The Motorcycle in the Art Gallery

Geoffrey Roche *The Motorcycle in the Art Gallery*. MA Thesis 1997.

THE MOTORCYCLE IN THE ART GALLERY:

INDUSTRIAL DESIGN AND ART

BY

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ABSTRACT

This dissertation is born of a general prejudice against official culture, canonical ideas of art and culture, and the 'caste- system' that differentiates between fine art and other cultural activities. It is based on the premise that there are close similarities in the practices and products of both fine and the products of the industrial arts.

The aim of the project is to undermine the ideal of fine art as being of a necessarily superior caste to other applications of imagination and creativity. That is, it is a challenge to the idea of 'art' as some mysterious, totally unique practice.

By the traditional standards of creativity, imagination, technical skill, and of understanding of nature and of materials, the works of the engineer or industrial designer may surpass those of the fine arts in terms of art- making. The cultural aspects of industrial design will be the primary focus of the dissertation, although engineering as a creative art will also be discussed.

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The walls between art and engineering exist only in our minds.

Theo Jansen (b. 1948).

CONTENTS

ANALYTIC TABLE OF CONTENTS.

The following is a summary of the arguments in the dissertation.

The first part(1.1- 1.5) will progress as follows:

1). Premise – industrial designed objects, if of fine craftsmanship and imagination, may be regarded as art- works in the traditional sense.

2). The Art- world objection: 'art' objects are those regarded as art- objects by the relevant art institutions.

3). Reply to 2. above: these art institutions do in fact include items of industrial design as art pieces. There may still be a theoretical distinction, however, between fine art and industrial design.

4). Premise: Industrial design is a mass art form, as opposed to fine or 'high' art.

5). The distinction between 'popular' and the 'good' or even 'great' in art is far from clear. Intrinsic artistic worth cannot be cited as a reason for distinguishing between the fine and the popular in art.

6). The Kitsch objection: as industrial design is a commercial enterprise that appeals to a large section of the population, it is of poor taste.

7). Premise 6). is not necessarily true in all cases.

The argument in the first section (2.6) will progress as follows:

1). Fine Art is identified with the artist's desire or intentions of personal expression (call this the *Expression Line*).

Industrial design, engineering, and other applied arts are typically rule- based, logical and goal-orientated activities that are not concerned with personal expression. Therefore, they are not 'art,' properly so- called.

2). Premise 1 is inconsistent with all artistic practice. Renaissance art and Classical art, for example, are part of the fine arts tradition, but are not primarily concerned with personal expression. Such arts were to a large extent rule- based, logical and goal- oriented.

3). Premise 1 runs counter to the artistic practices of those who are not concerned with personal expression but with working with 'purity of form.' (The Formalist Line).

4). It follows from 2. And 3. That 1. will not suffice as a definition of art, as it excludes many artefacts that are commonly regarded as fine art. It follows that the intention of personal expression is not a necessary for a given artefact to be regarded as an art- object.

5). Both the expression line and the formalist line take the artwork to be produced primarily for the purposes of contemplation, or, at the very least, the artwork must be manufactured with the intention that people will enjoy looking at it.

Thus far, architecture and industrial design may be inadmissible as fine arts, insofar as both may have intentional formal aesthetic qualities.

Artefacts that have been produced with only utilitarian intent in mind (either symbolic or physical) are excluded from the category 'art,' according to both these groups of art theories.

6). The Mystic Line: the work of art is a means to an end:

either a means to securing an experience beyond ordinary experience

or — a means to information beyond ordinary experience

or — a means to causing change in one's environment through channelling some unseen or otherwise occult force, or some *natural order* that is real enough but requires a disciplined and highly organized art in order to be secured.

Possible objects are- certain religious works, the Pyramids. Certain archaic technologies that are no longer practiced for the purposes of warfare but for spiritual development (Japanese martial arts such as Kyudo or Shinkendo).

Perhaps it is in this archaic sense that the applied arts (the science) are related to what are presently known as the 'fine arts.'

The section 'Fine Art and Origins' (2.7) follows the following argument:

It may be suggested that there is a distinction between industrial design and fine art on the following grounds:

1.i. The fine artist is an independent, creative agent whereas the industrial designer is conditioned by ideological and technological limitations.

1.ii. The fine artist is innocent of commercial or ideological motivation. The industrial designer is a member of a corporate body and so is not free to be authentically creative.

1.iii. The fine artist works alone.

2. Film may be both a corporate activity and a fine art. So premise 1i). is in doubt.

3). The History of Art suggests that premise 1ii) is also in doubt.

4). Art and Technology: Ultimately, fine artists are also reliant on the available training and technology of the time. So premise 1iii) is also in doubt.

It follows that industrial design cannot be distinguished from fine art by virtue of the fact that industrial design relies on contemporary technology.

5). Conclusion: Industrial design is analogous to architecture town planning, and furniture design in that it may be regarded as within the canonical ideal of the 'applied fine arts' but lacks expressive qualities.

The second section (3.1-3.14) will adhere to the following argument.

Here we will look at the relationship between engineering and the 'fine arts.'

1). Aristotle: art (*techné*) is the application of intuition and scientific knowledge to the attainment of some desirable ends. The art — work is a bringing-forth of something that previously did not exist, that is, it was brought into existence by the artist.

Heidegger: The artwork is a *revealing of being*.

So — the term *techné* encompasses all art and engineering.

2). Engineering is constrained by economic and physical factors and is a goal- oriented discipline. Engineering is (widely thought to be) the application of science. There is some doubt as to how such a discipline could be considered a *creative* one.

3). Dasgupta: Engineering is not the mere application of science.

i). Engineering I considerably older than science.

ii). Engineering is concerned with specific materials and their useful properties.

iii). Engineering has traditionally relied upon a great deal of trial and error.

4). i). Engineers (boatbuilding, aircraft engineers) may borrow directly from traditional craft technique or fine arts knowledge.

ii). Engineers may be inspired by natural forms.

5). i).

Limitations of economics, physics, practicality, etc. determine the nature of the final outcome of the finished work but they do not determine the form of the work. Engineering design is characterized by the requirement to make choices amongst a large number of options. What is often taken to be 'functional' design is no more functional than an infinite number of other designs that accomplish the same goal. An apparently 'functional' design is simply one that is cheaper to make. The decision to design an object in order to make it cheaper to make is one of a number of design options, and it may not be the most appropriate.

All engineering design is a compromise. There is no 'ideal' design to a given project.

ii). There is a distinction between design and invention.

Design is the development or application of a 'general principle of arrangement.' Invention is the creation of a new 'general principle of arrangement' — a configuration of elements that previously did not exist. As such, it is both creative and imaginative.

If art is defined as 'extraordinary capacity for imaginative creation' (Arnold Whittick) then engineering invention appears to qualify.

4). It is thought that engineering is concerned with mass production, heavy industrial processes etcetera and not traditional craft skills. Fine art works are traditionally thought to be autographic.

5). Reply to 4). 1). Some machines are in fact autographic, such as John Britten's Britten Daytona, or Wright Flyer I.

ii). There is a historical transition from craft techniques (where the craftsperson is the designer) to the present division of designer and builder. Traditional skills are still required for design and sometimes construction. If we define art as 'craft of extremely high quality' then engineering may still qualify.

6). Dewey. A machine is primarily a rearrangement of physical objects for some practical end. Its function is purely utilitarian. Artworks are produced for the purposes of imaginative contemplation. Therefore, machines, although imaginative, are not artworks.

Sparshott. (Distinction between artworks and useful objects).

> "A small change may ruin a physical object, reduce it to rubbish: a small hole in a contraceptive or in a reactor's cooling rods spoil all. But works of art are tough and resilient. They resist fading, fragmentation, restoration […] the force of the design act carries through all." (Sparshott:186).

7). Reply to 6i).

> A number of "rearrangements of physical objects" (The Brooklyn Bridge, the Great Wall of China, the Wright Flyer I) may themselves become objects of imaginative contemplation. Art works and at least one movement (the Futurists) have been inspired by engineering works.
>
> ii). Machines, like artworks, may also resist fading and fragmentation.
>
> Eekels: machines may make the transition from useful object to artwork. Many machines are deemed worthy of preservation long after their usefulness has been exhausted (sunken galleons, spacecraft etc).
>
> iii). A small group of engineering works and designs are regarded as objects worthy of veneration despite the fact that, from a strictly utilitarian point of view, they were useless (for example Babbage's calculating machine, Leonardo de Vinci's ornithopter, Richard Pearce's third aeroplane).
>
> iv). The machine as propaganda tool — as show of technological strength. Some machines have been built with a symbolic application in mind. From a strictly utilitarian point of view, the following were possibly more 'useful' than Napoleon's portraits: the Zeppelins *Hindenburg* and *Graf Zeppelin* (carried fare- paying passengers but had an obvious propaganda role), the *Maxim Gorky* aeroplane.

8). Conclusion of section two.

i). What does the engineering work have in common with 'fine art'?

a). The machine embodies *techné:* a bringing- forth, a revealing of Being.

b). Machine design (and sometimes manufacture) requires craft

c). Machine invention requires exemplary powers of imagination.

d). The machine is related historically to technical developments in the same tradition from which fine art emerged.

e). The machine may be beautiful.

(The artwork may also have accidental formal aesthetic qualities).

f). The machine may be regarded as a historically significant artefact.

g). The machine may embody a profound understanding of natural forces.

h). Because g). above, the machine may become a symbol of an entire epoch — 'progress' symbolized in some work that demonstrates our progression in understanding such forces (the Viking ship, the steam engine, the Brooklyn Bridge, the silicone chip, the Saturn V launch vehicle).

i). Both machines and fine art objects may be the result of some rule- based and goal- oriented activity.

j). Both machines and fine- art objects may be produced with a practical end in mind, or at least as means to an end that need not necessarily be mechanical, but symbolic/psychological.

k). The machine may be an extremely expensive status symbol that is manufactured for an economic elite who wish to communicate this putative status.

l). The manufacture of both machines and art works may be conditioned by economic, technological and ideological constraints.

ii). *What does fine art have that machine design does not have?*

a). Dewey: art is purposefully presented for the purposes of "enlarging and communicating a particular experience." Naval architecture and aerospace engineering are not concerned with communicating a particular experience — therefore they are not 'fine arts.'

b). Art requires that specific rituals of site and commerce are adhered to.

(Marcel Duchamp, George Dickie). This problem brings us back to the examples at the beginning of the essay. If we decide that the only necessary criterion for fine art is that it involves the correct rituals, we return to the conundrum presented at the beginning of the essay. What happens when engineering works are brought into the fine art 'site'?

Conclusion.

i). Distinction between the Aristotelian definition of art and the Modernist definition of art.

ii). We may question the assumption that the fine art establishment has a monopoly on the manufacture, discussion and dissemination of culturally significant art works. (For example, the Wrapped Boeing 747).

PROLEGOMENON TO AN AESTHETICS OF MACHINERY.

1.1 As Good As Gold.

The idea for this essay occurred to me in the Auckland City Art Gallery in 1991. I will describe the circumstances in order to frame the intentions and purpose of the project. The exhibition I had attended, entitled *Good as Gold: Art Transactions 1981-1991,* was a survey of the work of New Zealand- born artist Billy Apple. I was aware that Billy Apple was an important Contemporary New Zealand Artist and so I considered a visit to the gallery that day to be a part of my education. I had just left the small town of my upbringing, and was determined to educate myself about art.

The canvases on display were all much the same — commercial poster- type lettering, spelling out SOLD TO THE BRIERLY CORPORATION BY BILLY APPLE, or SOLD TO THE COLLECTION OF THE AUCKLAND CITY COUNCIL. Also in the exhibition were several photographs of Apple buying and selling things (a car, a trailer), the events recorded being 'art happenings.' Apple's art was, to some extent, a comment on the notion of art as a commodity, that is, a unit of exchange. (Several artworks were, however, concerned with more metaphysical themes, such as the purity of number, and the beauty of the golden ratio).

One object in the exhibition, however, did catch my eye, and gratified my desire to see something beautiful.[1] At the far end of the downstairs gallery, mounted on a low varnished wooden plinth, was a glistening black motorcycle; an immaculate 500cc Norton.

The sculptural quality of the machine's gleaming form was enhanced by the austerity of the gallery's white walls and ceiling. On the rear shock- absorber was a decal reading "Vintage motorcycle racing. Sponsored by Billy Apple." I was by now more interested in the motorcycle, in this hallowed space, and its placement upon the varnished wooden floorboards of the Auckland City Art Gallery triggered something. Apple, I thought, had inadvertently forced an intuition upon me.

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[1] It is a debatable point as to whether or not beauty is still an important principle in contemporary art theory, criticism or practice. I will assume that, at least in the case of applied fine arts (architecture, furniture design and so on) beauty is still an important part of an axiology of artistic worth.

This was my thought. Billy Apple was playing with widely- held notions of what fine art is, or has become, but introducing a well- oiled motorcycle to the exhibition hall seemed to be far less inappropriate to me than the *rest* of the exhibition. I had come to see something that exercised my imagination, and appealed to my sense of the beautiful. An artwork, I felt, was *by definition* a *work* — something substantial, something that had been produced with a high degree of craftsmanship, and we expect of the artist that a great deal of imagination is employed in the design and execution of the artwork. Was Apple himself deliberately forcing this association, or was he simply treating the sponsorship of the bike on the track as another of his signature conceptual pieces?

I had watched my mother and maternal grandfather at work at their respective crafts, and I had grown up with a fairly dogmatic idea of what art is supposed to be. To my understanding, the motorcycle was more beautiful, more imaginative, and had required more craftsmanship to design and build than Apple's paintings. By any traditional standard (as I will argue), as a work of *art* the motorcycle was superior to the work of Billy Apple (except insofar as, perhaps, he too had realized the transcendental beauty of the V-twin). [2] How had this inversion come to pass? What was the root of this inversion of aesthetic values?

1.2 The art of Boatbuilding.

My arguments will be methodological, but they will be grounded in intuition. Intuition is grounded, in this case, in childhood. It is my memories of my grandfather's workshop and my mother's studio that form the ground of my understanding of what art is.

My maternal grandfather was a sapper with the Royal New Zealand Army during World War II, serving with the ANZAC forces in North Africa. After returning to New Zealand, he became an engineering draughtsman. He retired to Omokoroa on the Tauranga Harbour, and spent his time there building boats.

When I was a small child I would go to the workshop during family visits and watch my grandfather at work — drawing plans, shaping and moulding wooden

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[2] This interpretation of Apple as motorcycle aesthete is quite possibly valid: on December 10th 2007 he gave a 'sound performance' of his pedigree collection of racing motorcycles at the Auckland City Art Gallery. See http://www.suecrockford.com/news/gallerynews.asp (accessed February 14th 2008).

components, or machining brass fittings on the lathe. At about the same time my mother was taking oil painting more seriously, having recently sold her first works in a local café. Her studio was also a favourite haunt of mine; the smell of oil paint and linseed oil still evokes fond memories of scribbling on the walls.

My grandfather would sit with me and draw the things he'd seen in the desert — camels, the Sphinx, armoured gun tractors, downed German bombers. My mother would also draw and paint but she was more concerned with portraying old men with flowing beards, or the local Maori architecture.

My Grandfather would work as follows: he would find some basic boat design in a manual or some other technical volume on boatbuilding. (The last boat he built was based on a type used along the shores of Cape Cod during the 1880's by lobster fishermen). He would consider the design and any possible modifications, draw up the plans, and then build a scale model of the hull to clarify any assembly problems that may arise. The building of the boat proper would take many months.

His work began with a two- dimensional representation, and ended with a bringing- forth (to use Heideggerian language) into the world of an artefact that embodied craftsmanship, purity of form, and the continuation of a centuries- old tradition. My mother began with considering some object in the world, and finished by portraying it on canvas in arrangements of pigment. The two activities seemed to me to be different examples of the same process.

There are a number of terms that will be unpacked and discussed in the dissertation—— they are *art*, *fine art*, craft, *design* and *industrial design.* The central question is —— what is the cultural status of industrial design? To put it less abstractly—— when the Auckland City Art Gallery a few years ago held an exhibition of classic 1950's design, did the inclusion of several Citröen DS 19's suggest that the D19 is an artwork? Or is it simply a 'great industrial design'? If so, what does industrial design, as a category, lack that a 'real' artwork possesses?

1.3 The Artworld Objection.

A possible answer to the question posed above could be offered from the 'Artworld' theorist. This type of view, pioneered by Arthur Danto and George Dickie, is that art is whatever the 'artworld' says it is. The *artworld* is composed of those artists, publishers, gallery owners, government cultural institutions, and art critics who are instrumental in the manufacture, appraisal and trade of a particular class of artefact.

This class of artefact, the 'artwork,' is an artwork by virtue of the fact that the manufacturer produced the artefact with the intention of presenting it to the 'artworld public.'[3]

An easy answer to my initial question is that Citröens are simply *not* artworks; artworks are things that the artworld says are artworks. Art critics do not consider themselves artists. Fine- art publishers do not publish books on beautiful machinery. Governments do not bestow art awards on manufacturers or designers of cars or war machinery. As such, industrial design is not art, properly so- called. [4]

I have two responses. Firstly, besides the deeper and more perplexing problems latent in the institutional theory of art, there appears to be an obvious flaw that clashes with actual cultural practice. The art establishment, especially over the last twenty or so years, has begun a trend of appraising artefacts as artworks after years of ignoring them. The most obvious example is cinematography, although there has also been a re-evaluation of photography, poster design and comic- book art.

Secondly, the problem with the institutional theory of art is that it actually lends support to the claim that cars and aircraft are artworks. I give some examples here.

The German fine- arts publisher Benedickt Taschen has recently published the book *Kleinwagen,* a work, in the fine arts format, on the design of small automobiles. [5] The fine arts publisher Phaidon has also published a coffee- table book on automobile instrument panels, entitled *Dashboards.*[6] The automotive industry also has its own aesthetics awards, such as the *L'Automobile piu Bella del Mondo* (The World's Most Beautiful Car), awarded at the Milan International Competition. Prominent art galleries have also shown exhibitions of industrial design, such as the *Art of the Motorcycle* exhibition at the Solomon Guggenheim Museum in 1998. In the Autonews section of the *New Zealand Herald* this year [1997] was the following

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[3] Marcia Muelder Eaton *Basic Issues in Aesthetics* London: Wadsworth, 1988: 92-93.

[4] Another reply to the 'artworld' argument is that the present author is a member of the artworld, insofar as he writes on the subject and deems industrial art to be art. [2008 addition: I'm not so sure].

[5] Hans-Urlich Von Mende. *Kleinwagen: Small Cars-Petites Voitures.* New York: Taschen, 1994.

[6] David Holland *Dashboards.* London: Phaidon Press, 1994. See also David Holland "The Dashboard: THE DASHBOARD-AN APPRECIATION - As the Part of a Car Most Familiar to Its Driver, the Dash Becomes the Face of the Machine Revving Below, the Symbol of Its Dating and Distinctive Design." *Architectural Digest* January 2004:167.

item:

> A panel of experts in visual arts has judged the new Jaguar XK8 sportscar as the most beautiful two- seater luxury car in the world. The Italian contest held in Milan judged the XK8 as "extremely artistic" and commended its designers for continuing the character and style of the XK family and the "unforgettable" E-type. [7]

If experts in the visual arts are called upon to judge a motorcar on aesthetic grounds, does this make it an artwork? This question will be discussed later in greater detail.

Another critic who has written of the automobile as an artwork is Roland Barthes, for example in the essay "The New Citröen." He writes of the then- new Citroen DS as

> [a] lmost the exact equivalent of the great Gothic cathedrals: I mean the supreme creation of an era, conceived with passion by unknown artists, and consumed in image if not in usage by a whole population which appropriates them as a purely magical object. [8]

Do some motorcycle engineers consider themselves as artists? Or automotive engineers? Apparently so. The following is quoted from an article in *North and South* magazine on the car designer Bruce Turnbull. Says Turnbull, "[c]ars are more than a pile of parts. They are where technology and art meet. They have a soul, a feel, a Behavior which gives each car an individuality."[9] Adds the author of the article, Mark McLauchlan, "[Turnbull] found engineering an aesthetic as well as a technical pursuit, and that's what provokes his passion for cars."

Another New Zealand designer who feels the same way is John Britten, whose first motorcycle design won at Daytona and was acclaimed as "the most advanced motorcycle in the world" by *Cycle World* in 1994. Interestingly, Britten is also well known for his beautiful architecture and furniture design.

From a 1994 interview:

> I don't think the community holds good development in high enough regard, in the

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[7] New Zealand Herald Autonews section, 1997 [incomplete reference].

[8] Roland Barthes *Mythologies*: 88-90.

[9] *North and South*, January 1987, p.11. [Incomplete reference].

same way that science and engineering are seen as being less worthy than fine arts. I mucked around with a two stroke engine last year that was as creative as most artistic things I've ever achieved. I see the bike as kinetic art. I just love to look at it. And after I've soaked it up visually I love to hear it run. The extreme end of the experience is watching one of the world's top riders go by on the back wheel. [10]

As with all great artistic achievement (and eventually I will argue that this is the correct choice of words), Britten's creativity appears to transcend mere technical skill. To quote Tim Hanna on the Britten bike:

> To put his achievements with the motorcycle in perspective, it must be remembered that he built nearly all of it himself. He built an incredibly powerful 1000cc V twin engine (developing a staggering 170 horsepower for the technically illiterate- about two- thirds the power of a Porsche 911), a novel aerodynamic and cooling system, a radical leading link front suspension system and the world's first carbon fibre wheels. To quote Kevin Cameron, technical writer for *Cycle World,* "any engineer would be proud to succeed in just one of these developments. Indeed, most of these concepts are clearly too much for entire factories. Whose output in innovation is in detail improvement, not great leaps forward. John Britten decided to tackle them all. They all worked."[11]

Figure 1. Porsche (at left) and Hitler with the *KDF*- Wagen, 1936.[12]

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[10] *Fashion Quarterly Focus* 1994 Australian Consolidated Press, Ltd. [p.179] [Incomplete reference].

[11] Ibid. p. 180.

[12] Source: Harold Marcuse, UCLA History Department.

http://www.history.ucsb.edu/faculty/marcuse/classes/33d/prevyears/33d03/33d03l05-1930s.htm.

Figure 2.1938 newspaper article featuring the KDF- Wagen.

A final example of the endorsement of machinery as 'art' is worthy of note here. It also illustrates the dangers of emphasising aesthetics over normative notions of morality). Nazi Germany placed enormous significance on industrial design — even the humble VW Beetle (named by the Nazis the Kdf- Wagen, *Kdf* standing for *Kraft durch freude*, "Strength Through Joy") being associated with the ideology of national superiority. The following text is from *Industrial Design* by John Heskitt.

> [In Hitler's Germany], [i]nnovation and quality in design and production were constantly stressed, and the aesthetics of goods and mechanisms were emphasised as a visible manifestation of German superiority. Exhibitions of 'Art and Technology' were frequent, and an official journal for engineers and technologists, *Deutsche Technik,* included a regular feature, "The Beauty of Technology," with high – standard photographs of, for example […] details of a Messerschmitt 109, emphasising the often compelling excellence of the visual form. In 1938, the German Prize, Hitler's answer to the Nobel Prize, was jointly awarded to four engineer-designers: Ferdinand Porsche of Volkswagen fame, Fritz Todt, head of the organization that built autobahns; and the aircraft designers Ernst Heinkel and Wilhelm Messerschmitt for their 'cultural work' and 'artistic creations.' The emphasis on visual form served a general propaganda purpose, but it is noticeable that the military applications and capabilities of designs were rarely mentioned, aesthetics being used as an instrument to disguise real goals, while at the same time glorifying the means of attaining them. [13]

It appears, then, that the 'artworld' has accepted industrial design as being in some sense 'artistic,' and has generally labelled it as 'design.' However, there still appears

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[13] John Heskitt *Industrial Design*. London: Thames and Hudson, 1995: 193-194.

to be a theoretical distinction between 'design' and 'fine art.' Although the Britten Daytona featured in a 1995 Wellington City Art Gallery design exhibition, I doubt that most members of the art community would accept it as being as significant as, say, a Colin McCahon or Tony Fomison painting.

This, then, is the purpose of the essay. I do not want to simply state something so glib or superficial as "art is whatever you say it is," or "whatever I can get into an art exhibition catalogue." Such trite responses disclose nothing, and are, in any case, historically uninformed (in particular as they presuppose that art is has always and will always be associated with art galleries and the contemporary notion of fine art). I want to analyse the cultural assumptions that distinguish between machinery, industrial design and fine art, and to look at the ways the three categories of artefacts cross over.

