a £70 microwave oven. The most adventurous PC design to date, the 1996 Acer Aspire, has recognised the unit is no longer just for the office. Reacting to the changing market Acer offers an alternative to the ubiquitous 'pizza-box' styling, with its decorated

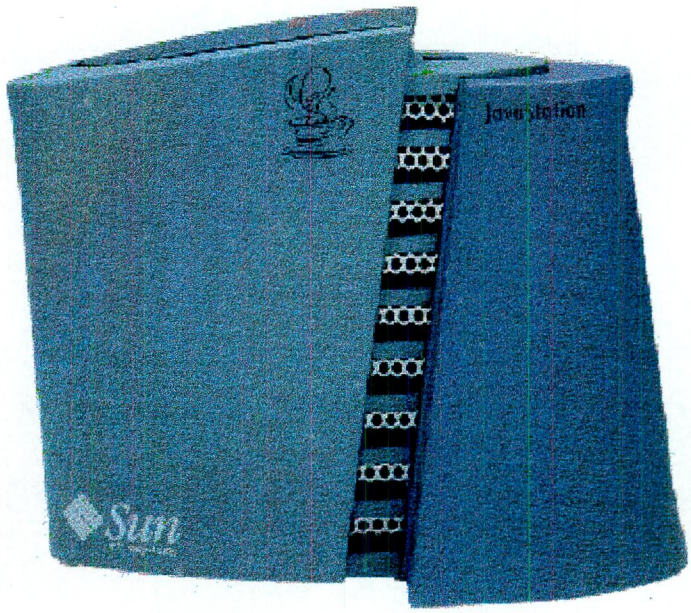
surfaces and sculpted shape. However this re-working of an existing unit is hardly an innovative solution or an attractive piece of furniture.

4.6 - Acer Aspire Personal Computer

There is hope however, high-end market leaders such as Silicon Graphics and Sun Microsystems have recently released several hard-drive units which expand the current vision of computer construction. The 1997 "JavaStation" from Sun Microsystems is a radical departure from the norm, it was developed to be a networking computer standard, in which remote servers provide more effective computing power to networks of desktop workstations, rather than individual hard-drives

Designed to be the next step on the Information Superhighway, the nature of this processing system requires a shift in how the public thinks about computers. This led the designers to want a radical design for the interface which connects users and their monitors to the server. Since the machine is designed for everyone, from bank clerks to corporate managers, the unit was designed to be viewed from every angle so one priority was to conceal the cable connectors. Even the name "Java", slang for coffee, was chosen to relate to every Americans daily routine. The designers note the gently curved leading edge, canted slightly forward toward the user, hints at the information and services that flow from the network to the user. A vertical split in the housing

adds to this metaphor by making some of the hardware visible, while at the same time allowing it to cool without a fan.



4.7 - Sun Microsystems "JavaStation"

Sun Microsystems have succeeded in defining a totally new look for computer equipment, and have made the most design worthy elements stick out while hiding other things like cable connectors. In a cut-throat marketplace, saturated with similar grey machines, the JavaStation is an aesthetically challenging, intelligent design, and for that they ought to be acknowledged - that they had the ability and nerve to do it.

Chapter 5: Technological Advancement and Changes in Design Since 1990

In his book The Meanings of Modern Design, Peter Dormer describes cultural changes which are encouraged by the recent technological developments:

> [There] is a move away from a heavy to a lightweight and sometimes invisible infrastructure,.. the narrowing of the gap between what looks like nature and what looks manmade. ...[and] a move away from non-renewable resources. ... These three trends will influence the nature of design as style and make sharper in the 1990s the arguments over how designers can help people feel comfortable with new technology without having to disguise the new with packaging from the past. Moreover, material science and information technology are delivering to us a culture in which our experiences become more complex, less substantial and, in the secular sense, more spiritual (Dormer, 1990, p.62).

In microelectronics, the trend towards visual disappearance has continued, quite literally into nothingness. Design has decayed into two components, hardware shrinks beneath our hands by changing from a cube into a user interface, while what was once a special appliance to listen to music or to write text is now on all purpose unit such as the Personal Computer. A new approach to design corresponds to this degree of extreme abstraction - it has become known with concepts such as the 'interface panel', or even more clearly in the metaphor of the 'electronic paper'.

