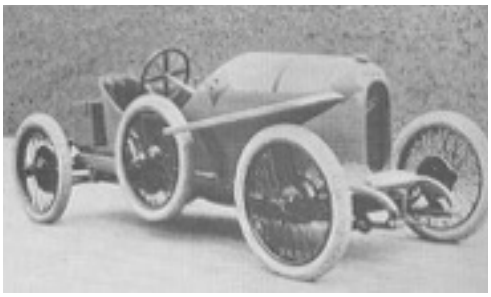
Famous Designers

Their economy and light car designs

Today automobiles are designed by large anonymous teams of engineers and designers, the word designer being used in the context similar to interior designer; being responsible for the ascetics of the overall design. In the past the term designer referred to the principle member of the design team. Some of those principles produced a range of outstanding designs across in some cases a large range of automobile types and have become justly famous designers. Names like Bugatti and Porsche are still well known due to the continuing existence of the companies first formed by Ettore Bugatti and Ferdinand Porsche, but some others such as Colin Chapman didn't put their name on the company, Others such as Alex Issigonis, Hans Ledwinka and Danti Giacosa created their designs for an employer but all were outstanding in their own way and It is their economy and light car designs that are described here.

Ferdnand Porsche 1875-1952 Born in Maffersdorf in Northern Bohemia now part of Czech Republic, the son of a tinsmith. His first automobile designs were for Lohner of Vienna in 1899. He went on to design for Austro-Daimler 1906-23, Then Daimler-MotorenAG, later Daimler-Benz, 1923- 29. Followed by Steyr, in Austria in 1929. Later in 1929 he set up his own design office in Stuttgart, He and his team designed many outstanding cars there before moving to Gmund in Austria in 1944 to escape Allied bombing. After a troubled period at the end of the war, he again returned to Stuttgart, the home of Porsche cars.

Although he was actively involved in motorcar design for over fifty years, only one of his light car designs reached series production. He was fortunate to see many of his heavy luxury, sports and racing cars designs reached production. But getting a light car produced, sporting or economy was a struggle. While at Austro-Daimler in the early nineteen twenties, he designed an 1100cc sports car. Hoping that it would form the basis of a wider range of cars, but he was not supported by board of directors



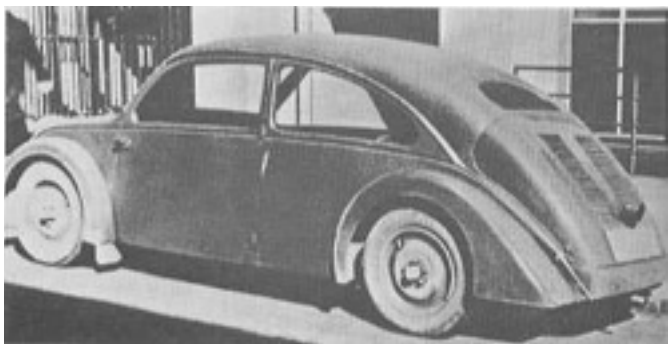
of Austro-Daimler. A handful of cars were produced and given the name **Sascha**, in honour of Count Shascha Kolowrat who underwrote the venture. The "Sascha's", proved very successful in motor sports events throughout Europe.

I have found a reference to a one-litre small car that Porsche designed while he was at Daimler-Benz, in a book by Richard von Frankenberg. This was in 1928, and thirty test samples were constructed but the project wasn't taken any further and none have survived.

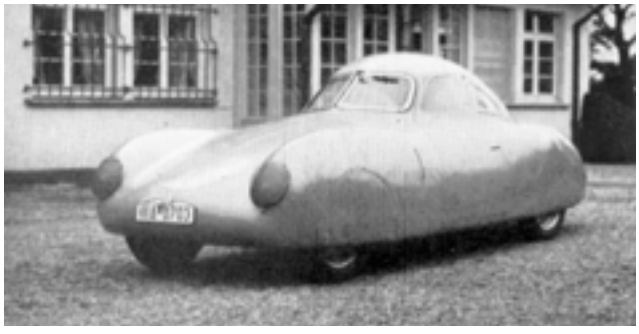
By 1931 Ferdinand Porsche had set up his own design bureau in Stuttgart, Germany and began to create designs for the German motor industry. The Porsche design bureau was staffed by engineers that Porsche had gathered together over a period of thirty years. They were Karl Rabe his chief engineer, Erwin Komenda in charge of body designer, Kales in charge of engine design, Mickl, he was responsible for aerodynamics and Hruska. His son Ferry Porsche was also part of the team and would take over from his father after the Second World War.

