Influential Cars of the 20 th Century
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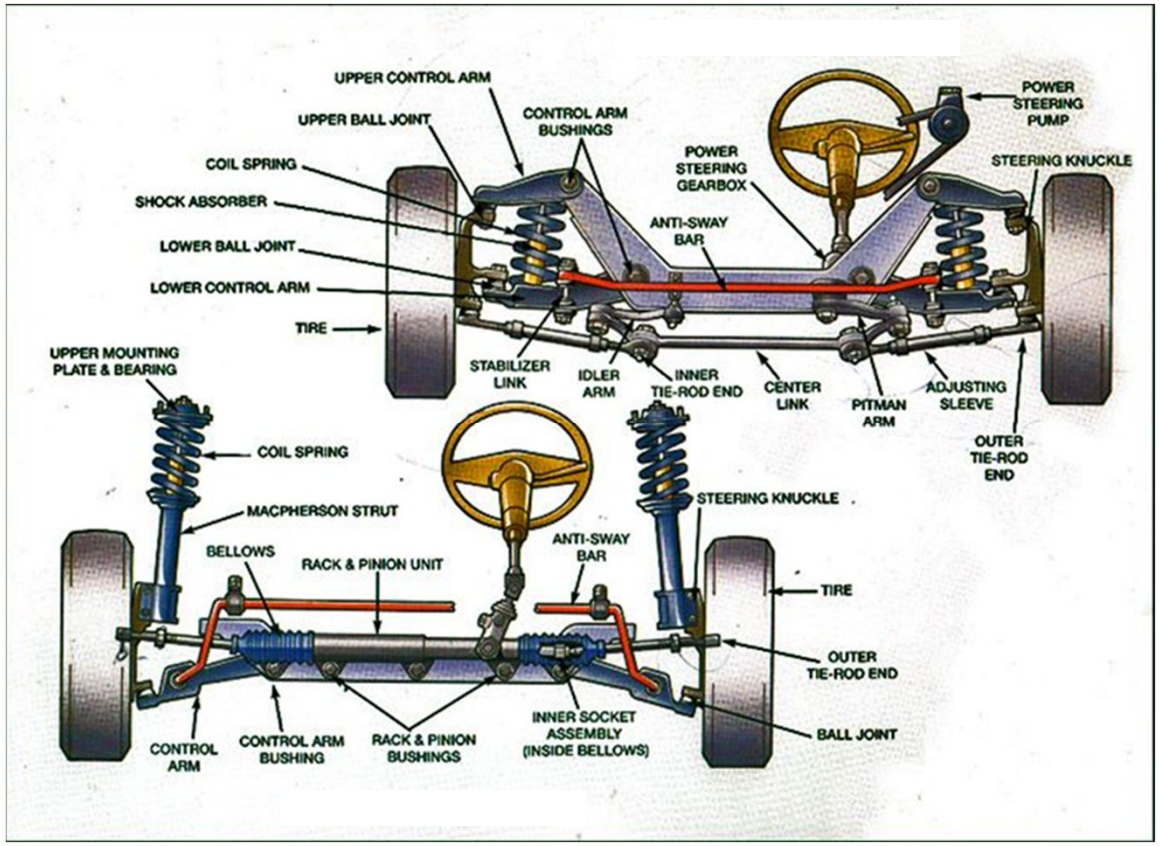
Jim Rauf

MacPherson Strut Suspension

- **Earle S. MacPherson** designed the MacPherson Strut suspension for a 1947 **GM** prototype small car
- He then went to **Ford** where he designed a similar suspension that first appeared on the 1950 **British Ford Consul**
- It is a simple independent suspension design, for front suspension, used by most mass market car maker in the world
- The design really came into its own as cars began to be produced with “unibody” structures , also called monocoques
- The MacPherson strut is a cost-effective way to produce an independent front suspension

MacPherson Strut Suspension

- **Ford** did not use struts on U.S.-built cars until the Fairmont in 1978
- Early unitized Ford cars like the 1958–1960 Lincoln and the 1960 **Ford Falcon** retained double wishbones
- After the original patents expired, **MacPherson** strut suspensions began a rapid proliferation in the U.K., Europe, and Japan
- They took longer to catch on among other Detroit automakers
- The design is particularly useful with front wheel drive configurations



