

**IAS SYMPOSIUM, STUTTGART  
CONCEPTUAL DESIGN OF STRUCTURES  
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**IAN RITCHIE**

## Ian Ritchie : A talk which touches upon several themes of this symposium

(1),(4),(5),(6),(7)

### Redefining the Design Team to Enable New Concepts to Emerge

#### **Introduction**

The reason I have been asked to say a few words at this symposium on Conceptual Design of Structures is, my preoccupation and writings on the subject. However it also provides me with an opportunity to announce my own personal indebtedness to engineers and at the same time to help proclaim to a wider audience that Art is an essential ingredient of all good design, although that art has, and is still, so often buried beneath an avalanche of the architectural and engineering fashion of the day. It was Buckminster Fuller who once said that most architects are simply good (or bad) taste purchasing agents (ie. they're experienced at selecting from catalogues or architectural magazines).

To enjoy the company of engineers, economists and those in the construction industry is a privilege, but for me they must be more than just concerned with their own world. They must be sensitive human beings, who have a personal philosophy about life in general. This is often too rare, or rarely apparent, but I have been fortunate to have met and worked with a few, and there is no doubt in my mind that they deserve public recognition (even if they don't seek it) on an equal basis to those architects they have worked with.

What these people have in common is confidence, and an intuitive sense of sharing an experience, where the job is the goal, not their job.

#### **Architects, Engineers & Construction Industry Culture**

Numbers, (says John McLeish in his recent publication) " are not a sadistic conspiracy devised by one half of society for torturing the other half. Instead they are evidence of our inventive genius, and understanding them is one of the most important characteristics that distinguish us (as animals) from other animals."

If we add culture exchange to numerical literacy, then we really do create a powerful medium for invention. Today this culture, at a personal level, between individuals, can often begin with estranged collaborators, all of whom have to be capable of shedding their protective skins to enable a barrier free exchange to take place - this is the primary move to allow cultural fertilisation and innovation to take place.

This approach is no different in a larger context. History is full of nations and peoples developing philosophies and techniques which have, through mixing, produced the context for extraordinary creativity.

An exhibition is essentially about cultural exchange -and this symposium is such a venue. In 1992, an exhibition - Art of the Structural Engineers, had the themes of concept, form, materials, connection and construction - these are no different from the essential components of architecture, sculpture, even music, which is why there should and must be common ground between those of us who are fortunate to be entrusted with a major role in creating our built environment.

The true artist searches for the essence in things and then seeks to express it. This is the **preconcept** which is important to identify before determining the concept of a building or structure.

It may be found in the poetry of the place, even hidden below the ground, or in the properties of a material, or how one part interacts with another.

When brilliantly expressed it is inevitably controversial, i.e. it makes us rethink.

Engineering is a domain which should seek essence. Engineering is much more than a quiet service industry to architectural egos, but perhaps it is too provocative to suggest that without engineers, architects would collapse!

### **Synthetic Thinking between Engineers, Architects & Designers**

To be provocative, I suggest that the profession of civil engineering and its offspring - structural engineering, has its roots in the discipline and hierarchical nature of imperial armies acting on behalf of certain western countries. Here were born the tenets of economy and efficiency.

Economy and efficiency are the historic buzz words of engineering design for the traditional engineer. When used by visually illiterate engineers as the only design criteria, they have led to a great number of 'aesthetically' unsatisfactory structures. However, it is the attitude and lack of design skills rather than these tenets themselves which have produced these results. There is no reason to suppose that we cannot make economy and efficiency subservient, without denying their crucial importance in the design process and eventual artefact.

During this "colonial" period the architect became the engineering decorator, with a rôle to camouflage - arguably carried out in the interest of urbanity, architecture or simply making the engineering publicly acceptable (e.g. Tower Bridge).

This division has existed for nearly two centuries. There have been enlightened engineers (Brunel, Telford, Eiffel, Nervi, Candela) who have produced exceptional engineering works which are not only structurally inventive, but go beyond the material domain to create notable public space. These engineers clearly had an awareness of the civic importance of some their works.

Masonry, as the main engineering material, marked most of mankind's achievements up to the 19th century. Then, with the advent of wrought iron (1799, the 30m span Coalbrookdale Bridge by Abraham Derby), wrought + cast iron (1820 Thomas Telford's 177m Menai Straights Suspension Bridge, Paxton's 1851 Crystal Palace), iron + steel (Gustaf Eiffel's work, 1884, notably the 178m steel arch of the Garabit Viaduct) and then steel in cable form, structural engineering with steel has become more and more specialised.

In the context of light and architecture, Paxton's extraordinary achievements and others in the mid-19th century - removing the entire solidity-opacity associated with buildings, has seen a renaissance in today's architecture.

The Innovation of reinforced concrete led to many advances (Auguste Perret, Eugène Freyssinet in France and Robert Maillart in Switzerland who, 1901, designed the 38m span hollow box arch form Zuoz Bridge) and this material has seen tremendous advances since, through a better and better understanding of the nature and quality of the materials involved and how they behave together. The engineer can now bring to this knowledge, yet more powerful analytical models to test ever more complex solutions.

Today has been added resin and structural glues to create natural and synthetic laminates.

