



OLDŘICH RŮŽIČKA

TOMÁŠ TŮMA



TRANSPORT MANIA

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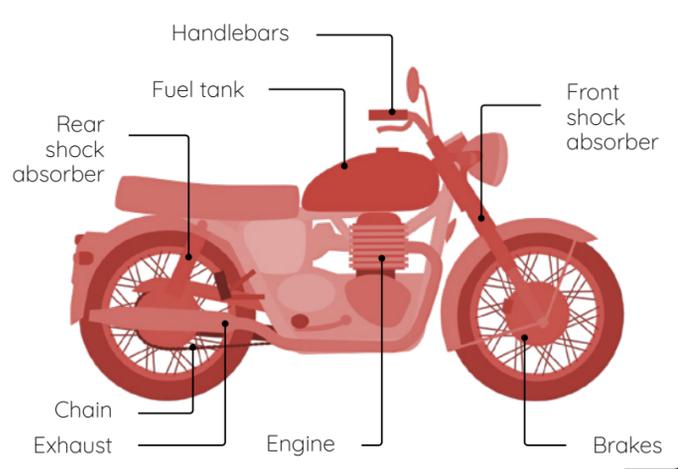




FUN ON TWO WHEELS MOTORCYCLES

5

MOTORCYCLE PARTS

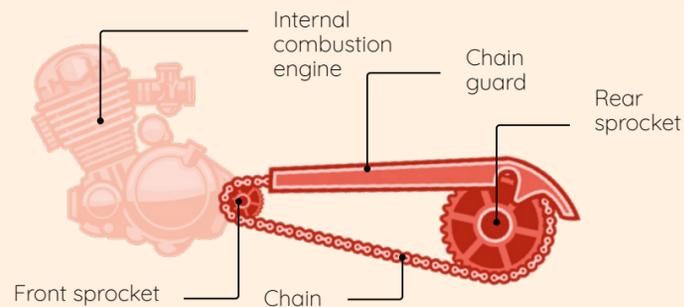


MOTORCYCLE

Motorcycles have millions of fans around the world, from travelers crossing continents to racers competing for split-seconds. They aren't just a means of transportation, but also machines that bring people joy, speed, and a sense of freedom. Today, they are powered by internal combustion engines that work on the same principle as car engines, but models with electric motors are becoming more and more common. Motorcycles are made for free-spirited riders and offer a lot of fun. Whether they're roaring down the highway or silently cruising through the city, they combine technology, courage, and a thirst for adventure.

MOTORCYCLE DRIVE

Chain drive is the most common way to transfer power from the engine to the rear wheel on a motorcycle. It works similarly to a bicycle, with the difference being that you don't have to pedal on a motorcycle. The engine spins a sprocket, and the chain transfers the motion to a larger sprocket on the rear wheel. It's a simple, efficient, and easily repairable solution, which is why most motorcycles worldwide use it.



TYPES OF MOTORCYCLES BY DESIGN

Naked Bike – a motorcycle without fairings, versatile for everyday riding.



Naked Bike

Sportbike – fast and aerodynamic machines built for power and speed.



Sportbike

Enduro – a versatile machine for both road and light off-road use.



Enduro

Touring Bike – a comfortable machine for long journeys with a large fuel tank and saddlebags.



Touring Bike

Cruiser – a low, heavier bike for more relaxed ride. A typical example is a Harley-Davidson.



Cruiser

Chopper – a heavily customized cruiser with a long fork and a distinctive style.



Chopper

Dirt Bike – a lightweight off-road special for racing and jumping, without road-legal equipment.



Dirt Bike

Café racer – a motorcycle modified for fast city riding, typically with a low seating position and retro style.



Café Racer

Scrambler – a street motorcycle converted for light off-road use with knobby tires.



Scrambler

STEAM BICYCLE

At the beginning of motorcycle development, similar to automobiles, were machines powered by steam. French velocipede manufacturer Pierre Michaux attached a small steam engine to his bicycle. Steam then powered a crank mechanism that rotated the rear wheel and set the entire machine in motion.



Michaux-Perreux Steam Velocipede, 1867

FROM BONESHAKER TO MOTORCYCLE

The first motorcycles were created by attaching a small engine to a frame that resembled an ordinary bicycle, so they were very simple and uncomfortable. Over time, stronger frames, more powerful engines, and new designs evolved, until they became full-fledged and powerful machines. Riding the first motorcycles was truly only for the brave and hardened riders.

The first **Daimler Reitwagen** motorcycle



1885

THE FIRST MOTORCYCLE

The first motorcycle with an internal combustion gasoline engine was built by Gottlieb Daimler and Wilhelm Maybach, and its frame resembled more a wooden bicycle with a small single-cylinder engine. Today, it is considered the ancestor of all modern motorcycles, even though it was not originally intended to be a real motorcycle, but only a test machine to verify a new engine.

Hildebrand & Wolfmüller, the world's first series-produced motorcycle.



1894

Triumph Model H, widely used by the British army in WWI.



1915

FIRST STEAM MOTORCYCLE ATTEMPTS

Sylvester H. Roper of Boston, around 1867–1869, built a steam velocipede often considered one of the first motor-powered vehicles in history. This machine had a rigid frame, wooden wheels with metal rims, and a small boiler often hidden directly under the seat. Steam from the boiler powered two small pistons that transferred power to the rear wheel.

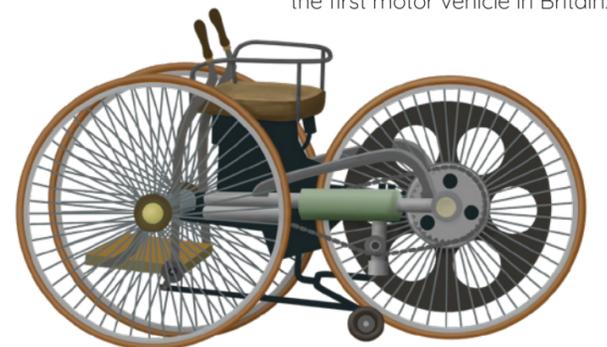
1869

Roper Steam Velocipede



1888

Butler's three-wheeled Petro-Cycle, the first motor vehicle in Britain.



1899

Laurin & Klement Slavia, the first Czech-made motorcycle from the later Škoda brand.



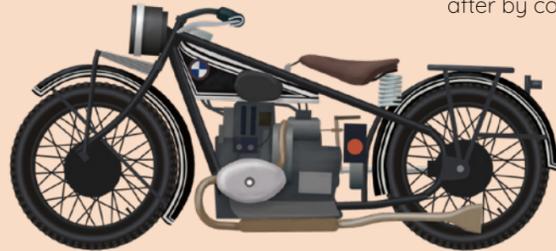
THE FIRST FEMALE BIKERS

In 1916, the sisters Augusta and Adeline Van Buren embarked on a cross-country motorcycle journey across the United States, from New York to California, approximately 5,470 miles in 60 days, on Indian brand motorcycles. They wanted to prove that women could handle equally demanding journeys as men. Their adventurous ride went down in history as the first major motorcycle expedition by women.

