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The auto-industry needs change, 'The Smart move forward'

by
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Introduction

> *Tomorrow's travellers will not look to one single means of transport. What they will be looking for is the simplest way of getting from A to B and the modern media will provide the best way of finding that out... multi-modal transport will be the philosophy behind 21St century transport policy. (Auto 1998, annual report, p90).*

The automobile industry needs change. The enormous powers behind both the auto and fossil fuel industries must be galvanised into focusing on environmental and consumer needs (as oppose to consumer wants), not creating and promoting an infinite wealth off finite resources as is currently the case.

From the dawning of mass production through the boom of mass consumption in the 1950s, the car has become a mass produced global potential killing machine. It has disastrous effects on the ozone layer; emissions cause many fatal diseases, and the car also causes numerous road deaths.

Cars, unlike other modes of transport (haulage lorries etc.) are not being designed to perform tasks to fulfil user needs. The culture of the developed world has become a culture that aspires and wants. People work to earn money so they can then spend it on their aspirations and desires. Manipulative and

ingenious marketing techniques have and are being used to encourage and promote people to aspire to certain lifestyles.

The car, the preferred mode of personal transport (for those who can afford one) has ceased to be just a mode of transport. Since Fordism and the model-T, a vehicle to get from A to B. Car styling is being used to associate an image with the user, be it an image of status or free love. All cars essentially do the same task, provide a form of transport, but carry at the same time the deadly potential to kill and pollute.

> *More than any other product, a car is associated not only with functionality and rationality but also with emotions. But the degree of importance attached to these aspects changes over time. Changes in societal values-for example an increasing awareness of environmental issues-and the development of individual lifestyles all have an impact on patterns of consumption.*
>
> (Auto 1998, p59).

The vital element of any marketer's job is to speculate on the future. The importance of an environmentally clean mode of transport is growing daily in the market place. Car manufactures have begun to take seriously the need for an environmentally friendly car. While marketing the vehicle is environmentally friendly is a positive step, they have yet to address the whole issue of transport. A vehicle is but one part of a mobility package. Mobility is a major issue, its importance growing with globalisation, telematics and the desire to travel

further distances. In this thesis I intend to look at the whole area of car manufacturing and the whole function of a mobility system.

Chapter One deals with the car, its image and serious effects on the environment. A looked at a brief history of the car market in the U.S. in the fifties, designing for obsolescence, up to today's attempt at making it environmentally friendly. This will be followed by a discussion on the difficulties and the problems that are involved in 'greening' the industry. Reference is made to government attempts to making this car industry, one of the biggest in the world and more ecologically friendly.

Chapter Two, looks at the auto industry and its stagnant way of thinking, looking at irresponsible car design. It focuses on the Smartcar and the endless list of features and manufacturing techniques. The image, attitude and lifestyle associated with it.

Chapter Three discusses the whole idea of the mobility package and its benefits. Its analyses the Smartmove package which is a totally innovative, comprehensive approach to the whole multi-modal aspects of movement and transport. It also attempts to correlate the philosophies of O2 (an 'anti-consumerist' design organisation) to the Smartmove package.

CHAPTER 1

Consumerism and the automobile.

The car industry boomed during the 1950s in America, a country that was economically in a very strong position after World War II.

It was a period during which many social and economic habits of the population changed. The birth of consumerism, the credit system, together with Rock 'N' Roll youth culture, all emerging at the same time. With suburbia rapidly expanding with the growth and influences of the middle classes, the automobile industry was to take full advantage of the situation.

> *Top levels of management and government voiced the myth that by designing for obsolescence, the wheels of our economy can be kept turning ad infinitum.*
>
> (Papanek 1971, p. 21)

Stylised objects became status symbols and social standing could be assessed by how often you replaced your car for the latest model. Harley Earl, design director for General Motors, stated in 1955:

> *Our job [designer] is to hasten obsolescence. In 1934 the average car ownership span was 5 years, now it is 2 years. When it is one year we will have reached a perfect score.*
>
> (Whitely 1993, p. 17)

Manufacturers claimed obsolescence was democratic. It was what the public wanted, greatly influenced by the powers of marketing and advertising. "Own and Aspire" (Whiteley 1993, p. 17).

An example of this is the Cadillac Fleetwood advertisement in the late fifties (fig.1). The car is *in situ* outside the Ritz-Carlton Hotel clearly associating the car with an image of wealth and creating the impression of a lifestyle of luxury. Extensive

Fig. 1. Own and aspire. Cadillac advertisement 1959.

sculptural detailing reminiscent of the jet age was highly fashionable at the time, and bound to hasten obsolesce.

However, justified by the belief that anything helping the flow of American-made products would help the economy and provide employment and wealth for the democratic population, an aggressive selling campaign by the manufacturers fuelled the consumerist society.

This democratic society in just forty years from World War I, through its quest for economic wealth, used more natural resources than the entire population of the world had used in the preceding four thousand years.

Car pollution

In 1988 the car market was still booming and growing, and there was not enough room in European cities to fit all cars comfortably. European cities were not designed for the automobile. From construction through the life of the vehicle and its deconstruction, fuel is burnt. The car can never protect or care for the environment at any point during its entire production or life cycle. A gallon of petrol weighs just over sixteen pounds. When burned the carbon in it combines with oxygen from the air to produce about nineteen pounds of CO_2. If the energy that went into the distribution the fuel is counted, the total global warming impact equals thirty pounds of CO_2 emissions per gallon (*Green Guide to Cars and Trucks* 1998).

The car in cities and built-up areas has an immediate impact on the public sharing the same physical space. These includes:

- Fine airborne particulate matter (PM) causing lung trouble, shortness of breath, worsening of respiratory diseases and heart conditions, lung damage and cancer.
- Nitrogen oxides (NOx) aggravate respiratory problems, both directly and indirectly, by forming PM and smog; NO_x also causes acid rain and damages aquatic environment.
- Sulphur dioxide (SO_2) also irritates the lungs and contributes to forming PM as well as acid rain.
- Hydrocarbons (HC) are volatile organic compounds that cause smog and are toxic and carcinogenic.
- Carbon monoxide (CO) is a poisonous gas that impairs the flow of oxygen to the brain and other parts of the body (*Green Guide to Cars and Trucks* 1998).

These facts explain why each year every car company has an 'Eco-friendly concept car' with zero emissions on show, demonstrating their environmental awareness.

An example of this could be General Motors 'Ultra-lite' (fig.2), star of the Detroit Auto Show, 1992. It weighs 600 kg and in theory it could be brought down to 400 kg. In a hundred days, this four-door family car was designed, engineered and fabricated from scratch to completion by a team of about one

hundred engineers and technicians, with some expert outside help.

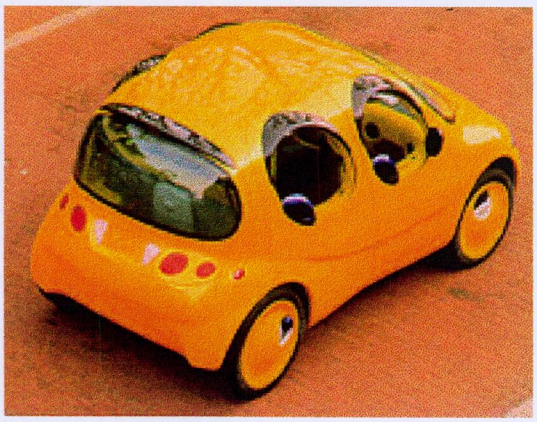


Fig. 2. GM's "Ultra-lite"

This suggests that the R&D team of General Motors are neglecting the need for a radical change in the automobile industry, basically throwing together an eco-friendly concept car for show. This is not at all surprising with today's fuel at rock bottom prices, where it is cheaper to buy a litre of petrol than a litre of water (a Ballygowan 500ml bottle retails at 60p, a where as a litre of fuel varies from 52p to 57p).