**now?**

Architects, who have recently been in the vanguard of structural inventiveness in their

architecture, have been so only because of the support of engineers, yet the public's appreciation of the engineer has been severely limited by the media's sole promotion of the architect.

In the late 20th century, structural engineering inventiveness requires the support of rigorous analytical method(s). It has not always been so, but we have experienced an ever increasing tendency towards this position as a result of material research, technical development, and application of new materials and development of sophisticated mathematical models for analysis. Architecture is as much a witness to this as is engineering.

There have always been individuals who, either ignoring or defying professional boundaries were capable of pan-professional action (e.g. Eiffel, Nervi, Fuller etc). Of course this behaviour attracts envy and creates jealousy from traditional professionals. It is rare today for an individual "engineer-architect-designer" to be capable of thoroughly analysing inventive structural engineering proposals without the support of specialists. He may appear to have a broader perspective within which to design, but this can be less than the conceptual horizons imagined by a collaborative team of creative individuals who come from different disciplines (e.g. Rice Francis Ritchie), yet who can also continue to develop individually within their own field.

Imagination - creativity - intuition, material understanding - analysis - design - economics, and an understanding of the political and social role of the process through which we realise projects are all ingredients in the making of architecture, and the urgent need to dissolve the intellectual boundaries between professionals is a fundamental necessity if we are to realise more intelligent and responsive architectural and engineering concepts and built realities.

### **Professional Barriers**

Psychological barriers only occur in the minds of men, and like any theory constructed by man these barriers can be deconstructed and replaced.

"Barrier absence" requires a way of thinking and attitude which is no longer territorial because respect and trust exist, which in turn encourages confidence with humility between people. Professionals should be as capable of realising this as anyone else, and in terms of their influence on society and the physical environment, should have a moral obligation to do so.

I know from my own experience with Peter Rice and Martin Francis, and the way our office in London functions with individual engineers and economists, that territories do not have boundaries, they are simply different landscapes which require different skills to negotiate well, but also through which, with one's collaborators, one can be supported and supportive.

Each individual, with his or her specialised knowledge, should feel comfortable and confident enough to hold the hands of the others across these different intellectual landscapes at the appropriate time during the development of the project.

In an architectural practice which has at various times included engineer, naval architect, artist, anthropologist, photographer, landscape architect, poet, where none are regarded as technicians or draughting people, we are accustomed to the absence of barriers as we are to the absence of hierarchy. Since a small office cannot always sustain this diversity, we collaborate with other professions in the usual way. It is important to do this with people who share the same objectives - for example design quality, and similar values.

Thus we have, over the years, established working relationships with a selected number of consultants.

Mutual education and reorientation is necessary when a job comes to us with another consultant

already attached to it by the client, and there is a "heat" period necessary to melt the engineering and architectural boundaries. Shotgun weddings are very difficult to manage.

## **Collaboration**

The kernel of creative collaboration contains several crucial ingredients:

- Each must take time to listen to the other, and suspend prejudices. Not only does this allow mutual respect to grow, but without it, the synergy of mutual creativity cannot flourish. The process is like brainstorming, in which nobody can quite remember where the concept or the solution came from
- The commonality of aims is usefully complemented by a diversity of expertise.
- No barriers = no defences. There are those who feel threatened when another profession speaks their language and questions their assumption. [It is a shame we have these languages and hide behind them at times.] This is inhibiting to any free exchange.

These principles of collaboration apply at all stages of a project; initially with a client and consultants, and later with a builder or fabricator. Differences of orientation can generate conflict, or can be harnessed creatively. The trick to helping this process to move in a constructive direction is often found by sticking rigorously to an open-minded approach where everyone's preconceptions - especially our own - are questioned, and we demonstrate a willingness to receive other's ideas and modify our own, whilst at the same time refusing to compromise our design principles and values. Those ideas that survive this process of challenge are the stronger for having stood up to scrutiny, and the process is exciting.

"After all, we all agree on that [collaboration]...But talking about it doesn't seem to have had much effect. One must somehow create the conditions which will allow such collaboration to take place, and one must educate members of the building team to see their own contribution not as an end in itself, but as a part of a common endeavour to create comprehensive, total architecture." [Ove Arup 26/10/72ICE]

## **Ten Commandments for Collaboration**

1. There has to be a moral commitment
2. There should be no preconceived idea and collaborators should be open to almost anything
3. Learn to really listen and to interrupt, and be ready to be interrupted
4. Ideas are shared - no one can claim them afterwards
5. Be altruistic, not competitive
6. Respect the minds of your collaborators, their individual skills will become valuable later
7. There is time together - synthetic time, and time alone - reflective time
8. All participants are equal, there are no bosses
9. You have to respect the common concept as being more important than what you could have conceived by yourself
10. Be prepared to improvise

All of our work has a public content, whether the entire building or just its facades. We rarely, if ever, construct with our own money for ourselves.

We act as the group between the public and the client and together we have an obligation to both. When we work together and collaborate, some degree of friction always arises, whether it is over the money, the design or the morals, and has to be resolved in the end by the project itself. It is recognising the project as mediator which helps to solve them.

The collective idea which emerges is the first and most important thing. It is vital that all who are to collaborate on the design of a project come together at the beginning.

