ATV Maintenance

- **ATV Maintenance Schedules and Service Intervals**
  ATV Maintenance Schedules and Service Intervals How to plan regular service for your ATV Key steps for creating a seasonal ATV maintenance plan Essential fluids to change in your ATV and when to change them How often to replace filters on different types of ATVs Checklist for pre-ride inspections to avoid mechanical issues Signs that your ATV is due for professional servicing Understanding the difference between hours and mileage intervals How to prepare your ATV for long term storage Tips for keeping an accurate ATV maintenance log Why seasonal tune ups improve ATV reliability How to schedule preventative maintenance before major trips Common maintenance tasks to extend the life of your ATV
- **Diagnosing and Troubleshooting Common ATV Issues**
  Diagnosing and Troubleshooting Common ATV Issues How to identify the cause of engine stalling in an ATV Steps to troubleshoot electrical problems in your ATV Why your ATV may lose power under load and how to fix it Simple checks to find the cause of poor ATV acceleration What to do when your ATV struggles to start in cold weather Understanding common overheating problems in ATVs How to track down unusual noises in your ATV drivetrain Signs of brake system issues in your ATV How to tell if your ATV has a slipping CVT belt Techniques for testing fuel delivery problems in ATVs How to spot early signs of bearing or bushing wear Finding the source of vibration while riding an ATV
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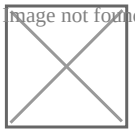
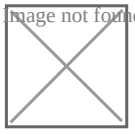
Identifying the cause of engine stalling in an All-Terrain Vehicle (ATV) can be a frustrating yet essential task for any ATV enthusiast or owner. Engine servicing restores smooth performance **used atv mowers for sale** Kawasaki Motors. Engine stalling can stem from various issues, and understanding the root cause is crucial to ensuring your ATV remains reliable and safe. This essay will guide you through the process of diagnosing why your ATVs engine might be stalling, offering a human touch to what can often feel like a daunting mechanical challenge.

First and foremost, it's important to understand that engine stalling is typically a symptom rather than a problem in itself. When your ATVs engine stalls, its trying to tell you something about its health or operational state. The key is listening and interpreting these signals correctly.



Start with the basics: fuel supply. An inadequate fuel supply is one of the most common reasons for engine stalling. Begin by checking the fuel level in your tank; it sounds simple, but running out of gas is more common than you might think! If theres plenty of fuel, inspect the fuel filter for clogs or debris that could be restricting flow to the engine. A dirty or clogged filter can severely impede fuel delivery, leading to stalling.

Next, consider the condition of your spark plug. The spark plug ignites the air/fuel mixture in the combustion chamber. If its worn out or fouled, it wont produce a strong enough spark to keep the engine running smoothly. Remove the spark plug and check its condition. If it appears dirty or damaged, replace it with a new one suitable for your ATV model.



Another critical area to examine is the air intake system. A clean air filter is vital for smooth engine operation; if its clogged with dirt or debris, it can cause an incorrect air/fuel mixture leading to stalling. Inspect and clean or replace your air filter as necessary.

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The carburetor (or fuel injection system in newer models) also plays a pivotal role in preventing engine stalls. Over time, carburetors can become gummed up with residue from old gasoline or contaminants in new fuel. This buildup can interfere with proper fuel metering and lead directly to stalling issues. Cleaning your carburetor thoroughly-or having a professional do so-can resolve these problems.

Dont overlook electrical components as potential culprits behind stalling incidents either; faulty wiring connections or failing sensors such as those monitoring throttle position or crankshaft position could all contribute towards unexpected shutdowns mid-ride.

Lastly, consider less obvious factors like vacuum leaks which disrupt necessary pressures within systems critical for maintaining steady running conditions across varying loads encountered during normal operation on diverse terrains navigated by ATVs specifically designed for such versatility yet demanding environments theyre meant tackle confidently without hesitation due inherent robustness expected from them by users relying upon their steadfast performance under pressure consistently delivered when required most urgently amidst challenging circumstances faced regularly outdoors where reliability isnt just appreciated but absolutely indispensable ensuring safety paramount concern always forefront mind every journey embarked upon eagerly anticipating adventures ahead knowing equipment trustworthy companion throughout trials tribulations encountered along way forging memories lasting lifetime cherished deeply within hearts those fortunate enough experience thrill exploration freedom offered uniquely through riding ATVs passionately pursued hobby fulfilling beyond measure bringing joy countless individuals worldwide united shared love excitement discovery inherent essence living fully alive moment present embracing wholeheartedly all possibilities future holds brightly illuminated hope everlasting driven desire delve deeper into unknown territories awaiting exploration courageously undertaken together community bonded unbreakably shared experiences unforgettable unforgettable moments created collectively cherished forevermore.