I want to question the assumptions that would place conceptual art higher in this country's cultural life than industrial designers and engineers. This is not a merely theoretical issue. As rate payers in New Zealand continue to fund exhibitions and collections of contemporary artworks that many have little interest in or patience with, publicly owned collections of machinery (such as the MOTAT collection) are in a serious state of disrepair due to lack of funds. This project, then, questions the traditional status of 'high art' as opposed to other aspects of national heritage, principally industrial heritage.

The questions to be discussed in this dissertation are the following:

What is art?

What is fine art?

What is craft?

What is industrial design?

Is Industrial Design a fine art?

To what extent is craft a part of industrial design?

What is missing from industrial design that prevents it from attaining fine art status?

Why does fine art possess such status?

These questions will be addressed somewhat obliquely, in the following manner. The following is a list of 'axioms,' or rather, general assumptions regarding fine art and its relationship to industrial design. I will discuss each in turn. Although there may be an element of truth to a few of these assumptions, they are all contingent, and

some of them I will argue are patently false. These presuppositions prevent the widespread acceptance of industrial design as a 'true' art form.

1). There exists a distinction between 'fine art,' 'popular,' and 'applied art.'

2). 'Fine art' is intrinsically of greater cultural import than 'popular' and 'fine art.'

3). Mass production of an object renders that object less aesthetically valuable.

4). By virtue of the fact that mass production reduces aesthetic or cultural significance, mass produced items (automobiles, etcetera) are of lesser aesthetic or cultural worth.

5). 'Fine art' requires traditional craft skills for its manufacture and dissemination; 'industrial designed' objects (boats, aeroplanes, automobiles) are made via mass-production techniques and so are outside the category of 'traditional craft' works. Fine craftsmanship (which has its own aesthetic aura, or 'glow') is not an aspect of good industrial design.

6). Industrial designed objects, as products of industrial activity, are purely objects of rational, practical processes and applications. The industrial designer is a servant of the corporation and the sales- curve, and a slave of the tenets of the physical sciences. Her or she is in no position to produce 'art' properly so- called. The fine artist, by contrast, is independent of commercial and utilitarian concerns and is concerned only with self- expression.

7). The practice of 'fine art' is historically and ideologically associated with specific methodologies and states of mind — also various psychological gifts — the aesthetic state of consciousness, the 'moment of insight.' The labours of the aircraft engineer, or the motorcycle designer, do not require or utilize such faculties.

The artist is popularly portrayed as the inspired, creative genius who physically engages with the material at hand, and is not inclined to abstract speculation. The engineer is popularly portrayed as emotionally and intellectually distanced from the task at hand, and is a calculating technician.

The intention here is to undermine the traditional distinction between so- called 'pure' and 'applied' art.

§

1.4 The Arguments

In the first part of the dissertation (2.1-2.5) I will discuss the cultural status of industrial design, and those theoretical ideals that would have us draw a distinction between 'fine art' and 'popular' or 'mass art.' (Insofar as industrial design is intensely commercial, I will take it to be closely related to popular art).

In this section I will argue that the distinction between fine art and popular art is not firmly grounded on artistic merit or intrinsic aesthetic qualities, but on cultural distinctions.

The conclusion of this section is that the industrial design of automobiles, motorcycles and so on is not essentially distinct from the design practices of 'fine art.' Insofar as contemporary architecture (taken to be a fine art, or of an equal status of fine art) is widely accessible to the general public, dependent on economic and corporate institutions for its manufacture, and is often designed with the tastes of the general public in mind, and reliant on contemporary manufacturing technologies (not to mention the approval of the engineers), it is of comparable cultural status to industrial design. Indeed, if we take 'industrial design' to mean the practice of aesthetically refining the designs of industrially produced utilitarian artefacts for the purposes of large scale production, much modern architecture *is* industrial design.

In parts 2.6- 2.7 I will argue that the Modernist notion of fine art is in fact conceptually limited in scope, and is part of a larger cultural blind- spot that prevents many of us from appreciating contemporary engineering works as great cultural achievements. [14]

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[14] It is possible that a given symbolic artifact was produced with a utilitarian function in mind. According to archaeologists, the brooding statues facing out to sea on Rapa Nui (Easter Island) were built to protect the people. Similarly, the Maori decorated functional objects (canoes, tools, weapons, instruments) with ornate carvings in order to encourage spiritual guidance and control. In such cases, we may argue that, in the minds of the makers of these artifacts, the symbol was as function as any physically advantageous design feature. In any case, such artifacts are not produced to act as 'mere' objects of aesthetic appreciation, or for personal or emotional expression; to destroy or defile such an artifact would bring severe penalties. We have, of course, our own tribal fetish- objects in our own society, for example the national flag. Francis Mazière *Mysteries of Easter Island* New York: Tower, 1968. Glen Pownall *Primitive Art of the New Zealand Maori.* Wellington, Sydney: Seven Seas Publishing, 1972.

The Modernist/ Romantic tradition holds that an 'art- work' is an artefact that has been manufactured primarily for the purposes of aesthetic appreciation (Oscar Wilde summarises this view in the preface to *The Picture of Dorian Gray* in 1890: "all art is quite useless" and "the artist is creator of beautiful things." Notably, Wilde no doubt considered such pronouncements quite flamboyant, suggesting just how novel this idea actually is). According to this dogma, artefacts that have been fabricated with some utilitarian function (either physical or symbolic) in mind cannot be artworks. To quote Wilde again: "[w] e can forgive a man for making a useful thing as long as he does not admire it."

This dogma appears to be intuitively incorrect, if we are to equate, naturally enough, 'great cultural works' with the category 'artworks.' We regard, for example, Stonehenge, the Great Wall of China, and the Great Pyramids of Cheops as being of great cultural significance, as *artworks,* although they can only be called 'artworks' from within the broad Aristotelian notion of the term 'artwork.'

With this in mind, I will also discuss the art theory of G.W.F. Hegel. Hegel regards the great art- work as a unifying symbol of a cultural period, a work that represents a culture's advancement. He cites the Egyptian pyramids, the Greek Temple, and the discovery of perspective drawing as examples of such works.

Sir Kenneth Clark, in a similar vein, writes of the bridge- building and steam- engines of the late 19th Century as the great artworks of the period. Again, this in keeping with the notion of art as expressed by Aristotle and Hegel.

> The new Forth Bridge is in our own style, which expresses our own age as the Baroque expressed the seventeenth century, and it is the result of a hundred years of engineering. It is a new creation, but it is related to the past by one of the chief continuous traditions of the Western mind: the tradition of mathematics. For this reason the builders of the Gothic cathedrals, the great architects and painters of the Renaissance — Piero della Francesca and Leonardo da Vinci, and the great philosophers of the seventeenth century — Descartes, Pascal, Newton, and Wren, would have looked at it with respect. [15]

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[15] Kenneth Clark *Civilisation.* London: BBC Books, 1969: 334- 335.

According to Hegel's theory, traditional oil- painting was only a 'great art' when it embodied the recent technical innovation of perspective rendering. [16] Likewise, we may describe the great works of the 1940's as perhaps the first jet- aircraft, or perhaps the first electronic computers. The great symbols of the 1960's were the first manned spacecraft, and now the great symbol of the age is the networked computer system. The English expression 'state of the art' summarises this Hegelian principle.

This Hegelian ideal of the 'age embodied in a symbol' seems as applicable to engineering (if not more so) as to the fine art establishment. As soon as a spacecraft or spyplane is decommissioned, it is carefully placed in a technology or spaceflight museum and treated as a historic relic. This practice of preserving contemporary machinery is a comparatively recent development, and suggests a developing self-consciousness of the historical significance of such artefacts.

In the second section I will discuss the cultural import of the mechanism within, that is, *concealed* by industrial design. [17] Generally speaking, the machine that is produced for mass consumption has two distinct aspects: the 'heavy' engineering (the engine, gearbox, chassis) that is concealed within, and the coachwork that gives the appearance of integration and closure. [18] The engineering division designs the machinery, which has a gradual development process. The industrial design division designs the coachwork, interior and so on, and the development of new 'styles' moves at a greater speed. New engine designs are infrequent, but new styles are introduced every year. [19]

There is a great difference between the aesthetic and cultural aspects of the coachwork and engineering. The coachwork of the Citroën DS 19, for example, is of interest to the art museum, as it is culturally equivalent to good furniture design or architecture. However, there is a theoretical distinction between the cultural worth of the coachwork and the engine. We can imagine, for example, a museum placing the coachwork and wheels. of a DS19 inside a gallery, having removed the engine to

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[16] Lucian Krukowski *Aesthetic Legacies*. Philadelphia: Temple University Press, 1992. : 75-76.

[17] This distinction is contingent. As will be discussed in section II 5, even the functional elements of a device may be altered for the sake of appearance.

[18] This distinction is limited in scope, in particular in cases where the interior does not exist (in bicycles and spectacles, for example).

[19] Airliner design is such an example. The interior of the 747 has been redesigned extensively several times, whereas the airframe is much the same.

facilitate cleaning and shifting. The gallery now owns an example of the work of architect, industrial designer and sculptor Flaminio Bertoni (1903- 1964), and regards this work as intact, sans engine. (just as, for publicity purposes, the DS was originally photographed with the wheel wells completely covered up, as if its undercarriage had retracted for flight). The engine was not built for aesthetic appreciation, and was not designed by Bertoni, so is not part of the work.

Here I will discuss the commonalities between two strands of material culture — that is, the 'fine arts' and the 'applied arts' — engineering, naval architecture, and so on. Beginning with the Aristotelian notion of art as a rational process of creation, I will argue that the commonalities between fine art and engineering suggest that the two fields may be closer than is commonly supposed.

The conclusion of this section is that engineering and fine arts are closely linked-historically, psychologically, and conceptually. To paraphrase Lewis Mumford, art the 'expressivist' end of technology; technology is the abstract extreme of art. From the Modernist, Romantic standpoint, engineering is simply not an art, for 'fine art' (largely a Modernist concept) is an expression of some personal insight or emotion. Therefore, engineering, although obviously an art in the broad Aristotelian sense, is not a 'true' art.

In parts II1-5 I will describe engineering as a creative discipline, and psychologically similar to the creativity of 'traditional' fine arts.

In parts II 6-7 I will give a description of the historical transition from craft- skills to modern industrial manufacture. The purpose of this section is to argue that there is no intrinsic distinction between 'traditional' craft manufacture and the craftsmanship involved in modern industrial design. The distinction lacks historical perspective.

In parts II 8-9 I will argue that the Western distinction between 'pure art' and 'applied' (lesser) art is institutional in nature and has very little to do with traditional artistic ideals of imagination, artistry, talent or craft skill.

The conclusion is that the institutional context of an artefact (whether a motorcycle, automobile or sword) has nothing to do with its status as an artwork in the traditional (Aristotelian) sense. The art- establishment does not have a monopoly on the production, discourse or dissemination of culturally significant artefacts.

SECTION ONE
THE ART OF THE INDUSTRIAL ENGINEER

Figure 3. Like an object fallen from heaven: a promotional photograph of the Citroën DS 19, sans wheels.[20]

2.1 INTRODUCTION

In this section I will discuss the putative distinction between industrial design and fine art, and will present the view that much of the ideology that differentiates 'fine' and applied art in this context s unfounded.

2.2 INDUSTRIAL DESIGN AND MASS ART

The greatest obstacle in discussing industrial design in terms of 'art' is the objection that it is intensely commercial. Indeed, it was primarily out of the need to stimulate a mass market that industrial design was institutionalised.

Industrial design made its appearance soon after the end of World War II. Before the war, automobile coach building was almost entirely a craft industry; the consumer purchased a chassis and engine assembly, and had the coachwork built according to one's personal specifications. The craft of automobile coach building was not far removed from the traditional craft of building railway cars or horse- drawn vehicles, with the exception that metal was employed for the bodywork rather than wood. By war's end, however, the industry had changed markedly. Industrial manufacturers in the USA and England were fully equipped for a mass market that did not yet exist. Consumers had to be convinced that they wanted an automobile if the industry was to sustain itself. It now became necessary to enclose the machine in a coachwork that would stimulate a purchase. Industrial design emerged as a discipline distinct from basic, functional engineering. [21]

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[20] Citroën "A Cultural Icon." http://www.citroen.com/CWW/en-US/HISTORY/LegendaryAndClassical/DS/ARTS/28072005_ARTS.htm (accessed March 8, 2008).

[21] Pettifer, Turner *Automania* :170-172; Heskett *Industrial Design* 105- 120.

Figure 4. The Ford Edsel.[22]

There is a significant difference between the industrial- designed object and the traditional 'art-work' that is especially marked in the example of the automobile. Unlike 'fine art' (it may be said), the design process for cars is intensely purchase-oriented. This is most evident in the automobile industry, by virtue of the fact that preparing a design and tooling up for large scale production is extremely expensive, and marketing blunders can seriously damage a vehicle company's finances. The Ford Edsel, for example, was a marketing disaster that almost destroyed the Ford company. Functionally the machine was adequate, but the grill design was considered especially repellent. It has been cited ever since as an important lesson in consumer research.

Since the Edsel disaster, automotive designers have been extremely careful in evaluating a design. The typical design group now comprises sociologists, psychologists, semiologists and ergonomicists. The symbolic content of the design is studied to ensure that the desired impact is evoked.[23] Market research evaluates the sales prospects of the new model. By the time the design goes into production, the manufacturer has established what the target demographic group will be. In effect, the automobile manufacturer is not selling merely useful appliances, or even objects of aesthetic consumption (contemplative or otherwise), but personal fetish- objects (in the classical, anthropological sense of the term) through which the owner expresses his or her self- image and economic status. The automotive manufacturer is selling a symbolic statement, not unlike that of clothing (to the detriment of the quality of engineering or of style, as Leonard Setright has argued). [24]

As a 'mass art,' industrial design makes a significant contribution to our cultural and semiotic environment. Philosophers have traditionally ignored mass art, or have expressed hostility, dismissing it as either pseudo art or kitsch. For the last decade or

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[22] Source: Dan Neil "The 50 Worst Cars of All Time."

Time.http://www.time.com/time/specials/2007/1,28757,1658545,00.html

[23] See in particular Reid R. Heffner, Tom Turrentine, Ken Kurani *A Primer on Automobile Semiotics*. Davis, California: Institute of Transportation Studies, University of California, 2006. Available from http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1106&context=itsdavis (Accessed January 6th, 2008).

[24] Helen Gordon "L.J.K. Setright" (Interview). *Cars* issue 9 (Fall 2004). http://www.granta.com/features/2004/12/setright. (Accessed March 8, 2008).

so, this attitude has changed markedly, with a number of philosophers turning their attention to such mass art products as film and computer games.

2.3 The Distinction between Industrial Design and Mass Art.

In this section I will begin by discussing the debate between David Novitz and Noël Carroll concerning the distinction between 'mass art' and 'fine art.' The purpose of this discussion is to determine what distinguishes industrial design from 'high' or 'fine' art, although the Novitz- Carroll debate encompasses all mass art- magazines, Hollywood films, erotica and pornography, pulp fiction and so on; [25] all art that is manufactured and distributed on a mass scale for a mass audience.

Following this I will discuss the 'kitsch' objection; viz. that industrial design, insofar as it lures the consumer via superficial stylistic devices, is worthless as 'art,' however much its study informs us of social, economic or ideological phenomena. Finally in this section I will discuss the putative distinction between industrial design and craft.

The Elimination Theory of Mass Art.

The classification, fine art, applied and 'lesser' arts (including industrial design), craft or handicraft, was discussed by eighteenth- century philosophers, principally Kant. [26] Today many practitioners of the arts and 'applied' artists and theorists of art tend to reject the distinction of fine and other arts, in keeping with the 'postmodern' ideology currently in vogue. However, we still have faculties and professorships of fine art in universities, and the distinction between high and popular art is still maintained in such institutions.

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[25] Not all industrial design is mass produced. Luxury sports cars, for example the Jaguar XJ 200, are effectively hand- made and produced in very low numbers (in the case of the XJ200, only 50 were built, all of which were sold before manufacture began). The Britten motorcycle company builds three motorcycles a year (as of 1997). There are of course machines that can be considered allographic works: prototypes and other pre- production models, for example.

The luxury automotive industry is not unlike the fine arts market in that it caters almost exclusively to an economic elite. One does not, after all, buy a half- million dollar Bugatti for utilitarian reasons, unless the purchase was made for investment purposes. The luxury sportscar is not, strictly speaking, designed for mass consumption, insofar as the mass- produced work is designed to be consumed by the masses. It must however appeal to the tastes of those wealthy enough to own one.

[26] For discussion on Kant on free vs. tied beauty, see Sparshott: 200.

In the paper "Ways of Artmaking: The High and the Popular in Art," David Novitz argues that there are no formal features that distinguish popular art from high art, nor are there any recurring affective features to aid demarcation either. Instead, he writes:

> What begins to emerge is that the distinction between high art and popular art does not merely distinguish between different types of art, but much more than this, it actually accentuates and reinforces class distinctions in society (Novitz: 224).

Novitz concludes:

> The distinction between the high arts and the popular arts cannot be wholly located in the intrinsic properties or affective dimensions of the work itself. (Novitz: 227).

The line that Novitz runs is that the distinction between popular art and high art is based not on any real formal or structural differences between the two, but is chiefly a device through which modern Western society elaborates pre- existing class distinctions in terms of putative differences in taste. [27]

Novitz identifies four ways in which high art has been traditionally demarcated from popular art. These are a). differences in form, that is, high art is complex where popular art is repetitive and base; b). differences in affect, that is, high art deals with profound, deep and nuanced emotional expression, whereas the formulae of popular art arouse tired and common emotions (the tear- jerker Hollywood film; the Mills and Boon novel), c). differences in origin, that is, high art is produced by individuals involved in noble and heroic adventures of self- fulfilment and self discovery, whereas popular art is produced collaboratively or even corporately; d). differences in motive: *viz.* high art, with its celebration of disinterestedness in commerce, is produced in opposition to capitalism's reductionism of all value to market value, whereas mass art is a child of the marketplace.

Novitz dismisses all of these distinctions as historically contingent, patently false, or both. His conclusion, after giving a great many counterexamples, is that there are no reasonable grounds for believing that 'mass art' has any distinguishing formal or affective properties. He regards the distinction between class differentiation.

Noël Carroll, in his paper "The Nature of Mass Art," argues that Novitz's conclusion is unjustified, and that there *are* formal distinctions between high and

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[27] David Novitz "Ways of Artmaking: The High and the Popular in Art." *The British Journal of Aesthetics* 29 (3)(Summer 1989).

'mass' art. [28]Mass art, for Carroll, is art that is communicated to a large number of people, and is designed to what Carroll refers to as an 'untutored' public. 'High' art, on the other hand, (typified by the 'Avant Garde'), is difficult, challenging, and unsuited to mass consumption or mass sales. Carroll formalizes Novitz's argument as follows:

> 1). The distinction between high art and popular art is based upon either:
> a). a difference in formal structure, b). a difference in affective properties, c). a difference in origin (ie. A difference of personal, individual creation versus corporate or collaborative creation), d). a distinction in motive, or e). a matter of class differentiation.
>
> 2). The distinction between high art and popular art cannot be based on a). b). c). or d). (This premise is motivated by the preceding counterexamples).
> 3). Therefore, the distinction between high art and popular art is based on e). a matter of class differentiation.

Carroll points out that Novitz's argument takes the form of a disjunctive syllogism, and, as such, fails to consider all of the alternatives. Therefore, it is inconclusive.

Although I think Carroll has a point here, my own view is that Novitz's account succeeds in seriously undermining the notion of a fundamental distinction between the high and the popular in art. It is certainly true that there are many artworks that are both critically acclaimed and popular time — the films of David Lynch, for example, the works of Emily Brontë or Charles Dickens, or the recordings of Radiohead.

I will make use of Novitz's argument insofar as it can be applied to the discussion of industrial design. Firstly, the Carroll- Novitz debate concerns a putative dichotomy *within* particular media: ie. 'literary fiction' versus science fiction, Man Ray versus Bunny Yeager, Béla Bartók versus Andrew Lloyd- Webber and so on.

The discussion at hand, by contrast, concerns the cultural status of industrial design as existing in a distinct realm, albeit a distant relative of architecture and other traditional arts. Secondly, Carroll's reply to Novitz, viz. that 'high art' is 'difficult' and 'complex,' is inapplicable to the discussion of industrial design (regardless of whether it is really applicable to much contemporary fine art). Industrial design, like architecture, is not necessarily required to or expected to 'say' anything difficult or

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[28] Noël Carroll "The Nature of Mass Art," *Philosophical Exchange* 23 (1992): 5-37.

complex (despite being, in the case of automotive design in particular, semiotically rich, and deliberately so). Furthermore, public buildings must appeal to the tastes of at least a portion of the general public, if only the planning committee that commissions the building. The tastes of a great number of people may be a relevant architectural design consideration, especially if they are expected to pay for the finished work. Apparently, this does not mitigate against the claim that architecture is a (or is equivalent in status to) fine art. The Sydney Opera House, for example, is critically acclaimed and a popular landmark, yet cannot be said to 'say' anything more in the way of nuanced emotion than the Citröen DS 19.

2.4. The High and the Popular in Art.

The classification 'popular art' includes, for example, comic books, poster art, pornography, rock music, popular fiction, motion picture film, computer games, and industrial design — automotive design, camera design, computer hardware design, and so on. The last group is of interest here — most people do not get the opportunity to command a battle tank or fly a fighter plane on a wartime mission, but through computer software one can enjoy a semblance of the experience of piloting such machines, with a realism compelling enough to give such technologies enough authority to be used in pilot training and military recruitment. Through a bizarre twist of material culture, manning a weapon system capable of mass destruction has become a recreational activity. Mechanized warfare, its strategy and technical aspects, is now a part of popular culture.

The standard, academic attitude to such things as automotive design, computer games and *Grand Theft Auto* is that such genres are lowbrow, unrefined and uncultivated. They are, of course, enthusiastically consumed by millions of people. Popular arts are seldom regarded as bearers of cultural heritage or national prestige. [29]

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[29] "So it seems to say that the distinction between the high arts and the popular arts is no longer based on the ideal of pure artistic value. It is a functional distinction: one which makes class boundaries within a society. High art is the formal, learned and 'difficult' art which has the attention of a cultured and educated elite. […] The distinction between the high arts and the popular arts is a social distinction, one which cannot be wholly located in the intrinsic qualities of the affective dimensions of the work itself." Novitz:227.

As Novitz remarks, however, the 'high arts' and those that regard them as being of great significance are faced with a paradox — popular arts receive much more attention (and sheer popularity is not enough to identify a work as being mere pop, as anyone who has stood in the queue at the Louvre can attest).

There is obviously a great amount of popular culture in general that is crass and fabricated according to banal formulae. However, there are many examples of 'fine art' that are arguably also without real artistic merit: ugly paintings, bad sculptures, vacuous references to (or transparent borrowings from) Marcel Duchamp. Entire artistic careers are nothing more than a single one- liner. Intrinsic artistic worth cannot be cited as a reason for distinguishing between the 'fine' and the popular in art, any more than a critic could make a sensible distinction between the intrinsic artistic difference between Jeff Koons' 1991 photograph *Red Butt (close-up)* and any other example of hard core heterosexual still photography.

We cannot claim that 'fine' art is any art that has succeeded in being unpopular or unintelligible to most people. We can, however, claim that a deliberate attempt at offending the sense of propriety of the bourgeoisie (whatever that entails at any moment in time) is often incorporated into a great many artworks. This is not, however, a guarantee of artistic worth.

As Novitz notes, [30] it has only been in the last century that it was felt necessary by theorists to draw a distinction between popular and fine art. He gives an historical account to trace the origins of this dichotomy. This begins with the emphasis on economic value — the appearance of a supply and demand economy — that emerged following the French Revolution. Utility and exchange now replaced the moral, religious and artistic values that had prevailed previously. Another important cultural influence was the intellectual emphasis placed on the individual, as expressed by John Stuart Mill. Writes Novitz:

> These features of nineteenth- century Europe: the primacy of economic value, the rise of the machine, and a new emphasis on the freedom of the individual- placed considerable strains on the artist of the day: strains that would eventually lead to a crisis in the artworld. On the one hand, many artists explicitly rebelled against the modern emphasis on monetary and economic value. They hankered after a kinder age in which artistic values were elevated and taken seriously. Many painters and

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[30] Novitz: 226.

sculptors denounced the view that the successful artist was one whose works could find a buyer in a supply and demand market. Artistic achievement, they argued, should not be confused with economic success. In order to be economically successful, an artist would have to pander to what people wanted, and since popular tastes were notoriously staid and unimaginative, appeal to economic values as a measure of artistic merit would inevitably stifle artistic creativity. (Novitz: 221).