1959 Austin Mini

- The **Austin Mini** was a small economy car produced by the **British Motor Corporation** (BMC) and its successors from 1959 until 2000
- Its space-saving **transverse engine** and **front-wheel drive** layout influenced a generation of car makers
- The configuration allowed 80% of the area of the car's floorpan to be used for passengers and luggage
- In 1999, the **Mini** was voted the second-most influential car of the 20th century, behind the **Ford Model T**
- The front-wheel-drive, transverse-engine layout of the Mini was copied for other "supermini" designs including the Honda N360 (1967), Nissan Cherry (1970), and Fiat 127 (1971)
- The layout was also adapted for larger subcompact designs

1959 Austin Mini

- The **Mini** was designed for **BMC** by **Alec Issigonis**
- It was manufactured at several plants located around the world:

England	Portugal
Australia	Malta
Spain	Uruguay
Chile	Venezuela
Belgium	Yugoslavia
Italy	

- The performance versions, the **Mini Cooper** and **Cooper "S",** were successful as both race and rally cars, winning the **Monte Carlo Rally** in 1964, 1965, and 1967

- **Minis** were **small** cars

Length	120.25 in
Width	52.5in
Height	53.0 in
Wheelbase	80.16in
Weight	1410 lbs

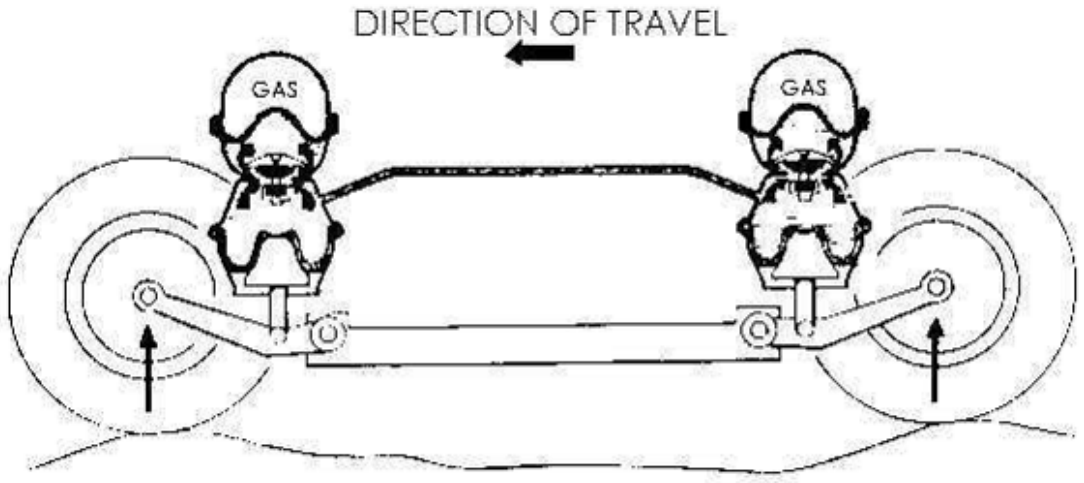
1959 Austin Mini

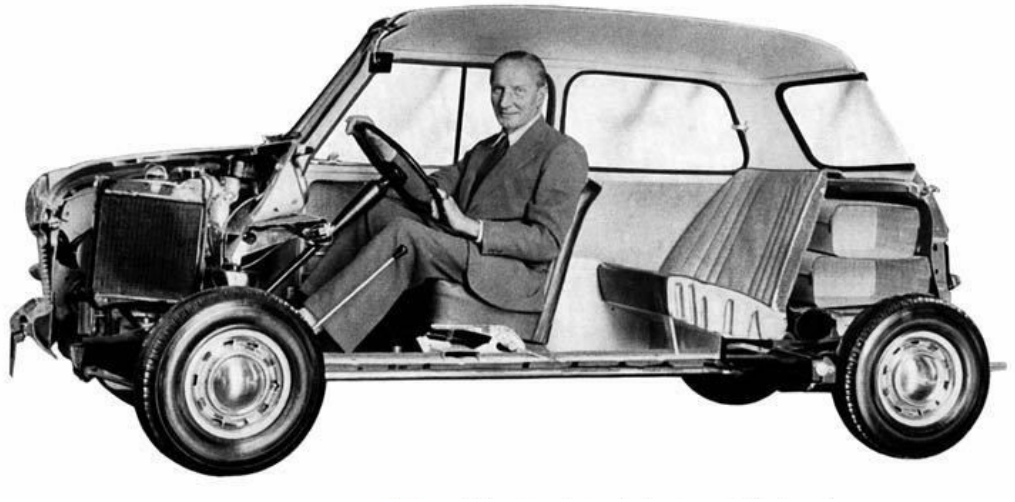
- The **Mini** used a conventional BMC four-cylinder, water-cooled engine
- Mounted transversely, with the engine-oil lubricated, four-speed transmission in the sump
- Front wheel drive differential was integral with the transmission