All design work is political in the ultimate sense in that we are trying to produce a world that is better to live in, where people understand more, where people are less oppressed and people live less dreary lives, where they have more control over their environment. This is the glue that brings us together, and should be present, if not apparent, in all concepts.

The person who first receives a call from a client has to decide very quickly how and with whom they will work. It is often an architect or an engineer. That person makes up their mind, but they also have some obligation as soon as they set up this wheel of collaboration, to inform the client. The defining of issues between collaborators such as the nature of the contract, fee split, joint or separate insurance and responsibilities are very important to pin down early. Collaboration doesn't really mean anything until it is defined.

Some of the best **concepts** have come from people who are not "recognised designers", yet who are as concerned about our future environment as architects, engineers and landscape designers. These include geographers, urban planners, archaeologists, anthropologists, artists and poets. These people understand how environments work as well as architects and artists, if not the buildings or structures themselves.

For me, open collaboration where individual egos work together in the interest of the project and beyond, are those which are the most enjoyable.

I have tried to outline above a methodology, a way of working which can engage different kinds of people working together to create concepts beyond individual potential.

I think the world of tomorrow will have problems that are more complex. Architects, engineers, designers and artists will have to find new conceptual and analytical ways of solving them with their clients. We will all have to learn new kinds of methodologies to solve problems.

We have always approached each project with fresh eyes and minds to seek, with the client the best way to achieve the desired end result. Traditional forms of engagement, of construction contract, of collaboration are constantly being questioned by us.

### **Synthetic thinking in a more complex world**

While our designs have often explored the structural and energy performance of certain materials to help create spatial environments, one of our current concerns, as illustrated by the experimental greenhouse in Terrasson and the proposed new Opera House adjacent to Tower Bridge in London, is to create a less expensive but conceptually stronger architecture using material which undergoes less processing by industry. This also means using less energy in the preparation of and fabrication of construction elements and potentially more economic buildings.

At the same time, we stay aware of research and developments in what I refer to as high technology, such as holographic films to help conduct and distribute light using far less transparent surface areas; molecular "replicating" spiders' webs, and nanotechnology (advancing in Saarbrücken at the Institute for New Materials, and elsewhere)

I would like to quote an exchange from the second reading of the Energy Conservation Bill which took place in the British Parliament last year.

(Mr Patrick Thompson) " ..Concepts such as wind power, wave power, hot rocks and fuel cells are exciting, but, as my noble Friend said, the truth about energy efficiency is that it is boring, as it

really only concerns property insulation and design."

(Mr. Brandreth) " I disagree with my hon.Friend about energy efficiency being boring. I find that when I talk to people in my constituency about cost savings, they recognise that it is a case of enlightened self-interest and that they can help save the world, while improving the quality of their home life and enhancing their bank balance. Far from being boring, it is exciting."

At the end of the 20th century we can recognise some of the environmental building follies of this century, such as air-conditioning. We can also see the crudeness of our industrial manipulation of the earth's resources into pretty basic building materials. Looking ahead, I can see much cause for optimism. One need only investigate a tree.

They capture light, make energy, grow by processing CO2 and water, support and are a home to other life forms, and they don't make a human audible sound, nor appear to waste heat or energy or waste anything else for that matter and are natural pollutant processors, they provide shade and they look great. If there are appropriate architectural forms, they are to be found in nature at the macro and micro scales. But we need to understand their dynamic composition and mechanisms at the molecular level, not simply appropriate their forms for visual delight - mimesis.

### **The complex problems of tomorrow**

A new wider and more appreciative Europe is, hopefully not simply the creation in the coming years of the largest, most powerful single economic market that the world has ever seen, with its consequent energy growth demands, but a staging post, symbolic of a desire to achieve a more integrated whole world.

Monetary economics has so far failed to find a way of dealing with social costs or with renewable resources. The present western mania (indeed more and more global) for development based on a mechanistic and materialistic viewpoint, supported by the present inadequate economic methodology has led to increased pollution, both on a global and local scale. To most economists it appears that the social and environmental costs still remain intangible. One may think that the point of economics is to help us manage the world better, however I suspect that few economists see it this way. It seems inevitable that there must be a change in the current economic way of thinking.

Man developed the present model, and our actions still maintain it. A sustainable economy means a more compassionate one, in the way we relate to each other and the planet. The earth owes man nothing. The global spread of the free market economy (so far leaving aside the polar regions) sucking the earth's wealth will probably lead our present concept of progress into oblivion. Excessive borrowing from each other and our children is wrong.

Exchange through discussion and openness of information is essential for understanding, and when this engages cultural exchange a major prerequisite for creativity is in place.

This in turn makes creativity more accessible and maybe more democratic in a less competitive environment.

Competition has been and remains the conceptual trigger of our present economy and society. We do not believe that this is inevitable as is often argued. Collaboration, cooperation and indeed altruism is as common a natural inheritance as 'survival of the fittest'. This is a clue to redefining economic ethics, where the economy is seen not only to serve people in a material sense but to place it in a wider, more holistic context, where non-material issues are as important as material

ones.

Quantum mechanics has shown that we are not observers, but participants in the world around us, and yet through our limited human perceptions, we continue to describe and prescribe as if our minds were still outside our own bodies and environment. The study of ecology has brought this into focus for us. Science has also shown us that the only certainty about certainty is uncertainty. These observations, which have undermined science's own imperious position, ought to be making us more tolerant and more ready to participate together in many more aspects of life.