Keeping the weight down in the production of a vehicle is essential (the lighter the vehicle the less energy needed to power or move it), yet where carbon fibre and aluminium alloys are very expensive, the auto-industry's favoured material, steel, is cheaper per kilogram than a Big Mac (Kenzie, Hypercars, 1998).

These steel cars are then marketed in the most interesting way. In terms of fuel economy, automakers can claim that their new vehicle is 96 per cent cleaner and meets a new environmental standard. Yet, all these claims are based on laboratory tests that have no relationship to typical driving. In fact actual emissions over the lifespan of today's automobiles are two to four times higher than standard levels.

It is arguable that the 'green' trend in all products is just a fashionable topic in society that is being maliciously abused to sell products to a guilt-free consumer. Toilet paper has always been made from recycled paper yet now we are being told on the packaging how 'Eco-friendly' the paper is.

However fashionable the 'green' agenda is, it is a very serious issue and cannot be used as a tool to sell a non Eco-friendly product, especially a car. The car, by definition, cannot care for the environment at any stage of its life cycle.

An example of associating the car with harmony and with a clean, fresh and comfortable environment is a Ford leaflet entitled "Today's Ford weather report". A simple yet cheeky typeface is used, over a clear sky and empty highway. The first six pages are associating a simple picture with key words. They are

Page 1 "Clear visibility . . ."
Page 3 "Clean air . . . "
Page 5 "Comfortable environment . . ."

It concludes with the final pages, selling you three ranges of air conditioning entitled "The choice is yours". It is playing on a clean air theme, although the car is actually polluting the air. Ford are also creating a new product, the consumer having to replace an expensive air filter, most of which are completely non-biodegradable. The hypocrisy of this leaflet is ridiculous

and is very manipulative toward the consumer who likes to feel comfortable.

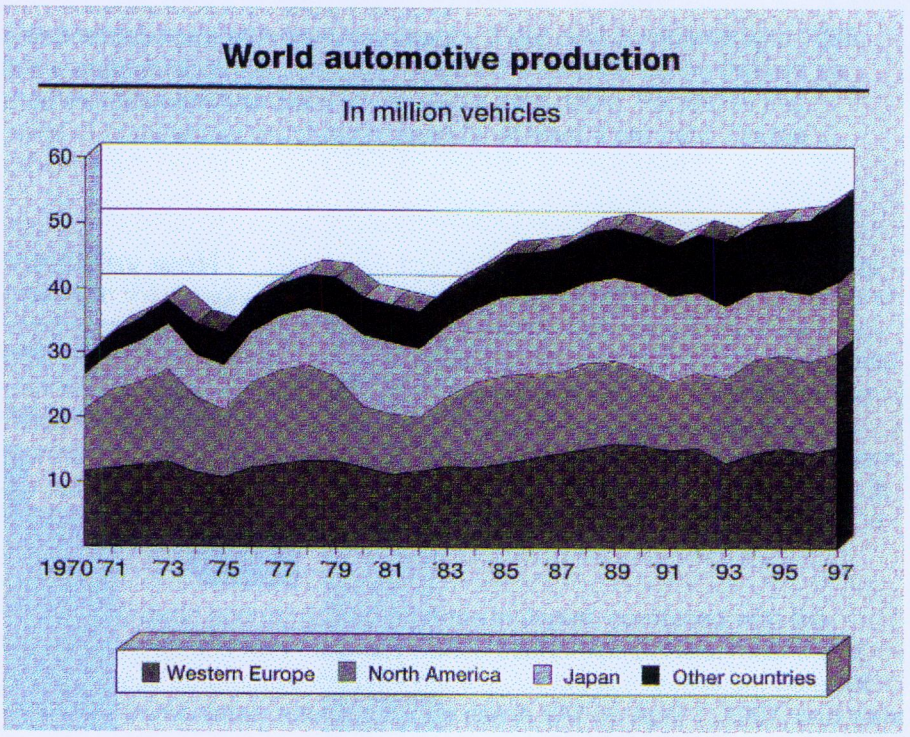
However easy it is to criticise manipulative marketing techniques playing on the 'green theme'; it is not at all easy to 'green' the massive auto industry.

Problems of greening the auto-industry

There are two major controlling factors: money and legislation. Legislation can be changed but is made by governments who benefit hugely from the sales of fossil fuels. The revenue raised per year in Sweden from CO_2 taxes was 1397 million ECU in 1995 (European Environment Agency, Environmental issues series no. 1, p.35). These figures give some indication of the colossal financial scale of the still growing auto and fossil fuel industries. There has been a 153 per cent increase in car ownership worldwide since 1965. Worldwide one in twelve people have a car, one in 2.7 in the UK and one in 1.7 in the USA, which is stable at this rate (Butman 1991, p. 16). First World countries are not the only emitters. Between 1990 and 1993 CO_2 emissions increased in Brazil by 8 per cent, Turkey by 16 per cent and between 1980 and 1994 in China emissions rose by 80 per cent. China is now only second to the US in CO_2 emissions (Johnstone 1995). With the downfall of communism, Eastern Europe is looking at an increase in terms of CO_2 emissions with an urge to achieve a so-called "decent" standard of living but cannot afford the "relatively" clean methods used in the West. If this trend continues in the next

twenty years, CO_2 levels will have risen 50 per cent. This would result in catastrophic consequences, with small island states being most directly threatened with obliteration.

The car industry is huge, one of the biggest industries in the world. Fifteen per cent of the US work force is employed in automobile-related industries; 11.5 per cent of all taxes in the UK arise from the auto industry (Butman 1991, pp. 14-27). From looking at the below graph, it can be seen that the industry is still growing.



Graph 1 (Source: Auto 1998 p 15).

It is clear that the car industry is very important as it provides both direct and indirect employment for millions of workers. Modern society has come to rely on the automobile industry as

a source of wages, taxes, and the car as a private and preferred mode of transport.

It is also very clear that the automobile industry needs to change radically. The public's idea of a car needs to change. It is no good telling the consumer to stop the habit that he/she has become accustomed to. Richard Seymour of Seymour Powell Consultants says in an article "Motown versus the dreamers"

> *The only way to reduce dependence on the car is to replace the benefits it creates with more attractive alternatives.*
> *(Design Renaissance, 1994, p173)*

How right he is, yet those attractive alternatives are proving very difficult to achieve. With the powers that be, oil barons, marketing forces and governments, it is questionable the Gulf War would not have happened if cars were fuelled with fermented vegetables.

There are many reasons for these difficulties in greening the automobile. These are: technical: the weight to energy ratio, safety and the energy source; social: how the car is perceived by the public, what it is used for and what image or social status does the user associate himself/herself with; political: a very tricky equation between the environment, revenue created from cars and the fear of recession (where the "green" issues are put to the bottom of the agenda).