- The radiator was mounted at the left side of the car so that the engine-mounted fan could be retained
- This saved vehicle length, but had the disadvantage of feeding the radiator with air that had been heated by passing over the engine
- It exposed the entire ignition system to the direct entry of rainwater through the grill

- Early prototypes used a 37 hp 948-cc engine which provided too much performance for the price
  - Top speed of about 90 mph
- Production cars used an 848 cc engine with 33 hp enough for a top speed of 75 mph
- Almost all **small front-wheel drive cars** developed since have used a similar configuration
- Most transmissions do not share engine oil lubrication

1959 Austin Mini

- **Hydrolastic suspension** is a "fluid" system that was used on Minis between 1964 and 1971
- The system used fluid displacer units fitted to each wheel
- The front and rear units were connected so that the front and rear left side form one connected pair and the front and rear right side form another connected pair
- The units were made from sheet-steel and rubber
- Each unit consisted of an upper and lower chamber housing containing a diaphragm, reinforced by nylon, and a compressed conical rubber spring
- The units were filled with a mixture of alcohol, water and additives to prevent corrosion
- A valve in the top of the fluid separating chamber replaced the conventional damper of other systems
- When either wheel on one side of the car hit a bump in the road, the fluid was displaced and caused the unit on the other wheel to react
- A bump at the front made the rear of the car rise to a corresponding height and the car always remained level