MOTORCYCLE LEGENDS

Some motorcycles are almost as famous as movie stars and have appeared in cinemas, on posters, or in legendary stories. For example, the Harley-Davidson Captain America from the movie Easy Rider became a symbol of freedom on two wheels. And famous bikes like the Indian Scout or Jawa Pérák gained fame because people fell in love with them in real life or they have an interesting story.

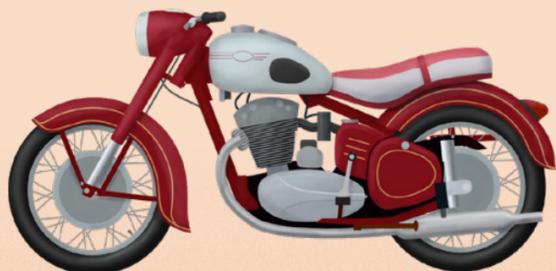
BMW R57, a sports motorcycle with a boxer engine and advanced technology, considered top of its class and still sought after by collectors. ☞1928.



Jawa 250 Pérák, was secretly developed during World War II in the Jawa factory under German occupation. That's why the nickname "Pérák" suited it well, referring to the resistance fighter and mysterious hero of occupied Prague. ☞1946.



Jawa 500 OHC, a powerful and elegant motorcycle, prized for its performance and beauty. ☞1952.



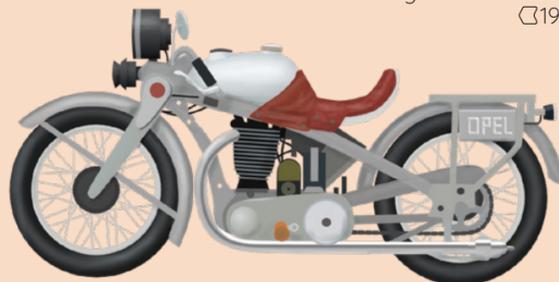
BMW R60/5 earned a reputation as a reliable touring motorcycle and became popular not only among European riders but also in the USA, where the motorcycle culture wave was peaking. ☞1970.



Indian Scout, a reliable and beautiful machine, became a symbol of American roads in the 1920s and was often used in races. American police officers also favored it and frequently used it in the 1920s and 30s to chase smugglers and gangsters. It was faster and more reliable than many cars of that time. ☞1924.



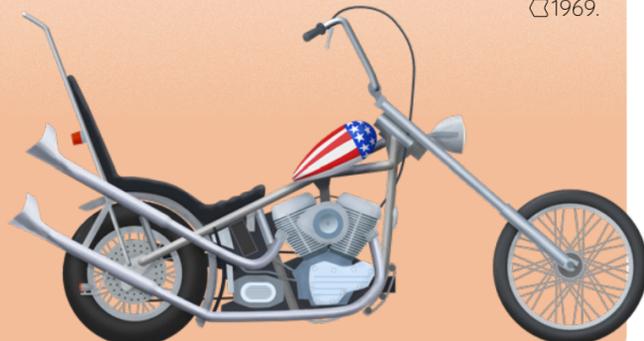
Opel Motoclub 500, was one of the first motorcycles in the world with a steel frame made from sheet metal stampings, and it still earns admiration among collectors today. ☞1928.



Norton E52, became one of the most recognized brands on the British motorcycle scene. It soon became a regular participant in road races. ☞1950.



Harley-Davidson Captain America, a true legend among motorcycle legends from the movie Easy Rider. Actor Peter Fonda rode it across America, and this ride became a symbol of freedom and rebellion for an entire generation. Four identical motorcycles were built during filming, but only one of them survived and was auctioned for over 1.3 million dollars in 2014. Today, it belongs to a private collector in the USA. ☞1969.



Café Racer, **Triumph Bonneville**, 2014. ☞



Adventure Enduro **BMW R 1250 GS**, 2021. ☞



Hyper Naked bike **Yamaha MT-09**, 2023. ☞



Motocross **Suzuki RM-Z 450**, 2023. ☞



MODERN MACHINES

Today's motorcycles are no longer just noisy machines smelling of gasoline, but often technical marvels full of electronics. They have systems that help riders, such as ABS to prevent wheels from slipping during braking or traction control monitoring rear-wheel grip. They can also connect a phone to the dashboard, and some allow different riding modes to be set according to the weather. This makes them safer, more comfortable, and riding them a true experience.

Cruiser **Harley-Davidson Fat Bob 114**, 2024. ☞



Sportbike **Kawasaki Ninja 1000 SX**, 2024. ☞



Touring motorcycle **Honda GL 1800 Goldwing**, 2016. ☞



AIRBAG ON A MOTORCYCLE

In 2006, the Honda Gold Wing was the first and, to this day, the only mass-produced motorcycle in the world equipped with an airbag. It's located in the fuel tank and inflates during a frontal collision to protect the rider, similar to how it works in a car.

HOW IT ALL BEGAN

The first attempts at motor vehicles date back to the 18th century when inventors tried to move vehicles using steam engines. The vehicles were huge, heavy, and slow. Some didn't go faster than a person walking. Driving them was not easy, and turning a corner in time was almost a heroic feat!

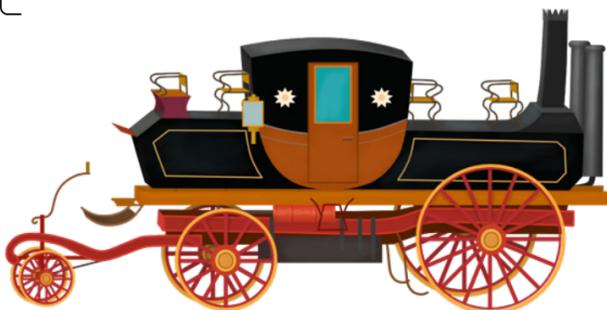
Joseph Cugnot's steam automobile.



FIRST CAR ACCIDENT

One of the first attempts at an automobile was a vehicle by French engineer Nicolas-Joseph Cugnot from 1769, intended to transport cannons. Instead, during one of its first drives, it crashed into a wall. This was probably the first car accident in the history of motoring.

Goldsworthy Gurney's steam stagecoach.



FIRST INTERNAL COMBUSTION ENGINE

Étienne Lenoir, a Belgian-French inventor, was the first to build a usable internal combustion engine. The engine was slow and cumbersome but inspired other inventors who further improved it. It may sound funny, but it was these clumsy, puffing, and hissing machines that laid the groundwork for the development of the real automobiles we know today.

1672

Ferdinand Verbiest's steam-powered carriage was just a toy for the amusement of the Chinese emperor. Even so, it was the first self-propelled model.