An interesting aspect of the car is: how often is it used and for what? It was worked out that in Europe the average car carries 1.2 persons and seldom goes further than 30 km a day, (Kenzie, car connection, Aug. 98) spending up to half its time wasting fuel in the urban jungle as it searches for a parking space. In Germany alone, "some 14 billion litres of fuel per year are wasted through traffic hold ups"(Gottschalk, Auto1998, p4). It does not make any sense to drive a 5 litre car which guzzles petrol through crowded, traffic-congested, overly-populated (with cars) cities.

A series of task analysis must be done; cars should be used only for certain purposes; rail, air or an alternative system should be used for longer distances. Rented, sharing or car pooling systems should be more consumer friendly. Short distances should be walked or cycled.

If you are to be realistic in achieving public acceptance, it must have economic benefits; it needs to have a specific place in the market. Most of all, the car needs to be looked at as just one part of a transport system. In the age of telematics and globalisation, interaction between car and other modes of transport must be made easier.

CHAPTER 2

Companies need to re-think.

> *The cost in fatal car crashes and pollution-engendered cancer is clearly not justified by the profits that can be still squeezed out of this object.*
>
> (S. Csciani 1988, p144)

It is very clear that the public's perception of what a car is needs to change. Automobile companies need to ask themselves what is their business: 'selling cars' or 'selling a means of transport'?

Theodore Levitt, who could, with justification, be called the godfather of contemporary marketing (Whiteley 1993, p. 19) and who had his thesis published in 1960, "Marketing Myopia" in the *Harvard Business Review*, was to place the consumer centrally in the company's thinking. He gave an example of the Hollywood movie industry, which could be related to the auto-industry:

> *Hollywood defined its business incorrectly. It thought it was in the movie business when it was actually in the entertainment business. "Movies" implied a specific, limited product . . . Hollywood scorned and rejected TV when it should have welcomed it as an opportunity to expand the entertainment business.*
>
> (Whiteley 1993, p. 20)

Levitt continued, 'had Hollywood been customer-orientated (providing entertainment) rather than product-orientated

(making movies) it would not only have avoided its near terminal demise but would have flourished (Whiteley 1993, p. 20). Automakers must realise that they are in the transport business and should be designing different modes of transport whereby individual mobility depends closely on different requirements and lifestyles.

It is something that has been shied away from for too long. There have been too many perfect 'concept' cars at every auto show for many years, but now governments are slowly putting on the pressure. People are not as ignorant of environmental matters as they used to be. A system must be devised that is user-friendly and as good if not better than the existing system. This system must have added benefits for the consumer before it can truly become successful.

Vehicles are 'modes of transport' and must be designed for tasks. A whole infrastructure must be designed. For this infrastructure to work it must be consumer-led. It needs to promote a lifestyle and way of thinking. It must give new and unthought of benefits to the consumer. On approaching the new millennium it must tell the consumer what the future of mobility is, analysing what is most needed.

There are many ingredients that need to be mixed to get a successful result in the most competitive, risk-taking industry in the world. Firstly, a complete analysis of what is needed is essential. European cities have historically not been designed to accommodate the huge numbers of habitants and cars in

mind. Traffic congestion, smog and a serious parking problem in all major cities in the world are an indication of a need for a better interface of design between both car and cities. With the rise in demand for land space, especially in cities, is it justifiable to park your gas-guzzler on valuable retail space each day? On average, commuter cars have 1.2 occupants (Kenzie, Car connection, Aug 98) which begs the question of car design, especially in size. How big does your car have to be?

Reduce to the Max: The 'Smart Car'

From concept to creation, the Smart story goes right back to 1972 when a Mercedes-Benz employee, Johanna Tumfonde, first started thinking of a car specifically for city use, yet it disappeared into some drawer like many other city vehicles that made brief appearances in the 1980s. Twenty years on in Irvine, in California it was Independence Day. The senior management of the Daimler-Benz group celebrated at its design centre, Tomfonde drove out in a working, city-vehicle prototype. It impressed and the go-ahead was given.

Nicholas Hayek, SHM boss and mastermind behind Swatch (one of the most successful consumer-led designs of the century, promoting a lifestyle for the young design-conscious consumer) pointed out, for the first time, in 1989, the possibilities of building a car in an interview for the German weekly, *Der Spiegel*. After approaching Volkswagen (people's car) who declined the idea, he approached Mercedes in January 1993

and an agreement was made. On 4th of March 1994, the joint venture of Mercedes-Benz and SHM was officially announced in Stuttgart. The MCC was born.

From here a totally new concept of car development was established. Renningen, Germany, was the base for development and in 1995 a future orientated factory concept was designed in Hambach, France.

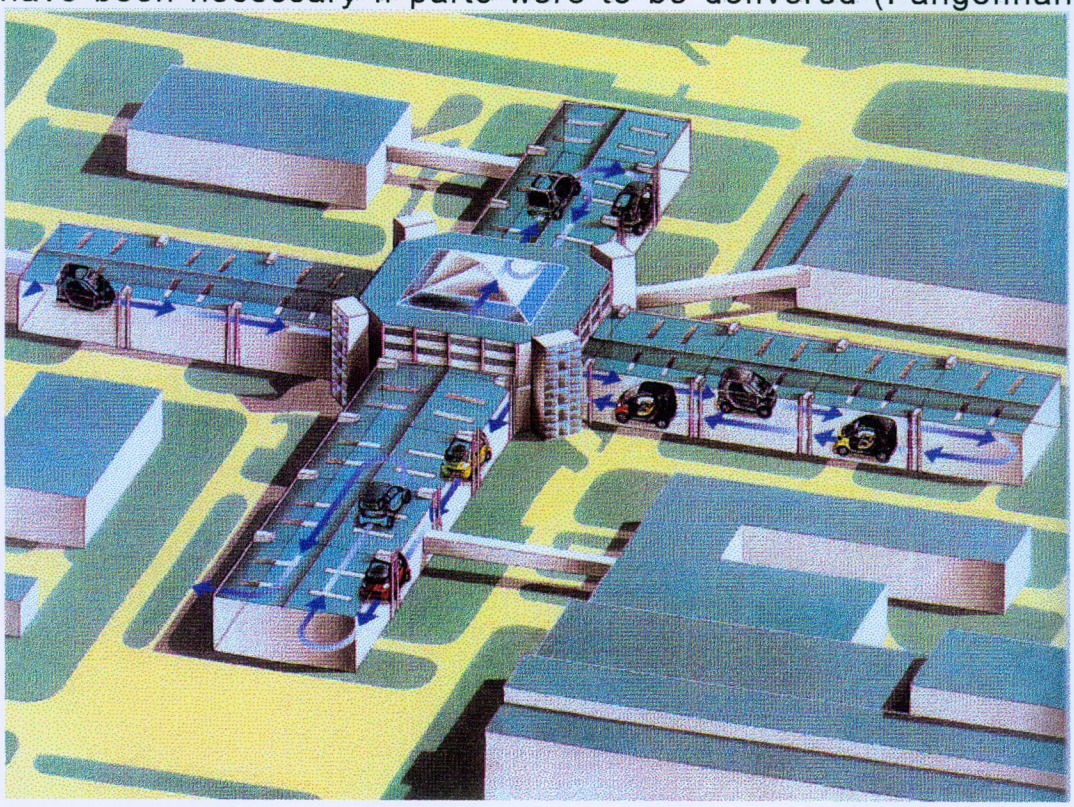
The Factory-Smartville

This unlike any other car factory, suppliers became partners; they manufacture most of the parts on site in Hambach and were also responsible for assembly (fig.3). This alone meant many things. Nothing could be taken off the shelf. People from all different sectors of the industry were put together under the same roof, put in groups and given responsibilities. Harold Schnepper, general manager with Magna (suppliers of body shells) commented, when asked of the new idea:

> *Because we aren't merely suppliers, we are partners too. Effectively this means no one tells us what to do - we have to find the best way of doing things.*
>
> (Smart 1997, p. 137)

Practically nothing has come from the shelf; everything has been purposely developed from scratch, as with the concept of the Smart.