This romantic mode of thought developed into what is often referred to as the 'Modernist' period — when art was no longer thought to be primarily a profession. A division had arisen: there were the 'popular' arts that appealed to the interests and tastes of the masses, and the 'fine' arts that now appealed to those who had the luxuries of time, money, and education to appreciate them. As Novitz puts it, "the broad mass of European society could no longer understand the work of their artists." (Novitz: 222). Art had become

[…] increasingly introverted, esoteric, experimental and incomprehensible. The process, Arthur Danto remarks, was accelerated by the invention of the still and movie camera. [31] Up until then, artists had thought of painting as the art of representing (as realistically as possible) three- dimensional objects on a two-dimensional plane. [32] […] it was now incumbent on painters and artists to discover a new *raison d'être* for their art, and the recent cry of art for art's sake helped furnish them with a new sense of direction (Novitz:222).

Many art theorists discuss a formal structural distinction between fine art and popular art. Novitz rejects such a distinction. He refers to two groups of counterexamples.
a). There are a number of artworks — the posters of Toulouse- Lautrec, Aubrey Beardsley's erotic drawings, the novels of Charles Dickens — which elude distinct classification as either 'popular' or 'high' art. It appears that such works may be *both*

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[31] Arthur Danto *The Philosophical Disenfranchisement of Art.* New York: Columbia University Press, 1986. See in particular chapter 5. (Matisse is accredited with making this point also).

[32] There were other artistic aims other than accurate representation prior to the camera; Bosch, Mannerism, etc.

popular and great art. However, as Carroll argues, there are obvious formal values that help us identify such objects as Care bears as *not* fine art. [33]

    Novitz's counterexamples here may extend to include industrial design. As T. Eekels notes,

> [a]ttention is called for the value shift that may occur in the course of history with respect to the appraisal of objects of industrial design. It is not uncommon that these objects are recognised as objects of art only decades after their being designed, and long after being in practical use. The instrumental value disappears, the historic and aesthetic values come to the fore, and the economic value often surges, mainly due to the fact that items of such a product have become very rare. Then the time has come that collectioners rush upon the remaining pieces, and that art museum directors organize exhibitions on the theme (Eekels: 180). [34]

b). Novitz points out that the modern conception of fine art fits badly with the fine art of earlier times, that

> much high art, especially Mediaeval and Renaissance religious painting, was produced in accordance with well established, not to say tired, formulae designed principally to stir flagging religious sentiment. And yet it seems wrong to regard Mediaeval icons and Renaissance Madonnas as popular art. (Novitz: 216).

    This group of counterexamples may be extended to other periods. Egyptian art of the classical period, for example, was largely repetitive and formulaic, as was classical architecture. The following excerpt from the writings of Marcus Vitruvius Pollio (70-80bce- 25ce), the Roman architect, illustrates this:

> Let the front of a Doric temple at the place where the columns are put up be divided, if it is to be tetrastyle, into twenty- seven parts […] one of these parts will be the module; and the module, once fixed, all of the parts of the work are adjusted by means of calculation based upon it […] such will be the scheme established for diastyle buildings. But if the building is to by stystyle […] let the front of the temple, if tetrastyle, be divided into nineteen and a half parts. One of these parts will form the

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[33] Carroll's claim here is undermined by the exploits of such artists as Jeff Koons, who has gone to some length to undermine the formal distinction between art and non- art.

[34] T. Eekels "On the Axiology of Industrial Design." *Diotima* (15) 1987:175-180.

module in accordance with which the adjustments are to be made as above described. [35]

It is clear, then, that *some* artefacts that are commonly regarded as 'fine art' were fabricated according to repetitive formulae. However, there may yet be another relevant formal distinction between such artworks and industrial design. The arts of the Egyptians, Medieval Europeans, and Greeks may have been, in some respects, formulaic. But they were not designed to lure the consumer. Industrial design, on the other hand, is designed to sell, and sell big. The automobile must appeal to the target demographic, and as such may incorporate design characteristics that are not in particularly good taste.

2.5 The Kitsch Objection.

The kitsch object is an allegedly worthless or tasteless object with pretensions of art, or at least, pretensions of something. As such, in the context of the individual artist, the kitsch object is, for one who can see past the superficial, a failure of authorial intent. In commercial contexts, the kitsch product is an exploitation of the poor taste and understanding of others. Generally speaking, the kitsch object incorporates the superficial appropriation of some cultural or artistic image or motif without regard for the context of that motif. Hence, the borrowed motif or image is cheapened and devalued. The effect upon the cultivated sensibility may range from amusement to outright horror. Stock examples are the Mona Lisa beach towel, the Negress or Aborigine ashtray, the Eiffel Tower pepper- grinder or the plastic cuckoo-clock.

Kitsch is also to be found in industrial design. When the streamlining style was introduced in the 1930's, it was originally associated with the new streamlined forms of aircraft and with apparently scientific justification. It was soon applied to industrial products largely for its symbolic properties and without functional justification. It was established as a symbol of speed and modernity, but when applied to such objects as toasters and staplers it had been reduced to a mere mannerism. The same can be said

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[35] Vitrivius *Ten Books on Architecture* trans. M.H. Morgan. Cambridge, Mass: Harvard University Press, 1960.

of the American automobiles of the 1950's: the mythology of speed and power (significantly, *airpower*) was evoked through wraparound chrome, rocket- ship taillights and jet- fighter tailfins. Insofar as these are ad- hoc borrowings from the sculpture, real and imagined, of aerospace engineering, they qualify as kitsch. They are simple forms, adapted for the sake of stimulating consumption.

As architect Vittorio Gregotti (b.1927) argues, not even artistic theory is safe from degeneration into kitsch within the sphere of industrial manufacture.

> The principle of functionalism was reduced to the lowering of costs and the raising of profit margins; the basic minimum; the ideological principle behind the ordinary commercial firm, has simply become a method for maximising the use of the firm's resources. Frank Lloyd Wright held that "the nature of materials dictates the speed of production," Adolf Loos asserted that "ornament is tantamount to crime"; and both dicta are invoked as a means of reducing labour costs. What started as an ethical principle has degenerated into a means of exploitation, and creative discovery now descends to kitsch (Gregotti: 260).

Gregotti ends his essay with a comment on the 'monumental grossness' or mass production (Gregotti: 272).

> A pink [Ford] Thunderbird with its stylistic attributes, its monumental grossness, and its explicit allure is a kitsch status symbol, but a hundred thousand cars strung along a motorway or assembled in some gigantic car- park introduce a new kind of equally ugly dimension as far as 'kitsch' is concerned (Gregotti: 272).

It is certainly true that the automotive industry has in the past been guilty of kitsch. Indeed, contemporary automotive design seems to owe more to Hotwheels toys and electric razor design than a classic aesthetic. But, as Gregotti concedes, modern architecture has also been guilty of kitsch. That a given object is kitsch, however, does not in itself mitigate against the claim that the object is *art*. Entire art genres (for example Victorian social realism, or symbolism) have been dismissed as kitsch (albeit 'high kitsch').

If we consider the kitsch- object as *any* example of an object produced that incorporates a spurious cultural or historical reference, we may run up against some

uncomfortable implications. For example, Caucasian New Zealanders often wear jade pendants in Maori style, often without any knowledge of the ritual or symbolic function or significance of such items. [36] The Auckland War Memorial Museum, a building in the neo- Classical style, has little to do with Greek culture. The Rolls Royce traditionally has a grille in the same shape and dimensions as a Doric temple, explicitly alluding to a Classical aesthetic. Depending on one's definition of ketch, all of these examples qualify — all neo- Classical architecture, all filmic treatments of novels, all war memorials.

The central problem is this: the idea of kitsch presupposes a notion of artistic authenticity that itself requires qualification. Given that the contemporary trend in cultural discourse is to undermine such notions as authenticity, our understanding of what qualifies as kitsch is problematic. The traditional notion of authenticity (and hence kitsch) in industrial design has been grounded in the past in functionalism. It was thought that the ideal design was perfectly suited to functional requirements, and nothing more. The two central dogmas of the Functionalist (Bauhaus- influenced) school were *form follows function* and *faithfulness to materials.* Insofar as the Hotchkiss streamlined stapler, for example, had a shape that had nothing to do with its function as a stapler, it was not a good design. It is the same presupposition that Gregotti appears to make in dismissing the Ford Thunderbird as a "kitsch status symbol."

Figure 5. Kitch silliness: 1954 Ford FX Atmos and 1961 Ford Gyron concept cars.[37]

This notion of 'authenticity' has its uses, but it is not without limits. While some manufacturers (BMW, Saab, Volvo) emphasise the engineering austerity of their vehicles over flimsy ornamentation, the Functionalist/ Bauhaus ideal was dated long ago. Firstly, the 'form follows function' ideal only worked when one could actually determine the function of an object merely by looking at it. [38] This was fine in the

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[36] 'Traditional craft' artworks that have been manufactured for sale through tourist outlets, and 'traditional' displays of indigenous culture for tourists (arguably westernized through removal from their traditional contexts) also fall into this category of kitsch.

[37] Source: http://www.shorey.net/Auto/American/Ford/1954%20Ford%20FX-Atmos%20Concept%20Car%20Frt%20Side.jpg. Accessed February 9 2008.

[38] Heskett *Industrial Design*: 38, 98-102.

case of lawn- mowers and bicycles, but we are now at a point where the functional components of machines (cameras, computers, telephones) are so small that they have virtually disappeared. The external form of the object has to be shaped or labelled to symbolise its function. That part of a computer that we directly interact with had little to do, visually, with the internal mechanisms. An early 21st century mobile telephone handset has symbols of 20th Century devices (a camera, a telephone handset) to illustrate the various buttons and functions: without such icons it would be indistinguishable from a taser or a calculator. Eventually the same may be true of automobiles. The external form is related to function mainly insofar as we have to interact with it comfortably.

Secondly, the 'faithfulness to materials' adage is limited in scope. There was a time when it was thought that the designer should consider the most 'appropriate' materials for a work, and that certain materials were 'intrinsically' better suited to design solutions than others. [39] Violations of such principles were to be regarded as being in bad taste.

Yet, to a large extent, it is debatable as to whether there is such a thing as a building material that one ought to be 'faithful' to. Engineers have learned to combine the structural and chemical elements of different substances to produce materials of the mechanical properties: fibreglass, ceramic composites, carbon fibre, honeycombed titanium, polymer- impregnated wood and so on. The manipulation of materials is not a modern development: insofar as bronze does not occur in nature, it is as 'unnatural' as any other modern technology.[40]

To reiterate: some industrial design is formally distinguishable from 'good' art, in that it qualifies as kitsch. However, there is a great deal of good industrial design that is innocent of the charge of kitsch. Designs that are both functionally sound and a pleasure to the eye and touch, and are not encrusted in superfluous or childish

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[39] Heskett: 38, 98-102.

[40] To this point it may be objected: there *are* inappropriate materials. We do not, for example, build temples out of Styrofoam. There are specific materials (leather, wood, cloth etc). that have traditional associations for us. However, traditional materials have only a contingent relationship with actual usefulness. We may be attached to particular materials for less than fully rational reasons. For example, Chrysler has recently (1997) developed technology to injection- mould entire car bodies. Apart from the safety and mechanical problems that need to be solved with all- plastic cars, Chrysler has to overcome the public's aversion to the idea of plastic as a suitable material. [find ref].

ornamentation are commended by critics and may also be commercial successes. Such designs, for example that of the Citroën DS 19, may even be considered both engineering and aesthetic achievements.

We may also note a formal elitism within industrial design practice. That is, we may observe a distinction between the 'high' and 'mass' art of industrial design, for example, which is more grounded in economic factors (as Novitz would suggest) than in any intrinsic property (as Carroll would argue). Those vehicles that win design awards (in particular 'most beautiful car') are typically extremely expensive sports cars. The emphasis in such designs is often form over safety and performance over ease of handling. The Lamborghini Countach, for example, looks fantastic, but offers no visibility to the rear and is very cramped. The seats are uncomfortable, and the engine is designed to run efficiently at speeds well over the speed limits of most countries. Such cars are typically custom- designed by independent coachbuilders (Pinin farina, Bertone, Ghia, Michelotti). Cars that are mass- produced, by contrast, are less likely to win design awards and are unlikely to acquire 'art object' status. [41]

2.6.i. Art and its Expressive Properties.

From the modernist, Romantic standpoint, industrial design is simply not an art, for 'fine art' is held to be an expression of personal insight or emotion. The art- work, accordingly, is an artefact that has been manufactured primarily for the purposes of personal expression. Accordingly, artefacts that have been fabricated with some utilitarian function (either physical or symbolic) [42] in mind cannot be artworks. Therefore engineering, although obviously an art in the broad Aristotelian sense, is not a *true* art. In this section I will argue that the Modernist notion of fine art is in fact conceptually limited in scope, is and part of a larger cultural blind- spot that prevents many of us from appreciating contemporary engineering works as great cultural and aesthetic achievements.

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[41]The Mini Cooper I and II, the Citroën 2CV AND DS19, Volkswagen Beetle and Volkswagen Carmen Ghia are obvious exceptions. [I'm talking rubbish here- really not sure of the veracity or the relevance of this paragraph].

[42] The semiotics of automobile design is concerned with satisfying the symbolic needs of the consumer. To some extent, then, the consciously chosen aesthetic qualities of a car design are functional, although not in the usual sense.

Following the classification of Francis Sparshott, the argument of this section will cover three distinct families of theories of art: a) the *expression* or *Romantic* line; b). the *formalist* line, and c). the *mystic line*. [43]

2.6ii. The Expression Line.

Why is a particular artefact fabricated? Not because of the artefact itself, but because an artefact can perform a certain function (for which it was designed), and because the user of the artefact feels that through the employment of the artefact she can satisfy certain needs, and through this again she will be able to realise certain values. The expression line holds that the true value of fine art is its expressive value; that fine art works are artefacts that have been fabricated for the purposes of expressing something. The fine art work is valued for its *psychological richness.* The ambiguous morphologies and symbolic depths we find in the works of George O'Keefe and Salvador Dalí, for example, unsettle and stimulate us, and they cannot be exhausted by interpretation or comment. There is a permanent novelty with the work of good art — even after years of looking at certain paintings or listening to certain musical pieces they will still seem as fresh as the first time we saw or heard them. [44] Many works (for example Expressionist of Surrealistic works, or the works of Bosch) allow us to enter a world remarkably different to our own, and yet we may also feel that such works remind us of something we have only momentarily glimpsed. Such works, it could be said, speak of a shared experience.

A machine or any other merely useful object, by contrast (a Boeing 747, a paper cup, a dishwashing machine) is not an important artefact but simply a tool a means to a desirable end (a holiday in Greece, a coffee, clean dishes): an ingenious tool perhaps, but a tool all the same. We may then suggest a demarcation criteria between art and non- art; artworks are artefacts made for the purposes of personal expression.[45]

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[43] Francis Sparshott *The Theory of the Arts* New Jersey: Princeton University Press, 1982.

[44] In this section I am presupposing that there is no essential distinction between 'fine art' and 'popular art.' By 'art' here I simply mean 'good art' as opposed to 'non- art.' The Expression line, then, would include the works of Jimi Hendrix, Edvard Munch and William Shakespeare and would exclude (non-art) advertising copy, processed food packaging and aeroplanes.

[45] Painting is uniquely suited to this, as one is in direct contact with the finished surface. (There has been some critical hostility towards artists such as R.H. Giger because of his use of airbrushing. The

Tools are artefacts that have been manufactured for some perceived end.

Background of the Expression Line.

Art distils sensation and embodies it with enhanced meaning in memorable form- or else it is not art.

Jacques Barzun. *The House of Intellect* 1959. [46]

Every artist writes his own autobiography.

Havelock Ellis. *The New Spirit.* 1890. [47]

Art enlarges experience by admitting us to the inner life of others.

Walter Lippman "The Golden Rule and After."
A Preface to Politics 1914.[48]

It seems reasonable to consider the expressive aspect of art as being of primary importance. As Edvard Munch wrote of his own work:

These paintings are meant to move people intensely, first a few, then more and more, and finally everyone […] in these paintings the painter depicts his deepest emotions, his soul, his sorrows and joys. They display his heart's blood […]
  ..it is true that a chair can be just as interesting as a man, but the chair must be seen by a man […] In one way or another, he must have had an emotional reaction to it and

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expressionist work in this section will be taken to be an autographic work — an artifact that has a direct causal and historical relationship with the artist. Allographic works (architecture, film, silkscreen prints) that require group work and the removal of the artist from the finished work via some mechanical or distributive process are not suited to expressionism.

[46] Quoted in Rhonda Thomas *International Thesaurus of Quotations* Middlesex: Penguin, 1970 p. 33.

[47] ibid. p. 35.

[48] ibid p. 53.

the painter must cause the viewer to react in the same way. He must not paint the chair, but rather that which a human being has felt about it. [49]

Where did this ideal come from? It is in fact considerably older than the Expressionist movement that Munch is historically affiliated with. Xenophon tells us that Socrates already sought to persuade artists to depict the states of the soul rather than mere external forms. [50] More emphatic, however, were the artists of German Romanticism. In Ludwig Tieck's (1773-1853) novel *Franz Sternbald's Travels* (1798), the painter-hero writes:

> You cannot believe how much I wish to paint something which expresses totally the state of my soul and which would arouse the same emotions in others […] Every viewer would have to wish himself into the painting and forget his actions and plans, his education and political ideologies for a short time, and perhaps he would feel the same way as I do now as I write and think about this.[51]

A similar ideal is expressed in the aphorisms of painter Casper David Friedrich (1774-1840):

> The painter should depict not only what he sees before him, but also what he sees inside himself [….] close your physical eyes so that you see your picture first with your spiritual eye. Then bring forth what you saw inside you so that it works on others from the exterior to their spirit. [52]

The Romantic/ Expressionist standpoint, according to which the subjective, spiritual state of the artistic agent seeks an expression through which to communicate to others, led a rejection in some quarters of previous genres that had failed to 'speak to the heart.' The German Romantic art group the Nazarines, for example, rejected their Baroque and Neo-Classical predecessors on such grounds,[53] and Leo Tolstoy

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[49] Reinhold Heller *Edvard Munch: The Scream* London: The Penguin Press, 1973, p. 23.

[50] Heller p. 23.

[51] Ludwig Tieck *Schriften* Berlin, 1843 vol. 16 p. 25ff. Quoted in Heller p. 23.

[52] Sigrid Hinz, ed. *Casper David Friedrich in Briefen und bekinntnissen.* Munich, 1968, pp. 92, 128. Quoted in Heller p. 24.

[53] Heller p. 24.

similarly referred to what he termed 'upper-class art' as being inauthentic. In *Art False and True* (1897) Tolstoy writes:

> As soon as the upper classes acclaimed every kind of art as good only if it afforded them pleasure, and began to reward such art more highly than any other social activity, immediately a large number of people devoted themselves to this activity, and art assumed quite a different character and became a profession [....] the chief and most precious quality of art — its sincerity — was at once greatly weakened and eventually quite destroyed, and art was replaced by counterfeits of art. [54]

The expressive artist is also popularly thought of as possessing unique psychological characteristics; it may even be the case that she is inspired by an abnormal psychological condition. [55] In pursuit of inspiration, the expressive artist may take deliberate steps to alter her state of consciousness, through meditation, fasting, sleep deprivation or psychoactive drugs. [56] These psychological characteristics and

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[54] Leo Tolstoy "Art, False and True." In *The Life and Teachings of Leo Tolstoy*. London: Grant Richards, 1904. [pagination?]

[55] I do not mean to imply that the artist is in some sense 'sick'; on the contrary, the relationship between (what we term as) insanity and artistic expression suggests that the discussion of mental abnormality in entirely negative ways is possibly mistaken. [juvenilia].

[56] W.N. Arnold. *Vincent Van Gogh: Chemicals, Crises and Creativity.* Boston, Mass.: Birkhäuser, 1992. Critchley, E. M. R. Hallucinations and their impact on art. Cadley, Preston, Carnegie Press, 1987.

The neurobiologists Janus Kulikowski and Ian Murray state that "Van Gogh, Modigliani, Munch, the Surrealists and modern op, pop and psychedelic art show evidence of chemical dreams," Richard Gregory, John Harris Priscilla Heard, David Rose Janus Kulikowski and Ian Murray "Chemical Dreams" in *The Artful Eye* ed. Richard Gregory, John Harris Priscilla Heard, David Rose. Oxford: Oxford University Press, 1995: 283-292:283.

Of the works of Hieronymus Bosch, several art historians have suggested a link with a hallucinogenic agent, possibly belladonna in a witch's ointment that was widely used in his time. See R.L. Delavoy *Bosch* Geneva: Skira, 1968. p.76; Mario Bussagli *Bosch* London: Thames and Hudson, 1967 p.7.

Several writers have argued for a causal link between neurosis and the art of Edvard Munch, pointing out similarities between his work and that of schizophrenics. His own writing suggests that he experienced synaesthesia — the blending of the senses, combined with visual and auditory hallucinations. See John Rowan Wilson *The Mind.* New York: Time Life, 1965 p. 8. Alf Bøe *Edvard Munch* London: Academy Editions, 1989. Richard Heller *Edvard Munch: The Scream* London: The Penguin Press, 1973.

practices are now an accepted part of the popular mythology of 'the artist,' and runs counter to our popular image of the industrial designer or engineer.

2.6iii. The Classical Line.

A work of visual art may convey many things to our cognition. It may tell a story, be a commentary, convey information, persuade us, provoke us to thoughts we had never entertained before. All such things are within the Province of art, and because artists have set out to do them and have triumphantly succeeded (in some cases) it may be thought that the essence and value of art lies in the fact that it can do them. However, a definition of art cannot be based on art's apparently *expressive* qualities.

The Classical line takes art to be preoccupied with the cultivation of harmony and proportion, not necessarily for its own sake but for the purposes of religious or mystical contemplation, or simply an innate human need for an ordered and harmonious environment. Architecture and Renaissance art are commonly associated with this Classical aesthetic,[57] as have some modern art movements, notably Futurism and Purism.

The classical line embraces a number of artistic traditions that are excluded by the Expressionist line. Firstly, artworks produced prior to the Renaissance are often

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Both Henri de Toulouse- Lautrec and Vincent Van Gogh drank large quantities of absinthe, both experienced hallucinatory experiences and both spent time in mental institutions due to (what was thought to be) heavy absinthe use. Conrad (1988) argues that there is indeed a causal association between the use of absinthe and the paintings of these artists. The artists themselves discussed each others' work in terms of the influence of absinthe. Of Toulouse-Lautrec's work, Gustav Moreau is recorded as saying "his paintings were entirely painted in absinthe" (Conrad:69). Like Munch, Van Gogh's letters suggest that his works were influenced by his hallucinatory episodes.
See also Bernard Zurcher *Vincent Van Gogh: Art, Life and Letters*. New York: Rizzoli, 1985, p. 248.
Barnaby Conrad III *Absinthe: History in a Bottle*. San Francisco: Chronicle, 1988.

[57] I take the Formalist position to be a secular Classical line, that is, without the mystical trappings of Pythagoras and Plato. It is problematic to distinguish Classical from Formalist aesthetics in discussing such groups as the Futurists and the Purists, as there is a certain mystic element in the writings of some of these artists. Another problematic figure is Piero Della Francesca, as his work is at once highly theoretical and based on technical drawing principles, and yet was inspired by Pythagorean theories on the mystical significance of number.

Formulaic and repetitive; often they not so much personal expressions as examples of a traditional form. Egyptian architecture, for example, is associated with the symbolic use of proportion and geometry, and did not change significantly in style for hundreds of years. [58] Classical architecture, likewise, did not change markedly for hundreds of years. [59] A number of religious works and buildings were designed according to rigorously applied formulae, often with some mystical significance in the proportions and shapes involved. Examples of such works are the Gothic cathedrals, Hindu temples and instances of the Mandala. [60] These works, it could be said, are not so much personal expressions but the expression of the knowledge and the beliefs of a tradition.

2.6 iv. The Formalist Line.

A number of artists and genres are not primarily concerned with subjective expression as much as the development and exploration of the technical possibilities of their medium, or with 'purity of form' for its own sake, or with expressing some underlying harmony that exists in nature. The work of these artists is included in the characterisation of art as primarily concerned with accurate optical representation or with formal aesthetic values, independent of (or only loosely associated with) personal or religious sentiment. (Of course it can be said that such artists as Piero della Francesca, Leonardo da Vinci could faithfully record the emotional expression of the sitter, but this is distinct from expressing the artist's own feelings). [61]

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[58] Richard Patrick, Peter Croft *Classical Ancient Mythology*. London: Hennerwood Publications, 1987.

[59] Kenneth Clark on Classical architecture: "The same architectural language, the same imagery, the same theatres, the same temples — at any time for five hundred years you could have found them all around the Mediterranean, in Greece, Italy, France, Asia Minor or North Africa. If you had gone into the square of any Mediterranean town in the first century you would hardly have known where you were, any more than you would in an airport today." Clark *Civilisation* p.3.