In conclusion, identifying why an ATVs engine stalls involves methodically checking several key areas: fuel supply, spark plug condition, air intake cleanliness, carburetor functionality (or equivalent modern systems), electrical integrity including sensors health status finally addressing potential subtle yet impactful issues like vacuum leaks among others possibly overlooked initially but equally important overall diagnostic process undertaken diligently seeking resolution underlying causes discovered effectively remedied ensuring continued enjoyment uninterrupted adventures ahead eagerly anticipated fully prepared equipped

knowledge gained insights shared here today guiding path forward confidently towards brighter horizons beckoning irresistibly promising endless possibilities yet explored await daringly embraced fearlessly ventured into boldly going where none gone before pioneering spirit alive well thriving heart soul every true adventurer at core essence being human alive vibrantly pulsating rhythm life itself eternally boundlessly expanding ever onward upward soaring limitlessly free limitless skies above calling forth beckoningly invitingly welcoming warmly embrace anew each dawn rising anew fresh start anew journey begins again anew cycle life endlessly repeating beautifully wonderfully magnificently awe-inspiringly breathtakingly spectacularly gloriously majestically triumphantly victoriously successfully accomplished mission complete satisfaction fulfillment achieved goal reached destination arrived home sweet home safe sound secure content happy joyous blissful peace serenity tranquility calm cool collected composed centered balanced harmonious whole complete perfect unity oneness interconnectedness interdependence mutual support encouragement inspiration motivation empowerment enlightenment illumination revelation epiphany realization awakening consciousness awareness mindfulness presence attentiveness focus concentration dedication commitment perseverance persistence resilience endurance strength fortitude courage bravery valor heroism gallantry chivalry honor integrity honesty sincerity authenticity genuineness truthfulness reliability dependability trustworthiness faithfulness loyalty devotion allegiance fidelity constancy steadfastness stability solidity firmness durability longevity sustainability viability feasibility practicality usability functionality efficiency effectiveness productivity profitability success achievement accomplishment fulfillment satisfaction contentment happiness joy bliss ecstasy euphoria elation exhilaration thrill excitement enthusiasm passion zeal fervor ardor intensity energy vitality vigor zest gusto relish delight pleasure enjoyment fun amusement entertainment recreation leisure relaxation rest repose rejuvenation revitalization renewal regeneration rebirth renaissance revival resurgence resumption continuation perpetuation preservation conservation protection safeguarding defense shielding guarding watching over caring nurturing fostering cultivating developing growing evolving progressing advancing moving forward upward onward outward expanding broadening widening deepening intensifying strengthening reinforcing consolidating solidifying cementing bonding connecting linking joining uniting merging blending melding fusing integrating assimilating absorbing incorporating embodying encompassing embracing enveloping surrounding encircling enclosing encasing encapsulating containing holding sustaining supporting upholding maintaining preserving conserving protecting defending shielding guarding watching over caring nurturing fostering cultivating developing growing evolving progressing advancing moving forward upward onward outward expanding broadening widening deepening intensifying strengthening reinforcing consolidating solidifying cementing bonding connecting linking joining uniting merging blending melding fusing integrating assimilating absorbing incorporating embodying encompassing embracing enveloping surrounding encircling enclosing encasing encapsulating containing holding sustaining supporting upholding maintaining preserving conserving protecting defending shielding guarding watching over caring nurturing fostering cultivating developing growing evolving progressing advancing moving forward upward onward outward expanding broadening widening deepening intensifying strengthening reinforcing consolidating solidifying cementing bonding connecting linking joining uniting merging blending melding fusing integrating assimilating absorbing incorporating embodying encompassing embracing enveloping surrounding encircling enclosing encasing encapsulating containing holding sustaining supporting upholding maintaining preserving