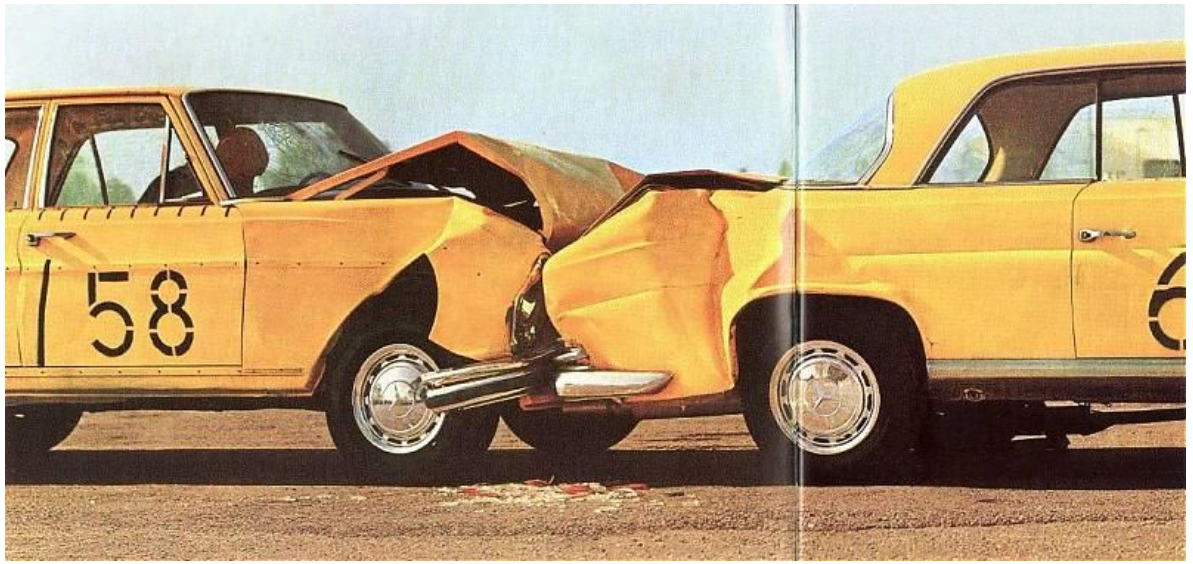
1959 Austin Mini

- In 1961, the Mini became the first British car to sell more than 1,000,000 automobiles
- Total sales were about 5,387,862 were built until it stopped production in the year 2000
- The designer of the car Sir Alec Issigonis hated the concept of windows that rolled up and down and demanded that the windows on the Mini slide open
- A Mini could be bought for around $1000 in today's money
- Between 1960 and 1967, BMC exported approximately 10,000 left-hand drive BMC Minis to the United States
- Sales were discontinued when stricter federal safety standards were imposed in 1968

- Some cars that copied the Mini configuration

Mercedes Benz Crumple Zones

- **Crumple zones**, crush zones or crash zones, are a structural safety feature used in automobiles, to increase the time over which a change in velocity (and consequently, momentum) occurs from the impact during a collision by controlled deformation
- Crumple zones are designed to increase the time over which the total force from the change in momentum is applied to an occupant, as the average force applied to the occupants is inversely related to the time over which it is applied
- Crumple zones are located in the front part of the vehicle, in order to absorb the impact of a head-on collision, and at the rear to absorb the impact of a rear end collision



- According to a *British Motor Insurance Repair Research Centre* study of where impact damage occurs on cars:

  65% front impact

  25% rear impacts

  5% left side

  5% right side

Mercedes Benz Crumple Zones

- The crumple zone concept was invented and patented by the Austrian-Hungarian **Mercedes-Benz** engineer **Béla Barényi** originally in 1937 before he worked for Mercedes-Benz and in a more developed form in 1952
- The 1953 **Mercedes-Benz *"Ponton"*** was a partial implementation of his ideas by having a strong deep platform to form a partial safety cell, patented in 1941
- The 1952 Mercedes-Benz patent number 854157, describes the decisive feature of passive safety
- He divided the car body into three sections: the rigid non-deforming passenger compartment and the crumple zones in the front and the rear

- The 1953 **Mercedes 180 'Ponton'** was the first to include the basic **Barényi** "three-box" design concept, wherein the central passenger-cell is more rigid than the car's nose and tail "boxes".

Mercedes Benz Crumple Zones

- The first **Mercedes-Benz** car developed using the patented crumple zones was the 1959 **Mercedes W111** “Tail Fin” sedan
- The safety cell and crumple zones were achieved primarily by the design of the longitudinal members: these were straight in the center of the vehicle and formed a rigid safety cage with the body panels, the front and rear supports were curved so they deformed in the event of an accident, absorbing part of the collision energy
- The more recent development was for these curved longitudinal members is to be weakened by vertical and lateral ribs to form telescoping "crash can" or "crush tube" deformation structures
- **Daimer Benz** shared their crumple zone designs and patents with the auto industry

- Government safety agencies specify crash safety standards

Progress in Crashworthiness
1959 versus 2009

1959 Bel Air

2009 Malibu

Insurance Institute for Highway Safety crash test.