[60] Robert Lawlor *Sacred Geometry: Philosophy and Practice*. London: Thames and Hudson, 1982. pp. 9, 67, 94.

[61] Some examples are given here. Firstly, the work of Piero della Francesca are austere and precisely structured. The *Flagellation of Christ,* for example, has a perfectly geometrical structure of recessed cubes. Francesca was interested in mathematics and geometry, and we see from his notebooks that he has precisely worked out, with then state of the art drawing techniques, the geometry of every aspect of the composition in advance. This was not, however, a mere stylistic or technical feature: Francesca's theories of geometry are derived from Pythagoras — the ideal of achieving divine perfection through

Several artists, including the Op artists (Victor Vasereley [b.1908], Ludwig Wilding [b.1927] Bridget Riley [b.1931], all Op artists) and Piet Mondrian (1872-1944) have removed subjectivity from their work altogether. For Mondrian and the Purists (a form of Cubism advocated by Amédée Ozenfant (1886-1966) and Charles-Edouard Jeanneret [Le Corbusier, 1887-1965] personal expression is a hindrance to the accomplishment of what Mondrian refers to as the 'essence of art.' As Mondrian writes,

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harmonious and mathematically satisfying shapes. (Sir Kenneth Clark suggests that the Renaissance artist's preoccupation with geometry derives from the artist's need to identify with the creative processes of nature. In the case of Francesca, the preoccupation with mathematics and geometry overtook his painting, and his final work was a treatise on arithmetic and geometry. Sir Kenneth Clark *Piero della Francesca.* Oxford: Phaidon, 1969, p.74.

Leonardo da Vinci: Da Vinci discusses art in terms of observing and accurately representing nature. As such, training in painting requires careful study and observation of natural forms. "Art, or rather the artist, must be guided by the same laws that govern nature. These force the mind of the artist to transform itself into the mid of nature's own mind, and to become the interpreter between nature and art." Leonardo da Vinci *Treatise Folio 36.* Quoted in Ignazio Calvi et. al. *Leonardo da Vinci.* London: The Cresset Press, 1957. P. 22.

'Technician' Artists. A number of artists have been concerned with the technical possibilities of their work, and are known to have employed scientific or technical innovations. Once again, the ideal of subjective expression does not appear to have been an aspect of their work. The work of Johannes Vermeer (1632- 1675), for example, is characterized by its extraordinary fidelity and minute accuracy, and is now universally accepted among Vermeer scholars that he employed a *camera obscura* in creating his paintings. Insofar as his works were taken directly from images projected onto the canvas, these works are arguably as objective as oil- painting could possibly be without merely copying a photograph. Vermeer's paintings are essentially hand- made photographs. See Philip Steadman *In the Studio of Vermeer*. In Richard Gregory, John Harris, Priscilla Heard, David Rose eds. *The Artful Eye*. Oxford: Oxford University Press, 1995: 353- 372.

Another artist who employed recent technical experiments in his work was Georges Seurat (1859-1891), who was greatly influenced by visual scientists, in particular Helmholtz and Rood. His style, *Pointillism,* developed in the 1880's, involved placing dots of mainly primary paint directly on the canvas so that they would mix in the eye. The technical possibilities of graphic representation and optical illusion were the main preoccupations for Mauritus Cornelis Escher (1898-1991, and the 'op' artists of the late 1960's were concerned mainly with the optical effects of pure, non- representational pattern (Gregory, Harris, Heard, Rose ibid op. 407). [incomplete ref].

Assuming that the expressionist theory of art is the most representative or canonical, one would conclude that Escher, the 'Op' artists and the Pointillists are not truly artists at all, but technicians of illustration and experimenters of cognitive psychology.

The laws which in the culture of art have become more and more determinate are *the greatest hidden laws of nature which art establishes in its own fashion.* It is necessary to stress the fact that these laws are more or less hidden behind the superficial aspect of nature. Abstract art is therefore opposed to a natural appreciation of things. But it is not opposed to nature, as is generally thought.

[…] That which distinguishes [the purely abstract artist] from the figurative artist is the fact that in his creation he frees himself from the individual sentiments and from particular impressions which he receives from outside, and that he breaks loose from the individual inclinations within him […] The progress of science, of technique, of machinery, of life as a whole, has […] made him a living machine, capable of realizing in a pure manner the essence of art.[62]

For the Futurist painters Fernand Léger (1881-1955, Amédee Ozenfant (1886-1966) and Le Corbusier, the machine became the ideal object of artistic contemplation; its order and precision revealing the underlying order and harmony of nature. [63] For the Italian Futurists, likewise, art was to be cleansed of all personal sentiment and reduced to pure form — *like a machine.* The aesthetic ideal of austere formalism over expressionism, although apparently Avant- Garde in Western culture, is also found in other artistic traditions, notably in Japan. [64]

Figure 6. Le Corbusier's car design, *Voiture Maximum* (1935).[65]

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[62] Piet Mondrian *Plastic Art and Pure Plastic Art.* Cited in Stephen David Ross *Art and its Significance: An Anthology of Artistic Theory* 2nd ed. Albany: State University of New York, 1987 p. 634. [Incomplete ref].

[63] Christopher Green. *Leger and the Avant- Garde.* New Haven and London: Yale University Press, 1976 pp. 208, 209, 211.

[64] As Yutaka Tazawa writes of traditional 'flower arranging' (*Ikebana*) "as might be expected, tea room flower decoration should not seek to produce an effect of elegant beauty, but must express purity and simplicity in an effort to penetrate the depths of nature." (78). A more famous example of Japanese meditative art is the 'dry landscape' (*kare sansui*), which expresses the great expanse of nature by rocks and sand alone. Origami, bonsai, paper making and traditional architecture (for example) also involve formal aesthetics and are very much artistic activities, but have a characteristically Japanese lack of direct, individual or emotional expression. Yutaka Tazawa *Japanese Cultural History: A Perspective.* Tokyo: Ministry of Cultural Affairs, 1973. Pp. 67, 78.

[65] Source: Bentley Publishers. http://www.bentleypublishers.com/images//features/h801/corbu.jpg (accessed March 9,2008).

To reiterate: we may agree with the Expressionists, Tolstoy, the Nazarines and others that much, perhaps the majority, of great art is concerned with expressing emotions, that Rococo art is simply extremely expensive interior decoration, and so on. But this art fails to encompass and acknowledge a great deal of art that is valued and appreciated for reasons quite different to that of expressing emotion.

2.6 v. The Mystic Line.

Francis Sparshott defines 'the Mystic line' as the theory that arts are concerned with the capture and regulation of natural forces. [66] According to this view, 'art for its own sake' — far from the artistic ideal — is in fact impoverished and empty; a pale shadow of its earlier, more potent self. [67] Sparshott groups all variations of the 'mystic line' into three groups.

> First, there are, or thought by some relevant groups of persons to be, powers operative in the universe other than those defined for the purposes of theories of popular science (whether physical, behavioural, or social). Such powers are exemplified by God, gods, the world soul, élan vital, *numina, mana,* demons, and so forth, but their character need not be specified, nor need they be associated with any particular religion or cult beyond what is implicit in the practices of the relevant arts themselves. Because positive science knows nothing of them, let us call these occult powers.
>
> Second, the proper domain of art lies in relating some or all human activities or passivities to the said powers: the human concerns in question may be those of some or all of the artist, his public, his society (or religious group, etc) or mankind at large.
>
> Third, within that domain of the relation of mankind to occult powers, the special province of art is those processes or products that represent, symbolise or control those forces in a way that to a suitably sensitive observer is evidenced by the character of the processes and products themselves. That is, art is a bearer of evident power, and that which is the ancestor of the aesthetic (and this could generate the arts in the secular guise in which we know them today) is the expressive evidence of power. [68]

[66] Francis Sparshott *The Theory of the Arts* New Jersey: Princeton University Press, 1982.

[67] Sparshott p. 371.

[68] Sparshott p. 373.

The Mystic line, unlike the Expression line or the Formalist line, can include all of those works that were not fabricated for the purposes of contemplation but for some symbolic or mystical purpose — burial tombs, traditional tattoos that signify rank or status, fetish- objects, [69] reliquaries, structures used for specific rites that incorporate the relative positions of astral or planetary bodies, or religious images or structures. This grouping includes the Pyramids, Stonehenge, shrines, pagodas, Shinto shrines and Hindu temples, charms, amulets and jewel- encrusted skulls.

Sparshott dismisses the Mystic line as a general theory of art for a number of reasons, but primarily because "it is entirely gratuitous. There is absolutely no intelligible connection between the harnessing of power or any other form of magical efficacy and the actual procedures of artists which as procedures remain mimetic and ornamental." [70]

2.6vi. The Secular Mystic Line

We may accept that the existence of occult powers is seriously in doubt, but Sparshott's conclusion is premature. There is, I contend, an important sense in which certain artistic activities harness powers, but not, of course, of the pre-scientific, 'magical' kind. In an important sense, the artist had causal powers. All traditional craft skills involve an understanding of the materials being worked, which itself requires the ability to alter the environment in the desired way. Painters, traditionally, knew how to use glazes; an all but lost art. The glass- blower understands the skills required to shape molten glass, the sculptor knows how to shape marble, the woodworker knows understands the arts of carving, steaming and shaping wood.

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[69] Fetish- objects are those that embody some magical force or property, or some other symbolic role that goes beyond the object's physical or aesthetic properties. Even in contemporary Western society the tendency to attribute magical powers to artifacts is evident. There are, for example, legends surrounding the 'bad luck' surrounding the cars in which the Arch Duke Ferdinand and James Dean died; people also attribute healing powers to such objects as quartz crystals. According to this definition of 'fetish object,' amulets, charms, 'lucky rocks,' healing crystals, images of St. Christopher are included. Other objects that are not treated as 'magical' as such but have a fetish- like symbolic weight are wedding rings, sporting trophies, war medals and national flags. Damage or loss of these objects is generally taken to be far more serious than the loss of a physically similar object that does not have the same symbolic or historical properties or associations.

[70] Sparshott p. 383.

Accordingly, artistic procedures are not entirely concerned with ornament and mimesis. The truly great artists are, in fact, attributed with near- magical powers, beyond mere technical proficiency, whether powers of illusion or the powers of rendering visible their nightmares.

In traditional Japanese art, and in the culture of classical Greece, we find a conception of art and art-making that is considerably broader than that of the modern West. Both traditions included practices and artefacts as 'art' that were neither a). mystical or magical in essence nor b). defined as 'art' according to either the formal line nor the mystic line. One group of practices that are regarded as 'traditional arts' in Japan, for example, are the martial arts (*kendo*, *kyudo*, *karate* and so on). These were once vital military skills, but bow they are widely practiced not primarily for practical purposes but for their own sake, or for spiritual development. Through a highly disciplined training, the student may learn to harness otherwise unobtainable physical and psychological power through the cultivation of balance, technique and focus. As such, to those who practice (for example) *kyudo* it is truly an art. That its practice is not primarily concerned with either aesthetics or the art- world does not distract from this judgement.

To include these types of practices as 'art,' I propose a secular version of the 'mystic line':

> Art is the application of exemplary knowledge and skill to the attainment of some desirable end, whether to change one's environment or oneself.

As stated, this definition is too broad (we would not include ingenious bank robberies or management theory in our class of 'artworks'). Yet it has a certain appeal and application where contemporary art theory stalls. We talk of certain activities as being *arts* by virtue of the fact that they require not only technical knowledge but hands- on skill and intuition, that is, an 'intuitive feel.' It is still common to find practitioners referring to, for example, 'the art of surgery' or 'the art of boatbuilding': a linguistic relic, perhaps, of a time when the word 'art' had not been restricted in meaning to its contemporary meaning. The English expression 'state of the art' also reflects this understanding of art as 'knowledge and skill'; insofar as skills and knowledge change over time, what is considered 'state of the art' changes over time also. This usage of

the word 'art' is in fact the same as the meaning of the term in the philosophy of Aristotle.

Heidegger on *Techné.*

The word *Technology* appeared in the English language for the first time in 1615, and was defined as "discourse or treatise on an art or the arts," from Gk. *tekhnologia* "systematic treatment of an art, craft, or technique." *Technology* originally referred to, of all things, grammar, and was not given its modern sense ("science of the mechanical and industrial arts") until 1859.

As Martin Heidegger informs us, the Ancient Greek word for art (and the cognate for 'technology') *techne* (τέχνη, sometimes rendered *techné* or *tekhne*), was not preoccupied with aesthetics at all. Instead, *techné* was understood as a 'bringing-forth,' a revealing and creation of things that had not previously existed that require the activities of the maker in order to exist. As such, the Classical Greek idea of art embraces all craft activity and artistic activity, insofar as these practices require both knowledge and skill. As Heidegger writes,

> From the earliest times until Plato the word *techne* is linked with the word *episteme.* Both words are names for knowing in the widest sense. They mean to be entirely at home in something, to understand and be expert in it. Such knowing provides an opening up. […] It reveals whatever does not bring itself forth and does not yet lie here before us, whatever can look one way and now another.
>
> Whoever builds a house or a ship or forges a sacrificial chalice reveals what is to be brought forth […] This revealing gathers together in advance the aspect and the matter of ship or house with a view to the finished thing envisioned as completed, and from this gathering determines the manner of its construction.[71]

One of the consequences of this account of art as *techne* is that the available skills and knowledge of a particular culture and age will determine what is considered to be 'great art.' Of the arts of the Viking peoples, for example, the greatest cultural works, from the point of view of *techne,* were the Viking ships, for the Maori of New Zealand the *Waka* (war canoe) and *Wharenui* (meeting house), of the Classical Greeks

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[71] Martin Heidegger "The Question Concerning Technology," in *The Question Concerning Technology and Other Essays* New York: Garland Publishing, 1977. P. 13.

the Parthenon, of the Egyptians the Pyramids, for the Western World at the end of the 19th Century the Eiffel Tower, the steam engines and the Brooklyn Bridge.

The '*techne*- work' stands as the unifying symbol of a particular culture during a particular epoch. Once again our common word usage reflects this idea — we talk of particular historical periods in terms of technological progress, not of artistic progress as such — the stone age, the iron age, the steam, jet and computer ages. As history progresses, our cultural and technological achievements become increasingly complex and abstract. They mark our progression in imposing order upon our environment, or ourselves, not as merely useful objects (although they may be useful) but as symbols of where we have been and where we are going. In this sense, the *techne* work transcends its mere usefulness or appearance. It speaks of our relationship with the world, and our striving to gain control over it. As Kenneth Clark writes of modern physics, placing technology, science and art in a continuum: "[w] hen scientists could use a mathematical idea to transform matter they had achieved the same quasi-magical relationship with the material world as artists."[72]

This idea suggests a continuum between art and technology that has been largely forgotten in the Western tradition — in the words (if not the sentiment) of Heidegger-a "forgetfulness of *techne*."

2.6 vii. Hegel and Art.

G.F.W. Hegel's philosophy of art dovetails with that of Heidegger, insofar as he takes the great artworks to be 'symbols of the age.' Hegel gives history its own form, the form of 'progress,' and holds that history is continuously striving to become more organized, abstract, and integrated. The art- work marks the progress of this process.

> World history is the manifestation of the Divine, the absolute process of Spirit in its highest forms. It is the development wherein it achieves its truth and the consciousness of itself. The products of its stages are the world- historical national spirits — their art, religion, science. [73]

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[72] Clark *Civilisation*: 344.

[73] G.F. Hegel quoted in Lucian Krukowski *Aesthetic Legacies*. Philadelphia: Temple University Press, 1992 p. 119.

For Hegel, progress in history requires potent symbols that both document its particular stages and place these documents within a metacultural account of historical change and direction. [74] According to Hegel, art provides these symbols.

While commentators have questioned Hegel's theory on the grounds that art apparently lacks truth- bearing properties, [75] the basic principle seems sound if a broader definition of art is used, as I shall argue. [76]

Sir Kenneth Clark's television survey of Western art, *Civilisation,* includes several artefacts that would not qualify as 'art' according to either the formal or expression lines, but qualify as art according to the *techne*/ secular mystic line. These are the Gokstad Viking ship ("Looked at today, it's a powerful work of art")[77] the Pont du Gard in Provence (an ancient Roman aqueduct), and the great suspension bridges of the Victorian era. Each is an ideal 'Hegelian artwork,' a symbolically rich artefact that sums up the cultural and technological achievements of the culture and age. Of the Forth Railway Bridge (1890) Clark writes:

> The new Forth bridge is in our own style, which expresses our own age as the Baroque expressed the Seventeenth Century, and it is the result of a hundred years of engineering. It is a new creation, but it is related to the past by one of the chief continuous traditions of the western mind: the tradition of mathematics. For this reason the builders of the Gothic cathedrals, the great architects and painters of the Renaissance — Piero Della Francesca and Leonardo da Vinci, and the great philosophers of the Seventeenth century — Descartes, Pascal, Newton and Wren, would all have looked at it with respect.[78]

We may or may not agree that karate, the Brooklyn Bridge and the Citroën DS 19 are appropriately regarded as 'art- works,' but it is clear that an artefact that is

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[74] Ibid. p. 118.

[75] Krukowski pp. 120- 127.

[76] There is reason to believe that Hegel had a broader definition in mind. In the opening words of he *Lectures on Fine Art* Hegel states that he is opposed to the equation of aesthetics with the philosophy of art, but considered the confusion too deep to be resisted. Hegel *Lectures on Fine Art.* Translated by T. M. Knox.Oxford: Clarendon Press, 1975.

[77] Sir Kenneth Clark *Civilisation* (1969) Episode I: By the Skin of our Teeth." http://www.youtube.com/watch?v=TxsVroiUHik&feature=related. Accessed January 20th 2008.

[78] Clark *Civilisation* p. 335.

manufactured in one age as primarily a 'useful object' will be taken up later on as being greatly significant. A paper cup, an airliner and a new tobacco pipe may seem of negligible worth at the moment. But we see a Medieval manuscript page, a nineteenth- century tea clipper ship and a sixteenth- century Dutch clay tobacco pipe quite differently. At one time these objects may have been valuable commodities but were nevertheless utilitarian objects — tools — (information storage, transport, a means of inhaling nicotine). With time they become symbolic of technological and cultural progression. As their utility is superseded they are appreciated for their aesthetic qualities. They are purposefully removed from circulation as tools and become artworks worthy of preservation.

To conclude this section:

1). There is a continuum between what we refer to as the 'fine' and 'applied' arts.
2). The 'fine art' establishment does not have a monopoly on the manufacture, discussion and appreciation of culturally significant works.
The second half of this essay will further discuss the discussion of engineering as *techne.*

2.7. Fine art and origins

Novitz's argument against the theoretical distinction between 'mass' and 'high' art questions the significance of 'individual genius' in the production of artworks. Here I will discuss three ideals of the 'fine artist,' as they pertain to the discussion of industrial design.

It is widely thought that the true artwork is the product of an individual. The artwork arises out of, and communicates, an individual's insights, skills, inspiration, sensitivity, taste and occasionally genius. As such, it is the individual artist who creates the work of art, and there are no corporate, social or ideological constraints which prevent the artist from pursuing the ideal of genuinely high art. The industrial designer, by contrast, contributes to the design of a final work that cannot be said to be the product of an individual's labours. [79] The automobile in particular is a corporate creation in which the individual's initiative (where it exists at all) is

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[79] Industrial designers are typically part of the manufacturer's institutional organization, and do not have a final say in the form their work ultimately takes. See Dormer *Design since 1945* pp. 19-24.

conditioned and circumscribed by commercial, ideological, technical and corporate considerations of one sort or another. As Novitz writes of film making:

> There is, for example, no one artist who is responsible for the production of a film. There is the joint task of actors, directors, producers, writers, sound and lighting technicians, make-up artists, and so on. The ways in which they set about their work depend not just on their shared conception of their project, but on a whole range of factors which include the subtleties of interpersonal relations, the available technology, as well as commercial, ideological and political concerns of various dimensions.
>
> [..] In addition, the fact that films are made to a budget suggests that their content will be influenced not just by considerations of expense, but also by the profit motive, and closely allied to it, the political (or at least the material interests of those who finance the film). For it is clear, I think, that investors are hardly likely to fund and continue funding films that threaten their perceived interests. All of this is certainly true of film, and the claim that it is true as well of all other popular arts — whether it be pop music, comic strips, magazine literature or soap opera (Novitz: 216).

By analogy, if film is now accepted as a fine art (or at least an expressive medium worthy of serious criticism and appraisal), it may follow that industrial design is not exempt on the grounds that it is a corporate activity. Aircraft and automotive design are of course (typically) corporate activities, and perhaps it is the sheer number of personnel involved that prevents us from thinking of vehicular engineering or design as imaginative, as if any spark of artistry is simply lost in the system. As the engineer Jeff Daniels has stated, "[a] erospace is expensive not because it breaks technological ground but because it makes exorbitant use of skilled manpower." [80] An aircraft design organisation traditionally employs over a thousand people; a mathematical services department, a mould loft (where designs are enlarged to full size and converted into life- size mock- ups in wood), a wind tunnel and a laboratory. Sub-departments design every component of the aircraft — undercarriage, furnishings, controls and so on. A single design may require up to 50,000 drawings and several

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[80] Jeff Daniels "Why Aerospace R & D must get its feet off the ground," *Design* 366 June 1979. Cited in Ken Baynes, Francis Pugh *The Art of the Engineer* Surrey: Lutterworth Press, 1981. p.200.

years of labour. [81] For this reason, the actual work involved in designing an aeroplane or car appears to be the exact opposite of the free activity we associate with 'art-making.' The work of the engineering draughtsman who is not at the top of the design bureau hierarchy may appear to be mundane and repetitive. Unsurprisingly, a large number of draughtsmanship jobs have disappeared with the appearance of computer-aided design.

It would be inconsistent, however, to say that such design activities are not really 'art' by virtue of the fact that they are the products of corporate operations. Opera, dance, architecture, drama and sculpture are all regarded as 'fine arts' or similar, despite the fact that they all have certain technical, economic and ideological constraints. Architecture may also require a large number of personnel not directly involved in the design process, some of whom may experience considerable tedium and hardship.

There may be another distinction to be made between the 'fine arts' and the 'applied arts' of engineering and industrial design. That is, we are more likely to attribute the fine art work to a particular figure. That is, we are more likely to consider it more appropriate to designate Christo (b. 1935) as the creator of the work *Wrapped Reichstag* (1995) than to name Sir William Lyons (1901- 1985) as the creator of the Jaguar XK-E (1961-1974). But Novitz warns against exaggerating the significance of the individual artist. Although the traditional 'high arts' depend in a more obvious way on the labours of individual artists, this was not always the case.

Prior to the Renaissance, most Western works of art were produced for the church, and were not attributed to any name at all. Most, instead, are attributed to specific schools, workshops or teachers. [82] Additionally, the artists of the period were dependent on patrons — builders, bibliophiles, and collectors in positions of power and wealth. Rather than being free creations of the artist, these works were regarded both as instruments of power and as status symbols. Byzantine art, in the words of art historian Pierre Francastel (1900- 1970) was "the greatest tool of government in the hands of a theocracy that sought to impose at least some fugitive unity on its

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[81] Baynes and Pugh ibid. p. 200. [This text, written in 1997, shows its age here; I imagine that much has changed since the transition to CAD-CAM].

[82] For example, we think of it more appropriate to name Christo as the creator of the work *Wrapped Reichstag* than to attribute Sir William Lyons as creator of the E-Type Jaguar.

subjects."[83] Medieval artworks, especially illuminated manuscripts, were regarded as valuable objects with a material worth as tangible as real estate. They were occasionally used as a tool of persuasion — princely patrons would commission quantities of manuscripts with jewelled book covers, and sent them as gifts to their fellow rulers or to important ecclesiastics. [84] The medieval artist's lack of independence is summarised by Sir Kenneth Clark's comment that "the craftsperson, whatever his speciality, was a valuable object — since the smiths made princely weapons as well as ornaments, they were necessary to a chieftain's status."[85]

The artists of the early Renaissance may appear to have had more artistic freedom, but it would be incorrect to say that they worked independently of economic, ideological or religious constraints. Even Hieronymus Bosch (1450- 1516) relied on church commissions, and Giotto di Bondone (1267- 1337), one of the earliest Italian painters known by name, was commissioned principally by bankers and wool- merchants. As Clark notes, many of the great works of the High Renaissance were commissioned by the Republic on heroic- patriotic themes. [86] Others were produced by artists with permanent positions — Diego de Silva Velázquez (1599-1660), for example, spent most of his productive life as court painter to King Phillip IV. Of the Roman artists of the mid- 1600's, Clark writes that "the leading families put painters under contract like athletes," resulting in "colossal palaces […] expressions of private greed and vanity. Farnese, Borghese, Barberini, Ludovisi, these rapacious parvenus spent their short year of power competing as to who should build the largest and most ornate saloons."[87]

Even relatively recent works of fine art have been commissioned to satisfy the wants of a particular patron. Two clear examples are Jean Auguste Dominique Ingres's (1780- 1867) *Napoleon on his Imperial Throne* 1806) and Anne-Louis Girodet de Roussy-Trioson's (1767- 1824) *Apotheosis of the French Heroes Who Died for their Fatherland During the War for Liberty* (1802) — in the case of the latter, Napoleon specifically ordered the artist to depict his marshals going into

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[83] [find Pierre Francastel *Art and technology in the Nineteenth and Twentieth Centuries* trans. Randall Cherry (New York: Zone Books, 2003)]. Cited in Novitz p. 217.