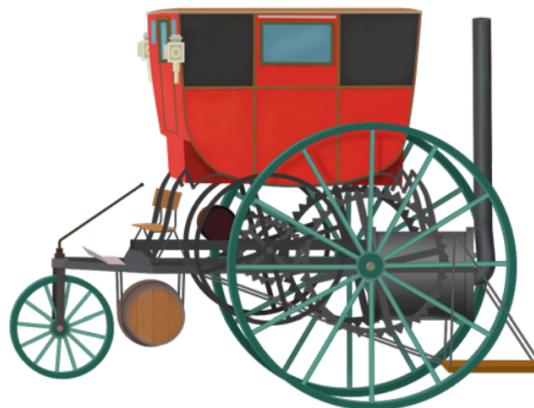


PUFFING DEVIL

Water was heated in a boiler, creating steam. This steam powered pistons, which in turn spun the wheels. The vehicle could travel at a few miles per hour, which was a small miracle at the time. It earned the name "Puffing Devil" because of the loud hissing sound of the steam. However, it only worked for a short time. British inventor Richard Trevithick drove a few friends up a hill, and they went to celebrate their success at a pub. Meanwhile, the carriage burned down, but it showed the world that cars could drive themselves just with steam.

1801

Puffing Devil, Richard Trevithick's steam carriage.



STEAM STAGECOACH

In 1829, Sir Goldsworthy Gurney drove a steam carriage from London to Bath and back. It was so fast that it even outran horse-drawn carriages! As it passed by, people were scared because they had never seen a vehicle move by itself without horses, puffing, hissing, and releasing steam. They started booing and throwing stones. The police had to protect the carriage so it could safely continue its journey.

1863

Étienne Lenoir invented the Hippomobile with a gas-powered internal combustion engine.



FIRST REAL AUTOMOBILE

The first automobile with an internal combustion engine was built by German engineer Karl Benz in 1885. It was powered by a gasoline internal combustion engine, which was truly revolutionary for its time. Finally, a machine that drove itself, without horses and without smoke from a chimney! However, it was said to be so slow sometimes that even a cyclist could pass it.

1885

Karl Benz's automobile with an internal combustion engine.



1894

Karl Benz began mass-producing the Benz Velo automobile.



BRAKES

The first automobiles used very simple braking systems. They had a metal or wooden block placed on the rear wheels, which pressed against the tires and stopped the vehicle by friction.

1908

Ford Model T. The first automobile produced on an assembly line.

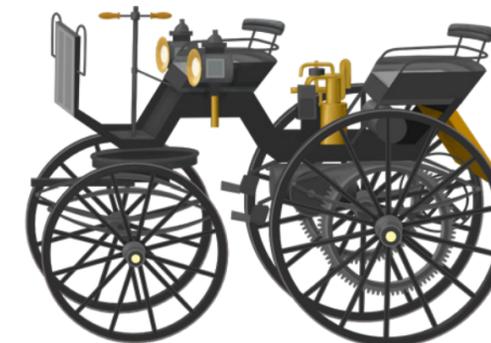


THE BEGINNINGS OF MOTORING

The beginnings of motoring date back to the late 19th century when inventors began creating the first motor vehicles powered by internal combustion engines. The first automobiles were slow and clumsy, but they gradually improved and became a common part of life.

1886

Gottlieb Daimler's carriage automobile.



FIRST LONG-DISTANCE DRIVE

In 1888, Bertha Benz, Karl Benz's wife, undertook the first long-distance car journey. She drove over 60 miles to visit her mother. Along the way, she repaired the car, cleaned pipes, and bought gasoline at a pharmacy, thus becoming the first person to use a roadside "filling station."

FIRST SPEEDING TICKET

In 1896, British driver Walter Arnold received the first speeding ticket. He was driving 8 mph, while the limit was only 2 mph. A police officer on a bicycle chased him!

1897

NW Präsident, a mass-produced automobile in Austria-Hungary.



AUTOMOBILES TODAY

Today's automobiles are fast, comfortable, and full of technology. Most have navigation, air conditioning, and often cameras or partial autopilot. Cars are divided according to their purpose. Family cars offer more space and comfort, sports cars are low and fast, and off-road vehicles can handle driving off-road. For city streets, there are smaller models that are easy to park. Today, everyone can choose a car according to their needs and wishes. If only manufacturers would also include a permanent parking space, imagine how popular they'd be!

Electric **Renault Megane E-tech**, 2021



Toyota hybrid RAV 4, 2025



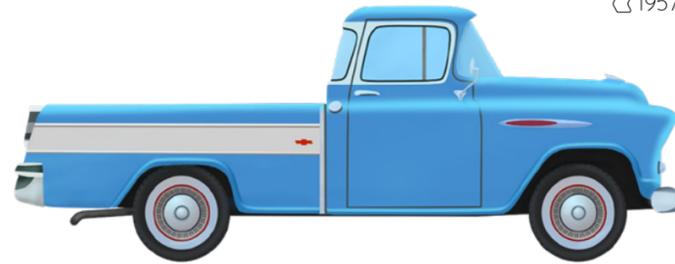
BMW 330e hybrid, 2022



Toyota Hilux, 2015

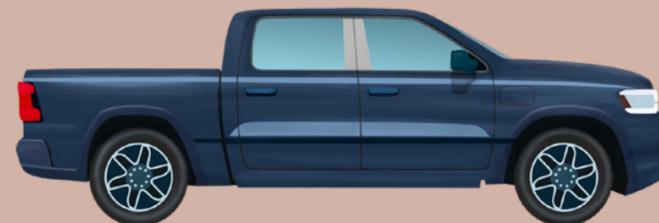


Chevrolet Cameo, 1957



PICKUP TRUCK OF THE FUTURE

The RAM 1500 Ramcharger is a modern pickup truck that combines the power of electric motors with a gasoline engine acting as a generator. Thanks to this, it can travel hundreds of miles without fear of running out of battery. Furthermore, it can tow heavy loads, achieve quick acceleration, and even supply electricity to a home or construction site.



RAM 1500 Ramcharger, 2023

PALACE ON WHEELS

Some cars are so luxurious that they resemble small palaces on wheels. The Rolls-Royce brand makes mobile palaces for the wealthy. The Phantom VII model was one of the most expensive cars of its time, costing hundreds of thousands of USD. It had a hand-stitched leather interior, wood trim, and an exceptionally quiet engine. In such a car, one might prefer not to even eat a snack, so as not to get crumbs on the carpet.

Rolls-Royce Phantom VII, 2010



Cabrio Lagonda V12, 1939



Mini Cooper Convertible, 2008



Electric Golf Cart



Minivan **Suzuki Carry**, 1980



Chevrolet G20, 1984



Ford Transit Van, 2020



TYPES OF CARS BY BODY STYLE AND PURPOSE

Micro – very small car, suitable for the city, often for two people.



Micro

Hatchback – compact car with a liftgate and folding seats.



Hatchback

Sedan – classic car with three compartments: engine, cabin, trunk.



Sedan

Coupe – sportier car, usually with only two doors.



Coupe

Supercar – very powerful and expensive sports car with high speed.



Supercar

Convertible – car with a folding or removable roof, ideal for summer.



Kabriolet

SUV (Sport Utility Vehicle) – larger vehicle with high ground clearance, suitable for off-road.



SUV

CUV (Crossover Utility Vehicle) – combines the look of an off-roader with the comfort of a passenger car.



CUV

Pickup – vehicle with an open rear bed for transporting things.



Pickup

Minivan – vehicle for more people, suitable for families with children.



Minivan

Van – larger enclosed vehicle mainly for transporting cargo or people.



Van

Camper Van – recreational vehicle with sleeping space, a small kitchen, and often a shower.