The actual product or special function is first (and most) apparent in the software - the interactive functions available. At the level of user interface, the electronics, as it were, magically turns the radio into a functioning image or pictogram of a radio, which, if required, gives way to further pictures, icons, or pictograms with further user menus. While the trend into abstraction continues in the hardware, the bodiless product - the software - blossoms into almost infinite pictures and functions.

In this context, we must ask what becomes of the "product language" if the objects disappear - which they should not normally do - or change. For example, the Personal Computer, familiar to most homes, offers itself as a multi-functioning object where hardware is increasingly incorporated as software while individual products become a

program or system. Fax or answering machines, typewriter, CD player, games console and encyclopaedia (to name a few) all combine into this single, visually uninformed, object.

However, for product design this entails a complete change in media, from 3-D 'body language' to a 2-D 'pictorial idiom'. This is the way we shall, in the future, be designing an ever greater range of highly different products, from electronic newspapers to wash-hand basin taps replaced by touch-screens. The task facing product design will remain the same - even in the new pictorial or multimedia idiom - to explain the idiosyncrasies and use of what is now a physically insubstantial concept. Moreover, we will have to design the way cultural contents or emotional feelings are conveyed, and this may even mean designing ornaments.

In pre-modern times, a view of product semantics tended to be a matter of course. This can be seen, above all, if we look for common features that express specific styles of living and forms of production, rather than for individual differences, in other words, if we address the stylistic language rather then the product language.

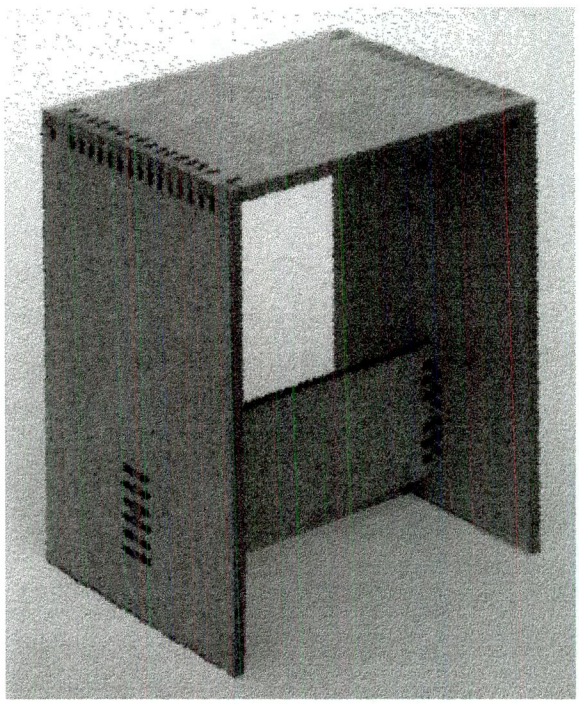
There are thus good grounds for drawing up a renewed semantics of style, if only as supplementation to approaches to product language or product semantic hitherto. However, the following issues are of greater relevance. For example, Memphis and New Design needed to be integrated by being linked back to the metamorphoses of "A Good Form" into a consistent theory of stylistic change. And there is also the new stylistic question which arises today in the wake of digital technology.

Customised Design and Production

These new technologies not only gives the products an immaterial and media-based shape, but, as it were, animates production, too. Computer-controlled machines, such as CNC (Computer Numerically Controlled) lathes, laser cutters, or punching machines for molds change the conditions of design and thus the shape of things. As early as 1985, the new style of production was heralded as the "end of mass production" and today takes concrete shape in the model of the "virtual company" or

of "virtual production". Essentially, what is involved is design and global action with "virtual products" (manufacturing programs) as well as giving them customised, material shape with computer-controlled machines.

Technologically, it could long since be carried out and the Italian Op Top company, at least, is already attempting to set a a chain of decentralized and customized furniture production facilities in keeping with the theoretical model of "virtual production". A centrally located showroom offers prototypes of different items of furniture which can then be fine-tuned to client needs in a production facility. The client receives the customised product 72 hours after ordering it.