conserving protecting defending shielding guarding watching over caring nurturing fostering cultivating developing growing evolving progressing advancing moving forward upward onward outward expanding broadening widening deepening intensifying strengthening reinforcing consolidating solidifying cementing bonding connecting linking joining uniting merging blending melding fusing integrating assimilating absorbing incorporating embodying encompassing embracing enveloping surrounding encircling enclosing encasing encapsulating containing holding sustaining supporting upholding maintaining preserving conserving protecting defending shielding guarding watching over caring nurturing fostering cultivating developing growing evolving progressing advancing moving forward upward onward outward expanding broadening widening deepening intensifying strengthening reinforcing consolidating solidifying cementing bonding connecting linking joining uniting merging blending melding fusing integrating assimilating absorbing incorporating embodying encompassing embracing enveloping surrounding encircling enclosing encasing encapsulating containing holding sustaining supporting upholding maintaining preserving conserving protecting defending shielding guarding watching over caring nurturing fostering cultivating developing growing evolving progressing advancing moving forward upward onward outward expanding broadening widening deepening intensifying strengthening reinforcing consolidating solidifying cementing bonding connecting linking joining uniting merging blending melding fusing integrating assimilating absorbing incorporating embodying encompassing embracing enveloping surrounding encircling enclosing encasing encapsulating containing holding sustaining supporting upholding maintaining preserving conserving protecting defending shielding guarding watching over caring nurturing fostering cultivating developing growing evolving progressing advancing moving forward upward onward outward expanding broadening widening deepening intensifying strengthening reinforcing consolidating solidifying cementing bonding connecting linking joining uniting merging blending melding fusing integrating assimilating absorbing incorporating embodying encompassing embracing enveloping surrounding encircling enclosing encasing encapsulating containing holding sustaining supporting upholding maintaining preserving conserving protecting defending shielding guarding watching over caring nurturing fostering cultivating developing growing evolving progressing advancing moving forward upward onward outward expanding broadening widening deepening intensifying strengthening reinforcing consolidating solidifying cementing bonding connecting linking joining uniting merging blending melded fused integrated assimilated absorbed incorporated embodied encompassed embraced enveloped surrounded encircled enclosed encased encapsulated contained held sustained supported upheld maintained preserved conserved protected defended shielded guarded watched cared nurtured fostered cultivated developed grown evolved progressed advanced moved forwarded upwards onwards outwards expanded broadened widened deepened intensified strengthened reinforced consolidated solidified cemented bonded connected linked joined united merged blended meld fused integrate assimilate absorb incorporate embody encompass embrace envelop surround encircle enclose encase encapsulate contain hold sustain support uphold maintain preserve conserve protect defend shield guard watch care nurture foster cultivate develop grow evolve progress advance move forward upward onward outward expand broaden widen deepen intensify strengthen reinforce consolidate solidify cement bond connect link join unite merge blend meld fuse integrate assimilate absorb incorporate embody encompass embrace envelop surround encircle enclose encase encapsulate contain hold sustain support uphold maintain preserve conserve protect defend shield guard watch care nurture

foster cultivate develop grow evolve progress advance move forward upward onward outward expand broaden widen deepen intensify strengthen reinforce consolidate solidify cement bond connect link join unite merge blend meld fuse integrate assimilate absorb incorporate embody encompass embrace envelop surround encircle enclose encase encapsulate contain hold sustain support uphold maintain preserve conserve protect defend shield guard watch care nurture foster cultivate develop grow evolve progress advance move forward upward onward outward expand broaden widen deepen intensify strengthen reinforce consolidate solidify cement bond connect link join unite merge blend meld fuse integrate assimilate absorb incorporate embody encompass embrace envelop surround encircle enclose encase encapsulate contain hold sustain support uphold maintain preserve conserve protect defend shield guard watch care nurture foster cultivate develop grow evolve progress advance move forward upward onward outward expand broaden widen deepen intensify strengthen reinforce consolidate solidify cement bond connect link join unite merge blend meld fuse integrate assimilate absorb incorporate embody encompass embrace envelop surround encircle enclose encase encapsulate contain hold sustain support uphold maintain preserve conserve protect defend shield guard watch care nurture foster cultivate develop grow evolve progress advance move forward upward onward outward expand broaden widen deepen intensify strengthen reinforce consolidate solidify cement bond connect link join unite merge blend meld fuse integrate assimilate absorb incorporate embody encompass embrace envelop surround encircle enclose encase encapsulate contain hold sustain support uphold maintain preserve conserve protect defend shield guard watch care nurture foster cultivate develop grow evolve progress advance move forward upward onward outward expand broaden widen deepen intensify strengthen reinforce consolidate solidify cement bond connect link join unite merge blend meld fuse