Camper Van

RECREATIONAL VEHICLE

Cars that are like a small house on wheels. Inside, they have a bed, a table, a small kitchenette, and often a bathroom and toilet. People use them for trips and vacations and can sleep anywhere, such as near a forest, by a lake, or in the mountains. Some RVs even have solar panels on the roof, so they can generate their own electricity even in remote places. RVs are like modern snails on wheels, only instead of a shell, they have a real room with a bed.

Recreational Vehicle





WORKHORSES ON THE ROAD

TRUCKS

7

TRUCK

Trucks are not built for a comfortable family outing but for serious work. They can transport heavy things, from food and furniture to enormous machines or lumber from the forest. They are the true workhorses of the roads, without which it would be hard to imagine today's world full of stores and deliveries. One semi-truck, for example, can carry up to 40 tons of cargo, which is about the same weight as ten elephants combined.

SLOW BUT UNTIRING

The first trucks were slow and noisy, but they could carry more than a horse-drawn wagon. Gradually, they grew stronger, improved, and it soon became clear that without them, trade and transportation would grind to a halt. The DMG Lastwagen from 1896, built by the Daimler company, is considered the first true truck. It could carry about 1.5 tons. A two-horse wagon could handle a similar weight, but the truck didn't get tired and could run all day. Its maximum speed at the time was about 7.5 miles per hour.

DMG Lastwagen, the world's first truck.



THE DUNG THAT CHANGED TRANSPORTATION

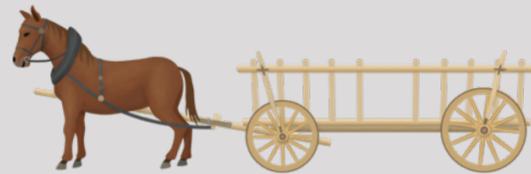
In big cities a hundred years ago, horse-drawn carriages were so common that streets needed special services just for clearing horse manure. This was also one of the reasons why people started dreaming of vehicles without horses.

Ford T Pickup, a modified version of the famous car that allowed ordinary people to transport cargo.



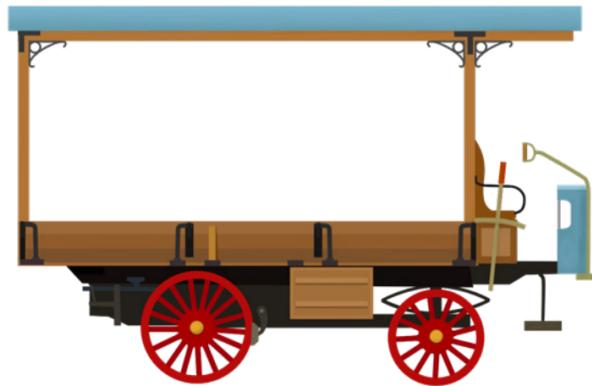
WHEN HORSES WEREN'T YET UNDER THE HOOD

Before trucks started driving on roads, all heavy goods were transported by horse-drawn wagons. One strong horse could pull about half to one ton of cargo, depending on the terrain and the wagon. When two horses were harnessed, they could carry 1.5 to 2 tons. It was hard work, but horses needed to be fed, rested, and couldn't pull loads all day without a break, which is precisely why people soon began looking for machines.



1898

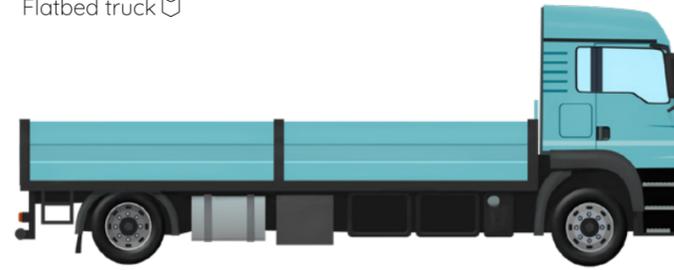
NW (Nesselsdorfer Wagenbau), today's Tatra, was among the pioneers of commercial vehicle production in Europe.



FIRST FEMALE TRUCK DRIVERS

The first female truck drivers appeared shortly after World War I. The famous Luella Bates from the USA got her heavy vehicle license in 1920 and drove for the Four Wheel Drive Auto Company. Women often replaced men who went to war, and their courage behind the wheel helped open doors for other female drivers in this predominantly male world.

Flatbed truck



Curtainside truck



Box truck



Tanker truck



MOBILE RESTAURANTS

Some smaller trucks can transform into mobile restaurants, known as food trucks. Inside the truck is a small kitchen where hamburgers, pancakes, or pasta are prepared. The truck then stops in a town square, near a school, or at a festival, and people can order food directly from the window. This allows the restaurant to go to the people instead of people having to go to the restaurant.

Dump truck



MOUNTAINS OF SAND AND GRAVEL ON THE MOVE

Dump trucks carry loose materials like sand, dirt, or rocks, and can haul up to forty tons. At a construction site, their bed lifts up like a giant shovel, and the cargo is emptied in seconds. Annually, around forty to fifty billion tons of sand and gravel are extracted worldwide, enough to build a wall 115 feet high and wide enough to go around the entire planet. And it is these enormous volumes that dump trucks transport.



UNOBTRUSIVE, BUT USEFUL VEHICLES

Ordinary trucks look plain, but without them, our world would stop. A flatbed can carry almost anything, a curtainside truck protects cargo from the weather, and a box truck is a big moving box for packages or furniture. Some even have refrigeration, so food stays fresh during long journeys. Tanker trucks transport water, milk, or fuel, and can hold up to 2,377 gallons, roughly the amount in a hundred bathtubs.

LOAD CAPACITY

A passenger car is built mainly for people and their luggage. It can carry about half a ton, which is equivalent to the weight of five people with their luggage. If you wanted to load heavy cargo into it, it would quickly reach its limit. A smaller truck is completely different. Its load capacity is typically 3 to 8 tons, so it can carry several pallets of goods or a pile of construction material. That's up to ten times more than a passenger car.

LOADERS

A loader is a construction machine that has a large bucket in front. It is used for picking up and loading materials like sand, gravel, dirt, or rocks.

SKID-STEER LOADER

This is a smaller and very agile machine. It can turn almost in place because its wheels on one side rotate differently from the other, causing it to skid. This makes it suitable for working in small spaces. Thanks to various attachments, a skid-steer loader can not only load dirt but also drill holes, sweep, or clear snow.



Skid-steer loader

TRACK LOADER

Thanks to its tracks, it can move even where wheels would sink: in mud, sand, or on a construction site full of rocks.



Track loader



Wheel loader

Hydraulic excavator



EXCAVATORS

An excavator is a machine with a long arm and a bucket that digs into the ground. It can dig holes, trenches, and foundations for houses. An operator sits in it and controls the arm like a giant hand using levers. A modern excavator can replace the work of dozens of people with shovels, and only one person operates it. There are excavators that can even work in water. They are called floating excavators and are used for cleaning rivers or lakes. Conversely, there are also miniature excavators that can fit through a doorway into a house. They can dig in basements or gardens, for example.