With almost everything being manufactured under one roof, there are huge environmental benefits, for example, consider the body panels; they are produced on the spot in Hambach, which means that only one truck-load of raw material needs to be delivered each day rather than the twenty lorries that would have been necessary if parts were to be delivered (Pangelinan



1997, p. 117).

Fig. 3. The factor-Smartville.

Smarts attitude to ecological commitment stems from the beginning of the car's production, right through to the end. All construction materials of the factory are environmentally friendly. No formaldehyde or CFCs are used. Run-off water from the roofs is collected in reservoirs and used for tempering steel or watering the grounds. Heat recovery systems are in

use throughout the factory. Waste heat from the injection moulding or air from the paint department is taken and used to increase the efficiency of the central energy-generating plant.

These are just some examples of environmental innovation and energy efficiency associated with the factory and its processes. The factory itself, or Smartville, is more like a park than a factory. It integrates harmoniously with the surrounding forests and Lorraine countryside. The factory is a Greenfield project, which has been stretched to the limit by young dynamic individuals who work for Smart.

One can easily criticise MCC, on the grounds that all these Eco-benefits are also beneficial financially in terms of transport, water charges, etc. and they definitely will benefit financially in the long run. However, this is a radically new and innovative approach in car production. The system has been re-thought, disparate elements have been amalgamated by streamlining logistics and reducing haulage traffic to a minimum. Klaus Doring who was responsible for project co-ordination believes that this system is among the most advanced car manufacturing plants in the world, if not the most advanced. He goes on to say that it will influence the thinking of the rest of the industry. (Smart, 97, p137)

The Smart Car and Its Attitude

> This car will change the automobile industry one hundred percent.
>
> (Michael Hardt, interview)

Approaching the third millennium, people in the developed world want a better quality of life. In cities they would like more mobility with less traffic and smaller urban agglomerations with larger areas of open space. The urban dweller and governments have had no solution to this problem. Logic suggests that the Smart City Coupé (fig.4) is the first step in a new ideal of personal mobility.

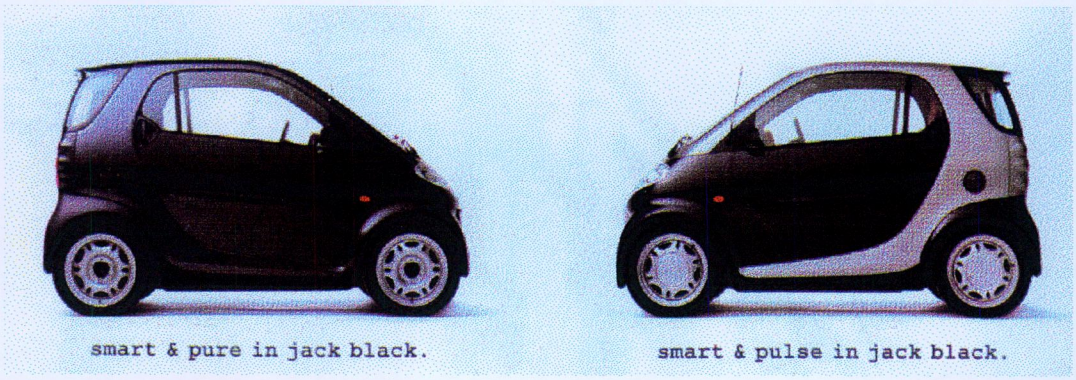


Fig. 4. Smart city-coupé.

The Smart people received over 360,000 enquiries even before its launch and in a survey of 10 per cent of those people, they found that other the cars these people would consider, up to cost two to or three times the price of the Smartcar (Kenzie, Car connection, Aug.98). This suggests that it is the upscale, well-

educated, style-conscious shopper who is interested in the car. A huge percentage of modern society would like to think of themselves as part of this 'category'.

With the huge amount of benefits available to the Smart driver, the Smart is the future of urban mobility. It is technically innovative, environmentally friendly[1], a delight to look at, a snap to park and most importantly where a car is concerned it is "hugely entertaining to drive" (Kenzie, Car connection, Aug.98). Its acceleration goes from 0 to 60km in 7 seconds, it is easy to handle, holding the road well on bends, smooth gear movement, changing gear without a clutch (called a Softleg).

The automatic clutch, however smooth, engages far too slowly to appeal to the real sports car lover. With only 55 horsepower under the hood it could be presumed that there was a trade-off between performance and smoothness. Although when the car is rolling it doesn't feel under-powered, for the Smart to appeal to the people who 'love' their powerful cars, it is a necessity that they address this problem.

The design gone into the Smart from every aspect as to keep it as close to the original concept as possible is remarkable. With form following function, the Smart represents a new approach to automobile aesthetics. The interior is a prime example of ergonomics at work. The exterior has interchangeable body panels. Instead of designing around the

[1] Chapter 3 will discuss the environmental issues in further detail.

safety cell the whole Tridon steel safety cell (fig.5) is designed to be a feature and not treated as a design restriction.

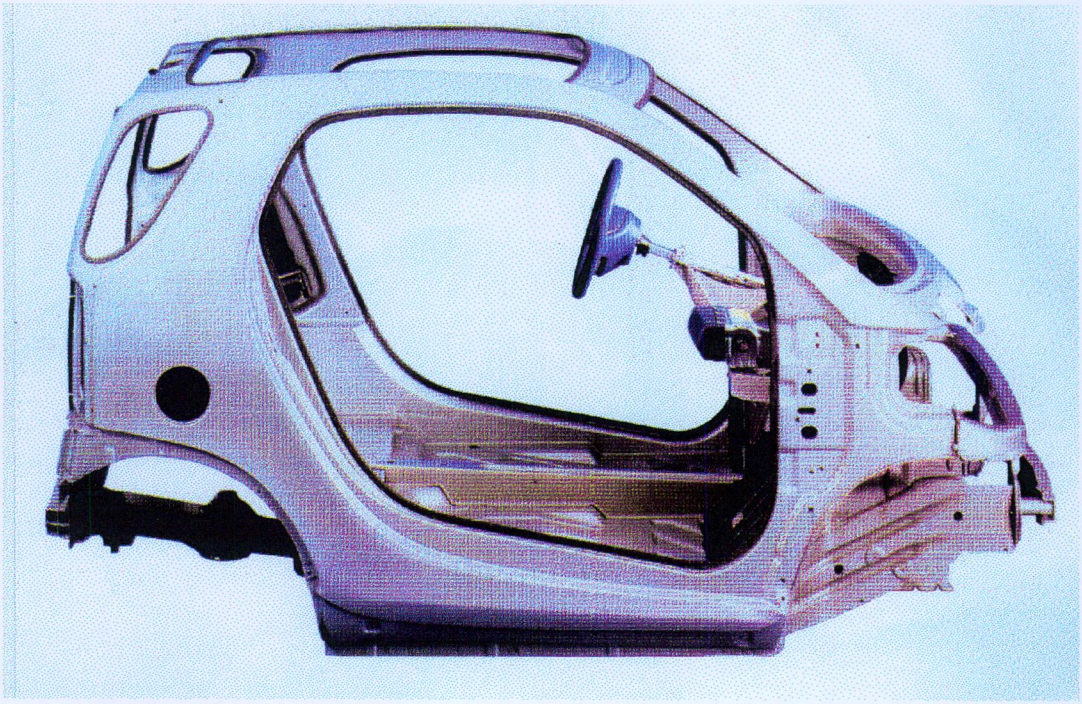


Fig. 5. Tridon safety cell.