One project that Porsche and his team started to work on was for a small economy car, but unlike the other work they had it had not been commissioned but was something Porsche wanted to do. It was numbered type 12. This was in September 1931. The design that unfolded had features that would become familiar in later years, a backbone frame, a rear engine, all independent suspension

and a beetle shaped body. The engine design was unconventional for a car, a three cylinder air-cooled radial. This arrangement was often used in light aircraft.
In 1932 the German motorcycle manufacturer Zundapp made enquires about a small car design that they wished to put in production. The type 12 was revised to meet Zundapp's requirements. A five cylinder water-cooled engine replaced the three cylinder unit. Prototypes of the car that was to be called the "Zundapp Volksauto", were produced and road tested, but the car didn't go into series production due to Zundapp's inability to finance the venture.
In 1933 Porsche was approached NSU by another German motorcycle manufacturer, for a small car design. This time is was for a slightly larger car. The design, **Porsche type number 32**, that was finalised utilised a flat four cylinder air-cooled engine of 1400cc. Torsion bar springs were used for the trailing arm front and swing axle rear suspension. Three prototypes were made, and had been tested, before NSU had to abandon the idea due to contract agreements made previously with Fiat, not to re-enter car manufacturer.



The idea of creating a small car of advanced design for the people of Germany seem to be doomed, until Porsche submitted a proposal on the development of such a car to the Transport department of the German government. This was in January 1934. He managed to get the chancellor a certain Herr Hitler, interested in the idea. This led to a lot of hard work by the Porsche bureau, before the car then called the "KdF Wagen", and known to us as the Volkswagen was a reality. The car was similar to the "NSU Volksauto", but slightly smaller and with a 985cc engine, was developed and ready for production by 1938. Production started at the purpose built factory at Wolfsburg in 1939. But only two hundred and ten examples were made before the factory went over to war production. Over twenty-one million Volkswagen Beetles have been produced since 1945. This alone proves the brilliance of Ferdinand Porsche and his team.
It was decided to develop a sports version of it to be run in a race from Berlin to Rome and back to take place in 1939. Three cars were built, named the Volkswagen **Type 64**, based on the Volkswagen saloon platform chassis with an aerodynamic sports coupe body designed by Erwin Komenda of the Porsche design office. The tuned Volkswagen engine produced 40bhp and that was sufficient to give the car a maximum speed of 91mph, which would have been used a great deal in the race as it was planned to be run the Autobahn recently built in Germany. The Volkswagen engine was ideal for this as it was designed to run for long periods on the autobahn a task it fulfilled with distinction in Volkswagens and the early Porsche coupes after the war. The race was cancelled due to the outbreak of the Second World War, but Professor Porsche drove one of



the cars throughout the war and that car survived to take part in post war motor sport in the hands of an Austrian driver. The next time the Porsche design office worked on a sport car it was an evolution of the type 64 but carried the Porsche name.

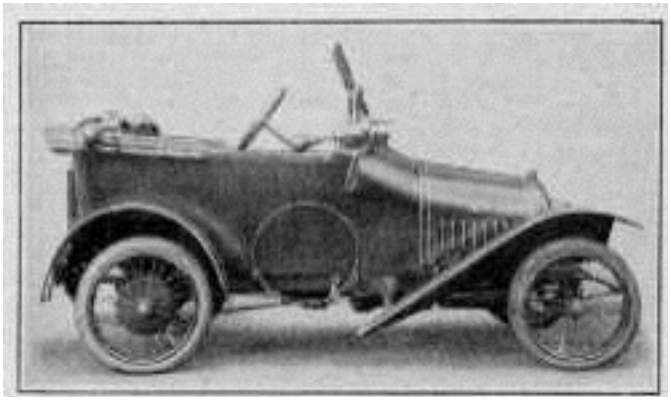
In 1950 production of the **Porsche 356** was transferred to Stuttgart, Germany, their pre-war base. The cars were made in the Reutter factory were the pressed steel bodies used from now on, were also made. After the initial revolutionary design, The story of the Porsche 356 is one of evolution Between 1950 and 1955, over seven thousand of all types of this original 356 was made, the engine size steadily increasing from 1086cc, to 1488cc and the power output rising to 115bhp in the Carrera 1600GT Coupe of 1959. During this time the car evolved steadily with improvements in all it's components, the Volkswagen content being reduced as Porsche designed items became available. In 1955 the 356 evolved into the 356A and that in turn evolved into 356B in 1959 as the design was refined and improved, by then the car had long been pure Porsche.
Designers

Ettore Bugatti was born in Milan Italy in 1881. He was descended from a long line of artist craftsmen. He served his apprenticeship in cycle making. His first car design to reach production was for de Dietrich of Alsace, then a German province. He later joined Emil Mathis in Strasbourg, making a car that had been design by Bugatti under the name of Hermies. This was in 1904. He left Mathis and began designing for Deutz in Cologne in 1907.
He gave all his designs a type number and by 1909 when he left Deutz he was up to Type 9. The type 10 was freelance design and was for a lightweight car, as opposed to his previous designs. One prototype was made. It so impressed his financial backers that in 1910 he was able to set up a business under his own name. His factory was located at Molsheim near Strasbourg, Alsace, Germany. Alsace became a French province after 1918. After a distinguished career making original, high quality car, railcars and designing aero-engines, he died in 1947.