Giant shovel excavator
Komatsu 4100XPC

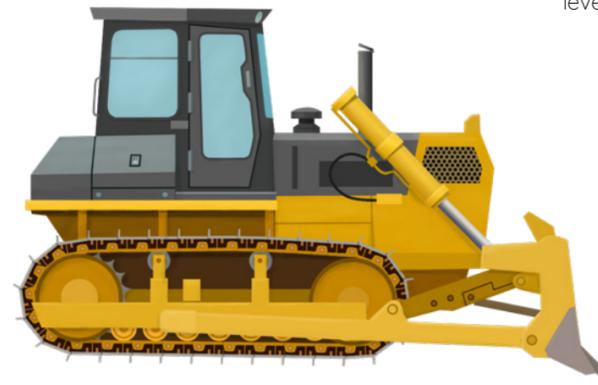


GIANT AMONG MACHINES

This excavator is used in mines and quarries to scoop up rocks and ore. It is so powerful that with one enormous bucket, it can load more than 100 tons, which is like lifting 70 passenger cars at once. Remember what you read about the large mining dump truck that is bigger than a family house. Now compare that dump truck with this enormous excavator.



Bulldozer for terrain leveling.



Forklift for loading pallets.



AGRICULTURAL AND FORESTRY MACHINERY

In the fields, people today couldn't do without powerful machines. Each has a different task, but all together they help grow food or obtain wood. **The tractor** is the king among agricultural machines. It can pull plows, wagons, and other implements. **A combine harvester** cuts grain, threshes it, and pours it into a tank. One combine does the work of an entire team of reapers with scythes. **Silage wagons** carry chopped grass or corn, from which silage, a fermented feed for cows, is made.



Forestry loader

MACHINES FOR FOREST WORK

Skidders pull felled logs along the ground. **Log loaders** lift them and load them onto piles or onto trucks. **Forwarders** load the logs directly and transport them. Thanks to these machines, work in fields and forests is done quickly and efficiently, leaving people with more energy for other activities.



Forwarder

Skidder



John Deer 9030 tractor



Silage wagon



Combine harvester



Locomotive S 2/6 could travel at speeds up to 96 mph with four coupled cars, 1906. ☺



LNER Class A4 4468 Mallard, the world's fastest steam locomotive, 1938. ☺



Locomotive 242 A1, a prototype of a powerful machine that was not mass-produced due to the upcoming electrification of railways, 1946. ☺



PRR S1, an American locomotive that, according to contemporary accounts, reached speeds of up to 149 mph. However, the speed record was never officially recorded. If it had been, it would have been the fastest steam locomotive in the world, 1939. ☺



DESIGNERS' COMPETITION

Steam locomotives took many different forms because every engineer tried to find the best way to get the most power and speed out of the machine. Some locomotives had enormous wheels to go faster, while others had powerful engines to pull heavy trains. Every new model was essentially an attempt to improve upon the previous one. That's why steam locomotives developed, looking very different even though they all worked on the same principle of a steam engine. Machines like the S 2/6, Mallard, 242 A1, or PRR S1 show how daring and clever the engineers of the time were.

THE WORLD'S FASTEST STEAM LOCOMOTIVE

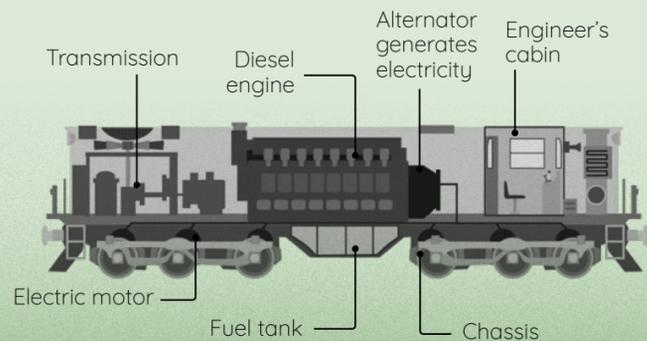
The LNER Class A4 4468 Mallard locomotive was a machine with an aerodynamic shape tested in a wind tunnel. Thanks to this, the locomotive achieved a shape that allowed it to reach high speeds. In 1938, the Mallard locomotive reached a speed of 126 mph, making it the fastest steam locomotive in the world to this day. During its record-breaking run, it pulled seven cars.

AERODYNAMIC TUNNEL

This is a long room where strong air flows. Engineers place models of cars, airplanes, or locomotives in it to see how the air affects them. This allows them to better design a shape that will have less resistance while moving and will travel faster and more efficiently.

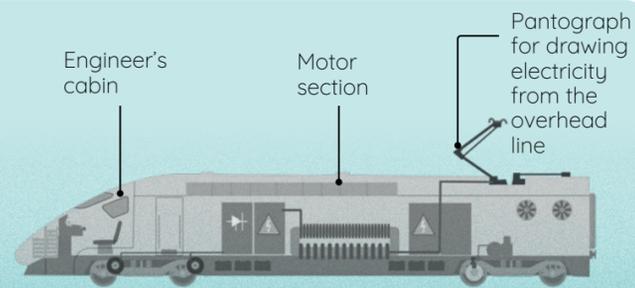
DIESEL LOCOMOTIVE

As time went on, engineers began to look for a simpler and more fuel-efficient way to power trains. That's when diesel locomotives appeared, which no longer needed a boiler or steam. Instead, they used a powerful internal combustion engine. A diesel locomotive has a strong diesel engine inside, similar to one in a truck, only much larger. However, this engine doesn't power the wheels directly. Instead, it generates electricity, which is then sent to electric motors near the wheels.



HIGH-SPEED TRAINS

They use electric propulsion. They draw electricity from overhead lines along the track. Electric motors are distributed throughout the train, so the train accelerates faster and more evenly than regular trains. Modern high-speed trains use regenerative braking: when they brake, they convert part of the motion back into electricity, which they can return to the grid or use for their own consumption.



RACERS ON RAILS

High-speed trains are special trains designed to travel much faster than regular trains. They have an aerodynamic shape to better cut through the air, lightweight construction, and powerful engines. Thanks to this, they can comfortably reach speeds of over 186 mph. They run on tracks that are straight, sturdy, and prepared for such high speeds.

Hokkaidō Shinkansen ☺

Japan, up to 199 mph. Shinkansen trains run in northern Japan and also pass through a long undersea tunnel between the islands of Honshu and Hokkaido.

Talgo 350 ☺

Spain, up to 205 mph. A Spanish high-speed train with low and lightweight cars, which gives it a smooth ride even at high speeds.

TGV ☺

France, up to 199 mph. The French TGV is one of the most famous high-speed trains in the world. It is known for its reliability and very smooth ride.

AGV ☺

France / Italy, up to 186 mph. A lightweight and efficient train set, the first in the world to use only motors distributed in the car floors instead of a locomotive at the end.

KTX-Eum ☺

South Korea, up to 160 mph. A modern South Korean high-speed train designed for shorter and frequent connections. It features a comfortable interior and economical operation.

ICE 3 ☺

Germany, up to 186 mph. The German high-speed train ICE3 has a lightweight design and motors distributed throughout the train set, making it accelerate well and very quiet.