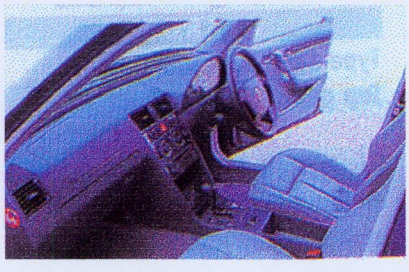
Smart is promoting a retro, smart, intelligent lifestyle for trendsetting individuals. The Smart is not about speed but movement; the Smart is smooth. With the transmission being "a jewel like" (Kenzie, Car connection, Aug 98) six speed manual gearbox with the absence of a clutch, the gear stick is pushed forward to climb gears and backwards to come down a gear. This is not so very different from the transmission of the Ferrari 355 f1 and works in a very similar fashion.

Smart Car - Its Look and Features

The 'Smart' cannot be placed in any category of vehicles. It is the first of its kind; it cannot be associated with either gender. Car critic Georg Kacher says The Smart is the most radical production car he's ever driven (Kacher, Aug 1998, p70). Its name alone promotes intelligence and awareness. The engineers and design team wanted it to be physically small, comfortable for two, wildly, safe, entertaining, stylish, different and of course excellent in the city.

The Smart could be described as 'cute' yet 'slick' in the same breath.

Considering this is still a two-seater city coupé that is over half a metre shorter than the 'mini', making it the smallest car in the world. It is very impressive that it still manages to carry extra features normally associated with top of the range models. With ABS, driver and passenger air bags, electric windows, interchangeable body panels, to name just a few standard features, the Smart is definitely not a toy. The cabin is better finished than that of a C-class Mercedes (fig.6) (Gavin Green, Jan1999, p.124). With a fully glazed roof the designers have created a sensation of space that you can normally only



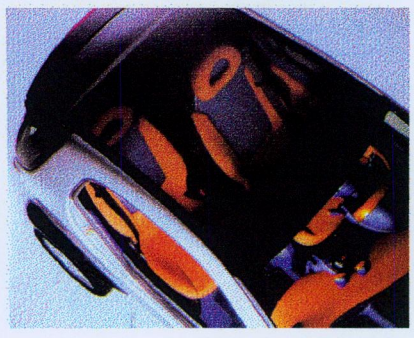


Fig. 6. C-class and Smart interiors.

associate with a mid-range limousine, feeling no narrower than a car twice its size (Kenzie,Car connection,Aug98)

What also contributes to the Smarts efficiency to the user and the environment is the option of the 'Mobility Box'. This is to equip the driver with one of the worlds first satellite controlled navigational systems. With the view of getting the driver from A to B in the quickest most efficient route possible. Taking account of the latest traffic reports, help is available on request with the press of a button. Your exact position is transmitted automatically to an emergency centre where they will brief you on the quickest possible route to your destination.

One has to ask the question, 'What does the future look like?' A product designer probably has the most input as to what a product will look like. In relation to an automobile, there are numerous inputs from every different sector of the industry. Therefore, in theory, their solutions should ultimately arrive at a well-defined direction, rather than a style. This style, however, approaching the twenty-first century, is something haphazard and has exploded in twenty different directions at once. With these dramatic styling changes, all in different directions, all resulting in different end products for example, Ford, Audi and the ridiculous Dare DZ (fig.7), a question needs to be asked, How is the auto industry moving forward?

Ford, with its alleged 'new edge design' strategy is moving forward through styling and marketing. The "Puma" (shown in fig. 7) is an example of combining of design using the chassis

of the Fiesta, but making the interior of the car smaller. It is claustrophobic to sit in, whilst its slick exterior shape/form does not say 'new edge'. In fact, in the writer's opinion, it is reminiscent of the styling of the fifties. For example, making drastic changes in size and its shape with the absence of enhanced performance. This overly styled car is bound to hasten obsolescence.

Fig. 7. Audi, Ford, Dare-In what direction are they moving.

The Volkswagen Beetle, the people's car, originated from a Nazi ideal whereby it was hoped to be affordable by all. It was an ingenious concept. However, the new, streamlined version (fig.8) contradicts this whole idea. It is irresponsible designing. The car is heavier than VW Golf, less efficient, and has less space. In modern society, in the developed world, everybody has a means of transport. Perhaps the new VW Beetle should have been a personal mode of affordable aviation/flight. This is probably ten or more years down the line but would be more in line with its origins. Volkswagen, the people's plane/copter.

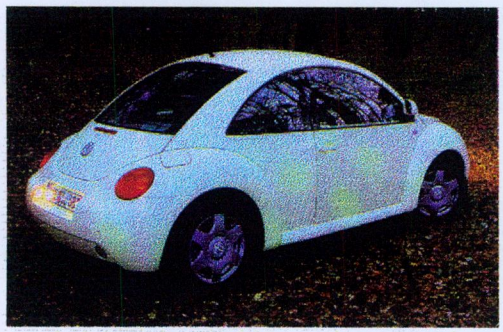
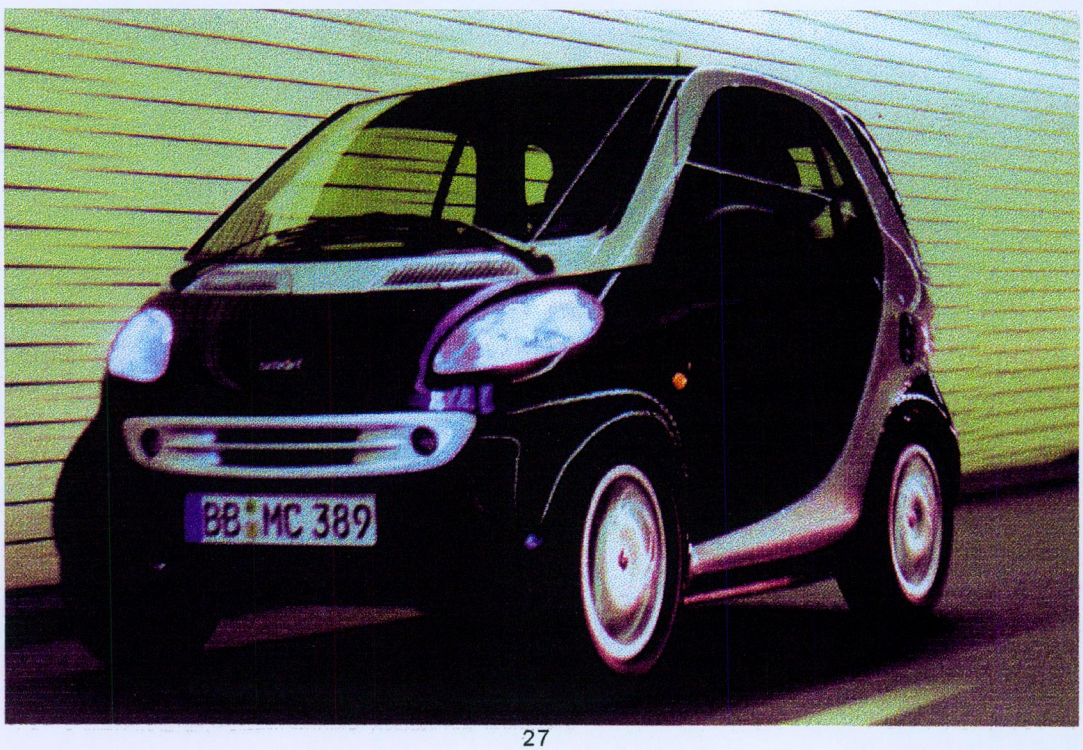


Fig. 8. New VW Beetle.