Is not the art of living the ultimate art?

In the end, it is not the planet which is at risk but man's place (and existence) with it. Our present concern for the planet appears to be a reflection of our selfishness (e.g Energy Conservation Bill debate illustrated above). We hear and talk about the loss of the world's natural resources, plant and living organisms, both in our own country and across the planet, but more often than not in the camouflaged context of our human survival through nature's diverse resource for human welfare (medical, etc).

It is vital to participate as an individual to express concerns about the wider issues which affect architecture. Like holography, in each part is the whole, but unlike the hologram, each part is important to the whole. Ideas popularized in the 60's, dematerialism (conceptual art), ecological awareness, spaceship earth - world citizen and the revolution in life-styles (sexual and religious taboos) have been slowly and discreetly absorbed and transformed by western society into more practical and vociferous views on how to begin solving world issues such as hunger, pollution, shelter and inter-cultural communications. (Some would argue that this is potentially another form of colonialism). Yet the economic model remains largely impervious to them.

In our urban environments, also spreading globally and 'home' to a larger and larger percentage of the earth's inhabitants, there is a danger that we are establishing an exaggerated and cocooned sense of our own self-sufficiency, which in turn will further alienate us from the essence of life on earth. Urban sprawl, a major world environmental issue was not even on the 1992 agenda of the World's first environmental conference in Rio de Janeiro.

The architecture we produce, and how we make our buildings is a reflection of our world view, or "how we walk on the earth". This is difficult for architects to assess in real terms, within a society still dominated by the culture of science and technology within the present economic model. [possible examples of our work: Fluy, Herne, The Emplacement, Curragh]

Access to hard facts on energy, labour, social impact, recyclability, and the renewability of materials used in construction is very difficult. Graphs depicting comparative energy consumption of, for example, extracting raw materials or of processing them do exist. However, these 'facts', important as they are in signalling awareness, represent little in terms of the more complete picture.

For example, we do not necessarily have the combined knowledge of the energy source used, their comparative polluting effects, the effect of these processes on health of the workers in these industries and consequent social as well as economic cost, etc. It is a mistake to assume that graphs/tables such as these give a whole picture. The importance and dependence on such abstracted and limited data discredits us. It is in these sorts of areas that information needs careful examination which will, through significant development, ultimately one hopes, begin to

give us clear data on which to make our more holistic judgements on not just materials, but the entire construction and deconstruction process, and the way we access and use our built architecture; in fact a more whole picture of the consequences of our decisions and choices. Another important view point is the effect (visual, psychological, physiological...) of the architecture on the "user". Healthy built environments for humans is one important aspect of a continuing biosphere.

There can be no revolution in the industrialised regions of the world with regard to the way we extract, process & manufacture, distribute and consume materials - i.e. an energy revolution. Only a long campaign will eventually change our habits, of which this symposium is a small, but I hope to make an important contribution.

**Humanity and intelligence have as much to do with the process of decision-making as with the tangible artefacts which result from our application of science, technology and economics.**

**The need to make evident metaphorical intelligence and humanity in what we design should be indisputable.  
It is this which drives our design approach.**

**An Illustrated Example:  
The Design of new HV Pylons for Electricité de France**

We were shortlisted along with Starck, Delaugiers, Perrault, Wilmotte, Tallon, Giugiaro and Mimram to compete for the design of new HV Pylons (400kV) in November 1994. We collaborated with RFR (Rice Francis Ritchie) and Kathryn Gustafson (landscaper), both based in Paris. We were joint lauré ats with Mimram.

The conceptual development of the design emanated from an investigative text which this competition inspired me to write on the subject of progress.  
**What does progress mean today and is there a relationship between a new meaning of progress and design?**

This investigation searched for the essence of the problem being posed - **the preconcept**. The fundamental problem for me was not structural, architectural but environmental. Most people are aware that pylons were a very strong symbol of progress - the distribution of electricity - during the 1930's, 40's even 50's. Today their existence in the landscape seem no longer acceptable. They are seen as visual pollutants upon the landscape.

What is it about the current pylon design which now so upsets so many people?

If, as has been suggested, they were quite acceptable pre-war - epitomising progress ( a witness in much the same way as railways and subsequently the motor car and TV), could it be that having been such a strong emblem associated with progress, they have now become less acceptable because progress, as we have known it, is now no longer so acceptable, or simply that the emblems of progress have moved on?  
Or, is it that they were and still are intrinsically ugly, and that their aesthetic aspect was

considered (if at all) by the general public, relatively unimportant at a time of western progress (economic + technological) and power, or has the general public's aesthetic (visual) values changed over the last 60 years - they were not so ugly but have become so?

Technology (applied science) is increasingly being questioned (pollution etc), and yet technology has been and still is for many people symbols of progress. (Pylons yesterday, satellites and Internet today).

How and to what extent technology is perceived through *design* depends upon the position from which progress is perceived - individual, local, national or global. Those designers who adopt "technics" as a style are liable to be pursuing an ephemeral goal - it will pass as fashion. So, can the science (or technology) be a dispassionate basis for design?