Ettore Bugatti famous for his grand prix and luxury cars always worked to a high standard of refinement. In 1910, the first of his designs bearing his name to be offered to the public. With a 1327cc single overhead camshaft eight valve four-cylinder engine fitted. It was available with three wheelbase lengths, the **Type 13** the shortest and the Type 15 and 17 longer to suit body types.

The type 15 and 17 were replaced by the Type 22 and 23 in 1920. Three engine sizes were available for the three model range that was made until 1926. 1368cc, 1453cc and 1496cc, all with

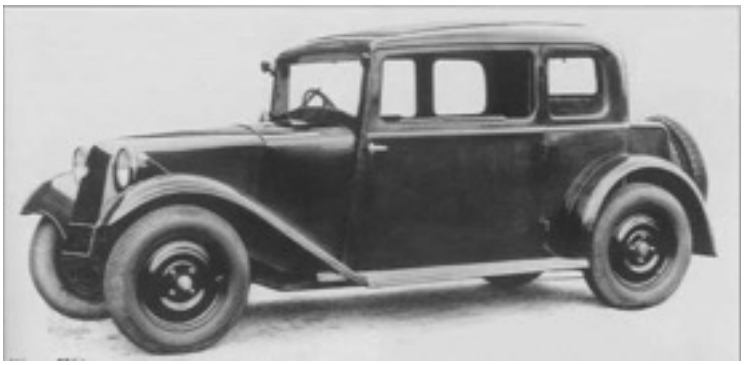
sixteen valve engines. These were lightweight high performance cars fitted various body types, racing sports and touring. From 1926 the lightweight cars on offer were the Type 37 and 37A sports (See details in Mainly for Fun Part Two) and the **Type 40 tourer**. Fitted with a 1496cc twelve valve single overhead camshaft four-cylinder engine, the 37A being supercharged. These were available to 1930.
Lightweights accounted for forty-five percent of the all cars produced made by the company.
There is one other Bugatti design merits inclusion. In 1913 Bugatti designed for Peugeot an economy car with a 856cc engine which they named the "**Babe**". It was made until 1915. At its reintroduction after the First World War, it was revised and named the Quadrilette, and made until 1921.



Hans Ledwinka 1878-1967 Born in Austria when it was part of the Austo-Hungarian empire. By 1906 Hans Ledwinka worked for Nesseldorfer a car manufacturer in Moravia, after the break up of the empire Moravia became part of the new state of the Czechoslovak republic and the company changed its name to Tatra 1923. He left Tatra to join Steyr in Austria in 1917 then left in 1923, to work for Tatra where he designed many ground breaking cars as diverse as the type 11 of 1923 to the rear-engined type 77 of 1937, until imprisonment by the communists in 1945. He pioneered the backbone chassis frame, swing axles and the air cooled flat four engine configuration.
Hans Ledwinka is justly famous for his "V8" rear-engined cars, the Tatra T77, T87, and the T97 with a flat four engine. His contribution to automobile progress began in 1905, when he restored the fortunes of the "Nesseldorf" company, later renamed Tatra. He did this by introducing advanced designs. He left Nesseldorf in 1916, working for Steyr in Austria returning to the town Nesseldorf in 1921. While working at Steyr he had been creating the design of a small car in his own time. His design had been rejected by the Steyr management, but he was able to develop and produce this

design on his return to the by then renamed Nesseldorf. Designated the **Tatra T11** it made the

name of Tatra well known throughout Europe.
The T11 was the first of his designs using a backbone chassis, a fan cooled horizontally opposed engine and a jointless independent rear axle. The engine in this design was a overhead valve 1056cc twin, mounted in unit with the gearbox on the front of the chassis. The front beam axle being attached to the engine. This was the first of a line of design to a similar pattern that were produced until 1948. The T11 was produced from 1923 to 1927, and replaced by the T12 with a similar specification. The T12 was produced from 1926 to 1936. In 1931 the T54, with a 1465cc air-cooled flat four engine was introduced. It was made until 1936. Also in 1931 the T57 a 1155cc air-cooled flat four was introduced, and through the T57A, **T57B** and T57K versions remained in production until 1948. The later models having a 1256cc engine. A total of thirty-eight and half thousand of these small Tatra's had been made between 1923 and 1948.