[84] Pierre Francastel *The Middle Ages*. London: Thames and Hudson, 1969 p. 16.

[85] Clark *Civilisation* pp. 9, 68.

[86] Ibid p.123.

[87] Clark *Civilisation* p. 185.

Valhalla.[88] These two examples are notable in that it is not merely the production of the work, but the content of the work that is dictated by the patron.

Art before Modernism.

Figure 7: Ingres *Napoleon on his Imperial Throne*. (1806)[89]

Figure 8: Roussey- Trioson *Apotheosis of the French Heroes Who Died for their Fatherland During the War for Liberty* (1802).

At a basic level, all artists depend on the societies in which they live, for both economic and ideological support. [90] Prevailing theories of art will determine whether or not a work is considered art, and the overall intellectual climate will determine whether or not a given work of art is tolerated: whether it will be considered art at all, or simply declared an offence to public decency. It would be unlikely, for example, that wrapping a large government building in fabric (in the manner of Christo) would have been considered a fine art in the sixteenth century. By the same token, meticulously replicating, in style and technique, the practices of 16th Century Christian oil painters, without irony, in the early 21st Century would be rejected out of hand as high class kitsch.

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[88] Emma Micheletti *Velázquez*. London: Thames and Hudson, London, 1968.

[89] Source: http://www.powellhistory.com/art/Painting/Ingres_Napoleon_on_his_Imperial_throne.jpg. Accessed March 8 2008.

[90] There are of course groups of artists, such as the Dad and the Impressionists, for example, that appear to have lacked popular acceptance. But even in these cases they found social and ideological support in each other. An artistic Avant- Garde can provide its own audience.

As Novitz points out, just as atheistic or anti- religious art would not have been tolerated in medieval Europe, we are no longer likely to tolerate explicitly racist art (witness the controversy concerning the Nazi cinema of Leni Riefenstahl), or artworks as economically demanding as the Gothic cathedrals.[91] Which works of art are accepted by society, and which are neglected or deemed too expensive or too offensive, has a direct effect on the practices of the artistic community. It influences the individual artist's beliefs about what is acceptable in art, and what is not going to be acceptable or successful. [92] In pragmatic terms, the artist who has an interest in making a living from his or her work (that is, anyone hoping to master their craft within their lifetimes) will have to pay attention to what will sell. Of all artists, only the poet can afford a sovereign indifference towards economics. Fine arts materials are expensive, and traditional craftsmanship is time consuming. One will not get far in a career in making jewellery by hand, or sculpture, without patrons to cover at least the cost of materials and labour.

Although artists are to some extent bounded by economic or ideological constraints, the fine artist may nevertheless claim that she alone determines success or failure of a given work. The industrial designer, on the other hand, sets out with a goal or design brief, some constraints, and some criteria by which the finished product will be judged a success or failure. This description seems far removed from the practices of contemporary 'fine art,' but it is quite similar to the working practices of the Renaissance artist. [93]

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[91] Novitz p. 218. This point is problematic. A particular work may not be tolerated by a number of people, but this does not mitigate against the claim that the work is properly termed as art. Avant-Garde works, for example, are rarely 'tolerated' at first. European missionaries were known to have destroyed Maori carvings, and the lay public may be offended at the work of sculptors who incorporate human remains into their works, but these do not demonstrate that these works are not art or artistically produced. The idea of 'theories of art' is also problematic — it is unclear that there were 'theories of art' in the modern sense in Medieval Europe, for example.

[92] This point is clearly illustrated in the case of Billy Apple's 'contract works,' which literally would not exist if no-one was willing to pay for them.

[93] This point is made clear by Peter Dormer. *Design since 1945*. London: Thames and Hudson, 1993 p. 24.

Art and Technology.

It may be argued that the artist, unlike the industrial designer, is independent of the technical innovations of the age. The artwork, on such a view, is primarily the product of the individual's initiative and expertise, whereas the industrial designer works with a pool of technical knowledge to which countless numbers of scientists and technicians have contributed.

Again, this view is problematic. This is clearly apparent in the case of Medieval metalwork: weapons and jewellery were frequently produced in the same workshop, by the same craftspeople. [94] Developments in metallurgy, bronze- casting, and smithery have as much to do with warfare and other practical applications as they do with 'art,' insofar as the two domains during that period were separable at all. The development of the Gutenberg press and engraving were also of major importance to the development of art, as was the development of pigments used in painting. Developments such as these are now so familiar to us that we scarcely notice them, but these are technological innovations all the same.

The painting of the Renaissance was closely associated with the development of optics and geometry, and had emerged as a science with its own rules, techniques, and technical literature. [95] The artist learned the techniques of the medium and, if possible, contributed to them. Brunellesco, for example, is attributed with the discovery of perspective, which became part of the basic training of artists right up until the 1940's. [96] Vermeer pioneered the use of lenses in draughtsmanship (his paintings are essentially hand- made photographs), and the chemist Chevevril made a lasting impression on 19th Century painting by developing a theory of colour contrast and optical mixture. [97] Writes Novitz,

> In a very basic sense, then, works of art depend not just on the ideas and labours of
> individual artists, but also on the technological innovations of others. They also
> depend on the techniques and conventions of the medium, for artist are always

[94] Clark *Civilisation* p. 9, 304.

[95] Velazquez, for example, was apprenticed to Francisco Pacheto for six years, and was subsequently awarded a diploma and credentials as an independent artist. Leonardo da Vinci was apprenticed to the engineer Verrochio. A number of painters, including Da Vinci and Piero Della Francesca, wrote technical treatises on painting and geometry.

[96] Clark *Civilisation* p. 98.

[97] Guiseppe Marchiori *Delacroix.* London: Thames and Hudson, 1969, p. 18.

> trained in certain traditions and acquire the 'vocabularies' which characterise these
> traditions. (Novitz: 217).

To a certain extent artists acknowledge this 'genealogical' aspect of fine art —
classical musicians cite their teachers in discussing their own development, and even
self- taught painters acknowledge their debt tothose artists who influenced them.

It is clear, then, that industrial design is not distinguishable from 'fine art' by
virtue of the fact that it is a product of technology. In a basic sense, *all* art is produced
using some technology or other. We may note that traditional 'fine arts' utilise
technologies of considerable antiquity (glass- blowing, bronze casting, drawing,
carpentry, ceramics), but this distinction between old and new technologies is not
helpful in demarcating art and non- art. Bronze- casting was a modern technology at
some stage, as was perspective drawing. At the time of writing (2008) using a camera
with rolls of film would be considered self- consciously artistic, and so on.

The distinction between plastic and visual fine art and industrial design is
undermined further by the fact that the design acts of both fields may utilise similar
techniques. A number of industrial designers had in fact begun in traditional art fields.
Giorgetto Giugiaro (b. 1938), founder of Ital Design, began as a portrait painter, [98]
Flaminio Bertoni (1903- 1964), designer of the Citroën DS 19, was an accomplished
painter and sculptor, Henry Dreyfuss began in theatre design,[99] the American designer
George W. Walker, the 'Cellini of Chrome," began in dress design,[100] Raymond
Loewy and Walter Teague began in illustration and graphic design, and Buckminster
Fuller (admittedly an 'outsider artist' of industrial design) was initially an architect. In
their industrial design work we see an application of traditional 'art' skills to the
design process. This is most clearly demonstrated in the work of the designer Harvey
Earl, often referred to as the 'father' of the fins- and- chrome styling of the 1950's. He
introduced the practice of sculpting proposed designs in clay laid over a wooden
frame, a technique that was standard practice until relatively recently.

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[98] http://www.giugiarodesign.it/. Accessed January 27, 2008. See also Julian Pettifer, Nigel Turner
Automania London: Collins, 1984.

[99] John Heskett Industrial *Design*. London: Thames and Hudson, 1995 p.107.

[100] Pettifer and Turner ibid. p. 139.

2.8. Conclusion of Section One.

As I have argued, the fine arts cannot be distinguished from industrial design purely in terms of intrinsic worth, commercial interests, or the techniques and skills involved. Insofar as industrial designers usually work for a particular corporate body and have specific commercial goals, they are analogous to the artists of the Renaissance in terms of working practice.

Industrial design, then, can be seen as fine art in the sense that architecture is still regarded by many as a fine art — in cases when the artistry and imagination in a given work warrants the moniker 'fine art.' Although industrial design is not an expressive art (in the sense that it does not express feelings or emotion, even if it *could* evoke feeling, which is another matter), its criticism and celebration is still important. Just as architecture and city planning shape our immediate environment, so too does industrial design. A designer of buses, for example, is not simply designing a bus for a particular manufacturer. She is also designing a part of the man- made environment of a great number of people. Insofar as industrial design shapes our environment and has to be interacted with, its appearance is important.

SECTION TWO
THE ART OF THE ENGINEER

3.1 INTRODUCTION

The purpose of this section is to reveal some of the commonalities between (what is now termed) fine art and engineering. There is a commonality in concept, a commonality in the skills and techniques involved, and a commonality in the creative psychology of the two groups of practices. The first section looks at the idea of *techne* in Greek discussions of art — a discourse that does not make a distinction between art and engineering. Following this will be a discussion of 'art- like' aspects of engineering. The conclusion of this discussion is that engineering is a creative art (broadly construed); that engineers may even be inspired by natural forms or traditional crafts, and that it is psychologically similar to artistic creativity, if not identical with artistic creativity as presently understood.

3.2 PLATO

We will begin this section by looking at the origins of the idea of 'art' in Western culture, that is, in the writings of Classical Greece. At the end of 1b). the idea of *techne* as introduced. Here I will return to a discussion of this idea in order to reveal the commonalities between engineering and the fine arts. Engineering is a *techne* activity.

Plato gives us the following definition of artistic creation.

> All creation or passage of non- being into being is poetry or making, and the process of all arts are creative, and the masters of all arts are poets or makers. [101]

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[101] Plato gives an account of art as a distraction from the attainment of true knowledge as it is three times removed from the true act of creation. (The first act is the act of creation of God, the second is that of the craftsperson, and the third act is that of the artist copying the works of the craftsperson in image only). Plato *Republic* II, III, X. In the passage quoted, the 'maker' is distinct from the 'artist.'

Art, then, is above all a creative activity— it is a revealing, an unfolding and bringing- forth. 'Poetry' here derives from the Greek term *poiesis,* which is translated literally as either 'making' or 'poetry.' Poetry is a *making*; one takes known elements and gathers them together to reveal a new entity that previously did not exist. To make a thing is to create it; to take base elements and shape them according to some design in order to bring that thing into existence, to bring it into being.

3.3 ARISTOTLE AND ART

In the *Nichomachean Ethics*, Aristotle adds to the Platonic idea of *poiesis* by describing art (*techne*) as a rational, skilled activity. The objects that have been made with human skills, that is, with *techne,* are categorised as 'artefacts,' as 'artificial'; a maker of things is called an 'artisan,' the application of human skill is referred to as 'technology,' which literally means 'the use of art.' Aristotle's discussion of 'art,' then, is a discussion of what we now understand to be 'technology.' Aristotle describes art in the following way.

> Now, building is an art or applied science, and is essentially a characteristic or trained ability of rationally producing. In fact, there is no art that is not a characteristic or trained ability of rational producing. It follows that art is identical with the characteristic of producing under the guidance of pure reason. All art is concerned with the realm of coming-to- be, with contriving and studying how something which is capable both of being and of not being may come into existence, a thing whose starting point or source is in the producer and not in the thing being produced.
>
> So, as we have said, art is a characteristic of producing under the guidance of true reason, and lack of art, on the contrary, is a characteristic of producing under the guidance of false reason. [102]

Ref. Plato *The Republic* trans Desmond Lee. London: Penguin, 1987 p. 421- 436. See also Stephen David Ross *Art and its Significance* 2nd Ed. Albany: State University of New York Press, 1987.

[102] Aristotle *Ethics* trans. J.A.K. Thomson. London: Penguin Books, 1976 p. 79.

The artist, then, creates through the application of reason and knowledge. The magical, or mystical notion of the artist as wielder of creative powers and as a repository of nature's 'secrets' is also in keeping with Aristotle's account. The idea of 'artist- as- causative- agent- in – bringing- forth- the- world's- potentialities' may also be found in the Germanic languages. The English term *craft* ('skill in the applied arts') s derived from the German word *Kraft*, which means 'power.' Aristotle discusses the experts of the arts as possessing wisdom- wisdom being defined by Aristotle as both intuition and scientific knowledge.

<p align="center">Wisdom (Sophia)</p>

> We apply the term 'wisdom' in the arts to the finished experts in the arts, eg. We call Phidias a wise sculptor and Polyclitus a wise statuary. Here all we mean by the word is excellence in art […] So evidently wisdom must be the most finished form of knowledge. The wise man, then, must not only know all that follows from first principles, but must also have a true understanding of those principles. Therefore wisdom must be intuition and scientific knowledge: knowledge 'complete with head' (as it were) of the most precious truths. [103]

Aristotle also describes all arts as essentially goal- oriented activities:

> Every art and every investigation, and similarly every action and pursuit, is considered to aim at some good. [104]

In the Classical world, then, the ideal of art was far broader than our modern one. We see this not only in the works of Aristotle but in Zeno and Lucretius.[105]

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[103] Aristotle *Ethics* p. 271.

[104] Aristotle *Ethics* p.63

[105] Zeno: "Art is a system, made up of insights, that have been exercised together in the interest of some advantageous objective selected from the objectives of everyday life." Sparshott p. 29.
 Lucretius: "Navigation, agriculture, city walls, laws, arms, roads, clothing, and all other practical inventions as well as life's rewards and refinements, poems, pictures, and polished statues of exquisite workmanship all without exception were gradually taught by experience and the inventiveness of the energetic mind, as mankind progressed step by step. Thus by slow degrees time evolves every discovery, and reason raises it up into the regions of the night. Men saw one thing after another become

The Classical description of 'art' may appear to be archaic and irrelevant to a discussion of modern art theory. However, the account given by Aristotle, Plato and others is important, as a). it reveals the historical and conceptual origin of what art *means* and b). it fits with our basic intuitions of culture. Indeed, it is quite possibly an Aristotelian notion of art we may have in mind when some of us query the activities of artists who have exercised their status as art- makers on a purely institutional level, as opposed to exhibiting a high degree of technical skill or imagination. As the French philosopher Sylvian Aurox has written, a culture is "the set of symbolic, technical and statutory mediations which a particular human group, in order to satisfy its needs, has set up between itself and the natural environment."[106] [107] And as Hans- Georg Gadamer writes, in *Truth and Method*,

> The pantheon of art is not a timeless presence which offers itself to pure aesthetic consciousness but the assembled achievements of the human mind as it has realized itself historically. Art is knowledge and the experience of the work of art is a sharing of this knowledge. Hence aesthetics becomes a story of world- views. [108]

The Russian psychologist Lev Vygotsky (1896- 1934) writes:

> Art is a method for finding an equilibrium between man and his world, in the most critical and important stages in his life. This view of course completely refutes the approach according to which art is an ornament, and thereby leads us to doubt the correctness of the above statement. [109]

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clear in their minds, until each art reached the peak of perfection." Lucretius *De Rerum Natura (On the Nature of Things)* trans. Martin Ferguson Smith. London: Sphere, 1969.

[106]Cited in Jocelyn de Noblet *Industrial Design: Reflections of a Century*. p. 47. *This name does not appear on a Google search. Recheck ref.*

[107] *This statement appears to be floating, and does not fit here.*

[108] *Art and its Significance* p.369-370.

[109] *Art and its Significance*. p.524.

3.4 Engineering and Techne

If we are to consider the definitions of art given by Aristotle, Vygotsky and Gadamer, it would appear to follow that engineering is, in some sense, an art. How, then, is engineering different to the *fine arts*?

Engineering differs from other arts in that it is always motivated by some useful objective, some precise, tangible goal (a certain rpm with a certain torque power, a certain load bearing capacity). Such arts as painting and sculpture are not practiced with a conscious desire that they be useful. That this virtue is sometimes overlaid with a desire for personal profit does not invalidate it: at one time fine art was generally thought of as a profession also.

Why is it thought that the engineer, in the Occident at least, is of lesser cultural status than the sculptor or painter? This was not always the case — the Greek word 'architect' was not limited to those concerned only with buildings but with all branches of technology as well. [110] An engineer in Eighteenth- century Germany was known as a 'Master of the Arts' (*Kunstmeister*), and at one time the German term *Kunstwerk* (artwork) was also used to refer to machines.

Fred Ashford considers the possibility that the low cultural status of the engineer is to the fact that engineering has traditionally involved a great deal of noise and mess, and so prevented engineering from attaining, along with architecture, the status of 'mother of the arts.'[111] As Ashford himself points out, this is a somewhat hollow claim; contemporary architecture also requires a great deal of engineering work and has not quite lost its art- status.

Subrata Dasgupta, by contrast, suggests that engineering has been overlooked as a culturally significant phenomenon by virtue of the fact that, unlike the histories of literature, art and science, the history of engineering is one involving the unknown, nameless, humble and unlettered. [112] It is perhaps significant that the Japanese, who have long considered machinery and weaponry to be as aesthetically significant as any visual art work, entirely lacked a concept of 'high art' until its introduction during the Meiji period. Nor are the Japanese particularly convinced by the idea that a machine be *merely useful*: machines must also be *beautiful.* Consider, for example,

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[110] Fred Ashford *The Aesthetics of Industrial Design* London: Business Books, 1969, pp. 2-3.

[111] Ibid. p. 2.

[112] Subrata Dasgupta *Technology and Creativity* Oxford: Oxford University Press, 1996, p. vii.

the *Karakuri ningyo*: the spectacularly sophisticated automata (all quite useless, all quite, quite magical) of the Edo period: wooden machines in the forms of maidens and boys that could fire arrows, serve drinks and paint complex calligraphy.[113] No doubt this refusal to make a distinction between art and machinery led to Japan's total domination of the world motorcycle market.

Engineering may be both imaginative and intuitive, as I will argue in Section 2, but the central reason as to why we are resistant to the idea of engineering as an art may simply be that engineering is 'practical' where as art thought of being, in the words of Lucretius, "Life's rewards and refinements." 'Art,' as we understand it, is that branch of *techne* that is appreciated for its own sake. Engineering is not *typically* appreciated for its own sake, but it is clearly the case that some *techne-* work does have the status of *techne- for- its- own sake* (Billy Apple's 1962 Norton Manx 500cc[114] for example, Tanaka Hisashige's (1799-1881) *Calligraphy Writing Doll*,[115] or Theo Jansen's (b.1948) *Strandbeest* kinetic sculptures[116]).

Figure 9 Theo Jansen's *Transport.*[117]

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[113] See http://www.karakuri.info/ (accessed February 7th, 2008).

http://www.karakuri.info/dashi/.   (accessed February 7th, 2008).

See also *Karakuri-Zui* (*Illustrated Compendium of Mechanical Devices*), by Hosokawa Hanzō, 1796.

[114] "Billy Apple at Auckland City Art Gallery." http://window.org.nz/2007/12/quicktake-billy-apple-at-auckland- art.html (Accessed February 7, 2008).

[115] To see this machine, see

http://www.youtube.com/watch?v=pBURWGr3AlU&eurl=http://www.pinktentacle.com/tag/toshiba (accessed February 7, 2008).

[116] http://www.strandbeest.com/ (accessed February 7, 2008).

[117] Source:

http://www.strandbeest.com/mGallery/index.php?c=transport&s=y&id=transport__dsc00002&x=1 (Accessed March 8 2008).

Figure 10. Yumihiki Doji (Archer Doll) by Shobei Tamaya IX, and plan from 'Karakuri Zuii' ('Karakuri - An Illustrated Anthology') published in 1796[118]

Figure 11. mechanised calligraphy writing puppet or "mojikaki ningyo."[119]

Such exotic, borderline cases should not distract us: the aesthetics of techne is in fact a very common feature of all cultures, suggesting that the art-world specific aesthetics of Western culture is an aberration. In many cultures including our own, it is common for some *techne*- work or *techne*- activity, initially considered merely practical, that later becomes an art work or entertainment, appreciated for its own sake. The Greeks, for example, made a sport and game of the arts and instruments of war —javelin, archery, discus and so on. The air- show is the modern equivalent of the Greek Olympics or the Roman Circus, insofar as it makes an entertainment and spectacle of the art of war. Further, those machines that have been built for some recreational or propaganda purpose (the Graf Zeppelin, the F1 sportscar) may be staggeringly *im*practical for any purpose other than for the sake of some propaganda or entertainment purpose, such as the sport of motor racing. What possible use is there to practicing the art of the bull- fight, the art of javelin- throwing or the art of piloting an F-1 car, or, for that matter, manufacturing javelins, or building racing cars that are

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[118] Kirsty Boyle. "Zashiki Karakuri." http://www.karakuri.info/zashiki/index.html. Last modified 14th January 2008. (accessed March 8 2008).

[119] http://www.kahaku.go.jp/english/exhibitions/ueno/special/2007/robot/index.html (accessed March 8 2008).

illegal to operate on public roads? It is not the rigor of economics that comes to mind when we consider drag racing or supersonic airliners (the Anglo- French Concorde never made a penny in profits its entire operational life). It is something else, whether national prestige, or George Bataille's Economy of Excess. [120]

Changes in historical and cultural context will cause a redefinition of the cultural role chosen for an artefact. The canoes, stone adzes and fighter aircraft housed in the world's museums began life as functional artefacts; they now function largely as objects of contemplation.

3.6 THE ORIGINS OF ENGINEERING TECHNOLOGY.

It is often thought that technology is the mere application of scientific principles to the solution of practical problems. History gives the lie to this perception. Firstly, if science is primarily concerned with the *understanding* of nature, technology endeavours to master it for practical ends. [121] Through making this distinction, it becomes clear that the 'science' (ἐπιστήμη, *episteme*) of the craftsperson that Aristotle speaks of is distinct from the modern idea of 'science.' The technologist or craftsperson has knowledge and skills pertaining to the material- at- hand that will enable her to shape the material in the desired way. Of wood, for example, the technologist (a person who possesses the *techne*, *sophia* and *episteme* required for a given art) knows of the correct direction in which to plane the wood; she knows of the skills of cutting, filing, chiselling and steaming the wood, and of the wood's mechanical properties. The scientist, by contrast, knows of (for example) the specific gravity, cellular structure and chemical composition of the wood.

The distinction in aims has profound implications for how the natural world is approached by science and by technology. The two approaches are complementary. Furthermore, the practical necessity for control over nature has far exceeded in

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[120] Critics of the US space programme argue that it has less to do with actual usefulness and more to do with national prestige and the American romance of 'the Wild Frontier.' As Timothy Ferris writes of the Space Shuttle and the Mir space station, "spending billions on manned spaceflight might well be justified if the missions made good sense, but it is precisely on this point that Mir and the shuttle are most vulnerable. The problem, simply put, is that nobody seems to know what they're for." Timothy Ferris "Some like it Hot." *The New York Review of Books* Vol. XLIV Number 14. September 25 1997. p. 16.

[121] Dasgupta p. viii.

urgency the intellectual and emotive desire to understand nature. People have been cooking food, making clothes, constructing roads, bridges, dwellings and public buildings; making explosives treating, casting and forging metals and alloys, and shaping the engines of war many hundreds of years before the rational comprehension of their respective underlying scientific principles could even be contemplated. At the time of writing, genetic engineering is capable of manipulating the genome of organisms, yet the actual principles of genetics are still not fully understood.