But it may be an ideal worth striving for, with an objective sensitivity to the process.

Either the notion of progress is replaced by something else, or it must be redefined. This redefinition is at present focussing on redeeming the ill man has and is doing to the Earth. Society's new "goals" have to be seen to be arrived at democratically and justly, and should be the broad framework within which design takes place.

The EDF have had something to do with progress for over 50 years.

Launching this competition, have the EDF have engaged themselves in the process of redefining progress, a notion of progress not measured solely in terms of GNP and the still limited framework of economic theory and appraisal, but in the wider more holistic sense of mankind's welfare and behaviour on this planet?

Or, is the EDF's relationship to progress far less significant?

The transmission of electricity down visible cables is so old that that no matter how one redesigns pylons now, in a few decades they will eventually disappear- like telephone lines.

This design competition is, essentially, a visual manifestation of the EDF's shifting position. But is this shift based upon a fundamental desire to bear witness to a new definition of progress, or simply a marketing response to a democratic protocol, translated through a new generation of pylons which will hopefully help change the public's perception of the EDF and its behaviour to the physically visible environment?

So is redesigning pylons about progress or making the best of an old technology which will be superseded within 25 years or so?

As designers approaching this problem, our aim must be to respond to both.

To the first, by understanding and **challenging some of the preconceptions** of how electricity is transferred from one part of the country to another, through analysis and proposals of more environmentally intelligent installations; from the materials used and the manner in which they are inserted into, and maintained in the environment.

To the second, by creating an **aesthetic** which is perceived as morally good, or at least less visually harmful than that presented by the current pylon designs.

### **Environmental Aesthetics as Symbol of Renewal**

Underlying architecture and the physical environment of our cities is the question of quality.

**Efficiency, (performance), economy and aesthetics** constitute the ingredients of quality, of which we can all probably agree on what performs well and what is economic (at least in the short term).

But can we agree on aesthetics?

We are now at the beginning of another aesthetic paradigm. Under the generic name of "post-modern" we have witnessed the first visual manouevres which have indicated our teleconnected societies' capacity to visualise this paradigm - through its designers.

A pluralist arena within which "art is art is art" - where anything goes if the artist says it is art; and of Post-Modern, neo-constructivist, de-constructivist, neo-modern, neo-neo classical... architectures compete for the attention of multi-national clients and their advertising agencies.

These veneers conceal the real paradigm - the nature of "progress" today. It no longer has a clear meaning or definition which can be recognised by the general public.

"In the present society the quantative and qualitative criteria for judging design can be summed up as : does it attract the consumer... Designers have always had more noble standards of appreciating their creations, but in practise the question of functionality, as in doing the job set out for it, of originality of design, of cultural sensitivity or of environmental impact are in this society predicated on the ultimate determining factors - does it in a direct or indirect manner generate financial wealth and or serve to perpetuate the political and economic status quo?" [Pippo Lioni, Up Against A Well Designed Wall, Paris 1993]

What constitutes the grammar of aesthetics today? We need to understand this before we can crystallise our own design aesthetic for the pylons.

It is composed not only of the visual, but also of the political, economic, and moral language. It needs to be made evident and show intelligence with humanity. Goethe described good architecture as frozen music, but in reality it is also frozen politics, economics and power.

**Part of the changing vision of our culture is how we spend our resources.**

We must distinguish the syntax of fashion from more enduring fundamentals of this grammar.

Much of most city environments and artefacts within them can be described as visually poor, and this makes it important to ask ourselves: what does **aesthetic poverty** communicate to the general public?

I suggest that it is something which lacks morality - it hurts the viewer's sensibilities and in so doing can become a **symbol of harm**. It has the effect a bit like Chinese drip water torture to slowly wear you down. There is a general lowering of aspiration and expectation that creates a climate of acceptance, or, more dangerous, of ignoring. Acceptance and ignoring translate through the social, cultural, psychological and physical environments. A numbing.

But does every society have common measures of aesthetic poverty and /or aesthetic values? I doubt it. And even more important is evidence that these values shift within societies as societies evolve. (cf the Eiffel Tower: 1889 now as a Parisian symbol and its protection against terrorist attack (1995), or indeed electricity pylons - a key symbol of the march of pre-war progress, and now).

Pylons looks cheap, even if they are painted gold!

Vulgarity (excess) costs a lot but looks cheap.

There is the case of : Not In My Back Yard (NIMBY syndrome); and

Build Absolutely Nothing Anywhere Near Anything (BANANA syndrome).

Out of sight, out of mind.

[i.e. It doesn't matter how beautiful it is we don't want it" - beyond aesthetic recovery!]

The reality is the public's preconception of a politico-economic imposition or 'necessity' despite any manner of public consultation - ("limited democracy"). The rôle of the EDF as a facilitating agent, now includes arbitrating between those who need electric power, and those past whom it is conveyed, in the interest of the common good. Today, people's freedom allows them to express their own interpretation of these issues, and as such there will be both consensus and contradiction in any design proposal.

If we are not yet in a position to suggest radically new power transmission technologies, are there any suggestions we might make that could possibly break through the present negative consensus opinion of overhead transmission lines and their pylons?