In 1931, Hans Ledwinka's son Erich, who was a member of his fathers design team at Tatra, designed their first rear engined car the **Tatra V570**. The flat twin cylinder, air-cooled engine of 854cc, was mounted at the back of a platform chassis and was in unit with the gearbox and final drive. Swing axles were again used to take the drive to the rear wheels. The first prototype made had a fairly crude body fitted, but the second prototype, shown at the 1933 Prague Motor Show had a streamlined body designed to conform to the ideas of Paul Jaray. Unfortunately it didn't reach production. This had more to do with the priorities of the Tatra management that any outside

influences. Tatra chose not to produce economy cars with the rear engine layout, but to reserve that layout for limited production luxury and family size cars The Tatra 77 of 1933, the Tatra 87 of 1936 and the Tatra 97 of 1937. With the onset of the war in 1939 all innovation stopped and war production was the priority. At the end of the war Ledwinka was imprisoned and his involvement with Tatra came to an end

Danti Giacosa was one of the greatest light car designers of all time. His work covered a large range from minicars to sports car. Using all the different layouts as and when they were the best solution at the time to meet the design parameters. Born in 1905, he studied engineering at the Turin Polytechnic until 1927. After completing his compulsory military service he joined Fiat 1928, at first working on military vehicles and then in the aero engine division. The director of the aero-engine division was Tranquillo Zerbi, designer of grand prix cars for Fiat. In 1933 when work commenced on the Fiat 500, the director of the aero-engine division was Antonio Fessia. He had sufficient confidence to entrust the design of all the mechanical components of the car including the chassis to Giacosa. Giacosa was engineering manager at Fiat by 1937 and he had become director of the engineering division of Fiat by 1950. The **Fiat 500** was a state of the art two seat miniature car that soon proved popular when production commenced in 1936, earning the name "Topolino". It was a two-seater and had a 569cc side valve engine, but the chassis with independent front suspension using a transverse leaf spring and wishbones and neat packaging was a big advance, with the engine located over the front wheels and radiator behind it over the four speed syncromesh gearbox, also excellent hydraulic brakes. With fuel consumption around 50mpg and a maximum speed of 55mph, but with handling good enough to allow average speeds of 40mph. Between 1936 when first introduced until the end of production in 1948, 122,000 were made of this original version.

Giacosa's next design was the **Fiat 508C**. A completely new car to replace the 508, the 508C or as it became known as the "Millecento", had a 1100cc short stroke engine, with overhead valves, (The 500 engine had side valves), an outstanding chassis design that earned it a reputation for good handling and ride quality. It was with a 508C chassis that as engineering manager Danti Giacosa led a team that developed the **Fiat 508CMM** a streamlined coupe. Fiat used the car to win the

1100cc class in the Mille Miglia of 1938. This model was produced in small numbers until 1940. The 508C was produced from 1937 to 1948, when it was replaced by an updated versions the 1100B and 1100E which was produced until1953.

A wealthy Italian industrialist Piero Dusio, with a request to design a single seat racing car approached him in 1944, that could be purchased for a relatively low price. This he did in his free time away for the Fiat factory. The design utilised components from the Fiat 500 and 508C. The resulting car the Cisitalia "D46" was on sale in 1946 at a price in Italian Lira equal to around 1000 UK Pounds. The space-frame chassis was constructed using steel tubes and the body consisted of light alloy panels. The Fiat 1100cc engine that was fitted to the car was tuned to produce 60 BHP. A maximum speed of 108MPH was claimed. A batch of twenty cars was laid down in 1946 and the cars were raced successfully throughout the rest of the nineteen forties. Giacosa did the initial design work on the next Cisitalia model a two-seat sports car the Project 202. Again he used a multi tube space-frame chassis. The design being an adaptation of the single seat model. The prototype was fitted with a coupe body similar to the Fiat 508CMM, before series production commenced, he passed over responsibility for the design to Giovanni Savonuzzi.
Though Danti Giacosa had become director of the engineering division of Fiat, that didn't mean that he could follow his own inclinations regarding the design of any new cars. The Fiat sales department had an overriding influence on new the model produced. Therefore Giacosa may be excused that his next design the Fiat 1400 of 1950 was only a qualified success. Fiat wanted to produce a car that satisfied the needs of countries with a poor road system that had previously been supplied by American manufacturers before their cars had become bloated. They wanted a car with good stability, good visibility, and room for six people and their luggage, a speed of 75MPH and a fuel consumption of 28MPG. Unfortunately they also wanted the car with a modest size engine that wasn't too expensive to run in Italy. Despite Giacosa's best efforts they got a car that nether one thing or another. Only one hundred and twenty-thousand examples produced in eight years.