CRH2 ☺

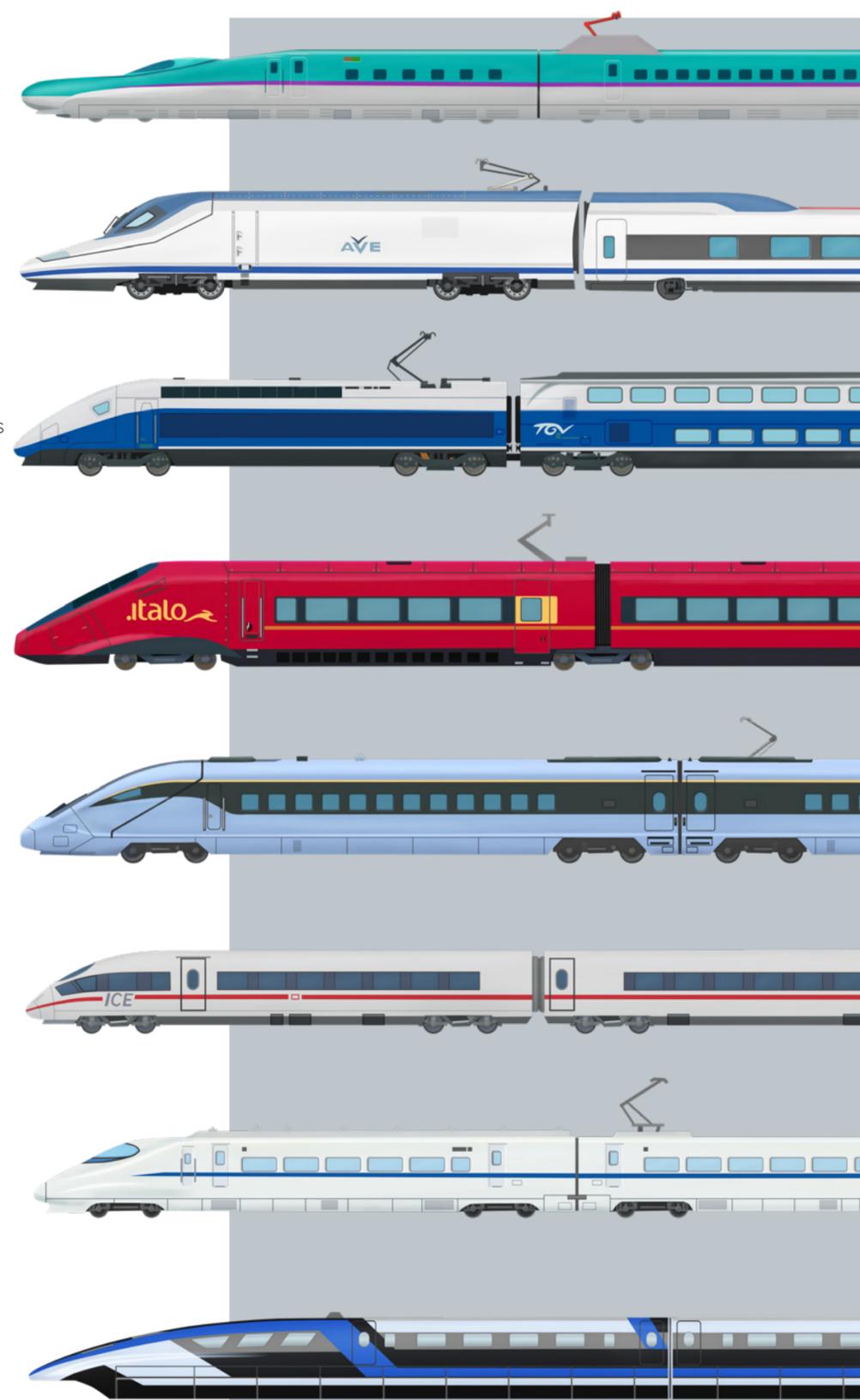
China, up to 217 mph. The train is based on the Japanese Shinkansen but was modified for Chinese tracks. It is one of the most widespread high-speed trains in China.

Maglev ☺

China, up to 267 mph. The Maglev floats above the track using magnets, so it has no wheels and can travel at really high speeds.

THE BULLET TRAIN

When the Japanese Shinkansen first ran in 1964, people called it the "Bullet Train" because of its shape and speed. It could travel so fast that no other railway in the world had anything like it at the time. Yet, it ran quietly and smoothly.



MOTORIZED SHIPS

Motorized ships brought the same change to water transport that cars brought to land. Ships no longer had to wait for the wind or rely on the strength of rowers. Thanks to the engine and the invention of the propeller, motorized ships can travel faster and independently of the weather. Today, there are small motorboats for fun, large cruise ships, and enormous cargo tankers that transport goods across oceans. Yet, they all operate on the same principle that changed travel across the world's waters.

Fishing boat



Motorboat



Cruise yacht



Tanker, a ship for transporting liquid materials like oil or gasoline.

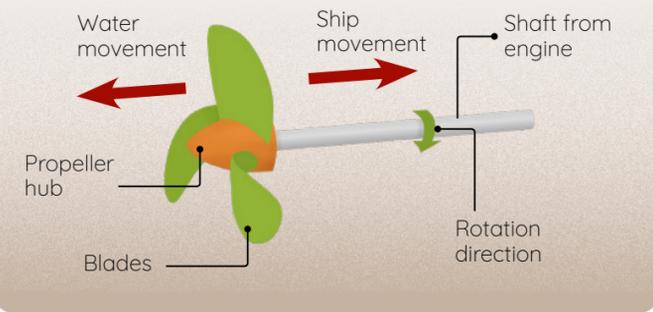


Container ship transports goods in special shipping boxes - containers.

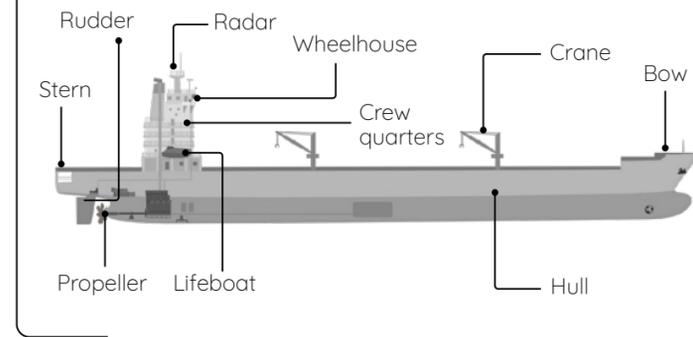


THE PROPELLER

The invention that changed water transport was constructed by Czech engineer Josef Ressel in 1827. A ship's propeller works similarly to an airplane propeller. When its blades rapidly spin in the water, they push water backward behind the boat, propelling the boat forward. It's similar to swimming: when you push water backward with your hands, your body moves forward. This invention made it possible to build ships that no longer had to wait for favorable wind. Since then, almost all motorized ships in the world have used a propeller.