Historically, then, technology is far older than modern science. If we consider it appropriate to speak of 'technology' in discussing ancient civilisations, it could be said that technology reaches back to the hominids and the stone tools of the Lower Palaeolithic Age about two and a half million years ago. By contrast, even the earliest speculative forms of science are only a few thousand years old and science in its modern form is only about five hundred years old. [122]The mental process of inventing artefacts, therefore, can scarcely be held to be a mere ancillary of the cognitive process of scientific discovery. Scientists determine what is true. Engineers determine what works. As Dasgupta writes: "it is fair to claim that the earliest manifestation of creativity in humans and their immediate ancestors was in the realm of technology- much earlier, even that the cave art we so admire, which is known to have been practiced twenty or twenty- five thousand years ago."[123]

3.7 THE EPISTEMOLOGY OF ENGINEERING

As mentioned above, engineering requires a distinctly different approach to gathering information — engineering is concerned only with that knowledge that is useful for a given activity. Engineering, that is, is *epistemically distinct* from science. Indeed, there are many examples of technology preceding science. The iron- making process was used long before its chemistry and physics were understood. [124] When the Wright Brothers began work on developing a propeller for their first aeroplane, they were surprised to find that there was not, after almost a century of development, a single

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[122] Dasgupta p. viii.

[123] Dasgupta p. viii.

[124] Dasgupta p. 4.

scientific study on the physics of propeller design, whether nautical or aeronautical. Until then, all marine propeller design had been largely trial and error. [125]

   To make a crude generalization: scientists conduct experiments to determine of a particular proposition is true or false. Engineers conduct tests to see if a design or device actually works. Not only is engineering prior to science— a great deal of science has been developed in order to understand why a certain technology actually works. Furthermore, science relies upon the science relies upon the development of engineering. As David Pye writes:

> If there had been no inventions there would be no theory of mechanics. Invention came first. […] Our entire theoretical knowledge has been founded on abstractions taken from the fruits of inventions made without theory.[126]

3.8 Trial and Error.

   The history of technology is filled with stories of gradual progression and frustration at a general lack of scientific understanding. Although by the fifteenth century Venetian shipwrights were using mathematical formulae to determine the curvature of frames, shipbuilding was far from being an exact science until much later. [127] Early aviation engineering was also largely a matter of guesswork, which no doubt had a great deal to do with the fact that early aviation was extremely dangerous. Designs that were relatively successful were repeated; designs that crashed repeatedly were avoided (military types with near- lethal design flaws would still go into mass production as late as World War II). [128] Even the seemingly natural arrangement of

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[125] Valerie Moolman *The Road to Kitty Hawk*. Alexandria, Virginia: Time Life Books, 1980: pp. 112-118.

[126] David Pye *The Nature and Aesthetics of* Engineering *Design*. London: The Herbert Press, 1978, p. 65.

[127] Baynes and Pugh p. 77. In his 1697 study of ship anatomy, Hoste of Toulin wrote that "Chance has as much to do with construction, that the ships that are built with the greater care are commonly the worst, and those that are built carelessly, are sometimes the best. Thus the largest ships are often the most defective, and more good ships are seen amongst the merchantmen than in the royal navy." Cited in Baynes and Pugh p. 79.

[128] The Messerschmitt 109, of which 35,000 were built, had an undercarriage so dangerously narrow and fragile that, according to some estimates, approximately one third of all machines were lost in ground handling. The Messerschmitt 163, a rocket interceptor, used an unsafe fuel system and equally unsafe fuel that frequently led to manned aircraft simply exploding on the tarmac.

main- wings, engines and stabilizing surfaces was not universally agreed upon until the 1910's. It was not until the 1920's that it was universally agreed that the biplane configuration is not required to stay safely aloft.

It is true that aviation science eventually caught up with aviation, but it is nevertheless the case that even modern engineering is a trade-off. Engineers learn from their mistakes, as they have done so in the past. Another, more recent example is the case of the De Havilland Comet, the world's first operational jet airliner. When Comets began to crash in service (1953- 1954) it was only later discovered that the disasters were being caused by the square passenger windows (square windows are fatal design flaws in pressurised hulls. Stress builds up in the corners, cracks occur and the fuselage rips open). Airliners have had rounded windows ever since.

Untested machinery always presents some element of risk, and machinery is never perfect. As Pye notes:

> Nothing we design or make ever really works. We always say what it ought to do but it never does. The aircraft falls out of the sky or rams the earth full tilt and kills the people. It has to be tended like a new born baby. It drinks like a fish. It life is measured in hours […] never do we achieve a satisfactory performance. Things are not simply 'fit for the purpose.'
>
> […] Everything we design is a lash- up, something inept and provisional. [129]

> Design, like war, is an uncertain trade, and we have to make the things we have designed before we can find out whether our assumptions are right or wrong. There is no other way to find out. When we modify our prototype, it is, quite flatly, because we guessed wrong […] 'Research' is very often a euphemism for trying the wrong things first. [130]

Of course science too progresses through trial and error, but it is clear that engineering is not simply an 'application' of pure scientific theory.

3.9 Engineering and Craft Knowledge.

There is a historical transition from crafts- manufacture to industrialised manufacture, which I will discuss in section 3.13. However, even in the modern

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[129]Pye p. 27.

[130] Pye p. 27.

period there are examples of engineers looking to traditional art and craft technologies in an effort to solve specific design problems. For example, designers of spacecraft have looked to Origami in order to design components that can be folded and unfurled elegantly.[131]During World War II, German engineers working on early jet turbine engines hired a violinist to assist with the design of fan blades. Turbine blades were disintegrating at a particular frequency; a trained violinist was needed to find out exactly what that frequency was. [132] Finally, in New Zealand a weaver of traditional Maori flax designs assisted in the design of an electromagnetic coil.[133]

3.10 Engineering and Natural Forms

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[131] "Origami UCL Project."

http://www.medphys.ucl.ac.uk/teaching/undergrad/projects/2005/group_05/application3.htm (Accessed march 8 2008).

[132] Whilst working on the first aircraft jet engine, technicians for the German aircraft company Junkers encountered vibration problems with the engine at certain throttle settings. A professional violinist was brought in, and he was asked to 'play' the individual turbine blades with his bow to determine their natural frequency. As it turned out, the blades resonated at the operating speed of the engine, a coincidence that amplified small vibrations enough to fracture the blades. Alterations were made and the problem was solved. Richard P. Hallion *Designers and Test- Pilots* Alexandria, Virginia: Time- Life Books, 1982. p. 91.

[133] The University of Auckland School of Engineering has recently (September 1997) been working on a new tram system. One of the design problems in developing this system was finding a suitably flat yet dense electric coil. Maori weavers at the Maori Arts and Crafts institute at Whakarewarewa in Rotorua took up the challenge to create a design able to carry the required amount of electrical current. Te Awara kuia and Emily Schuster, after three months of experimentation, adapted a traditional plait to the purpose, and the design was found to be a success. NZPA Staff reporter "Weaver's Powerful Legacy." *New Zealand Herald* September 6 1997.

This example is noteworthy as it reveals an apparent inconsistency in our thinking. When discussing the cultural activities and achievements of peoples other than contemporary Westerners (the Vikings, the Maori, the Inuit) we naturally assume that the technology they use/d (weapons, hunting methods, navigational methods, sailing craft and so on) are also a part of their culture. Hence, we regard Maori weaving as a craft or even an art. At one stage this craft was practiced for largely utilitarian reasons — for making eel traps, tool grips, flax kits, and so on. However the electromagnetic coil in the mechanism of a city tram is not regarded as a craft- object. But what if the design of the electromagnetic coil is derived from a Maori plait design? Why does another culture's technology cease to be 'culture' when it is assimilated into contemporary Western technology?

Engineers have also been inspired by natural forms — the shapes of birds, fish, and more recently, the organization of protein and other biological microstructures. As with the case of inspiration from craft knowledge, these examples show that engineers, like artists, are capable of looking beyond their field of expertise in search of design solutions, through juxtaposing the known and tested with the novel. Engineering is not, therefore, a 'closed' field that is shut off from the techniques and developments of other arts and technologies, nor is it closed off from knowledge gleaned from direct observation of nature.

There is an obvious reason as to why nature should be a source of inspiration to engineers. Nature is filled with successful engineering design. As Michael French suggests, our intuitive aesthetic response to beautiful natural forms (trees, flowers, animals) is related to an innate understanding of good functional design. That is, what is termed 'aesthetic sense' in humans — far from being merely a source of esoteric amusement — has a distinct survival value. [134] Even the traditional aesthetic vocabulary used in discussing artworks is suggestive of functional design. We speak of composition, balance, symmetry, refinement, elegance, simplicity, and unity. Bridges, buildings and weapons, French suggests, will more or less 'look right' if the design is sound. The 'intuition' of the engineer is akin, if not identical, to the aesthetic sense of the artist. [135]

The idea that all human notions of aesthetics are derived from an innate sensitivity to functional design is, of course, problematic. There are some infamously ugly aircraft that were also failures, whether economic or military (the Brewster Buffalo [1939], and Fairey Battle [1934] were as ugly as they were military failures). There are ugly aircraft that function perfectly well (the Fairchild A10 Thunderbolt II) just as there are ugly organisms (tapeworms, the dodo, the deep sea hatchet fish). However, the idea of beauty being linked with *fitness* is age- old. As Plato writes:

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[134] Michael French *Invention and Evolution Design in Nature and Engineering* 2nd ed. Cambridge: Cambridge University Press, 1994. For another discussion on the evolutionary origins of human aesthetic response, see John D. Barrow *The Artful Universe* Oxford: Clarendon Press, 1995.

[135] French takes 'intuition' to mean "immediate apprehension by the mind without reasoning, immediate insight." French *Invention and Evolution* p. 236.

> And isn't the quality, beauty and fitness of any implement or creature of action
> judged by reference to the use for which man or nature produced?[136]

Studies of natural life in the 19th Century (and earlier, in fact) led to a greater appreciation of the efficiency of the organic form of fishes and birds (fig.9). [137] The principle of such studies were eventually applied to the design of the first manned gliders. Otto Lilienthal (1848-1896), perhaps the most important researcher into avionics before Wright brothers, based his designs quite explicitly on his studies of bird anatomy and flight, as did Jean- Marie le Bris (1817-1872), who named his most important design "the artificial albatross." Clement Adler (1841-1925) also based his designs on nature, taking his inspiration from the bat. Ship hulls, submarines and Zeppelins, all of which evolved into a long, slender form, pointed at the nose to improve penetration, and tapered at the end to reduce drag and turbulence. This long engineering development led to the streamlining style of the 1920's and eventually the design and aircraft and automobiles. [138]

A more recent development is the planned use of natural forms at the molecular level. At present, research is being conducted into the possibility of building objects

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[136] Plato *Republic* trans. Desmond Lee. London: Penguin, 1985., p.430.

[137] There is in fact a long tradition of aircraft design being directly influenced by the study of birds. Leonardo da Vinci describes engineering as "interpretation of nature" (Codex A.H. Folio 117 r-b). Cited in Gorgio Nicodemi et al. *Leonardo da Vinci.* London: The Cresset Press, 1957, p. 24. This principle is especially evident in his own engineering designs for flying machines. For Leonardo, a thorough study of birds was a necessary prelude to the solution to the problem of powered flight. In his treatise *On the Flight of Birds* (p. 140 ibid) we see a progression from a detailed study of bird anatomy and flight to attempts at mechanical devices that will replicate bird flight. These studies culminated in his ornithopter designs which, although technically brilliant, would not have been successful in attaining powered flight.

Sir Arthur Cayley, one of the founding fathers of aeronautics, was also an enthusiastic watcher of birds. His scientific observations of bird flight influenced his design work, which culminated in his 'governable parachute' glider design of 1809. (Moolman *The Road to Kitty Hawk* pp. 40-45).

The largely successful gliders of Otto Lilienthal were also largely based on bird morphology. The Wright Brothers too observed bird flight, and their wing- warping steering system was inspired by watching buzzards land. They had also read Etienne Marey's classic book *Animal Mechanisms* (which was also admired by the Futurists) which was also a major influence (Moolman p. 111). The engineers Guiseppe Bellanca and Jack Northrop were also inspired by bird flight (Hallion *Designers and Test Pilots* pp. 40, 45), and Igor Sikorsky, the helicopter pioneer, was inspired by dragonflies.

[138] Heskett *Industrial Design* p. 121.

up by mechanical means, atom by atom. This nanotechnology (so- called as it involves mechanisms and transformations measurable in nanometers) relies on the possibility of building nanomachines that can rearrange atoms. In theory, such devices could "turn coal into diamond, and sheets of diamond into rocket engines. Suitably programmed, they could repair all of your body's ailing cells."[139] Orthodox physics, writes Ed Regis, suggests that such engineering is simply impossible: atoms are not discrete Newtonian entities that can be handled like Lego- blocks but are nebulous, largely empty probability- fields. As Ed Regis and Eric Drexler explain, however, this is simply not the case. As they argue, we know that it is possible to build up complex machines from individual atoms because Nature has already done so. Indeed, the fundamental biological units (DNA, cell walls, motochondria and so on) are precise, assembled structures that are composed of individual molecules. Genetic codes are a proof- of- concept that nanomachines can be built, just as, for early aircraft builders, the birds were a proof- of- concept that powered heavy- than- air flight was possible. As Dexler envisions matters, the design and assembly of nanomachines would appropriate structures already present in cellular biology — the molecular structure of flagella can be used to design pumps, for example.

3.11 Engineering and Creativity.

Engineering is a choice- based activity. It is somewhat like the game of chess: there is a specific number of rules, a specific desirable end- point, and any number of ways of getting there. It is a goal- oriented and rule- based activity, but the final outcome is not determined by (among other things) the laws of physics and the constraints of economics, any more than any other creative endeavour is limited by economics or physics. Writes David Pye:

> When any useful thing is designed the shape of it is in no way imposed on the designer, or determined by any influence outside him, or entailed. His freedom in choosing the shape is a limited freedom, it is true, but there are no limitations so close as to relieve him or the maker of responsibility for the appearance of what they have done. The ability of our devices to 'work' and get results depends much less exactly on their shape than we are apt to think. The limitations arise only in small

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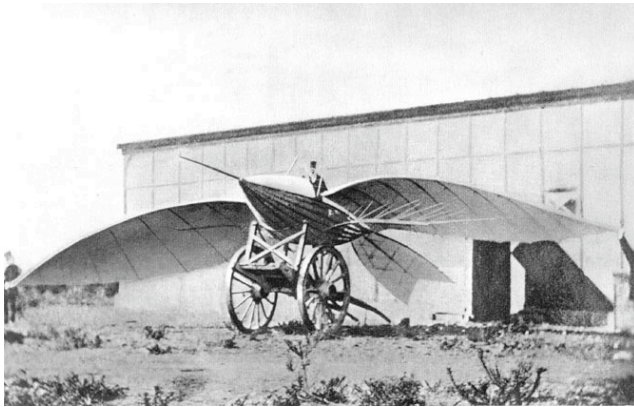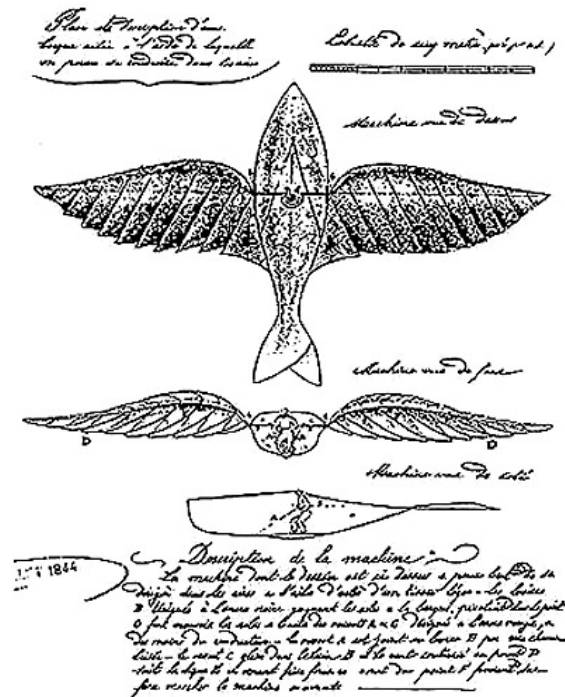[139] Ed Reigis *Nano* New York: Brown and Company, 1995 (dust jacket).

Fig. 10. Le Bris Glider, 1868. [140]

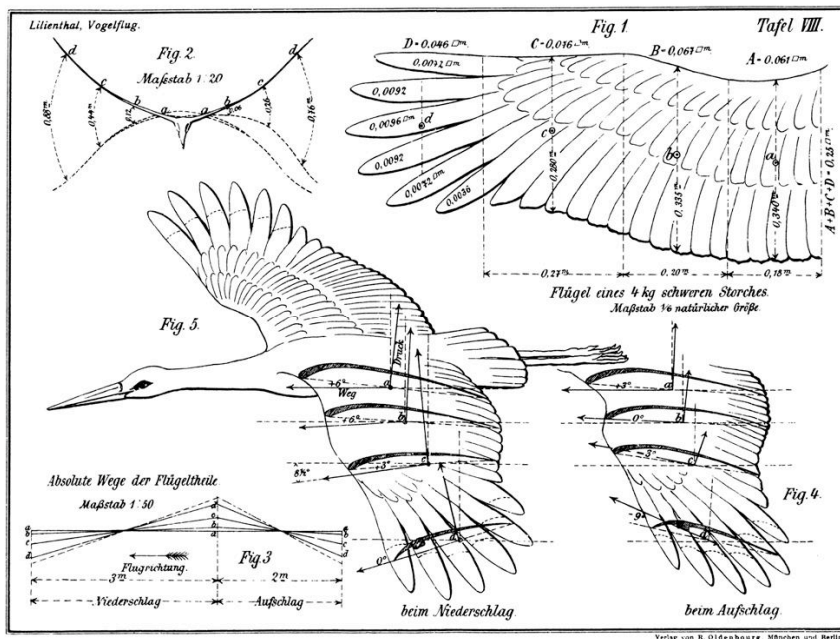Fig. 10b. Le Bris's Patent drawing, 1857.[141]

Fig. 10c. Diagram from Otto Lilianthal's bird aerodynamics studies. [142]

Otto Lilianthal with glider, June 29 1895. [143]

Replica of Clement Adler's bat- winged *Avion III,* displayed at Musée des Arts et Métiers, Paris.[144]

> part from the physical nature of the world, but in a very large measure from
> considerations of economy and style. Both are matters [...] of choice.

Pye identifies six key requirements of design. The designed work must conform to the basic physical principles of that particular device, it must be mechanically sound, it

[141] http://en.wikipedia.org/wiki/Image:LeBrisPatent1857.jpg. (Accessed February 17th, 2008).

[142] http://www.aniprop.de/Lilienthal_TafelVIII.jpg. (Accessed February 17th, 2008).

[143] Glide from a flying-hill at Lichterfelde, photographer unknown

Archives Otto-Lilienthal-Museum/www.lilienthal-museum.de. http://www.lilienthal-museum.de/olma/ehome.htm (Accessed February 17, 2008).

[144] http://www.memo.fr/article.asp?ID=THE_TRA_009 (Accessed February 17, 2008).

must be suitably easy to use and maintain, it must have an acceptable cost, and its appearance must be acceptable. (One may add to Pye's list: the machine must not be too dangerous, and it must be compliant with recycling principles). These requirements place conditions on the final appearance of the finished product, but they do not determine the form of the finished product. The designer is ultimately responsible for the final work, and the final work is necessarily a result of design choices made by either the designer or the tradition from within which the designer works. As Pye writes:

> The requirements for design conflict and cannot be reconciled. All design for devices are in some degree failures, either because they flout on one or the other requirements or because they are compromises, and compromise implies a degree of failure. Failure is inherent in all useful design not only because all requirements of economy derive from insatiable wishes, but more immediately because certain quite specific conflicts are inevitable once requirements for economy are admitted: and conflicts even amongst the requirements of use are not unknown.
>
> […] It follows that all designs for use are arbitrary. The designer or his client has to choose in what degree and where there shall be failure. Thus the shape of all designed things is the product of an arbitrary choice. If you vary the terms of your compromise— say, more speed, more heat, less safety, more discomfort, lower first cost — then you vary the shape of the thing designed. It is quite impossible for any design to be the 'logical outcome of the requirements' simply because, the requirements being in conflict, their logical outcome is an impossibility. [145]

Typical conflicts in engineering design are high speed and low maintenance, low initial cost and durability, high speed and low first cost, light weight and high strength, cargo capacity and speed, and so on. Even a cursory glimpse at the cars and motorcycles on the street shows the amount of variation in these basic tensions, owing to the various compromises of the sort outlined above. Rear mounted engine versus front mounted engine, air cooled vs. water cooled engines, three doors, five doors, two doors, gull- wing doors, manual, automatic, V-twin, flat- four, Wankel, and so on.

3.12 Design and Invention.

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[145] Pye p. 70.

'Design,' in Pye's words, is the adaptation of a particular 'general principle of arrangement,' that is, a specific type of device, whereas 'invention' is the conception of an entirely new 'general principle of arrangement.' Although there are clear cases of both invention and of design, there is a continuum between invention and design. John Britten, for example, did not invent the motorcycle, but his revisions to the traditional 'general principle' (a new cooling system, carbon- fibre wheels, and so on) were more than a mere exercise in design as such.

Invention is distinct from design in that it is a bringing- together of known elements to form something hitherto unknown and unthought-of of. It is, in a fundamental sense, creative. It increases the complexity and wonder of the universe, yet through human agency. In Heidegger's famous phrase, the art of the inventor *discloses being*. We may say of 'design' that it is a largely *techne* activity (insofar as it is the application of skill and knowledge) whereas invention involves *poiesis*; like poetry, invention involves a creation of the novel from familiar things. As Pye writes:

> The poet invents new juxtapositions of words and phrases which convey a new experience. The inventor makes new juxtapositions of things which give new results. Neither the poet's words nor the inventor's things have any remarkable properties on their own. They are everyday words and things. It is the juxtaposition of them which is new.[146]

The inventor, argues Pye, has special abilities shared by the artist; namely the ability to seize upon possible relationships between apparently isolated elements, and exploiting the creative possibilities of these new relationships.

> The artist has glimpsed something: he has seen, perhaps, fleetingly and indistinctly, some particular relation or quality of visible features which had previously been disregarded, and which impressed itself on him by its beauty. By means of making a work of art he then seeks as it were to fix isolate and concentrate what he has seen.
> [...] What the artist discovers, isolates and concentrates, he usually becomes conscious of and expresses in an entirely different context from that in which he first sighted it. A designer designing a tool may give it a profile which derives from something he saw in a mussel shell, or in a turbine blade [...] it will appear in his

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[146] Pye p. 58.

> mind's eye full grown and full armed, and it will come as an inspiration, as if it came from nowhere. [147]

Another writer, the engineer Michael French, also writes of invention in explicitly artistic terms.

> What generally happens is that the designer chooses on a basis which is best described as aesthetic appeal: he thinks about the problem and the possible choices until some pivotal idea seizes his imagination, some particular way or ways of performing one or two of the more crucial functions which appear satisfying or elegant, which have unlooked- for advantages or combine in a particularly helpful or economical fashion. Then he tries to add all the other functions, to complete the outline of the solution; it may be he will come up against insuperable difficulties, and have to seek for another promising start point and have to seek for another promising start point, again, by the use of his aesthetic judgement. It is aesthetic in the sense that the emergence of the pivotal idea is accompanied by the same kind of intellectual pleasure as is excited by an inspired development in a great piece of music or a striking painting, and it may be recognized by that circumstance. [148]

Igor Sikorsky's (1889- 1972) autobiography *The Story of the Winged S* (1958) also includes a discussion of the 'mysterious faculty' behind his inventions, the most famous of which being the helicopter. Sikorsky regards the inventiveness in arts, engineering, and all other branches of skilled human activity as involving "the process of intuitive discovery," the capacity to comprehend or foresee beyond the limits of existing evidence. [149]

Bisociation

One view that appears to be widely held by thinkers on creativity is that the basic factor in the formulation of new ideas is the combination of apparently unconnected or disparate ideas — "elements drawn from domains which are far apart," as Henri Poincaré wrote.[150] Arthur Koestler (1905-1983) discusses this concept in his book *The*

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[147] Pye p. 144.

[148] French p. 231.

[149] Dorothy Cochrane *The Aviation Careers of Igor Sikorsky* Seattle and London: University of Washington Press, 1989. P. 152.

[150] Cited in Dasgupta p. 91.

Act of Creation (1964)*,* terming it *bisociation.* [151] This idea appears to be related to the portrayal of inventive creativity given by Pye and French; *invention* involves the harmonious juxtaposition of ideas or forms that results in a synthesis that is intellectually satisfying.