His next light car design was the **1100-103**; this model perpetuated the name Millecento previously given to the 508C. This Millicento was a compact unitary construction saloon fitted with wishbones and coil springs at the front and a live axle and half-elliptic springs at the rear. Its excellent handling

and good performance was in the tradition of its predecessor. Of conventional design for its period, with a water-cooled OHV inline four-cylinder engine of 1089cc, that at first produced 33 BHP rising to 44 BHP but much more when tuned. Features that would unfamiliar to us today were the steering column change for the four-speed gearbox, and the transmission handbrake. Through a series of models culminating with the 1100R, (The 1100D had a 1221cc engine.) The Millicento was in production until 1970 and one and three quarter million examples had been produced. Next Giacosa and his team designed a replacement for the Topolino. The last version of the 500C had been discontinued the previous year 1954. The **600** was a totally new car, and for Fiat a new

layout with the engine at the rear as well as unitary construction. When the 600 were introduced in 1955, rear engine cars had been produced for well over a decade and their advantages and disadvantages by then well known. Giacosa used the advantages to produce a four-seat car, although with limited luggage space, that had a reasonable performance from an engine of only 633cc, due to its low weight of eleven and one half hundredweight and also compact dimensions. Capable of almost 60 MPH and returning a fuel consumption of 45 to 55 miles per gallon and the ability to cruise at 50 MPH. He overcame the stability problems associated with other rear engined design's by identifying that the problem was not the weight distribution of the cars, but the simple swing axle rear suspension used in those designs. His answer was to the stability problem was to specify a semi-trailing arm type of rear suspension that eliminated the large change in the camber of the rear wheels that was inherent with the simple swing axle suspension system. The mini people carrier may seem to be a concept of the twenty-first century, that is not so. Within a year of the launch of the 600 a six-seat version was in production, the Multipla. By replacing the transverse leaf spring used in the front suspension by upper links and coil springs, the mechanic components of the 600 utilised in a forward control unitary body with zero crumple zone and only a small increase in wheelbase to accommodate three rows of seats. Over seventy-six thousand of this first version of the Multipla produced by 1963. The 600 was replaced by the 600D in 1960.The engine size was increased to 767cc, with a maximum speed up to 70 MPH. Production ceased in Turin in 1970, but carried on in the Seat factory in Barcelona. Before then the 600 had been produced by NSU/Fiat in Germany, Zastava in Yugoslavia and Concord in Argentina. Over two and a half million eventually produced.

Giacosa's next rear engine car for Fiat was the Nuova 500 of 1957, with a similar layout to the 600, but with a two-cylinder air-cooled engine instead of the water-cooled inline four-cylinder unit. Being a two/plus/two-seat car, it was the true replacement for the "Topolino", at the bottom of the Fiat range. With a wheelbase fractionally over six feet and a length under nine feet, it was also a lightweight weighing less than five hundred kilos. The 479cc engines in the early production cars so under powered with only 13 BHP that they recalled and an up rated engine that produced 16.5 BHP was fitted. The final 500F of 1965 had a 499cc engine producing 18 BHP, sufficient to get to 70 MPH and a fuel consumption of 55 MPG. In 1960 Fiat introduced the "Gardinera", a 499cc station wagon with a similar inline twin cylinder engine as the "500", but with cylinder horizontal. The engine was located under the floor at the rear of the car. With a slight increase in wheelbase and the weight increased to five hundred and seventy kilos, it was newer a four seat car with a luggage area over the engine. In parallel with the Fiat models, the "500", platforms clothed in prettier bodies by Autobianchi at their Desio factory. Named the Bianchina, a convertible, later a convertible, a four seat saloon, an estate car and a van version on the Gardinera platform produced. A version of the Nuova 500 was made by **Styr-Puch** in Austria in 1957, with their own flat-twin air-cooled engine and swing axle drive and suspension. The Styr 650TR of 1965 to 1969, was the hottest 500 model made and a competent rally car.
Fiat introduced a roomier four-seat two-door saloon in 1964, to run alongside the "600". The "850", had an 843cc engine and a 270 centimetre increase in the wheelbase, but the specification was the same as the "600". An 850T version of the "Multipla" was also available the following year. Fiat also produced coupe and spyder versions using the "850", platform with an engine that produced 47 BHP at 6200 RPM, later 52 BHP from a 903cc engine. A total of over a half of a million of these produced by 1972. Spyder production had ceased by 1973. Many special versions produced by the legion of specialist coach builders at work in Italy at the time. The "850", saloon and coupe models also produced by Seat in Spain. The "600", had been discontinued by Fiat in 1970.