Accepting that we are in a period of "**redefining progress**", we could consider 'concentrating' the physical transmission & communications symbols - EDF lines, the motorway, the TGV lines - and suggest routing all future EDF transmission lines along motorways or TGV lines, until they approach the obvious obstacles such as airports and town + city edges. (It's interesting that the EDF have indicated the need to coordinate strategic infrastructure). Topography sometimes dictates this - Switzerland & Japan for example.

A possible reconfigured scenario might be one where the conductor lines are not seen against the sky, but become one with the motorway - adopting a low profile along the road boundary (or central reservation), housed within crash proof ventilated tubes.

Surely this is where future development will or ought to take place - and would put the power closer to where it will be needed. This ought to make economic and strategic sense, no? Also, the EDF has given each competitor the same agricultural setting to illustrate their proposals. Is this agricultural setting symptomatic of the present, future or the past?

Should we consider a future scenario in the same location - e.g. a new motorway or TGV line across the field, and illustrate this as well?

The meaning of progress and the psychology of perception needed further investigation, as well as the psychology of symbols / symbolic meaning of our artefacts. (i.e. semiology).

REMEMBERING JUNE 1965 IN SPAIN (anon June 1966)

Crossing the hills in northern Spain are electric pylons of various patterns, one of which bears a remarkable resemblance to a pair of human figures.

The morphological observation is easy to taken as an image to define a concept - (cf Starck, Giugaro, Wilmotte competition designs)

There, stretching for miles, I see them,  
Striding across all those arid hills -  
Giant copulating couples in steel.  
Only a country ruled by clerical ethics  
Where sex and sin are synonyms,  
Could have devised, so unwittingly,  
Such power-pylons as these.

Perhaps when all is said and done  
**The primary fact, the very spark of life,  
Is electricity.**

So here is a symbol fitter than we know  
Blazoning its message abroad from these brown hills;

And the devout Spaniards oblivious  
Of what they have designed.

In spite of a thousand years of holy indoctrination,  
Or perhaps indeed because of it,  
Truth finds strange ways to manifest itself.

For many of the major architectural projects with which we have been involved we have had to address the grammar of aesthetics in a context where we have been agents of national or local ministries who have not fully engaged citizens in the process from the beginning. Often the public's **preconception** is a politico-economic imposition or 'necessity' despite any manner of public consultation, and nothing to do with aesthetics or design concepts.

### **Psychology of Perception - Symbolism of Form (Modernité)**

The curve is synonymous with nature's forms (organic); right angles and straight line are not. (The right angle / straight line symbolised the modern movement's "control" over nature".

If we accept the hypothesis of the "curve as natural", this may symbolise, and reflect a public concern for the well being of the natural environment. However, the over-indulgent use of the curve might lead to a *stylistic* reading of a proposal. By stylistic one means a tendency to the wilful imposition of form, which by implication would distance the proposal from nature, and consequently make it fashion and therefore short lived.

Post-Modern architectural and industrial design has withered and died because it simply reflected the shallow ideas behind it, and was only sustained briefly by the power of superficial image/advertising during the last couple of decades.

De-Constructions' visual language attempted to shift our perception away from modernism -man in control and at the centre, to man out of control and de-centred. It has yet to succeed, because it is self-contradictory and because they use the same static materials evidently under man's control.

If we investigate the visual character of transmission lines and the pylons which support them we should be able to recognise certain aesthetic issues which currently "harm" the viewer.

### **The Transmission Lines**

We "know" that they are carrying high voltage electricity. But how do we know? For most people one suspects that it is because they have been told so. For those who have been close to them, they will have heard it and read the signs at the bottom of the pylons which say "danger - risk of death". There is, however, nothing which visually communicates the transmission of electricity to us - they might equally be "clothes lines for giants"! They do not visually tell us that anything is *flowing* in them. The manner in which they visually appear hooked onto pylons even suggests that nothing can flow through them. The way in which transmission lines are grouped and occupy space does not suggest that they are a composition with the space that they are passing through, but merely a composition within themselves, or an imposition on the the space they pass through. They appear to ignore topography.

Other infrastructures such as motorways, railway lines, canals and their viaducts, do have a strong and easily understood topographical relationship.

In the context of distant views, landscape and space, the transmission lines themselves are often disturbing. This is caused by the "confused visual geometry" of the lines traced against the sky, which in turn is caused by the more common geometric arrangement of the points of attachment on pylons. Only when directly looking along them from below is there a strong sense

of visual order.

Lines currently occupy a large amount of "sky space" - aggravated by their height above ground.

### The Pylons

Pylons are clearly interruptions - props to keep the lines up. Their relationship to the transmission lines visually destroys any notion of flow or continuity.

They are generally composed of straight line elements, with plenty of diagonal lines. They have a logical structure, but a dated industrial aesthetic - the diagonal line.

Nature's vertical forms tend towards gentle curves and behave dynamically with, rather than statically resist climatic forces.

### Moving Beyond the Aesthetic Dilemma

To define the position of the line conductors in space and in relation to the space created by them with the ground is a primary consideration. The design of the pylon structures supporting them would follow from this.

Or, do we design a pylon and 'fit' the the conductors to them. The latter is a pylon design exercise and is an incomplete design concept of "*lines with pylons*" composing space and form together through the landscape. The EDF have several pylons - tall, medium and low. Only the low one (Trianon) has a simple geometric arrangement of conductor lines.