Offset head on collision with each car traveling att 40 mph

https://www.youtube.com/watch?v=C_r5UJrxcck

The passenger compartment of the ‘59 Bel Air is greatly deformed

Passenger compartment of the '09 Malibu stays completely intact

1955 Chevrolet V8

- The small block **Chevrolet V8** was first available in 1955
- In both the sedans and in the **Corvette**
- It became the bestselling car engine of all time-over 80 million produced
- It became the ultimate hot rod powerplant
- This makes the **1955 Chevy** one of the influential cars of the 20th century

1955 Ford Thunderbird

- The steel body **Ford Thunderbird was** introduced for 1955
- The two seat Thunderbird had **Ford's** new 292 cu in 198 hp OHV V8 engine
- The car was built from 1955 through 1957
- Sales were not impressive
    - Total sales were 53,166
- The **Thunderbird** nameplate was used on a larger four seat car beginning in 1958 thru 1960
- Two rear seats were added and the level of luxury and features of a full-sized car were incorporated into a mid-size platform
- Sales were much improved over the two seat car
    - Total sales were 198,191

First Production Fiberglass Car body

- The **first fiberglass-bodied** American sports car was the **Kaiser-Darrin** not the **Corvette**
- The car was first announced on September 26, 1952 and initial prototypes were shown on February 22, 1953
- Due to managerial changes involving the merger with Willys, the **Kaiser-Darrin** was finally released for public sales on January 6, 1954
- It was designed by **Howard "Dutch" Darrin**
  - It had doors that slide on tracks into the front fenders
- The **Darrin** was intended to compete head-to-head with European roadsters sold in the United States in the post–World War II period
- Only 435 production **Darrins** and six prototypes were built

- The 161 cu in side valve six produced 90 hp
- The car weighed only about 2200 lbs and could reach 60 mph in about 15.1 seconds
- Top speed was a little less than 100 mph
- It was underpowered and did not measure up to foreign competition

Chevrolet Corvette

- **Corvette** started life in fiberglass form mostly out of necessity
- Only 300 were made in the first production model year and fiberglass is well suited to low volume production since creating the tooling to stamp out steel panels is expensive
- Labor and supply problems with steel also contributed to the decision to build a fiberglass body for the Corvette
- Years later **Corvette** production would climb to numbers that favored steel production which was more efficient as steel bodies did not need time to cure inside of molds
- Tradition, always an important factor in the **Corvette** story, dictated that the distinctive fiberglass body material would remain in use
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Chevrolet Corvette

- The first- generation **Corvette** was introduced late in the 1953 model year
- It first appeared as a show car for the 1953 General Motors Motorama, held January 17–23 at New York's Waldorf-Astoria Hotel
- At the time, **Chevrolet** general manager **Thomas H. Keating** said it was six months to a year away from production readiness
- The car generated enough interest to induce **GM** to make a production version to sell to the public
- First production was on June 30, 1953
- This generation was often referred to as the "solid-axle" models (the independent rear suspension was not introduced until the second generation)

Chevrolet Corvette

- Three hundred hand-built **Corvette** convertibles were produced, all Polo White, for the 1953 model year
- The 1954 model year vehicles could be ordered in Pennant Blue, Sportsman Red, Black, or Polo White--3,640 were built, and sold slowly
- The 1953, 1954, and 1955 model years were the only **Corvettes** equipped with a 235 cu in version of the second- generation Blue Flame inline-six rated at 150 hp
- The 1955 model offered a 265 cu in (V8 engine as an option
- Despite the poor sales of the **Corvette** at the time, the brand- new V-8 was an overwhelmingly popular option
  - Only 6 of the 1955 models were produced with the inline-six