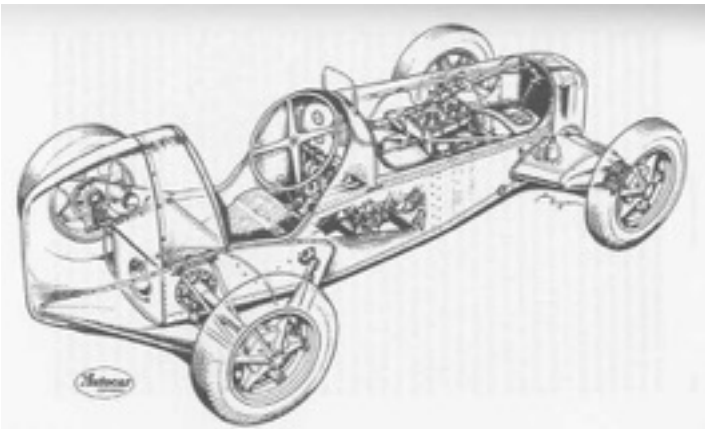
Dante Giacosa's first front wheel drive car was the **Autobianchi Primula**. Autobianchi was a subsidiary of Fiat. Ready for production in 1964, it had a four cylinder water-cooled engine of 1221cc that was already fitted in the Fiat 1100D. The rest of the car was of all new design. The engine was transversely mounted with the four-speed gearbox located inline with the crankshaft. With a gear train to the offset differential and final drive and unequal length drive shafts. This is the arrangement we see under the bonnet of most front wheel drive cars today. Other features of the design are not so familiar, such as the gear change on the steering column, also the wishbone and transverse leaf spring front suspension and the rear dead axle with half-elliptic springs. The steering was by rack and pinion, a first for Giacosa, but almost twenty years after it's first use by Issigonis.

The "500", series of cars was twenty-five years old by 1972 when Fiat introduced their last rear engined saloon car the "**126**". A four seat car the size of a BMC Mini on the wheelbase of the "500". The engine was increased in capacity to 594cc, producing 23 BHP and a top speed of 65 MPH. The 126 was in production until 1987 and almost two million examples produced.

The **Fiat 128** of 1969 was the final break through by Dante Giacosa. After a lifetime of exceptional car designs both conventional front engined and also rear engined cars. In the 128 he brought together all the features that are considered conventional today. Transverse engine/gearbox/ off set final drive with unequal length drive shafts, in conjunction with MacPherson strut front suspension. Rack and pinion steering and disc brakes on the front wheels. The 128 had wishbone and transverse half-elliptic spring independent rear suspension. Fiat had dealt with all the bugs associated with a new concept in the Primula and the 128 was a great success with one and a quarter million were produced by 1972. Although the wheelbase was 2.45 metres, the overhang each end was minimal, resulting in a compact car but with ample passenger space.
After reading the above, I hope you agree that my opening statement was not exaggerated and that we are unlikely to see his like again.

Alex Issigonis. was born of Greek parents in Smyrna, now Izmar in Turkey in 1906-1988. His father had become a naturalised British subject when living in Britain before Alex was born. He returned to Smyrna to run the family engineering business on the death of his father in 1900. Smyrna had a large Greek population at that time. They where driven out by the Turks in 1922. Alex came to England with his mother in 1923 shortly before his father's death. He studied engineering at Battersea polytechnic. His first job with a motor manufacturer was in the Humber drawing office in 1933. He worked for Humber in Coventry until 1936 when he moved to Morris Motors at Cowley near Oxford. He left Morris for Alvis after Morris merged with Austin to form the British Motor Corporation in 1952. The work he did at Alvis didn't see production and he returned to work BMC at Longbridge in 1956. He retired from the then British Leyland Motor Corporation in 1971.

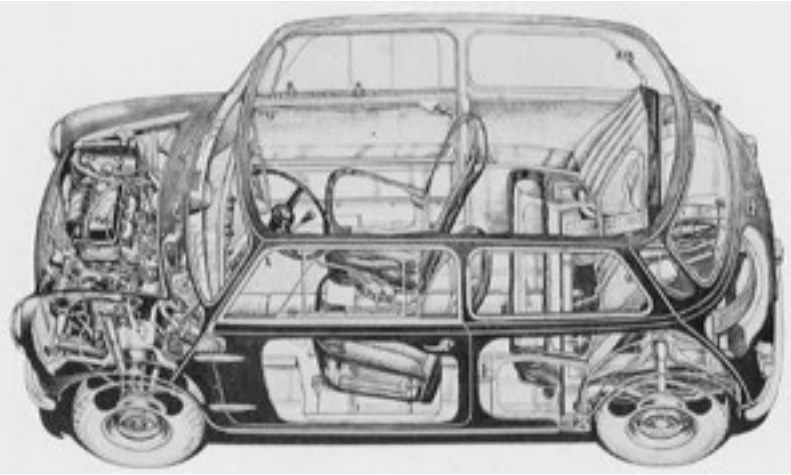
The first complete car that Issigonis designed, rather than components for someone else's project was the Lightweight Special. He and a friend constructed it in his home garage using only hand tools. As John Bolster wrote in his book, "Specials", "**The Lightweight Special** is one of the most amazing specials ever constructed". The chassis was a monocoque made using aluminium/ plywood sandwich panels. It was strong but lightweight. Th wishbone front suspension and swing axle rear suspension were unique to the car and had rubber springs. Ultra lightweight Electron wheels and hubs were another unique feature. A supercharged 750cc Austin Seven Ulster engine, was fitted at first and used in competitions with great success. This was replaced after the war with an experimental O.H.C engine made by one of the Nuffield companies (the owners of Morris). This engine is in the car today and the car is still used for hill-climb competitions.