5.1 - CNC produced Table

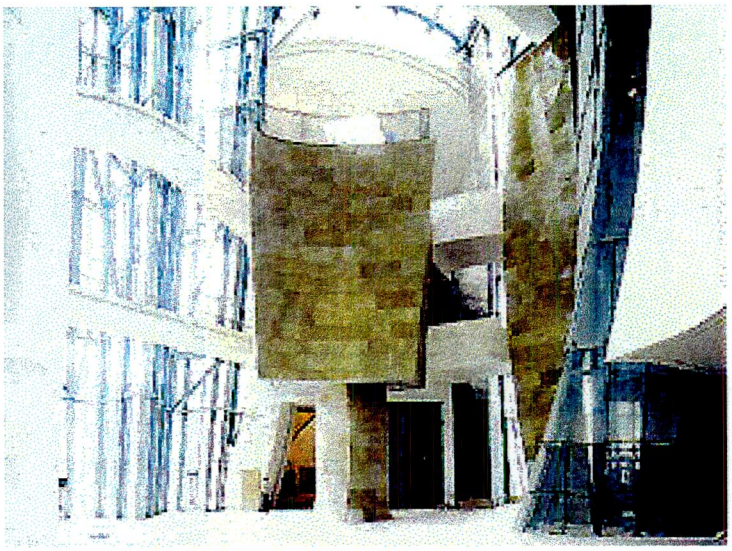
How can the new form of production also be expressed in a new form of product?. A clear focus on the difficulties involved in the new technology may help here. For example, traditional joints such as finger joints are hardly compatible with CNC technology. Due to the radius of the cutting tool bit, a semi-circular gap arises at the point of each finger joint which looks like a highly inaccurately cut. Instead of covering this over, it can be highlighted as a feature of the new technology. Unlike when made by hand using a chisel, here the production technology leaves marked radiuses as a sign of the new technology. Attempts to make these marks even more

pronounced transform the rounded dove-tail, for example, into slotted joints that resemble a jigsaw puzzle, the contours of which can even be created free-hand using a graphic pad.

On a more general commercial level, a woman who is not "average size" - and of course nobody is average size - can have a pair of jeans made up to her exact measurements by Levi Strauss & Co. Or rather she can be measured in a store here in Dublin and the data transmitted to a sewing plant where denim is cut by computer-controlled machines in any of 4,224 permutations of hip, waist and leg measurements. At the moment you pay a premium and the service is for women only, but it's the sign of a trend that could transform industrial culture: "mass customisation" - the ability to make unique products at mass production prices. Individualised products don't stop at jeans, there is now the potential - and consider the implications - of making all manufactured products unique.

> By connecting the directly with production process, all customers, whether they are the final customers or designers specifying a component, become what the American futurolgist Alvin Toffler has termed "prosumers" ("producer" + "consumer") and will be able to control not only the product features but perhaps also the "design" of a product as well
> (CLARKE, 1998, p.26).

These new technologies have attractive implications for architecture, buildings have always, in a sense, been unique products made from fairly standard components. With the advent of flexible production systems architects seem bound to have a far wider range and variety of components to specify from. In addition, it allows more of the components to be designed by the architect, giving new design and aesthetic possibilities. Frank Gehry's new Guggenheim Museum in Bilbao, Spain, for example, would be too costly and impractical to construct without both CAD and CNC machinery.



5.2 - Interior,
New Guggenheim Museum,
Bilbao, Spain

However, changes in production technologies also represent a threat to the role of architect and designer. The same tools which allow the designer to design-in customisation could also enable the consumer to play a larger role as a "prosumer", in effect designing the product themselves. There is no technical reason why this shouldn't happen and no reason why, ultimately, there should be a high premium for this kind of product personalisation. This certainly challenges notions of design integrity. So what happens to design with a capital "D"? Will we need designers? Can consumers be trusted with design or will the result be aesthetic chaos or pluralism? We don't know yet, but what seems clear is consumers will always need someone to guide them through the choices.