The descriptions of inventive creativity given by Pye, French and Koestler are supported by two historical examples. Firstly, that of Alexander Graham Bell's telephone. Bernard Carlson and Michael Gorman have documented, after examining Bell's drawings, notebooks, and the relevant artefacts, how his first 'gallows telephone' was the emergent outcome of several artefacts and ideas that were essentially unrelated to each other. Bell had brought together Herman von Helmholtz's experimental apparatus (using tuning forks) for the study of the production of vowel sounds, his own experience with the 'phonactograph,' a device for teaching the deaf to recognise speech patterns, and his knowledge of the anatomy of the ear. [152]

A second example of bisociation at work is that of the Wright brother's solving of the problem of aircraft stability and control. Whilst considering this problem, three distinct images were brought together: the twisting of bird wings, the motion of a bicycle speeding around a corner, and the image of a bicycle inner- tube box twisted in the hands. In a moment of insight, the three fell together, and the design problem of the Wright Flyer's wing form and control system was solved. [153]

It is clear, then, that the inventive act is a creative act. Art is traditionally thought of as a creative activity. So — what distinguishes the special properties of the creative individual from the special properties of the inventive individual? Pye dismisses the dichotomy entirely, stating that

> …anyone with experience of training designers will confirm that a man who is capable of invention as an artist is commonly capable also of useful invention. Leonardo's exceptional genius in both useful and artistic invention seems to have

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[151] Arthur Koestler *The Act of Creation.* London: Hutchinson & Co. 1964.

[152] Another example of functional design inspired by natural form. W.B. Carlson and M.E. Gorman "A Cognitive Framework to Understand Technological Creativity: Bell, Edison and the Telephone." In R.J. Weber and D.N. Perkins (eds) *Inventive Minds* New York: Oxford University Press, 1992, pp. 48-79.

[153] T.D. Crouch, "Why Wilbur and Orville? Some thoughts on the Wright Brothers and the Powers of Invention," in Weber and Perkins pp. 80-92.

fostered the idea that he was exceptional also in combining these two talents; but this is not so. The combination is usual rather than exceptional, so usual in fact that one is led to suspect that both are really different expressions of one potentiality. [154]

Thus far in Section 2 I have argued that engineering design is imaginative; that engineers may be inspired by natural forms or by traditional crafts, and that it is psychologically similar to artistic creativity, if not identical to artistic creativity. However, it may still be claimed that engineering is not 'art,' by virtue of the fact that engineering is concerned with mass production and not traditional craft skills. There are two responses to this argument.

1). Some machines are in fact *autographic,* that is, designed and built by the same individuals. (We could point to, for example, Otto Lilienthal's gliders, or Tanaka Hisashige's 1881 *Calligraphy Writing Doll,* or Blaise Pascal's *Pascaline* calculator machine). Further, many forms of artistic production are not autographic. Poems, musical performances of particular pre-written works, and silkscreen prints are designed in a singular design- act which is then applied to mass, or at least series production. Even singular 'fine art' works may be allographic (that is, designed and actualized by different parties) architecture, for example. If a given artist produces the design for a work that is not actualized by the designer herself (a building or orchestral composition, for example) then it would not appear to be the case that this fact mitigates against the claim that it is indeed a work of art. That is, the fact that a given machine or work of industrial art is multiply produced is irrelevant to its artistic merit, just as the number of times a given orchestral work is performed.

Nor is it actually true that consumer machinery is mass produced. Only 78 Porsche 550 Spyders were ever produced; the British car manufacturer Bristol builds, by hand, only around 100 vehicles a year (and will make by hand any component for any part for any Bristol ever made). Andy Warhol's silkscreen prints were produced in limited numbers, but there were numerous editions of any given print. Given that both silkscreen- printmaking and (more so) Porsche construction involves skilled labour, it is implausible to assert that prints are art and Porsches are not on the grounds stated above. Indeed, the technical illiteracy of so many modern artists, and the technical skills demanded of industrial designers (being able to render in three dimensions, for

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[154] Pye p. 65.

example) render absurd any traditional distinction between high art and industrial design.

3.13 The Transition from Craft Skills to Industrial Manufacture.

The development of technical draughtsmanship during the Renaissance eventually led to the separation of the tasks of design and construction in both naval architecture (boatbuilding) and architecture. This technical shift led to changes in the manufacture of machinery leading up to the Industrial Revolution; with the appearance of a precise formal geometry, it was possible to standardise production of precision machine parts. It also became possible to give precise instructions for manufacturing particular components to the craftsperson. [155]

The introduction of scale drawings had three principle effects on manufacture: a). it divided design acts from manufacture acts; b). drawing- before- making made possible the planning of artefacts that were either too large or too complex for a single craftsperson to build on his or her own, and c). the rate of production could be increased. Henceforth, a product that could be made by a single craftsperson over several days was split up into standardised components that could be made simultaneously in hours or minutes by repetitive manual labour or by machine.[156] As Lewis Mumford writes, this transition effectively ended the traditional role of the traditional craftsperson as primary manufacturer. [157] This transition, however, has not rendered obsolete the requirement of skilled and talented workmanship in the manufacture of useful artefacts.

Nor has the rationalisation of mass production (as suggested by such mythologists as Heidegger) changed the fundamental ontology of manufactured objects. That is: it is simply not true that mass, rationalized machine production has somehow killed or is antithetical to the maintenance of traditional skills. An individual can quite possibly build an entire sportscar from scratch, machining every component by hand. This would be an act of extraordinary skill, just as building a traditional horse- drawn

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[155] See Baynes and Pugh *The Art of the Engineer.*

[156] Ibid p. 12.

[157] Lewis Mumford *Technics and Civilisation* New York: Harcourt Brace and World, 1963: p. 83.

vehicle requires extraordinary skill. It just wouldn't make a great deal of economic sense (which is to say, such an endeavour would be economically akin to fine art).[158]

The new technology has arisen from the technology of the past. With the appearance of the steam engine, for example, the combined skills of metal workers, millwrights, woodworkers and builders were utilized, using tools and materials that had not changed significantly for hundreds of years. Previous to the age of steam, such skills had been used in water- wheel construction, cannon- founding and shipbuilding. [159] Traditional metalworking skills were also employed in the development of machine- tooling for mass manufacture. As Lewis Mumford writes in *Future of Technics and Civilisation* (1934), the greatest sculptors of the 19th century were the engineers responsible for the construction of modern machine tools. [160]

The technical developments of the 19th century led to the complete standardisation and rationalisation of machine manufacture. However, the mass manufacture of automobiles and aircraft still required traditional wood and metalworking skills well into the 1930's — skills that were developed in the age- old disciplines of architecture, furniture and boatbuilding. [161]

It can be claimed, then, that there is no discreet cut-off point at which industrialised production ended all craft activity; the artisan is no longer in a role of designer, but the designing party is itself using skilled workmanship (that is, draughtsmanship) in generating the design. The division of designing and manufacturing roles has led to new developments in both design and manufacture, but it is not the case that skilled workmanship has disappeared in the transition. [162]

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[158] There is an actual case of such a work. Pierre Scerri, a French engineer, has built, entirely from scratch, a fully functional 1:3 scale Ferrari 312PB. It is so accurate that the engine (based on plans provided by Ferrari) actually sounds like the original engine. Scerri spent a decade on the project, learning how to blow glass specifically to make the headlights. The car featured on the British TV show "Jeremy Clarkson's Extreme Machines" in 1998. Work on the project began in 1978.; completing the plans and mouldings required took fifteen years alone. The 'model' was completed in 1992. http://www.youtube.com/watch?v=SeUMDY01uUA (accessed February 20 2008). Scerri's website it at: http://mps-sportproto.com/fr/ (accessed February 20 2008).

[159] *Art of the Engineer* p. 58.

[160] Noblet p. 29.

[161] *Art of the Machine* pp. 193, 198.

[162] The history of film is analogous to the transition from craft- skills to mass production. The films of the pioneering film- maker Georges Méliès (1861 –1938) were made entirely by Méliès himself: he

Furthermore, certain components, especially those composed of advanced composite materials, have an eccentric shape, and must sustain considerable wear and tear, may require a production process that is primarily artisanal in nature. [163] Carbon- fibre components (racing car bodies, surfboards, racing bicycle wheels, missile casings) and laminates (helicopter blades) are such examples of modern craftsmanship. [164]

It is clear, then, that in the design and possibly the manufacture of machines, craft (that is, skilled workmanship) is still involved to this day. What distinguishes modern manufacture from pre-industrial revolution manufacture is the separation of the different aspects of the various design and manufacture tasks. Only very rarely (for example, in the case of John Britten's prototype Daytona) will an individual be involved in both design and manufacture.

3.14 Conclusion.

We have seen in this section that engineering has a number of affinities with fine art. Engineering can be imaginative, and may involve adaptation of forms and techniques form other crafts or from the natural world. Inventiveness in engineering is also akin to inventiveness in the arts, suggesting perhaps an ancestral continuity.

If we consider one type of art as being 'craft of extremely high quality and imagination,' or at least make exemplary craftsmanship and imagination a necessary property of a certain type of artwork (as opposed to those types of art that are exempt from such conditions, for example conceptual art), then engineering works may still qualify. It may, however, be the case that only a small number of engineering works can be said to have been both designed and built using exemplary craft- skill. [165]

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directed, invented the special effects, painted the sets, made the costumes, and even performed for the camera. Perhaps because of the large numbers of people now involved in film production we do not talk of cinematography now as a 'craft skill' in the traditional sense that painting or carving are craft skills, but it is a craft skill all the same.

[163] Dormir p. 52.

[164] de Noblet p. 399.

[165] Possible examples: pre- production prototype cars and aircraft; pre- WWII aircraft, all spacecraft; insofar as no spacecraft has been mass produced).

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SECTION 3

THE MACHINE IN CULTURE

</div>

4.1 Introduction

The purpose of this section is to discuss the theoretical distinction between industrial design and fine art, and as to whether this ought to be a hierarchical distinction or simply a difference in kinds of art. The section will then discuss the role of the machine in culture as a symbol and as an art- like object.

4.2 The Distinction between Pure and Applied Art.

There is a further objection to the claim that the products of the mechanical and industrial arts are potentially artworks, in the same way that 'fine art' works are artworks. According to John Dewey, there is a basic reason as to why engineering works cannot be artworks. Art, argues Dewey, is essentially related to the question of experience. As he writes in *Art As Experience,*

> Art is the unification of experience of those means that lead to consummatory ends. Where experience is most thoroughly unified and complete, consummated, there we find art. In this sense, science and politics are also art. [166]

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[166] John Dewey *Art and Experience* cited in Stephen David Ross *Art and its Significance* p.209.

In *The Challenge to Philosophy,* Dewey makes clear the distinction between the work of art and the functional artefact.

> Not even the useful object is produced except by the intervention of imagination. Some existent material was perceived in the light of relations and possibilities not hitherto realised when the steam engine was invented. But when the imagined possibilities are embodied in a new assemblage of natural materials, the steam engine took its place in nature as an object that has the same effects as those belonging to any other physical object. Steam did the physical work and produced the consequences that attend any expanding gas under definite physical conditions. The sole difference is that the conditions under which it operates have been arrived at by human contrivance.
>
> The work of art, however, unlike the machine, is not only the outcome of imagination, but operates imaginatively rather than in the realm of physical existences. What it does is to concentrate and enlarge an immediate experience. The formed matter of aesthetic experience directly *expresses,* in other words, the meanings that are imaginatively evoked; it does not, like the material object brought into new relations in a machine, merely provide *means* by which purposes over and above the existence of the object may be executed. And yet the meanings imaginatively summoned, assembled, and integrated are embodied in material existence that here and now interact with the self. [167]

This account of the machine as 'merely useful object' has the implication that a machine, once rendered useless, becomes worthless junk. A machine does not evoke imagination and so, bereft of its function, is reduced to brute matter. As Sparshott writes:

> A small change may ruin a physical object, reduce it to rubbish; a small hole in a contraceptive or in a reactor's cooling rod spoils all. But works of art are tough and resilient. They resist fading, fragmentation […] the force of the design carries through all. [168]

Against this putative dichotomy between 'useful' things and 'art' things I make the following responses. Firstly, the machine itself can become an object of aesthetic appreciation: in the case of consumer aesthetics of industrial design, is a basic

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[167] Ibid. p. 222.

[168] Sparshott p. 186.

element of the design process. Secondly, insofar as it is deemed aesthetically valuable, the machine may 'resist fragmentation' in exactly the same way that fine artworks do. The machine may function as a symbol rather than as a mere tool. Finally, it is unclear as to what extent all fine art works actually communicate a shared experience.

4.3 The machine as object of aesthetic contemplation.

As I argued in section 2.6vi (the secular mystic line), there are, occasionally, machines that transcend their mere physicality. This may be due to accidental aesthetic qualities (speed, for example) or deliberate aesthetic qualities, or monumental grandeur, intellectual achievement, the pleasure of use, or genuine fear and awe of the political of the political and ethical implications of having brought such objects into existence (call this the *Babel effect*). It seems both historically and conceptually incorrect to speak of, for example, such machines as the Wright Flyer I, the first Lunar Module, or the Lockheed Martin- Boeing F-22 Raptor as being merely (to quote Sparshott) a "new assemblage of natural materials" that has "the same effects as those belonging to any other physical object." Insofar as these machines are the result of human contrivance, there seems to be more to them than a mere arrangement of natural materials. Surely if imagination, *poiesis* and *techne* are involved in producing such works as aeroplanes and motorcycles, the machine itself is not something that is found in nature or has a natural equivalent. Even the basic substances found in a modern artefact are to a large extent unnatural: bronze is an artificial substance, as are glass, Perspex, paper, and carbon fibre. Chemical engineers manipulate matter at the molecular level, and eventually nanotechnology will enable us to build machinery from the atom up. Indeed, it may be possible for nuclear science, nano-engineering and genetic engineering to yield results that go beyond any naturally occurring phenomena. The manufactured object may be as artificial as is conceivably possible, only natural in the sense that it is humankind's nature to rip asunder and transform the order of things as we found them. Further, given the sheer intellectual effort required to develop such technologies, speaking of them in terms of 'rearranging natural materials' is as incorrect a speaking of novel- writing as 'putting the words one has found in the right order.'

Technology, by virtue of the fact that it requires human ingenuity, its possible aesthetic properties, and because of its associations with historical progress, may simply transcend its mere usefulness. As Robert Pirsig writes,

> […] technology is a fusion of nature and the human spirit into a new creation that transcends both. When this transcendence occurs in such events as the first aeroplane flight across the ocean or the first footstep on the Moon, a kind of public recognition of the transcendent nature of technology occurs. [169]

The industrial arts have also exerted an influence on the 'fine' arts, owing to the novelty, spectacle or even horror that the machine may evoke. The machine may not directly communicate a novel experience, but as a spectacle or as something fully engaged with it may inspire the creative imagination a great deal.

As a spectacle, the machine has inspired such works as J.M.W. Turner's Rain, Steam and Speed: The Great Western Railway (1844) and Charles Demuth's *Figure Five in Gold* (1928), a painting of a passing fire appliance. Picasso's *Guernica* expresses the horror of an aerial attack (by the Condor Legion, the Luftwaffe serving in the Spanish Civil War). The stories of Richard Bach (who once flew fighter jets in the USAF) and Antoine de Saint- Exupéry (who flew the mail routes through Africa and South America before flying briefly in the USAAF) deal with the romance of aviation; the writers J.G. Ballard, E.E. Cummings and Karl Shapiro have explored the erotic semiotics of the automobile. The writer Alfred Jarry (1873-1907) adored his bicycle for the way it allowed for the melding of man and machine; the poet Harry Crosby (1898- 1929) was similarly obsessed with aircraft, and planned to suicide by diving his aircraft into the ground in his Ryan M-2 (the type flown by Lindbergh across the Atlantic).

The Purists, Vorticists and in particular the Futurists took the machine to be *the* object of aesthetic consciousness. For them, the automobile was a paradigmatic innovation— a rejection of the past in favour of the ideas and objects of the modern world. The selection of the automobile was based on the belief that it best expressed 'the sixth muse': the beauty of speed, and the conquest of both time and space. The machine was not an expression of experience but something more vital: it was a

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[169] Robert Pirsig *Zen and the Art of Motorcycle Maintenance* p.295.

means of attaining a heightened experience of speed and power. As the Futurist

spokesperson Fillipo Marinetti (1876-1944) wrote in the *Futurist Manifesto* 1909):

> We affirm that the world's magnificence has been enriched by a new beauty: the
> beauty of speed. A racing car whose hood is adorned with great pipes, like serpents
> of explosive breath- a roaring car that seems to ride on grapeshot is more beautiful
> than the *Victory of Samothrace.*[170]

In the popular story Jonathan Livingston Seagull, Richard Bach speaks in a similar

way of the aesthetics of powered flight:

> By the time he [Jonathan Livingston Seagull] passed four thousand feet he had
> reached terminal velocity, the wind was a solid wall of sound against which he could
> move no faster. He was flying now straight down at two hundred fourteen miles per
> hour. He swallowed, knowing that if his wings folded at this speed he'd be blown
> into a million tiny shreds […]
>
> But the speed was power, and the speed was joy, and the speed was pure
> beauty.[171]

The machine, then, has had an impact on the arts, both 'fine' and popular. This

goes against the claim, made by Dewey, that the only artefacts that are interacted with

imaginatively are artworks.

4.4. The Machine as Exhibition Object.

It is clear that the experience of being at the controls of an aeroplane, motorcycle or

automobile is of more importance than the machine per se in the examples of

artworks cited above. In this sense, then, the art of (for example) motorcycle

engineering is analogous to the 'arts' of cigar- making, wine making or other culinary

arts (the arts of which simple sensory pleasure is the intended outcome, rather than

something more cerebral). One cannot enjoy the tactile aesthetic qualities of the

motorcycle until one actually uses it, just as one cannot appreciate a cigar merely by

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[170] Marjorie Perloff *The Futurist Movement.* Chicago and London: The University of Chicago Press,
1986. P. 89.

[171] Richard Bach Jonathan Livingston Seagull. London: Pan, 1972. p 26.

looking at it (and to do so is simple fetishism). The machine is, for Bach and the Futurists, a means to an experience; it is a work that cannot be passively consumed but actively engaged with. One could build bikes with purely aesthetic intentions in mind (as does 'engineer- artist' Shinya Kimura, who rebuilds Harley- Davidsons on strictly Wabi- Sabi principles).[172] But this, arguably, is simply not what bike design is about.

However, even as a static object the machine may still be ennobled by the romantic and symbolic aspects of its past, and by aesthetic qualities. This is why apparently useless warplanes and spacecraft can be placed on display at public expense, and why it is that sunken ships and warplanes are still explored by recreational divers and archaeologists as one explores castles and temples. They have made the transition from 'useful amalgam of parts' to 'culturally significant artefacts.' (Given the emotional connections that mariners, car enthusiasts and fighter pilots have for their respective craft, it is debatable whether any red- blooded man- or woman- could consider their favourite car in such bloodless terms). Machines become objects of imaginative contemplation despite their functionality.

A small number of artefacts (Charles Babbage's adding machine, the designs for Leonardo da Vinci's ornithopter, Richard Pearce's third aeroplane (figs. 4& 5) [173] are regarded as works worthy of preservation and admiration, despite the fact that, as useful tools, they are all quite useless. If an engineering work is regarded as a work of great craftsmanship or invention, (as is the case with all these examples), these may override the fact that, as mechanisms, they failed to accomplish anything useful.

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[172] Shinya Kimura/ Zero Engineering. *Zero Chopper Spirit: The Samurai Bikes From Far East*. trans. Kakuyo Yoshida and Ryojiro Okamura. Tokyo: Chop Stick Publishing, 2007. See also the website of Shinya Kimura's custom shop, www.zerochop.com. (accessed March 8 2008).

[173] Richard Pearce (1877- 1953) is thought to have flown a petrol- engined monoplane aircraft in Waiotahi in 1902, some months before the Wrights made their historic flight. It is unlikely, however, that the flights made by Pearce were controlled and from a flat area of land. So, strictly speaking, he did not make the required 'sustained and controlled level flight from level ground' as the Wrights had done. He made two more aircraft after the first. The third, preserved at the Museum of Transport and Technology in Auckland, was intended as a vertical- take off and landing (VTOL) aircraft. The design is ingenious and incorporates a number of novel features but was out of date when completed, is mechanically unsound, and was essentially a failure. It was never flown. Pearce died in Auckland in total obscurity in 1953. See Gordon Ogilvie *The Riddle of Richard Pearce.* Wellington: Reed, 1972.

Hence, they occupy a classificatory, cultural space closer to that of artworks than that of useful objects.

4.5 The Machine in Political Propaganda.

There have been a number of examples of machinery being used — not as useful tools — but as symbols of national or political prestige, that is, as propaganda works. In such cases the machine is employed in a manner analogous to the role of artwork or fetish- symbol. [174] The machine is employed as a fetish that represents power and technological (possibly even cultural) supremacy, despite the fact that the machine itself may only be of minor or negligible economic or strategic utility.

Although the totalitarian regimes of the first half of the Twentieth Century have provided the most spectacular examples of machine fetishism, it is neither a modern nor an unusual application. [175] The European navies of the Eighteenth Century and contemporary spaceflight are equally associated with national prestige and, in the case of some acquisitions and projects, only contingently related to actual military or otherwise utilitarian ends. I will focus on one such example of machinery employed in propaganda work in order to discuss the role of the machine in political culture. The example I will take is the use of the giant Zeppelins *Graf Zeppelin* (1928) and *Hindenburg* (1936).

Figure 12. The Tupolev ANT- 20 *Maxim Gorky* propaganda aircraft[176]

Figure 13 LZ 130 *Graf Zeppelin II*. [177]

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[174] By 'fetish symbol' I mean "a thing evoking irrational devotion of respect." (Oxford dictionary).

[175] The racing floatplanes of the 1930's were also involved in propaganda. The Schneider Trophy air race for float- planes (1919- 1931) is notable in that by 1926 al the teams were government subsidized, and all the pilots were military. Over the course of time the competition went from being a sporting event to a competitive striving for national technical superiority.

In the Soviet Union, the grandiose character of Stalinist architecture was mirrored in a series of enormous aircraft, culminating in the *Maxim Gorky* of 1934.

[176] Source: http://www.aviastar.org/pictures/russia/ant-20.jpg (accessed March 8 2008). A video (in French) is available here: **http://www.youtube.com/watch?v=kbT5EV2meEo (accessed March 9 2008).**

[177] Source: http://www.pilotundluftschiff.de/typenlz130.htm (accessed March 8 2008).

The Zeppelin *Graf Zeppelin* was thought at the time of its completion as the pinnacle of air transport. Although it functioned well for a number of years as a luxury liner on the trans- Atlantic route, it was later found to be uneconomical and essentially a technological dead end. [178]The Zeppelins were unable to fly high enough to avoid poor weather, and were almost prohibitively expensive to build and operate. Flights of the ships were funded in part by the Government and by publishers who were keen to publish the flights, suggesting that it existed economically as a media item and national standard- bearer as much as an actual vehicle. The *Graf Zeppelin,* being of impressive appearance (ten storeys high and more than two city blocks- 236 metres- long) and capable of arousing extraordinary public affection, its appeal had more to do with style, or even the mythology of aviation, than with functionality. [179]

Another, even larger airship — the *Hindenburg* — was designed by the Zeppelin works for a regular transatlantic air service. The construction of the new ship would have been brought to an end by the economic climate, it if were not for the appointment of Adolf Hitler as Chancellor. Although of virtually negligible use as a military or civilian tool (attempts to bomb London using Zeppelins during World War I being predictably disastrous), Josef Goebbels saw the potential for the Zeppelins for spreading propaganda. [180] With enormous swastikas painted on their vertical fins, the two airships were made flagships and monuments to the new regime, colossal testimony to the superiority of German science and technology. The Zeppelins were thereafter integrated into Nazi political rallies, speeches, and marches. They would remain aloft for days on end, dropping political pamphlets. Loudspeakers on the Zeppelins would broadcast marches and election speeches whenever it flew over populated areas. [181] By night it would remain stationary over crowded arenas, illuminated by spotlights.

The symbolic and hence political potential of the Zeppelins is clear. As Clement Greenberg wrote of political culture in the 1939 essay *The Avant Garde and Kitsch,* "the masses must be provided with objects of admiration and wonder."[182] As

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[178] Heskett *Industrial Design* p.p. 188- 190.

[179] Douglas Botting *The Giant Airships* Alexandria, Virginia: Time- Life, 1980.

[180] Botting p. 148.

[181] Robert Nitske *The Zeppelin Story*. London: Thomas Yoseloff Ltd, 1977.p. 155.

[182] Gillo Dorfles Kitsch. An Anthology of Bad Taste. London: Studio Vista, 1968.p. 25.