C-1 Thru C-8 production	1,741,410
T-Bird (‘55 thru ‘57) production	53,166

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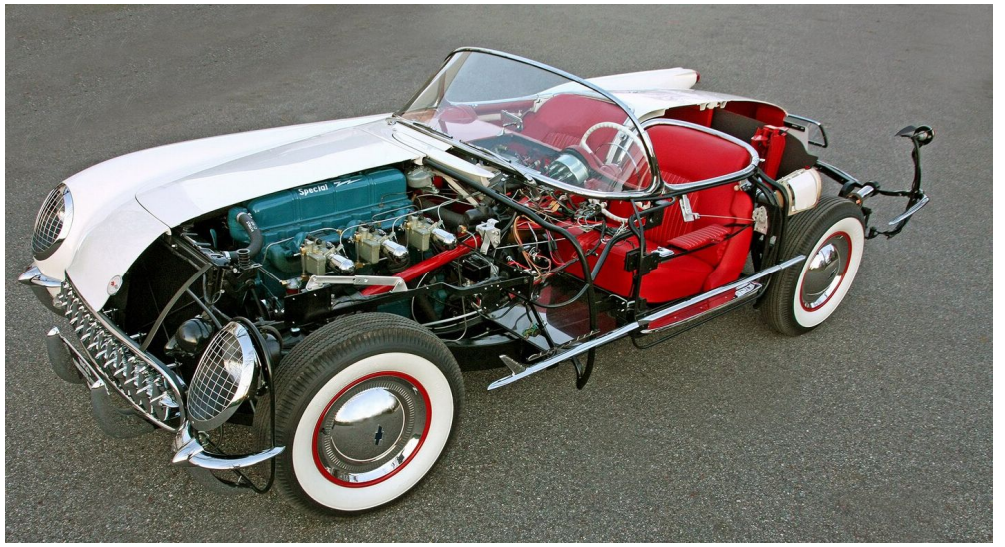
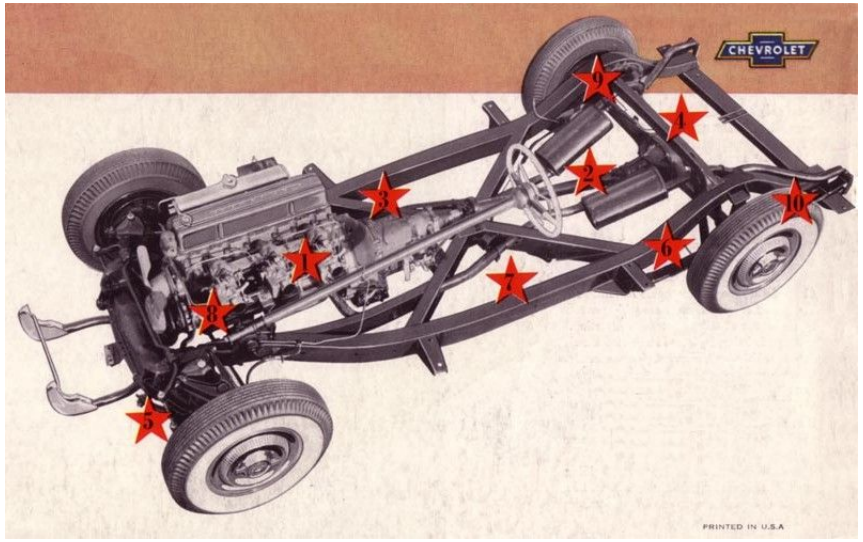
Chevrolet Corvette C-1





Chevrolet Corvettes

C1 – First Generation (1953-1962)

C3 – Third Generation (1968 – 1982)

C5 – Fifth Generation (1997 - 2004)

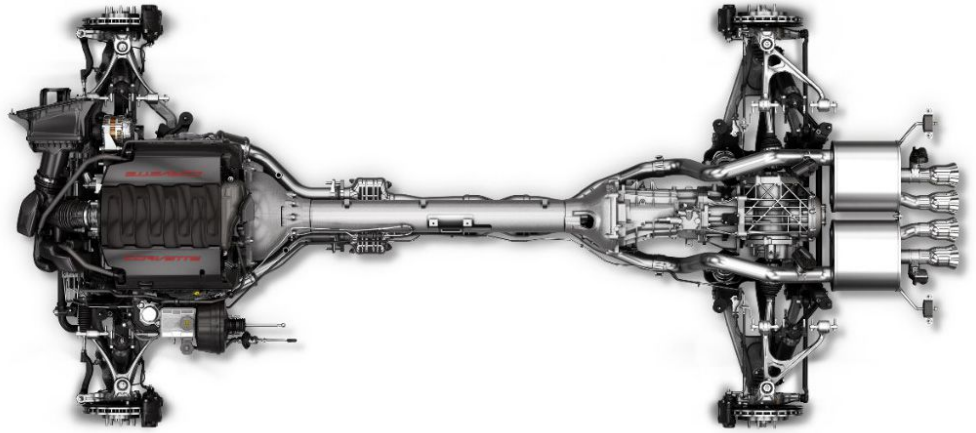
C2 – Second Generation (1963-1967)