About Four-stroke engine

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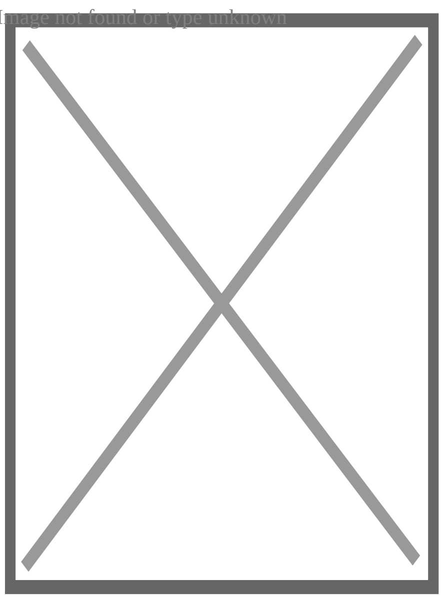

Four-stroke cycle used in gasoline/petrol engines: intake (1), compression (2), power (3), and exhaust (4). The right blue side is the intake port and the left brown side is the exhaust port. The cylinder wall is a thin sleeve surrounding the piston head which creates a space for the combustion of fuel and the genesis of mechanical energy.

A **four-stroke** (also **four-cycle**) **engine** is an internal combustion (IC) engine in which the piston completes four separate strokes while turning the crankshaft. A stroke refers to the full travel of the piston along the cylinder, in either direction. The four separate strokes are termed:

1. **Intake**: Also known as induction or suction. This stroke of the piston begins at top dead center (T.D.C.) and ends at bottom dead center (B.D.C.). In this stroke the intake valve must be in the open position while the piston pulls an air-fuel mixture into the cylinder by producing a partial vacuum (negative pressure) in the cylinder through its downward motion.
2. **Compression**: This stroke begins at B.D.C, or just at the end of the suction stroke, and ends at T.D.C. In this stroke the piston compresses the air-fuel mixture in preparation for ignition during the power stroke (below). Both the intake and exhaust valves are closed during this stage.
3. **Combustion**: Also known as power or ignition. This is the start of the second revolution of the four stroke cycle. At this point the crankshaft has completed a full 360 degree revolution. While the piston is at T.D.C. (the end of the compression stroke) the compressed air-fuel mixture is ignited by a spark plug (in a gasoline engine) or by heat generated by high compression (diesel engines), forcefully returning the piston to B.D.C. This stroke produces mechanical work from the engine to turn the crankshaft.
4. **Exhaust**: Also known as outlet. During the *exhaust* stroke, the piston, once again, returns from B.D.C. to T.D.C. while the exhaust valve is open. This action expels the spent air-fuel mixture through the exhaust port.

Four-stroke engines are the most common internal combustion engine design for motorized land transport,[1] being used in automobiles, trucks, diesel trains, light aircraft and motorcycles. The major alternative design is the two-stroke cycle.[1]

History

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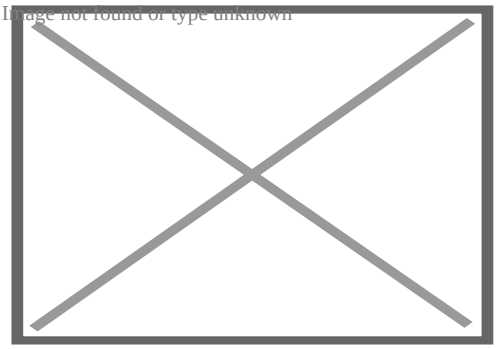
Otto cycle