Perhaps the final question is; do consumers really want to customise? Realistically that depends on the person and the product, we may be returning to the pre-industrial manufacturing paradigm where things are made to order from catalogue (except the Internet is the new medium). What is striking in those cultures is not how different or individual products were, but how similar. In post-modern societies however, people became more individual and more willing to express themselves through products like clothes, personal accessories and furniture so perhaps, given the opportunity, we are all ready to become "prosumers".

Conclusion: The Transition to the Digital Age.

New inventions dictate the early forms of the new products they make possible. In conjunction, new materials, which have their own characteristics and possibilities, have allowed further exploration of these new inventions and developments.

Traditionally however, peoples conservative nature often makes the introduction of new products difficult. This is especially true with new domestic technologies and can be seen in early radio and television design, where the units were modelled like existing furniture to allow easier integration into homes. Often the development cycle of new products requires it to be disguised as something familiar to the consumer and in so doing the product can enter the domestic market.

A combination of forces allows the product to become more acceptable to consumers. As the technology improves and the product gets better, its use becomes more widespread and more recognised. More sales and mass production allows the price to fall, opening further markets and increasingly integrating the product into society. Familiarity makes the technology more accepted and frees the product to then develop its own identity.

Only then can the essence of the product come through, forming its own image of technology which becomes desirable in its own right. The product is deliberately styled to identify its association with technology, and establish itself as the physical manifestation of cutting-edge progress. People now want the product to identify its own technological quality.

Other products begin to take inspiration from the originals success, and make themselves more valuable by forging a visual or spiritual association with the original product. Styled to affiliate itself with "High Tech" these peripheral products may have no other real link other than benefiting from peoples perception of technology and demand for progress.

This thesis set out to examine the relationship between the forms of designed products and developments in technology this century. The examples set out dealt not only with the physical changes allowed by new developments, but also with designers perceptions of what will be possible and how these influence form. As shown, Modernism and Streamlining were "styles" which developed directly from physical advances in technology. They devised images for the future based on new materials and technological possibilities which were applied to a variety of unrelated products to ensure sales.

Now, on the verge of the Digital Revolution, designers find themselves with a new breed of products to inform. Rather than developments in materials allowing new products - for which the materials themselves influence the form - now we are offered electronic devices which normally have no physical demands their own. These digital products often have few physical functions, no previous design history, the minimum of internal mechanisms and very little physical context with which to develop an immediate visual association. Although the application of meanings and symbols to products is not a resent phenomenon, these new products have sparked off a trend of using Simile and Metaphor to inform their physicality.

In our newer synthetic world, objects have to respond to our emotional and environmental needs as well as sensual, intellectual, and ever-changing social behaviours. Can we expect a commentary on culture, on social issues, or a message from product design? Or is design demoted to serving purpose, to fulfil needs only, to create a more comfortable, convenient situation or condition? We know commodity is dangerous and can lead to excessive production and consumption. At the same time, objects shape our everyday lives, as we interact with them at every moment. Are our social conditions really changing as digitalisation seeps its way into every aspect of our everyday life? When design fell under the notion that objects really possess meaning, was this a way into finding a new direction in design; a new principle.

> The way forward for design remains difficult but exciting. ...The demise of the 'black box' approach to design has inspired both anarchy and thoughtfulness and there are numerous signs that the 'good design' movement was, in fact, not the final answer that it seemed to be for so many people, but merely a temporary obsession with the machine and a taste set of middle-class values as a metaphors for design. It amounted in the end to little more than an interlude between two historical periods for which object symbolism and consumer preference were, and are, much more important than form and good taste (SPARKE, 1986, pp 207-209).

However we choose to term the changes in style, and how close we are to the new technology, the design goal seems clear. Just as functionalism, which proceeded from the industrial revolution, was so enthusiastic for the opportunity of social change which was offered in the slogan of "Good Form", we too must take cultural possibilities from the digital revolution and find a new product language. However, the realisation will probably be far than the earlier "overcoming of style" and abolition of ornamentation. After all, it's far more difficult to build a house than to burn one down.

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