C4 – Fourth Generation (1984 – 1996)

C6 – Sixth Generation (2005 – 2013)

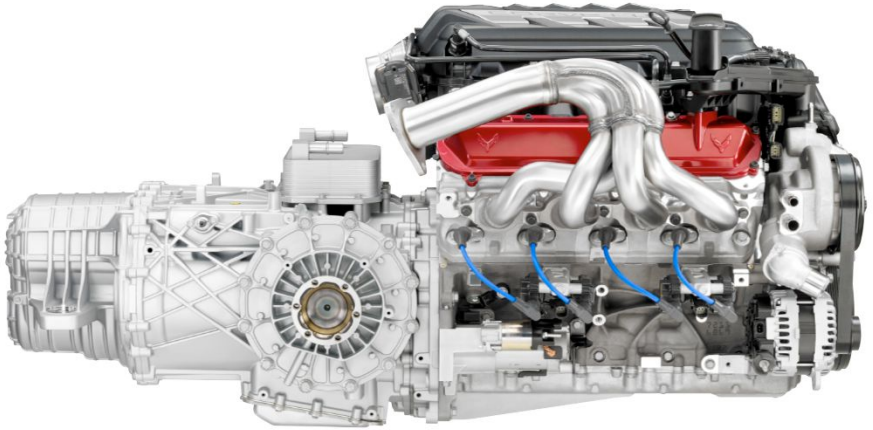
Chevrolet Corvettes

C7 – Seventh Generation (2014 – 2019)



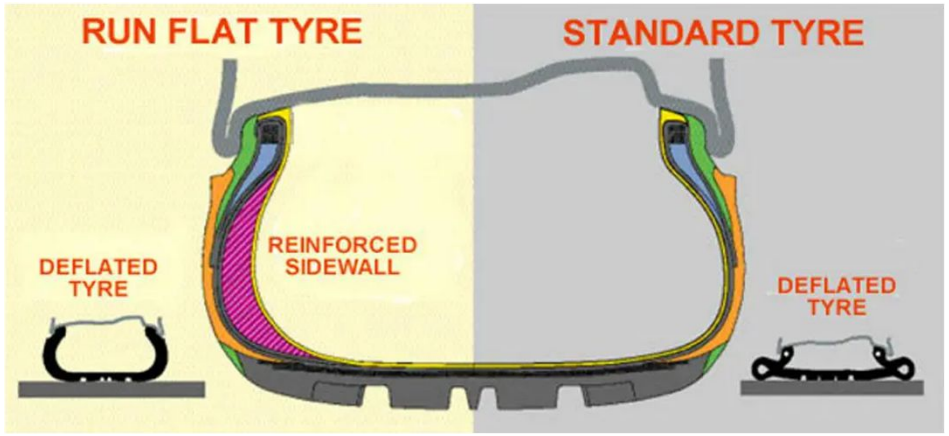
Chevrolet Corvettes

C8 Eighth Generation (2020…)



First Car with Run Flat Tires Corvette

- The first **run-flat tire** was developed by **Goodyear** in 1978
- The first application of a run-flat tire on a regular production vehicle was the optional **Goodyear, Eagle GS-C EMT** on the **1994 Corvette**
- The first, **standard-equipment**, run-flat on any car was **Goodyear's Eagle F1 GS-EMT** on the **1997 Corvette**
- When deflated, the **run flats** on **Corvettes** are rated GM for 200 miles, in 73° weather, at 55 mph



Run flat tires for my car are 39% more expensive than conventional tires!

Chevrolet Corvette

- The **Corvette** has been America' only sport car for some time
- It has been developed into a high-performance sports car that is very competitive with many exotic European high-performance sports cars
- It offers comparable performance at a much lower price
- The current C-8 model is in the "super car" performance range without being in the "super car" price range
- The corvette has come a long way since 1953

Influential Cars of the 20 th Century

- In the later half of the 20th century automobiles have made a lot of progress
- More efficient designs for manufacturing
- Improved passenger packaging
- Increased safety
- Increased performance