Issigonis specialised in suspension design at Morris Motors, in the 1930's after developing his idea's at Humber. He designed the independent front suspension and rack and pinion steering for a new 1250cc saloon that was ready for production in 1939. But it wasn't produced until 1947, due to the war. Then made at Abingdon as the MG Y type. That suspension design was used again on the MG TD and all MG's up to and including the MGB.
His next design for a complete car was for his employers Morris Motors. This was the **Morris Minor**. Work started on the design in 1944 and production of the car started in 1948. With the constraints of having to utilise an existing design of engine, gearbox and rear axle, he produced a car that was popular and enduring. With a modern design of engine fitted, but not of Issigonis design the Minor remained in production until 1972 and almost one and a half million examples were produced.

He left the recently formed British Motor Corporation for Alvis 1n 1952, working on the design for a large car that wasn't produced. He returned the BMC and at the beginning of 1957 commenced work on the design of the Mini. The **BMC Mini** needs no introduction. In production for forty years from 1959 to 1999 with over five million examples made. It set the trend for packaging that has

transformed the small that is still going on. That is the Issigonis legacy. The novel features of the Mini have not survived the test of time. Small wheels have not found favour and later Mini's had larger wheels. The idea of the gearbox in the sump and rubber springs disappeared with the last Mini produced.



The BMC **1100/1300** range of cars designed by Issigonis, came with many different badges. Austin, Morris, MG, Riley, Wolesley and Vanden Plas, all part of the British Motor Corporation. It was a larger example of Mini packaging. With a body designed by Pinin Farina. This time Issigonis linked the rubber springs front and rear with hydraulic lines to form an advanced suspension system. Otherwise the running gear was the same. It proved a popular car, with a wide range of appointments or performance. One and a quarter million examples were produced between 1962

and 1974.
The last light car to bear the Issigonis stamp, was the **Austin Maxi**, made from 1969 to 1981. Originally fitted with a 1485cc version of the BMC "E4", Single overhead camshaft engine, the Maxi was an even larger version of the Mini theme and just as efficient. With a five-door body, I'm sure designed by an engineer like the Mini and not a stylist. It had a cable operated five-speed gearbox at first, which was unpopular and "Hydrolastic" spring as used in the 1100/1300 cars. The car was never developed to it's full potential and less than half a million examples were produced.
The year before the launch of the Maxi, BMC had merges with Leyland to form BLMC. Alex Issigonis didn't fit in with the new organisation and at the age of 65 he retired. He was willing to try new ideas. Sometimes they were a success and at others not. Ether way he contributed a great deal to light car design. All great men have to have support and Issigonis had amongst others, Jack Daniels at his right hand throughout his creative years.
The Maxi was just over four metres long and weighed just under a thousand kilograms, some versions of the modern BMW Mini are just under four metres and weigh 1250 KG. Minis are not that mini any more.

Colin Chapman 1928-1982 was the founder of the Lotus car company. His lifelong obsession was motor racing and racing cars. The non racing cars the company produced seem to have been a by product of that obsession, a means of earning money to go motor racing.
Colin Chapman differed from all the other designers I've written about, in that his designs where exclusively sporting. All his designs were lightweight in the interest of maximising performance, and all his production road cars were in the light car classification until 1975.
He started his involvement in car design and construction while a student, first by making specials, a very British activity using mundane cars to produce a sporting cars, in Chapman's case, trial's cars then racing cars. He moved on to designing and producing kit cars, and from that, a designer and producer of complete cars, sports cars, sports coupes and racing cars, making the name Lotus famous.

The pinnacle of his special building was the **Lotus Mark 3**, Produced from a 1930 Austin Seven saloon purchased for £15 in 1951, and arguably along side the Issigonis Lightweight Special one of the best Austin Seven special ever made.

The **Lotus Mark 6**, sold in kit form is a good representative of the earliest cars produced by Chapman in the early 1950s, with a multi-tubular chassis clothed in aluminium panels. Engines fitted ranged from the 1172cc side valve Ford unit to the then new 1100 cc Coventry Climax engine. For most of the 1950s Lotus concentrated on producing bespoke sports racing cars. The Mark 6, Mark 8, Mark9, Mark 10 and the Eleven models. In 1957 Chapman's introduced a couple of new light car designs .