### A Concept for Transmission Lines

To suggest that "**sinusoidal**" **line of cables** across the landscape would be more acceptable than a series of "pointed catenaries" would suggest flow, ("courant") if not direction. If these lines could also indicate the direction of the electricity flow then perhaps we would have a clear metaphor for contemporary "progress" - (concern with, rather than control over nature, together with the notion that progress implies a direction).

To achieve very gentle curving lines would require structural gymnastics and result in much structure in the air.

To achieve a modest continuity of line through a softening of the points of attachment /interruption is achievable, and technically valid when considering cable fatigue at their fixing points.

With regard to the transmission lines' composition and occupation of space we have investigated their potential to **describe space** rather than simply occupy space. To have a relationship to the topography. The potential for the cables to be seen to "fly" through the landscape in a "path" or ribbon, in much the same way a pilot flies an aircraft, or a child does in his computer simulation games. We have assessed the manner in which conductors are grouped in space, vertically and horizontally and the implication on pylon design.

We have grouped the lines as a horizontal plane to the ground.

From a distance the visual effect might be one of single layer curving through space, defining not only their own plane but also the volume beneath them - placing the topography in context against "a curved line horizon".

In order to maintain this aesthetic approach, it is vital to consider the relationship of the top of the pylon to the transmission lines. It is desirable that the lines visually flow over or through the pylons, and that the pylons do not "interrupt" the notion of flow.

One immediate advantage of this approach is the reduction of the effective and visual height of the pylons themselves.

The pylon design concept should follow from the validity of the concept for the transmission lines spatial geometry, and will be tested against economic and technical criteria we have begun to investigate.

Apart from considering safety, recyclability, non-polluting & low energy fabrication as essential objectives, we established and eventually agreed a priority list of qualities, although individuals had strong preferences. All were discussed in the context of the preconcept.

- |  |  |  |
|--|--|--|
| 1. <b>Simplicity</b> <sup>3</sup>        | 11. colour                                 | 21. 3-phase symbol                       |
| 2. <b>astyle</b> <sup>4</sup>            | 12. variable response                      | 22. erectable without tests              |
| 3. composition flexibility               | 13. rural                                  | 23. optimise for individual site         |
| 4. <b>low</b> <sup>2</sup>               | 14. contextual                             | 24. sculptural                           |
| 5. <b>minimal</b> <sup>8</sup>           | 15. <b>extended family</b> <sup>7</sup>    | 25. urban                                |
| 6. narrow                                | 16. <b>conductor geometry</b> <sup>1</sup> | 26. rhythmic                             |
| 7. <b>minimal footprint</b> <sup>6</sup> | 17. familiarity                            | 27. <b>no triangulation</b> <sup>5</sup> |
| 8. <b>economic</b> <sup>9</sup>          | 18. <b>happy</b> <sup>10</sup>             | 28. exportable                           |
| 9. simple fabrication                    | 19. Tactile                                | 29. new technology                       |
| 10. simple erection                      | 20. bio-morphological                      |  |

*My personal order of priorities are in bold*

#### A Concept for Pylons

Two detailed approaches were investigated with regard to lines, isolators and pylons: -

- A conventional **suspension** isolator arrangement - hanging down (a short term expedient).
- An arrangement of isolators in "**compression**" - upward, allowing a further and significant height reduction and economy in the pylon (the desired solution).

The pylon design we have developed deals with both the K type - in line pylons, and S type - line angle change pylons with ease and similarity.

They are capable of modular height variations.

In their relationship to ground contour there are two options available. Constant height (aesthetic or practical requirements) or unequal height (aesthetic or economic requirements).

In relationship to the ground (anchorage), the pylon column enters the ground. Bolt fixings and base plates are not seen.

Material: plate steel

Finish: galvanised and painted

Colour: summer corn, silver sky, forest green

Isolators: fibre glass composite with silicone (or neoprene) sheath

Colour: grey

The company, Sediver, have confirmed the practicality and performance of these isolators in more extreme climate conditions - coastal, high altitude, sugar cane fields (caramel from burning) etc.

The EDF have already used them at high altitude (economy of weight and delivery to remote locations) and coastal regions (salts).

Conventional glass isolators will only be used if instructed to do so by the EDF, and will only work

in suspension (hanging down).

**In conclusion I would like to suggest a contemporary definition of progress in relation to design:**

**Real progress for mankind and a real sustainable future for the earth are becoming essentially the same. Architectural and engineering design and construction must deal with its own progress by drawing upon the strong metaphorical stem of the human spirit and earthly values.**

Ian Ritchie 03 01 96

incorporating extracts from IR writings from 1985-95

## Dictionary Definition of Progress

[OED definition] Progress: *n.* & *v.* -*n.* 1 forward or onward movement towards a destination. 2 advance or development towards completion, betterment, etc.; improvement (*has made little progress this term; the progress of civilisation*).

## Quotes regarding Progress:

[The American Environment: Robert Kennedy, 1967]

And let us be clear at the outset that we will find neither national purpose nor personal satisfaction in a mere continuation of technical progress, in an endless amassing of worldly goods. We cannot measure national spirit by the Dow-Jones average or national achievement by the gross national product.