PARTS OF A CARGO SHIP



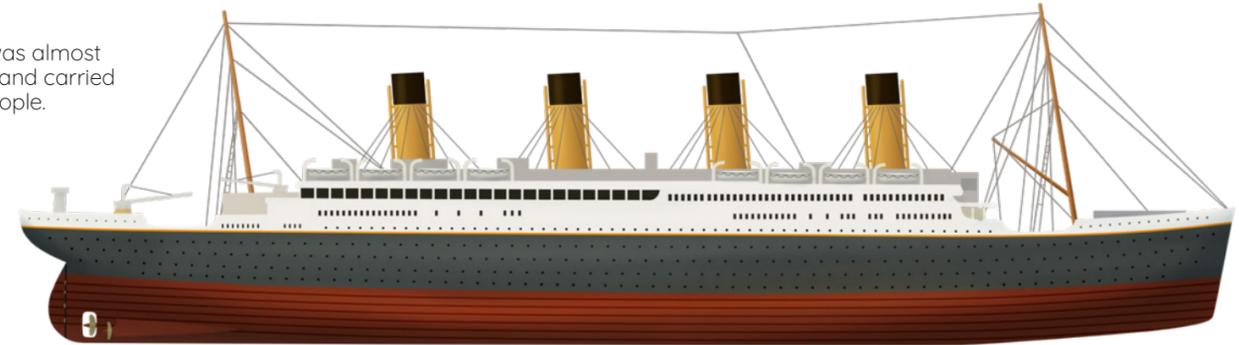
CARGO SHIPS

Cargo ships are among the largest means of transportation in the world, and without them, global trade would almost stop. They transport goods across oceans, and much more cheaply and efficiently than airplanes or trucks. Some ships carry hundreds of containers; others transport oil, gas, or bulk materials. Thanks to them, most of the things we use daily, from clothes to electronics, are able to reach us.

TITANIC

It was one of the most famous ships of all time. When it sailed in 1912, it was among the largest and most luxurious ships in the world. Its builders believed it was unsinkable. On board, it had dining rooms, lounges, hotel-like cabins, and state-of-the-art technical facilities for its time. However, on its maiden voyage from England to America, it struck an iceberg and sank a few hours later. The great tragedy of the Titanic still reminds us of the crew's bravery and also that even the largest ship has its technical limits.

The Titanic was almost 883 feet long and carried over 2,200 people.



The cruise ship Explorer of the Seas is 207 feet high, 1,020 feet long, and can accommodate over 4,000 people.



WARSHIPS

Warships are built to protect coasts, patrol the seas, and, if necessary, defend their country. This includes small, fast boats as well as giant aircraft carriers. Some are equipped with powerful cannons or missiles. Modern warships often have such advanced technology that they can locate targets hundreds of miles away.

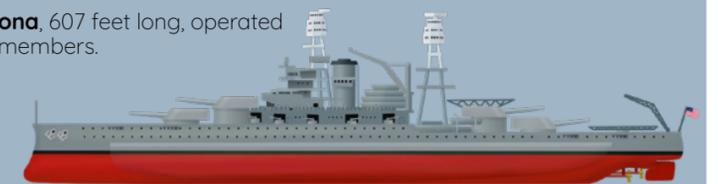
AIRCRAFT CARRIER

An aircraft carrier is a giant warship that acts like a floating airport at sea. Airplanes and helicopters take off and land on its deck. This allows aircraft to operate very far from land, where there are no other airfields. When landing, aircraft catch an arresting wire with a tailhook to stop before the end of the deck. The ship can hold dozens of aircraft and thousands of crew members.

USS Gerald R. Ford, an aircraft carrier 1,106 feet long. Up to 4,660 people serve on board, and it can accommodate around 75 aircraft and helicopters.



Battleship USS Arizona, 607 feet long, operated by over 1,000 crew members.



Cruiser USS Lake Champlain, a ship designed to defend aircraft carriers.





HELICOPTER

A helicopter is a flying machine that can take off vertically, hover in place, fly, and land using a rotor. The idea of vertical takeoff without a runway fascinated people for hundreds of years, but the development of helicopters was very complex. When a helicopter's rotor spins, it creates a force that acts on the machine and tries to rotate it in the opposite direction. The first helicopters couldn't counteract this. They had weak engines, simple controls, and engineers didn't yet understand airflow. The first machines could lift off the ground, but they were unstable and difficult to control.

DEVELOPMENT OF HELICOPTERS

As early as the 15th century, Leonardo da Vinci designed his "aerial screw," which never flew but showed the basic idea of a helicopter. Pioneers of helicopters tried to figure out how to use rotating rotors to lift a machine into the air and keep it stable at the same time. In the early 20th century, Frenchman Paul Cornu managed to briefly lift off the ground with his machine, achieving the first true vertical takeoff. Many designers attempted to build helicopters, but only some succeeded in creating a machine that could truly be controlled safely. Their successes paved the way for the helicopters we know today.

1907

Paul Cornu's helicopter was the first heavier-than-air machine to take off vertically, even if only briefly and a few tens of centimeters.



1485



Leonardo da Vinci designed a helicopter in the 15th century that never flew but was ahead of its time.

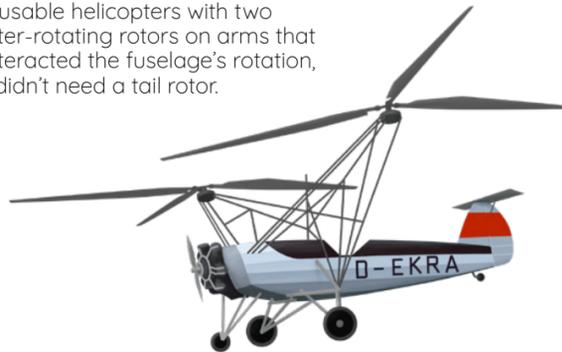
1935

Gyroplane-Laboratoire was an experimental helicopter that could take off stably and fly in a controlled manner. It did not have a tail rotor but two large rotors that rotated in opposite directions.



1936

Focke-Wulf Fw 61, one of the first truly usable helicopters with two counter-rotating rotors on arms that counteracted the fuselage's rotation, so it didn't need a tail rotor.

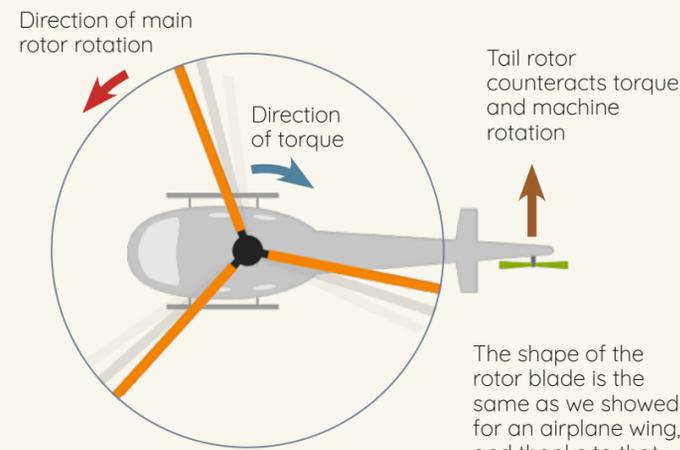
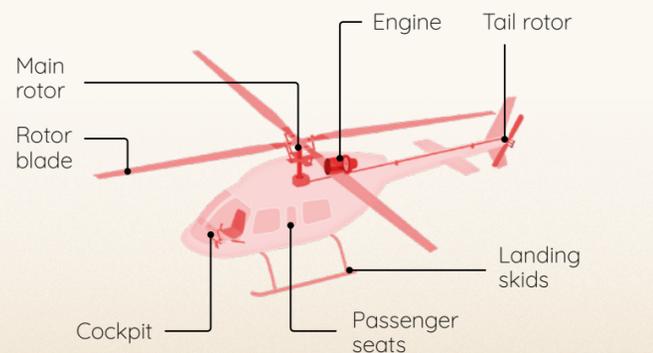


1939

Sikorsky VS-300, the first functional helicopter, laid the foundations for today's helicopter design, first showing the classic arrangement with a main rotor and tail rotor, which is still used today. It was built in the USA by Russian emigrant Igor Sikorsky.