Greenberg argues, the art and imagery of the totalitarian state must appeal to the masses — a grandiose style that places emphasis on effect and immensity is required for this. Symbols of power and material plenitude are required (as opposed to the more 'difficult' arts of the Avant- Garde), and the Zeppelins provided such a symbol. [183] Insofar as this usage of symbolism and doctrine goes against the very idea of a 'superior culture' (that is, a culture of artistic works and practices too difficult to harness for the purposes of disseminating propaganda), the whole process of political culture (Zeppelins included) may be regarded as 'low art,' as kitsch. [184]

How were the Zeppelins incorporated into Nazi mythologizing? Swastikas were added to their surfaces, and they were incorporated into the crude but effective theatrics and choreography of Nazi propaganda.

The actual design and construction of Zeppelins has nothing to do with the production and dissemination of symbols, and hence of kitsch and propaganda. [185] It is only when the Zeppelin is used as a symbol, moves into the realm of symbol and image, that it becomes a fetish/ kitsch symbol. The coordinated usage of virtually evocative machines and monuments, as well as mass media (film, radio) and theatrics (rallies, marches, etc.) for the purposes of harnessing public approval at a subliminal level — that is, the art of propaganda — is possibly the key 'art- like' process in this context.

There is possibly also an analogue between the propaganda use of the Zeppelins and Marcel Duchamp's ready-mades. Duchamp took a urinal from a manufacturer and exhibited it as a sculpture, and through removing it from its nullity and ordinary

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[183] The Hindenburg 'disaster' is a testament to the sheer visual, almost mythical impact of the giant Zeppelins. Although a spectacular and apparently apocalyptic spectacle, only thirteen passengers (of ninety- seven on board) were killed. Botting p. 167.

[184] As discussed in section 2.5, notions of kitsch presuppose a theory of taste in art. Another aspect of Nazi culture that has a distinctive kitsch element is the elevation of the products of industrial design to high- art status. Through this cultural reevaluation, he 'low' in art (i.e. car design) is elevated to the status of fine art, thus possibly marginalizing the import of the Avant- Garde, regarded as (by the Nazis at least) 'degenerate.' Appreciating industrial design is one thing, but elevating such works as the Volkswagen Beetle to the status of icon to a new way of life (as the *Kraft Durch Freude Wagen*) is something else. The Nazi 'cult of technology' may be considered as kitsch. This essay is not an attempt at leveling- down culture to make it easier to ingest for the uneducated layperson, so it is arguably exempt from the charge that it is a kitsch- manifesto.

[185] The chief designer, Hugo Eckener, was in fact an outspoken anti- Nazi. See Botting p. 144.

context revealed (allegedly) its otherwise aesthetic properties. In an approximately similar fashion, the removal of the *Hindenburg* from its intended role as transatlantic luxury liner, and having it overshadow Hitler's motorcade, made it an emblem of the *Reich*. Through self- consciously placing the Zeppelin before the general public and associating it with the ideals of national strength (through the swastika), Goebbels makes the 'tool' a symbol, incorporating it into a larger scheme of symbols, mythologies and fabrications.

It follows from this that a given artefact (a urinal, a Zeppelin) may possess symbolic and aesthetic qualities independently of any intention on the part of the designers to project such symbols. In the Modernist, canonical idea of 'fine art,' art is concerned with the utilisation and manipulation of such symbols, hence Duchamp's urinal and Goebbels' redecorated Zeppelins are artistic acts, albeit in dubious taste. [186] The Aristotelian notion of art would include both the Zeppelin and the urinal as 'works of art' in their own right, but is uncomprehending of art as symbolic play or appropriation

4.6 White Car Crash 19 Times: A Possible Reply from the Artworld.

Fine art has a tradition of producing works that are suitable works of imaginative contemplation. However, if we are to consider all of those objects that have been accepted into the artworld as artworks, a number, the usual suspects in philosophy of art courses (Andy Warhol's Brillo boxes, Billy Apple's vintage motorcycle, Christo's *Wrapped Reichstag*, Duchamp's urinal, Jeff Koon's *Red Butt {Close- up}* {a close- up photograph, in standard hard- core heterosexual pornographic style, of Koons anally penetrating his wife}) it appears that Dewey's definition of art as 'consummated experience' is problematic if used as a definition of art. That is, art that is deemed artworthy on purely institutional grounds endangers the entire institutional framework with conceptual collapse through inflation of the term, or brand, 'art.'

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[186] A possible distinction: for even the simplest child, the Nazi- appropriated Zeppelin is seen as an object of wonder. From the perspective of a canonical ideal of art, the fact that the Zeppelin is easy to 'take in' and understand makes it of rather lowly status. Duchamp's urinal, by contrast, is relatively complex: one has to firstly understand what Duchamp is up to, and then take the time to dissociate oneself from ordinary urinal- consciousness and enter into aesthetic- consciousness (or rather playing- the- game- of- seeing- things- aesthetically- when – institutionally- sanctioned- by- the –rites- of- the- artworld conciousness: one does not need to put things in an art gallery to see them aesthetically).

A number of artworks (those cited above, for example) appear to be ordinary objects, or assemblies of objects, that have been placed in a fine- arts site in order to turn them into 'objects of imaginative contemplation.' Simply by placing a motorcycle in an art gallery, for example, forces the observer's attention towards the motorcycle a). because it is in a largely empty room, and so attracts attention, and b). because it is unusual (hence 'artistic') to see motorcycles in art galleries. By this simple and well- tried method, potentially any object can be turned into an artwork (and any sufficiently non- referential and self- contained symbolic gesture or ritual can be declared an art performance). In the case of Apple's works, the artefact resulting from the artistic activity (the temporary display, the reference in the exhibition catalogue) is of secondary importance to the rituals of commerce that turn the artefact into an artwork.

This discussion brings us back to the scene in the art gallery back in 1992, at the beginning of the dissertation. Why is a vintage motorcycle an artwork whilst inside the gallery, but a merely useful object whilst outside the 'artworld' site? What does the motorcycle acquire when it is brought into the gallery and listed on the catalogue? What would happen if Billy Apple had chosen — not a vintage bike but a hand built and numbered Britten Daytona — built by Britten himself, and considered by its Maker to be an artwork (of a sort) *to begin with*?

The transformation of ordinary things (motorcycles, urinals, etc.) into artworks in such cases apparently has nothing to do with traditional concepts — the central concepts of the co- founders of our form of civilisation — as *sophia, techne* or *poiesis* (wisdom, skill, making) — so what is it? In the case above — why would Apple take the credit for producing *art* whereas Britten would simply be providing the *material*? Given that artists such as Koons and Warhol have deliberately blurred the distinction between fine art and non- art, or popular art, it is becoming increasingly difficult to justify the notions of connoisseurship and cultural elitism when confronted with such works without looking ridiculous.

How could such artists as Billy Apple and Andy Warhol respond to the premise behind this essay: that is, that 'fine art,' taken to be a reference term for a class of artefacts, has a number of similarities with those arts that are practiced with practical ends in mind, specifically engineering and industrial design? To put it another way — how would Warhol and Apple respond to the suggestion that their art could be

inferior to that of the industrial designer who works with (possibly) great skill and imagination?

In a more aesthetically advanced culture, such a gesture as placing in an art gallery passes without a hint of irony or need for theoretical explanation. When Shinya Kimura displayed his custom motorcycles in an Omotesando art gallery in 2007, it was considered by the media as just another show by just another artist. The same could be said of the debut of the Citroen DS19: there is no irony in Barthes's essay; nor was there irony in Bertoni's official recognition as a great artist. In Japan, where fine art, as a distinct socially constructed reality, does not exist, Apple would be dismissed as a mere plagiarist.

But how could this be? It is entirely possible, of course, that the Japanese just have it wrong. One reply could be this: there is more to the notion of 'fine art' than the 'artefacts' involved. In the work of Apple, Duchamp and Warhol, the 'art' has as much to do with the ideas behind the works as the works themselves. In such cases, then, an Aristotelian 'classification of artefacts' would seem to have missed the point altogether. The Duchamp 'urinal' is a case in point.

Urinal Art

In 1917 Duchamp took a urinal to the Grand Central Gallery in New York and exhibited it as a sculpture entitled *Fountain,* having signed it R. Mutt. Against the charge that he had plagiarised the work of a designer of plumbing fittings, "he [R.Mutt] took an article of life, placed it so that its useful significance disappeared under the new title and point of view— created a new thought for that object." [187] In the case of Duchamp's urinal, Apple's contract- art and Warhol's Brillo- boxes, the empirical qualities of the artefacts involved tell us little of the artistry involved. The distinction between art and non- art on empirical grounds is made almost impossible by the fact that the artwork may be empirically identical to the non- artwork. To understand such works *as* artworks, we must abandon the Renaissance idea of artist – as- skilled- artisan and turn instead to the idea of the artist as an observer, communicator or even critic (why *this* motorcycle? Why *that* urinal?) of his or her immediate environment. As opposed to the industrial designer, who works within the framework of commerce and materials, the 'fine artist' may place a distance between

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[187] Sparshott p. 669.

herself and the realm of commerce and the physicality of things. The artist requires a distance from reality and socioeconomic forces in order to reflect upon them in her work.

Andy Warhol and the Imagery of the Machine.

Figure 6: Andy Warhol *Gun* (1982).[188]

Despite Andy Warhol's almost total rejection of the ideals of 'fine art' as imagined in the 19th Century (in particular of the artistic ideal of the artist as disinterested in commerce) his direct appropriation of advertising illustration, industrial design imagery, comic books, press photographs, and canned food labels conforms to the idea of artist- as- communicator, and as chronicler of an age. In discussing the distinction between industrial design and fine art I will discuss two Warhol works, *Gun* (1982) and his 1963 series of paintings of auto wrecks.

The painting *Gun* is not a traditionally rendered painting. It is a silkscreen print, and the image has been mechanically copied (most notably by one of Warhol's assistants) from a technical illustration, perhaps from a firearms catalogue. The image is of a Hi- Standard .22 calibre handgun. [189] The design of the gun is the work of an industrial designer or designers, and the purpose of the design is concerned with the norms of handgun design — functionality, simplicity of use, ease of maintenance, and the presentation of a polished, marketable appearance. This has nothing to do with the notions of fine art, despite certain, perhaps tenuous similarities to the design process.

Warhol's *Gun,* by contrast, operates exclusively in the realm of images and symbols — the overlayed black and red silkscreen prints on a white ground present us with a visually striking image. The image, appropriated from a commercial and mass-produced source, goes beyond its origins and becomes an artwork that is open to

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[188] Source: www.parismoods. com. Auction news.
http://creative.free.fr/sothebys100506/4M43D_N08201-6-1.jpg (Accessed March 8, 2008).

[189] Klaus Honnef Warhol. *Commerce into Art.* Cologne: Benedikt Taschen, 1993. Ppp. 24-25.

interpretation. The image becomes a part of a conscious dialogue (as opposed to the partly subconscious dialogue of design semiotics) between the artist and the audience. It is an accepted part of the Modernist tradition that we may discuss what the painting *means*, and that it may have aesthetic or symbolic resonances only present with the question of meaning or intention in mind. It could be a comment on the American two- edged love affair with small arms. It could be a comment on mortality, or consumerism, or specifically on Warhol's own experience of surviving a shooting. It could mean all three or none of these, but through appropriating the found image in an artwork these interpretations are possibilities that are invited. In any case, it is clear that, although empirically similar, the original image of the handgun and Warhol's appropriation are far apart in their cultural contexts. Just as a hammer- and' sickle assemblage accidentally formed on a barn floor, Warhol's *Gun* means something distinct from a mere commercial image in a mass- produced image in a firearms catalogue. In this case, the idea of artist- as- communicator and manipulator of imagery is more relevant than the idea of the idea of artist- as- *techné*- ician.

In the same vein, Warhol's 1963 series of multiple silkscreen images of crumpled automobile wrecks (*Orange Car Crash 10 times*, *Green Burning Car I*, *White Car Crash 19 Times*) using images taken directly from press photographs, go beyond the banality and commonplace of the found images themselves. There may be some artistry involved in car design, or even in the 'road fatality' genre of press photography, but such technical skills and arts are not of the same *type* of art as Warhol's silkscreens. Warhol has taken the image and has possibly seen some symbolic potential that has been otherwise overlooked. The newspaper image of the burning car wreck is enlarged and multiplied using the silkscreen process, transforming the image into an unsettling symbol of violent, senseless yet intentional death.

In this sense, Warhol is still operating within the traditional notion of the artist as observer and communicator. His silkscreen prints of food labels, film stars, car crashes take the images of the everyday and ennoble them to the ranks of 'art,' placing them in an aesthetic space and thereby transforming them into something altogether new — possibly even making them socio- psychological symbols and icons. This process also reveals a shift from the real and tangible to the illusory and artificial — Warhol seems to emphasise the fact that the mass- produced imagery of the newspaper distances us from the reality of such events as car- crashes.

Manipulation of the image (through enlargement or repetition) is a means of revealing aspects of the image that we may have become insensitive to.

In any case, the work of Andy Warhol and Marcel Duchamp strongly suggests the ideas and cultural context of a given work may be at least as important as the material, empirical facts and appearance of the resulting 'artwork' artefact. In such cases, the art establishment and its rituals and conventions may be as important to understanding the work as hanging it the right way up.

In other ways, modern art may be best understood not in terms of technical skill but in the light of prevalent theories or ideology. Other artists of the 20th Century — notably the Abstract Expressionists, Jackson Pollock, Mark Rothko — were celebrated for their introspective and extravagant idealism. (This marked an intellectual climate in the 1950's that rejected the physical and material). The artwork itself was not the 'sacred object' it used to be. In the work of Pollock the act of painting — not the painting itself — was the central component and point of emphasis.

4.7 Conclusion.

Against Dewey's definition of art, then, it can be concluded that there may be machines and other practical objects (buildings, bridges, weapons) that were not built for the purposes of 'expressing experience,' that nevertheless surpass much contemporary 'fine art' as objects of imaginative contemplation, craftsmanship, beauty and cultural significance.

However, there is an important sense in which the Modernist notion of fine art is profoundly traditional. It maintains the idea of the artist as communicator and commentator, concepts which are largely foreign to engineering and (to a lesser extent) industrial design. Engineering may provide objects of imaginative contemplation, just as certain Renaissance works, mathematical formulae, chess games and natural forms provide objects of imaginative contemplation. This is a type of appreciation quite distinct from the appreciation of an artwork that has been produced for the sake of *communicating* something between individual consciousnesses. We could crudely generalise — and say that engineering is possibly a solipsistic creative activity (in that there is no acknowledged other with whom one

communicates)[190] whereas Modernist art is *communal.* Industrial design is somewhere in the middle, in cases where machinery is looked at and interacted with. Fine art presupposes an audience, industrial design presupposes a consumer, and engineering presupposes neither

CONCLUSION OF THE ESSAY

What do the practices and products of engineering and industrial design have in common with the practices and products of fine art? The machine embodies *techné* and *poiesis* — a *bringing- forth,* a revealing of *Being,* in Heidegger's terminology. Machine design (and sometimes manufacture) requires craft (craft here being associated with the German term *Kraft* — meaning 'skilled creative power).'[191] Machine invention requires exemplary powers of imagination. The machine is related historically to developments in the same technological tradition from which the fine arts emerged. The machine may be beautiful (the artwork may also have accidental aesthetic qualities). The machine may be regarded as a historically significant artefact. The machine may embody a profound understanding of natural forces and of mathematics. The machine or engineering work may become a symbol of an entire epoch: 'progress' symbolized in some work that demonstrates our progression in understanding natural forces and how to manipulate them to our own ends (the Viking

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[190] certain forms of outsider art may be similar in this respect, insofar as some outsider art may be produced for some ritual function known only to the creator.

ship, the railway engine, the Brooklyn Bridge, the Saturn V launch vehicle and so on). The machine may symbolise a nation's fighting spirit (the Supermarine Spitfire). Both machines and fine art objects may be produced with a practical end in mind, or at least as a means to and end that need not necessarily be mechanical, but symbolic (perhaps in some subliminal way). The machine may be an extremely expensive status symbol that is manufactured for an economic elite who wish to communicate this putative status. The manufacture of both machines and art works may be conditioned by economic, technological and ideological constraints.

What does fine art have that machine design does not have? Simply put: artists want to produce objects that will be taken to be artworks. Engineers and industrial designers are concerned with designing and building chainsaws, motorcycles and automobiles, but they may nevertheless be concerned with aesthetic — (once traditionally artistic) — qualities. A Boeing 747, for example, is an engineering work, but only an 'artwork' as defined by Aristotle. This is because the building of airliners requires exemplary skill and knowledge. A Boeing 747 that has been wrapped by a modern artist (in the manner of Christo) on the other hand is a 'contemporary art work."

The philosophers, mathematicians, physicists, engineers, architects, and artists of the past — Aristotle, Thales, Leonardo da Vinci Pierro della Francesca, Newton, Wren, Eiffel, the builders of the Gothic cathedrals, or the Brooklyn Bridge — would look on at the Boeing 747 with approval. Some of them may even recognise in it the influence of their own work. Our imaginary artwork, *Wrapped 747*, on the other hand, is not associated with such a venerable tradition of technological progression. It does not even appear to be associated with any artistic tradition earlier than Duchamp. It has, however, been produced with the intention that it will later be taken to be an artwork.

To conclude, we may question the assumption that the intentions of producing a 'work of fine art' will automatically give the resulting artefact a greater cultural worth than an artefact which was produced with some utilitarian function in mind. Insofar as the 'fine arts' establishment is concerned with the distribution and manufacture of works that are produced to be appreciated primarily as fine art works, we are free to question the idea that this institution has a monopoly on the production of culturally significant works. Given that both the popular and applied arts are increasingly acknowledged as being of cultural significance and artistic richness (computer games

in particular), we should also seriously doubt the idea that the fine arts establishment is the sole heir to the art and craft traditions of the past. A fine- artwork need not necessarily be culturally significant. A useful object need not necessarily be non- art.

I have concluded that the only distinction between fine art and industrial or mechanical design is that the artist intends to create art, whereas an engineer or industrial designer does not. The emptiness of this distinction, I think, is made clearest in cases where people create unremarkable or even amateurish mechanical designs, and embellish the mediocrity or simple ordinariness of their work with the assertion that they are 'artists.' In 1995 Philippe Starck designed a stylish but otherwise average 650cc motorcycle for Aprilia, the Aprilia Moto 6.5. On the bike's artwork status, Starck stated that "I'm trying to move towards making objects which are honest, objects for non-consumers, for modern rebels."[192] Referring to the myth that art has nothing to do with consumers, Starck's tongue was no doubt firmly in cheek. The bike was undoubtedly beautiful, but was never to win the Istituto Europeo di Design's Most Beautiful Bike in the World contest. The Ducati 1098 *has* been voted the most beautiful bike in the world— so why not proclaim its designers to be artists?

By the same token, when an artist designs something resembling a functional machine, which has essentially mechanical objectives in mind which are not met (Panamarenko's {b.1940} futile attempts to build flying machines),[193] his fine art credentials should not distract us from the fact that actual pioneering aircraft are simply more interesting to look at, are better examples of design inspired by nature, and more original as creative works than his sculptures.

If and when the genius and skills of the technician and craftsperson are restored to positions of honour in the everyday life of our society at large, 'art' will revert to the sphere of 'making,' its original home. The mystique surrounding 'fine art' will continue to evaporate off, and artistic creation will be appreciated wherever it is evident. Artists the likes of which have never before been seen since the Renaissance have already begun to emerge. One such artist is Theo Jansen (b.1948), who bases his

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[192] Bike Trader "Aprilia Moto 6.5."
http://www.autotrader.co.uk/EDITORIAL/BIKES/REVIEWS/26115.html. (Accessed March 2, 2008).
[193]Home page: http://www.panamarenko.org/home.php (accessed March 2 2008).

self- propelling kinetic sculptures on designs generated using genetic algorithms. His walking- machines are as mechanically accomplished as they are sublime works of art for the very reason that he has rejected a dichotomy that was essentially foreign to the pre- modern era.

I have argued that 'the artwork' is traditionally thought of as a 'culturally significant work,' but that the association between artworks, non- artwork artefacts and cultural significance is continent. In discussing the relative worth of an artefact, then, we need a way of establishing its cultural worth without making the assumption that it is an 'artwork,' or assuming that the very question has any relevance.

Consider the following case. In 1993 artist Gabriel Orozco took a Citroën DS, sliced it lengthwise into three sections, and faultlessly rebuilt it with the middle section missing. The reconstructed car is undoubtedly a visually impressive work. Supposing that he had used the last *déese* on Earth (God forbid), would this be a case of cultural creation, or a case of cultural vandalism? What is the more valuable artifact, from a cultural perspective?

Figure 14. Orozco's *La DS* (1993). [194]

There is, of course, no simple answer to this question. Some people would take an Expression line; some would place a greater emphasis on technical skill (Orozco's rebuild is thorough: the doors and bonnet all open and close, and the joins are seamless). The Art World has, perhaps, spoken: at the 2005 International Art Fair (FIAC) the DS was celebrated as an artwork in its own right. [195]

The answer to this question, when addressed with regards to specific artifacts (or specific policy decisions — which museum gets funding, which exhibition is approved) would require the consideration of questions of the type below. Is the artifact an authentic example of its kind? (That is, is it a forgery or a copy of an original that we consider historically significant?). Does the artifact communicate some important idea or impression? What was the intended purpose, whether

[194] Source: http://en.wikipedia.org/wiki/Image:OrozcoLaDS1.jpg (accessed Mach 8 2008).

[195] Autocult "Citroen Totem Mobile" http://www.autocult.com.au/NewsDetail.aspx?id=166. (Accessed March 8, 2008).

mechanical or symbolic, in manufacturing this artifact? (If it was mechanical, has the maker succeeded?) Does it stimulate or gratify the senses? Does it stimulate or gratify the intellect? Does it fascinate? Were rare and skilled arts or techniques required to produce it? Does the artifact satisfy our desire for a more ordered and harmonized — that is to say — *humanized* environment? Is the artifact to be valued for its novelty, singularity or rarity? Does the artifact represent some intellectual achievement? Does the artifact reveal some higher natural order of harmony that is normally hidden from ordinary experience? Does the artifact aid us in understanding ourselves and our past and future?

In considering the value of an artifact (taken from within the context of the relevant institutions), the question "is it art?" (that is, "does the contemporary art establishment regard this as art at the present time?) is of nugatory importance. The objective of this essay is to suggest that art (in a broader, and therefore in a more historically and conceptually complete sense of the word) may exist outside of the art gallery: perhaps even in the car park.

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ILLUSTRATIONS

[NB: these notes refer to the original 1997 MA thesis and not to this version].

The illustrations overleaf are to accompany the text.

Figure 1. An exhibition catalogue cover from the 1995 Wellington City Art Gallery exhibition *Objects of Desire,* being an exhibition of New Zealand industrial design. The illustration on the cover is of the Britten Daytona motorcycle.

Figure 2. A page from the text *Orders of Architecture* (1659-1664). From Baynes and Pugh *The Art of the Engineer* (49).

Figure 3. Illustration from Thomas Malton's *A Compleat Treatise on Perspective* (1779). Baynes and Pugh (49).

> These illustrations show the adoption of formal geometry and draughtsmanship in boatbuilding, which eventually led to the division of labour and the separation of design from manufacture which characterized the Industrial Revolution.
>
> Figures 4 and 5. Richard Pearce's third aeroplane (never flown).

Figure 6. *The Perspective appearance of a ship's body in the mid- ships* by Edmund Dummer (1680). According to Baynes and Pugh (*Art of the Engineer*: 85), illustrations such as this show a desire on the part of shipwrights to raise their professional status to that of architects, through self- consciously utilizing architectural drawing techniques.

Figure 7. Otto Lilienthel with folded glider. In Moolman *The Road to Kitty Hawk* (76).

> (Engineering inspired by natural forms). The resemblance to bird morphology in the glider is such that it folds in the manner of bird wings.

Figure 8. Gokstad ship, Oslo. Sir Kenneth Clark *Civilisation.*

Figure 9. Drawing showing a ship's draught with a fish. From *Fragments of English Shipwrightry.* Sixteenth century. Mathew Baker. Baynes and Pugh (70).

Figure 10. *Le Bris* glider. French, late 19th century. Moolman *The Road to Kitty Hawk*

(76).

Figure 11. Douglas DC-2 (1934). Heskett *Industrial Design.*

Figure 12. Politics and industrial design: Porsche (left), Hitler and the KDF *Wagen.* (KDF being the acronym for *Kraft durch freude,* "Strength through Joy," later simply the *Volkswagen Käfer* (beetle). From Etzhold *The Beetle.* Sparkford: Haynes, 1991.

Figure 13. Citroën DS 19. Dormer *Design since 1945.* (66).

Figure 14. Ford Edsel. Pettifer, Turner *Automania* (139).

Figure 15. Engineering and art in unison. A bridge designed by an artist and executed by engineers. *New Zealand Herald* 1997.