The Smart, from its initial concept through to creation, was designed and developed for a specific task around the user. People have said that Ford are brave for their bold styling, but styling is styling. The Smart car is probably the biggest step in the automobile industry since Fordism and the Model-T. It has taken nearly a century and has been worth the wait. Gordon Murray, technical director of Maclaran, said in response to the question "What's going on with car design?" (Autocar Dec.1998, p. 62), "We are going to have to embrace this [the Smart] as the future of the car" (Gordon Murray, *Dec.1998*).

The overall form of the Smart is derived totally from function. The biggest determining factoring in a micro-compact car is safety. By the late 1980s, after forty years of accident research

from Daimler-Benz, the tridon safety cell was conceived (fig.6), a highly deformation resistant steel cell which will transfer most of the impact energy to the 'softer' areas of the other vehicle. This cell is also one of the main features of the overall aesthetic. It is coupled with numerous other safety technologies such as ABS, dual air bags, self-tensioning seat belts with belt force limiters, a collapsible steering column and a host of other technical innovations, such as a feature found in only top range limousines: TRUST, a new form of stability control. If the car loses control caused by an icy patch or avoidance of unexpected obstacle, TRUST immediately cuts off the petrol supply (reducing torque) to the drive wheels and engages or disengages the clutch accordingly. Within physical limits, the Smart will regain control. The Smart is every bit as safe as a conventional mid-range vehicle. The Smart could be referred to as the 'David' of the car industry. It is small but has got everything that top of the range cars have.



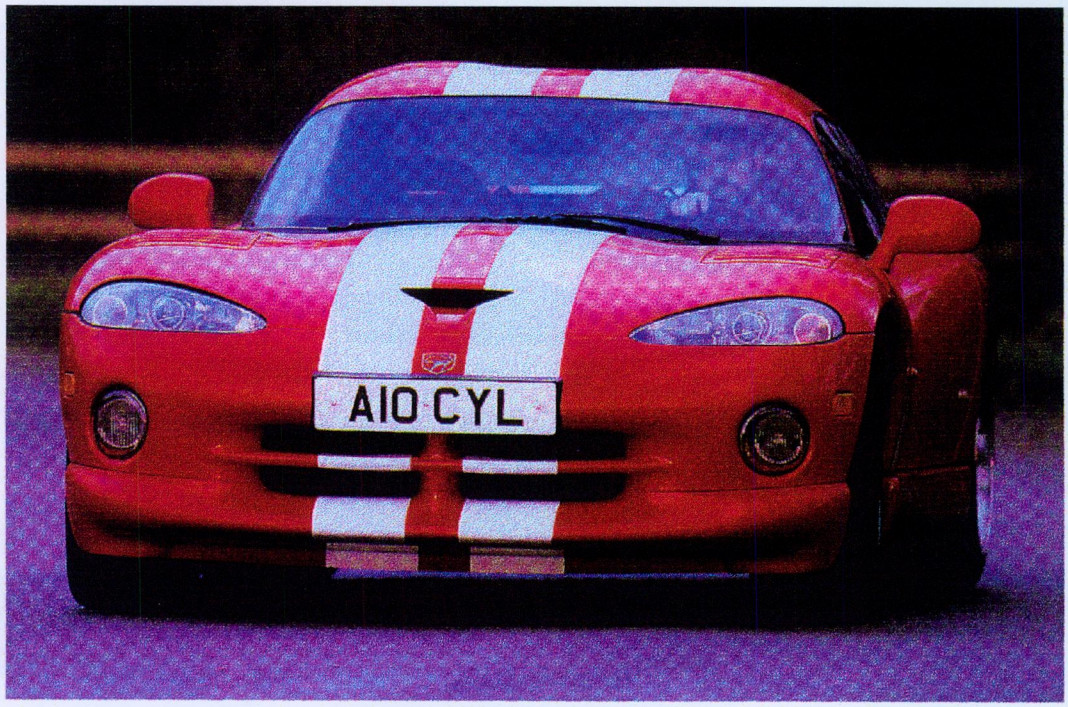
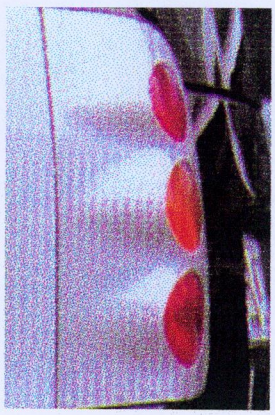


Fig. 9. The aggressive and irresponsible Dodge Viper.

The exterior has a sporty feel to it, which is quite unusual for a vehicle that is taller than it is wide. This illusion is created from the two-tone colour scheme, the colour of the body panels and that of the safety cell. A sensation of speed is created with the curved bonnet flowing into the doors, the slanting lights placed above and behind the front of the front wheels give an animated impression that the wheels have 'taken off' and the car is trying to catch up. Jim Kenzie says, "It's as cute as a spotted pup" (Kenzie,Aug'98) yet it has quite a lot of aggressive styling features. The wheel arches, protruding in all directions, side, frontal and at the rear, giving the car a very masculine stance, ready to eat the road. It could be said that the 'Smart and Pulse' mimics one if not all of the aggressive cars in production, the 'Dodge Viper' (fig.9). For example, the wheel

arches are protruding but observing face on, the Viper and Smarts headlights are proportionally identical (proportionally identical, meaning the Smarts are more round to fit into its form), curving around to the side panels. The grill and lower lights of the Viper are mimicked in the grill of the 'Smart and Pulse'. As already mentioned the Smart and Pulse is a different model from that of the 'Smart and Pure'.



One of the more apparent features of the exterior, are the rear lights (fig.10). Again, giving the feeling of speed, reminiscent of the jet age, clean and subtle, they are contained in the vehicle, unlike the American "dream machines" of the 50s.

The Smarts interior aesthetic is a contradiction in terms. It is cute yet aggressive, sporty yet hungry, having a different personality for whatever colour you have it. How do you like your Smart? - 'One car many styles'.

The Smarts Interior

As with the exterior, function is the main dictator. The Smart may appear small on the outside yet it has more cabin room than the average mini-van, space wagon or saloon (fig.11). This huge amount of space is an integral part of a highly complex safety system. On impact from the rear, the whole drive assembly (situated at the rear), engine and transmission, move forward as much as 10 cm on longitudinally moving

bearings, absorbing the energy and bringing the energy back into the vehicle behind. The steel plated seats move accordingly with the seat belt force limiters giving at precisely controlled intervals. This innovative safety concept seems outrageous yet it works very similarly to that of a non-recoiling hammer used by a plumber.