Famous Designers

In 1956, Colin Chapman shown above with an **Elite**, began the design of two new cars, one was a car to compete in the forthcoming Formula 2 and the other was to be a lightweight sports coupe. Both were to have Coventry Climax engines located at the front although of different type's, and to share the same suspension design. The formula two car had a multi-tubular space frame chassis that was conventional at the time, but the coupe, the Elite chassis was a revolutionary design, being similar to the by then common steel unitary construction chassis's of mass produced cars but made of glass reinforced plastic. The aim was for a lightweight unit that could be made in greater numbers than a tubular chassis.The FWE engine was engineered for the car by Coventry Climax from existing models as the capacity of 1216cc made the car eligible for the US 1250cc racing class. The transmission consisted of a BMC gearbox then a short propeller shaft to the chassis mounted final drive unit and finally fixed length drive shaft's that also acted as transverse arms for the strut type rear suspension. With rack and pinion steering, Girling disc brakes at the front and inboard at the rear to complete the advanced specification. The body style was conceived by Peter Kirwan-Taylor an accountant, it was then refined by Frank Costin, it is to me one of the most beautiful cars of all time As with all Lotus designs, weight reduction was a great consideration and was kept down to 670 kg, so performance was outstanding for a 1200cc coupe. The later 83bhp engine versions could attain a maximum speed of 118mph and a 0-60 time of 11 seconds. Despite manufacturing problems the Elite remained in production for five years and 988 were made. Lotus has never used a GRP chassis again although all subsequent Lotus car have had GRP bodies. Others have used GRP chassis since and many of them have been lightweight coupes.

One of the most enduring concepts in the world of sports cars is that of the **Lotus Seven**. From the beginning in 1957 it was the ultimate lightweight sports car that attained a good performance with a relatively modest power unit. With the Seven, Colin Chapman built a car combining features from the Lotus Six and his Formula Two cars and his competition experience to produce a car that would do well in competitions of for fun motoring. The Ford 100E side-valve engine that only produced 40 BHP was initially the only engine option. The Seven was available in kit form and could be built for just over £500 or purchased complete for £1,036. It wasn't long before a BMC A series engine option was available and a Coventry Climax FWA engine option. With the latter the car became a Super Seven. Over the next thirteen years the car evolved from the original Seven S

1 to the Seven S 2, Super Seven S 2, Seven and S 3 with wide range of engine options and almost two thousand examples had been produced. In 1970 Lotus produced the Seven S 4, a car that was not quite in the spirit of the original Seven. It was larger with a GRP body instead of the GRP and aluminium panels of the previous cars and was a civilised car with a 1599cc Ford or 1558cc Lotus DOHC engine and a 100mph top speed, this with aerodynamics of a brick. But maximum speed has never been what the Seven's attraction. By 1973 when Lotus ceased production of the Seven, after a thousand S4's had been made.

In 1962 Lotus began producing a completely new sports roadster design the **Elan**. The Elan had originally envisaged using a GRP chassis but this proved too difficult and a deep section backbone chassis frame with a separate GRP body was used. Around the time that Elan was being developed, Lotus was also developing a double overhead camshaft adaptation of Ford GB's latest engine. This was a 1588cc four-cylinder unit that when fitted to the first Elan model the S 1 produced 105bhp. This gave the Elan a lively performance with a top speed of 115mph and a 0 to 60 time of 9 second. Though more expensive than its competitors and not that well built, the Elan sold due to its superior handling. Developed through the **S 2** then S 3 and S 4 and Sprint versions, 7895 examples were produced by 1973. The final version the Sprint had a 126bhp version of the engine that gave it a top speed of 120mph and the 0 to 60 time was down to 6.7 seconds.

In 1966 Lotus unveiled their first mid engined production car the **Europa**. With a fabricated backbone chassis and GRP coupe body and fitted with a 1470 cc Renault 16 engine and transmission installed 180 degree's from the original. The car was cramped but handling was exceptional due the usual excellent Lotus suspension. Produced until 1971 with a 88bhp 1565cc exceptional engine in later version, and usually sold in kit form in the UK. The Europa Twin Cam, fitted with the Lotus DOHC engine fitted was produced from 1971 to 1975, the Special was the star performer with a top speed of 121mph and 0 to 60mph in 7.7 seconds. A total of 9230 examples of the Europa were produced.

Another new Lotus was the **Elan+2**, a long wheelbase version of the Elan platform with an all new coupe body. made between 1969 and 1974 and fitted with a 1558cc version of the Lotus DOHC engine producing 118bhp. Later 130+2s models had the same 126bhp engine as the Europa Special and a top speed of 120mph. A total of 5200 examples of all versions were produced.

With the demise of the Elan and Europa Colin Chapman stopped producing any models with engines under two litres and so later Lotus cars cease to be lightweights.