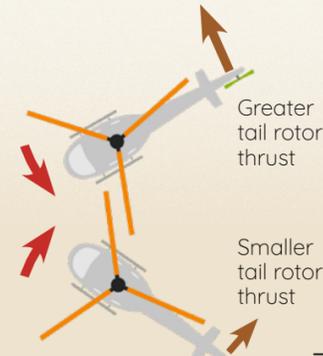


PARTS OF A HELICOPTER

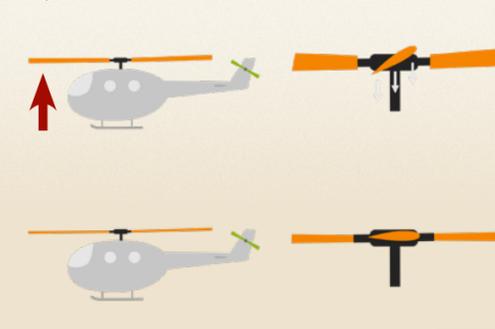


The shape of the rotor blade is the same as we showed for an airplane wing, and thanks to that, lift is generated by the rotor too

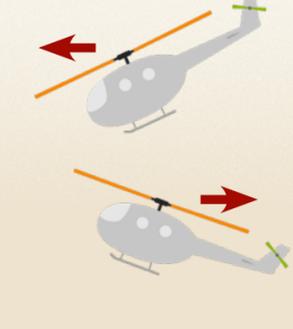
1. Turning left and right



2. Climbing and descending by blade pitch



3. Flying forward and backward



HOW A HELICOPTER WORKS

The main propeller (rotor) spins quickly during flight and pushes air downward. This lifts the helicopter into the air. However, this rotation also creates torque, a force that causes the entire helicopter to want to spin in the opposite direction from the rotor. If this force were not balanced by another force, the helicopter would begin to spin uncontrollably. That's why a helicopter has a tail rotor. This creates a sideways thrust that counteracts the main rotor's torque, allowing the helicopter to fly straight and stable.

1. When the pilot changes the pitch of the tail rotor blades, and thus the thrust force, the helicopter begins to turn left or right.
2. The helicopter flies up and down by changing the pitch of the main rotor blades.
3. The helicopter flies forward and backward by tilting the rotor.

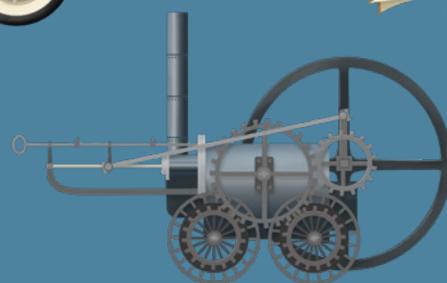
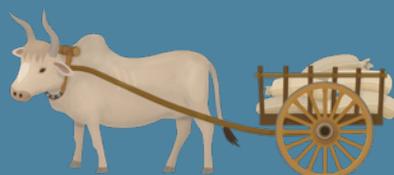
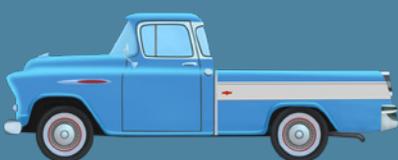
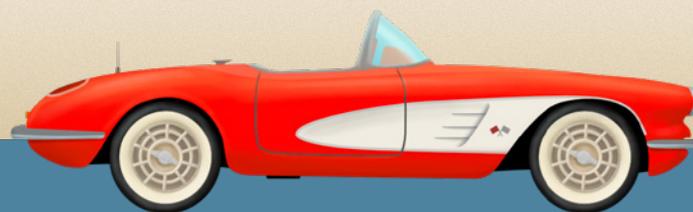
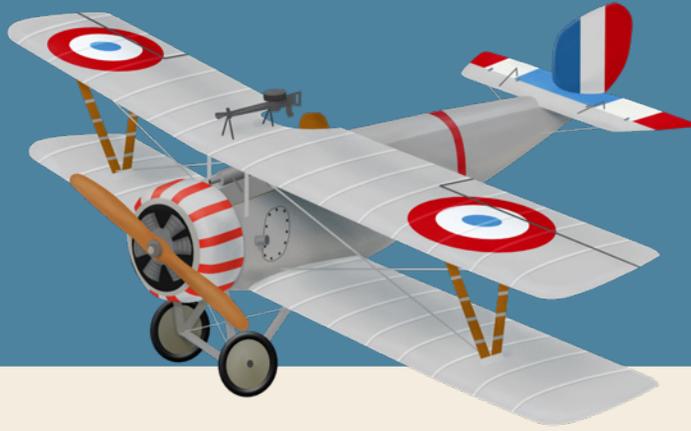
Mil Mi-8, a very widespread helicopter that still serves for transport, rescue, and helping people worldwide, 1965



RAH-66 Comanche, a modern stealth helicopter that never entered service but showed what future helicopters might look like, 1982.



Boeing Vertol 234, a giant helicopter with two rotors that could carry very heavy loads, 1981.



TRANSPORTMANIA

Written by Oldřich Růžička
Illustrated by Tomáš Tůma

This book explores the fascinating and diverse world of transportation, from vehicles that move on land to those that navigate water and soar through the air. It shows readers the mechanisms by which vehicles move – the function of the internal combustion engine, how an airplane is flown, why submarines dive, and much more. It also presents individual types and categories of transportation through a vast array of colorful illustrations. Transportmania is the ideal book for anyone who wants to understand how the world of transport works. It offers a combination of technology, history, and the present day, demonstrating that transportation is not just about machines, but also about human ingenuity, courage, and the desire to explore.

In this book, you will find:

- ☐ Animal-Powered Transportation
- ☐ Human-Powered Transportation
- ☐ Bicycles
- ☐ Motorcycles
- ☐ Automobiles
- ☐ Trucks
- ☐ Buses, Trolleybuses, Trams, Subway, Cable Car
- ☐ Construction and Agricultural Machines
- ☐ Trains
- ☐ Ships
- ☐ Submarines
- ☐ Commercial and Military Aircraft
- ☐ Helicopters
- ☐ Airships and Balloons
- ☐ Spacecraft and Rockets