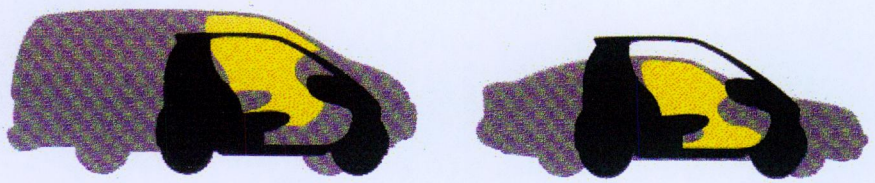


Fig. 11. Small on the outside, Smart on the inside.

The layout of the interior is a wealth of ergonomics worked into a harmonious environment. Jim McCraw, a critic for *Car Connection,* in a review of the Smart states:

> *The interior of the Smart is like nothing else, several steps beyond the new German style found inside the new Beetle . . . All of the plastic parts are high grade and durable looking.*
> (*McCraw, Aug. 1998*)

These durable looking plastics are die-cast, high ductile-yield magnesium (Pangelinan, Aug.97p68) which act as a barrier and protect the interior from flying objects from the outside. Everything is sensibly arranged: clearly laid out displays, logically positioned switches. The passenger seat sits behind the driver to improve visibility and the bucket steel reinforced safety seats are all-day comfortable (McCraw, Aug 1998).

When not in use, the passenger seat can be folded down to reveal a cup holder and a hard work top. This also increases the storage room from 150 litres to 363 litres, an ample amount of storage room.

The interior is bubbly and happy. It is futuristic in a 'Jetsons' kind of way. The 'Jetsons', although a cartoon probably has the most optimistic outlook on the future compared with that of any comic Hollywood film or TV series. Likewise, the Smart, seems most definitely the most optimistic mode of personal, urban transport for the future.

The interior, again like the exterior, can be customised to accommodate the user to his or her personal preference (fig.12). With over fifty different accessories and optional equipment ranging from a leather steering wheel to a CD organiser, a child's safety seat to a smoker's kit, they are all yours for the taking. If you get bored and feel like a change, the Smart fresh-up package will alter in colour all trimmings including gearstick, door handles, upholstery and various other parts in the cockpit.

The Smart has all the features normally associated with larger, more 'upper class' vehicles, as standard, and a vast amount of optional equipment for one to choose from. This optional equipment enables one to customise a car to their own individual need. A parallel can be drawn with the concept of having an apartment in a block, all the basis same layout and

design, but different tastes in decoration and style dictated by the user/occupant.

Fig. 12. One interior, many styles.

CHAPTER 3

Mobility package and its benefits

The Smart car is a tiny two-seater for cities, it is small yet quite expensive. It retails in Germany for DM16, 480(IR£6609) for the 'Smart and Pure', DM 17,480(IR£7024) for the 'Smart and Pulse' and DM 19,980(IR£8030) for the 'limited/1' a special edition, luxury model. These prices seem somewhat steep in relation to other smaller cars on the market, but the Smart is not just a car. Note: Giving the equivalent Irish prices would be misleading due to different taxing systems and shipping costs. The limited/1costs as much as a reasonably well equipped Fiesta in Germany. (Kacher, Aug.'98, p 70)

The Smart is part of an integrated mobility concept that gives the customer a means of private mobility beyond using a car in the traditional sense. Smart regards the brand and the product as one. Smart provides a system for personal mobility. It was devised solely for the customer's comprehensive travel needs on owning a car. The Smart car is but one stage in a whole Smart package consisting of:

SmartmoveTravel	Smartmove Assistant
Smartmove Rail	Smartmove Parking
Smartmove Fly	Smartmove City

All these are offering the car user greater benefits and options to that of buying a car in the conventional manner. This is the

most important step in developing the concept of selling a variety of different 'modes of transport', not just focusing on the one product, the car, which is but one aspect of transport.

The whole innovative approach is exactly what is needed; it is the first concrete step in changing people's perception of car ownership and use. Transport using a combination of a variety of transport modes is now presented as one package, all part of a whole. Unlike the concept of successful 'Park and Ride', whereby he/she parks his/her car in a carpark outside the city and rides a bus into the city-centre (which Dublin used for the first time this Christmas), but has been used successfully for years in places like Cork, Cambridge and other European cities, this system is but one aspect of a whole mobility package. This system however is independent of car manufactures, and was set up to fit the needs of the public by, in Dublin's case, Dublin Bus.

But looking at the Smartmove package, this appears to be far more comprehensive. Telematics are the future in improving co-ordination between differing modes of transport, and simplifying the ability to use a transport system as a whole. It has taken such systems as 'Park and Ride' and developed them far beyond their original concepts and present-day applications. To quote their press information release 1998, "Some elements of the package will be available on all markets by the date of market introduction, others will undergo further development before being introduced to the market. For example, 'Smartmove Fly', a Smart car owner on purchasing his/her air

ticket via Internet or phone, automatically has direct access to a Smart car at his/her destination. In one transaction, the Smart car owner can fly-drive without any of the normal delays and administration procedures (for example, passport, driving license, insurance, credit car details)- normally encountered in a fly-drive package.

Smartmove Parking, another example in the mobility package, is very attractive, especially since it provides reduced cost parking specifically for the Smart car, an essential for any city driver. Some multi-story car parks from October '98 were equipped with the technical facilities enabling Smart and other extra compact cars to be automatically charged a lower parking fee.

Smart has travel links to other modes of transport and transport operators: "rail operators in the case of Smart move Rail, and car-sharing schemes and local public transport in the case of Smartmove City" (Smart Press Information 1998, p 13).

Car sharing is a plausible concept, Smart have incorporated this into their mobility package which has proved a success in the Netherlands with the backing of O2.

O2 are an international network of anti-consumerist designers based in Europe who are committed to conservation and ecology. Niels Peter Flint, founder of O2, stated in an article in 1989 which briefly explains O2's thinking:

Thinking about how to make things that cause as little pollution, as little consumption of energy, as possible. That means right from the production process through to its use - and then onto recycling. (Coming up for air, Design Week, 2 June 1989, p 16)

One of the easiest ways to reduce consumption of energy and pollution is to use less. Obviously, but sharing something you do not use all of the time is one way of reducing the over-use of a product and in turn reducing energy and resources.

Car sharing is an interesting concept and is currently popular in the Netherlands (O2). Entrepreneurs who have found that there is a market for people who occasionally use a car are setting up these systems.

The borrowing system works whereby it gives the user huge benefits, more so than when owning a car. These include, no tax paid on something you do not always use, no expensive parking charges (especially if living in a city location where parking must be bought or rented with accommodation).

It works on a subscription basis so you and the people in your neighbourhood can enjoy the comfort of using a car only when you need it, dispensing of the disadvantages of car ownership like the aforementioned car parking fees, tax, maintenance, depreciation etc.

It could be said that most car manufacturers would shun this ideal, afraid it could get popular and lead to the demise of the

industry. Not in Smarts case, With the Smart mobility package from the date of market introduction in Germany and Switzerland the Smart car owner becomes a member of a car-sharing organisation for a year without paying any contribution, acceptance fee or security.