For the gross national product includes our pollution and advertising for cigarettes, and ambulances to clear our highways of carnage. It counts special locks for our doors and jails for people who break them. The gross national product includes the destruction of redwoods, and the death of Lake [Erie]. It grows with the production of napalm and missiles and nuclear warheads, and it even includes research on the improved dissemination of bubonic plague. The gross national product swells with equipment for the police to put down riots in our cities; and though it is not diminished by the damage these riots do, still it goes up as slums are rebuilt on their ashes. It includes Whitman's rifle and Speck's knife, and the broadcasting of television programs which glorify violence to sell goods to our children.

[Stanley Diamond; ref Art after Philosophy and After: Kosuth]

"Just as, in the nineteenth century, the social organization and techniques of modern industrial capitalism emerge as a world force, so the idea of inevitable progress in the name of science becomes a fixed ideology. The revolutions having succeeded and then, quite obviously, having failed in their social promise, it appears as if all the frustrated passion was mobilized behind the idea of a regnant science"

"Civilisation may be regarded as a system in internal disequilibrium; technology or ideology or social organisation are always out of joint with each other - that is what propels the system along a given track. Our sense of movement, of incompleteness, contributes to the idea of progress."

[William Leiss; ref Art after Philosophy and After: Kosuth]

"In the social context of competition and cooperation the abstract possibilities for an increase in the domination of nature are transformed into actual technological progress. But in the ongoing struggle for existence **the desired goal (security)** continues to elude the individual's grasp, and the technical mastery of nature expands as if by virtue of its own independent necessity, with the result that what was once clearly seen as a means gradually becomes an end in itself..."

"The crucial question is: what is the historical dynamic that spurs on the mastery of internal and external nature in the modern period? Two factors shape the answer. One is that the domination of nature is conceived in terms of an intensive exploitation of nature's resources, and the other is that a level of control over the natural environment which would be sufficient (given a peaceful social order) to assure the material well-being of men has already been attained."

"The more actively is the pursuit of the domination of nature undertaken, the more passive is the individual rendered; the greater the attained power over nature, the weaker the individual vis-a-vis the overwhelming presence of society...."

"The cunning of unreason takes its revenge: in the process of globalized competition men become the servants of the very instruments fashioned for their own mastery over nature, for the tempo of technological innovation can no longer be controlled even by the most advanced societies, but rather responds to the shifting interplay of worldwide forces. Entire peoples and their fragile

social institutions, designed for far different days, are precipitously sucked into the maelstrom."  
" When man began to desire private property then entered violence, and fraud, and theft, and rapine. Soon after, pride and envy broke out in the world and brought with them a new standard of wealth, for man, who till then, thought themselves rich, when they wanted nothing, now rated their demands, not by the calls of nature, but by the plenty of others; and began to consider themselves poor, when they beheld their own possessions exceeded by those of their neighbours."  
[Samuel Johnson]

Technological progress has merely provided us with more efficient means of going backwards.  
[Aldous Huxley]

There is a period of life when we go backwards to advance. [Rousseau]  
The savage has his life within himself; civilised man, in the opinion of others. [Rousseau]

"In most cultures prior to that of industrial capitalism, artists have had a well-defined and clearly understood relation to some part of their society, some group of consumers. In a primitive tribe or collective, art is the expression of the whole tribe - later, some people may be especially good at it, or hereditarily trained to it, and take on the production of artefacts as their work, but they work surrounded by the community, and work for the community's immediate and obvious benefit. In other periods of history, the artist has produced for a court, for a personal patron, for a religious sect, or for a political party. It is only with the dominance of the capitalist system that the artist has been put in the position of producing for a *market*, for strangers far away, whose life styles and beliefs and needs are completely unknown to him, and who will either buy his works or ignore them for reasons that are equally inscrutable and out of his control." [Meredith Tax]

"Because we are aware of our past, the future exists; and in the future there is hope, and in **going forward** in time with hope, we carry with us the idea of progress". [IR]

Progress is no longer the idea that just because we *can* do it means we *should* do it. (IR)

**"Progress is nothing but the victory of laughter over dogma"** [Benjamin De Casseres]

IASS SYMPOSIUM OCTOBER 7-11, 1996, STUTTGART

CONCEPTUAL DESIGN OF STRUCTURES

Ian Ritchie : A talk which touches upon several themes of this symposium

(1),(4),(5),(6),(7)

## SYNOPSIS

### Redefining the Design Team to Enable New Concepts to Emerge

I would like my talk to address **fundamental issues** concerned with the importance of art in design - the preconcept, how designers collaborate, the meaning of progress and aesthetics and to finish with an **illustrated example**, the design of the new HV Pylons for Electricité de France which engages the meaning of progress as a preconcept, the emergence of a concept, and how they have guided and informed the design.

### Fundamental Issues

architects, engineers & construction industry culture

synthetic thinking between architects engineers and designers

professional barriers

collaboration

synthetic thinking in a more complex world

the complex problems of tomorrow - touching on economics, information, energy and environment

### An illustrated Example - EDF Pylons

progress, environmental aesthetics as symbol of renewal, & the psychology of perception.

Transmission lines and pylons

a new concept for the transmission lines and pylons