In Switzerland, on the purchase of a Smart from a Smartcar centre (fig. 13), the user acquires a Smartmove Travelcard. The card enables the user to receive half price rail fairs. With the aid of an integrated electronic chip, the card is an electronic key, which provides access to more than 1000 cars situated at 700 stations in Switzerland, 250 of which are railway stations. (Smart press release, Oct 98)

Fig. 13. Smartcar centre, located in highly frequented locations. (Smart press release, Oct.1998)

The Smart is part of a mobility fleet. In the Zurich area alone there are over 300 cars at numerous locations, whereby owners of the travel card can avail of the use of any of these cars. Reservations can be made on a twenty-four hour basis by telephone or Internet. The user is charged on an hourly basis. The exact number of kilometres is measured electronically; the cost then corresponds exactly to the use of the car. Payment is made via a monthly mobility invoice.

Smartmove Car-sharing in Germany works in a similar way to the Swiss system, with bookings and monthly invoice payments. However, it is working in co-operation with the German federal Car sharing associating (BCS). Membership, registration costs or a deposit are not required for the first year for the Smart owner. This system allows the owner to use a larger vehicle for transportation goods or for long trips with family or friends.

For one year free of charge upon purchasing a Smart, the customer can make avail of the Smartmove Assistance. This is a system whereby upon breakdown, if the car cannot be repaired immediately the customer is given a replacement car free of charge, from the nearest Smart or car-hire centre and when their car is repaired they can collect it without paying any repair bills. There is also the opportunity to acquire the Smartmove Assistance Plus which offers full cover for all expenses and arrangements in the event of an emergency. All of these Smartmove options are consistently being developed and will be extended to cover additional markets in the future.

Economical benefits.

All car manufacturers are promoting and creating wealth in most sectors of society. The creation of stylish luxurious cars as status symbols for the wealthy is in effect perpetuating an outdated approach to transport and car ownership. These luxurious cars are not designed to be environmentally friendly; they are not efficient in their use of petrol, not conducive to small space parking, not suitable to the environment of today's European cities where space is of the essence.

Additional unnecessary luxuries, for example, adjustable seats, in the Lexus LS400, all make for additional weight, which means it requires more petrol to run. This is contrary to what should be considered as present-day requirements of low fuel consumption. This adherence to what should be obsolete ideas of disregarding the amount of fuel consumption of a car is indicative of the stagnant thinking of the automobile designers and manufacturers. No one disputes that there is a market for these non-environmentally friendly vehicles, however the car manufacturers should be investing and promoting a more environmentally friendly option. By adhering to an obsolete way of approaching car design, they are contributing to their own slow but inevitable demise.

Governments are taking action against vehicles that over-consume fuel and in Germany are planing to double parking rates for larger cars (Michael Hardt). Most European countries now penalise the larger car. In Ireland the 1999 Budget

increased motor taxes, replacing the two-tier system of vehicle registration with a three-tier, favouring the smaller more efficient car.

In Germany, where the Greens are in coalition and as the policies have a distinctly 'Green' flavour, speed limits have been introduced to the autobahn, road tax is not required if the vehicle is under a certain fuel omission level. All these measures contribute to the reduction of appeal of the larger, more damaging to the environment, vehicles.

In the US, in the state of California, the state legislation ensures that 10% of all vehicles that are sold by manufactures must be of zero fuel emission by the year 2003 (Domus, Jan.97, p72). The British government is also proposing to promote the same policy in Cambridge. This all indicates clearly the way forward for vehicle design and transport systems; and automobile designers and manufacturers must, for their own survival, take notice and re-orientate their whole approach.

The Smartmove package has certainly shown the way forward and is poised to reap the benefits. The Smart car itself complies with the European regulations Euro 11 and D3 on fuel emission using only 120g/km CO_2, which attracts an additional tax exemption in Germany up to the end of 2005. (Smart press release, Oct, 98). The smaller car, of which the Smart is the ultimate, also reaps the benefit of cheaper car parking fees.

On a more individual level, the Smart car appeals to its owner for its versatility and flexibility in terms of style. It can easily be restyled, customising interiors to meet the changing fashion trends of the day. Its name and branding and lifestyle orientated marketing appeals to the style conscious as well as eco-friendly individuals. It has a strong element of status associated with it. This is reflected in the price, and marketing strategies of the Smartcar. Their strong promotion of a modern lifestyle to car-use and mobility in general is new, innovative and logical. This should demonstrate to the more conservative car manufacturers, that it can be just as financially rewarding to design and promote a mobility system.

On a moral level the Smart car is the way forward. It is almost full-circle recyclable, it has low fuel emission, small space requirements, special blow-off paint, etc. It must be recognised, however that it too has areas which also need to be developed if it is truly to become the ultimate in being environmentally friendly: it needs to look at alternative fuel sources to fulfil its goal and achieve complete recylability.

The Smarts appeal to the traditional car buyer who look for their vehicle to provide a status symbol and portray a certain image (aggressive, fast moving, powerful) is very restricted. While being a fast and efficient size and shape, its appeal may be lacking to the car lover whose eco-friendly awareness has not yet developed. Smart also have a lot of work to do in terms of creating and developing within their market an awareness of the importance of an eco-friendly approach to personal mobility.

The Smart is definitely the most optimistic approach for the future of transport. Drawbacks though there may be, the overall package is the way forward. The major benefits of the Smart will happen later, to fulfil its goal of eliminating emissions and achieving a closed circle recycling system. The whole mobility concept is a system, which will change the auto-industry. Its unique approach of mobility had to make a quick impact on the market to hold a market position in the most competitive industry in the world, hence its fossil fuel power source. The optimum outcome is for a competitor to the Smart's mobility system. Producing, not a zero emission electric vehicle, but an emission-free mobility concept. The mobility industry needs to be competitive, so that such comprehensive mobility packages could be offered on numerous levels, to feed the ever-growing demands of the consumer, for choice of product and services.

Conclusion

In conclusion, it must be seen that the time has come for a whole rethink in the design, manufacturing and marketing of the car.

As Dr. Gottschalk, President of the German Association of the motor industry 1999 (VDA), points out "The motor vehicle continues to play a key role in the commercial and private mobility", so it is worthwhile for auto-makers and governments to persist with attempts to reduce and eliminate emissions, but also to look at the whole area of transport, mobility. The importance of mobility is growing with globalisation. The car must be viewed as one part of the comprehensive transport system as epitomised by the Smartmove mobility package. Smart are offering a mobility service. You don't just buy a Smartcar-you are buying into a mobility system.

Smart, although running off a fossil fuel energy source, are promoting and marketing a service for urban use, the car being only one element. Its size and compact nature seems to be the logical approach for overly congested cities.

The mobility package is and must be the future of the transport industry. Long distance driving would be virtually eliminated decreasing unnerving stress and numerous road deaths. Smart is the only company offering a

comprehensive mobility system in one transaction. Like any service it must be encouraged to develop. It also needs company in the market in order to ensure competitiveness and market choice. While it promotes an excellent system, there are still areas that need to be addressed to make it more ecologically sound. Smart was designed around consumer demands and since the service or infrastructure has not yet arrived to enable Smart to run on an alternative power source such as electricity, this will continue to be for the present one of the major drawbacks to being totally 'Green'.

Smarts whole aim is to benefit the consumer, yet its existing use of fossil fuel is still a cause of pollution.

> *Further efforts are needed to achieve a balance between the economic and ecological issues surrounding transport. What is needed first and foremost is an agreement to optimise the available choice of vehicle, route, and overall transport system and the technical interplay between the vehicles and the infrastructure (Auto 1998, p99).*

In my opinion Smart-move has begun this thinking and is putting this philosophy into practice. It is the most innovative approach yet to feature in the motor industry, and as such should be supported, encouraged, adapted and developed.

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