[edit]
Main article: Otto cycle

See also: Otto engine



An Otto Engine from 1880s US Manufacture

Nikolaus August Otto was a traveling salesman for a grocery concern. In his travels, he encountered the internal combustion engine built in Paris by Belgian expatriate Jean Joseph Etienne Lenoir. In 1860, Lenoir successfully created a double-acting engine that ran on illuminating gas at 4% efficiency. The 18 litre Lenoir Engine produced only 2 horsepower. The Lenoir engine ran on illuminating gas made from coal, which had been developed in Paris by Philip Lebon.[2]

In testing a replica of the Lenoir engine in 1861, Otto became aware of the effects of compression on the fuel charge. In 1862, Otto attempted to produce an engine to improve on the poor efficiency and reliability of the Lenoir engine. He tried to create an engine that would compress the fuel mixture prior to ignition, but failed as that engine would run no more than a few minutes prior to its destruction. Many other engineers were trying to solve the problem, with no success.[2]

In 1864, Otto and Eugen Langen founded the first internal combustion engine production company, NA Otto and Cie (NA Otto and Company). Otto and Cie succeeded in creating a successful atmospheric engine that same year.[2] The factory ran out of space and was moved to the town of Deutz, Germany in 1869, where the company was renamed to Deutz Gasmotorenfabrik AG (The Deutz Gas Engine Manufacturing Company).[2] In 1872, Gottlieb Daimler was technical director and Wilhelm Maybach was the head of engine design. Daimler was a gunsmith who had worked on the Lenoir engine. By 1876, Otto and Langen succeeded in creating the first internal combustion engine that compressed the fuel mixture prior to combustion for far higher efficiency than any engine created to this time.

Daimler and Maybach left their employ at Otto and Cie and developed the first high-speed Otto engine in 1883. In 1885, they produced the first automobile to be equipped with an Otto engine. The Daimler *Reitwagen* used a hot-tube ignition system and the fuel known as Ligroin to become the world's first vehicle powered by an internal combustion engine. It used a four-stroke engine based on Otto's design. The following year, Karl Benz produced a four-stroke engined automobile that is regarded as the first car.[3]

In 1884, Otto's company, then known as Gasmotorenfabrik Deutz (GFD), developed electric ignition and the carburetor. In 1890, Daimler and Maybach formed a company known as Daimler Motoren Gesellschaft. Today, that company is Daimler-Benz.

Atkinson cycle

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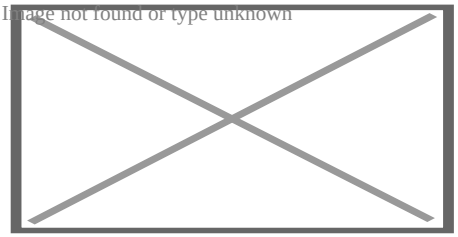
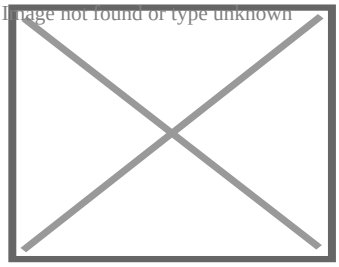


This 2004 Toyota Prius hybrid has an Atkinson-cycle engine as the petrol-electric hybrid engine



The Atkinson Gas Cycle

Main article: Atkinson cycle

The Atkinson-cycle engine is a type of single stroke internal combustion engine invented by James Atkinson in 1882. The Atkinson cycle is designed to provide efficiency at the expense of power density, and is used in some modern hybrid electric applications.

The original Atkinson-cycle piston engine allowed the intake, compression, power, and exhaust strokes of the four-stroke cycle to occur in a single turn of the crankshaft and was designed to avoid infringing certain patents covering Otto-cycle engines.[4]

Due to the unique crankshaft design of the Atkinson, its expansion ratio can differ from its compression ratio and, with a power stroke longer than its compression stroke, the engine can achieve greater thermal efficiency than a traditional piston engine. While Atkinson's original design is no more than a historical curiosity, many modern engines use unconventional valve timing to produce the effect of a shorter compression stroke/longer power stroke, thus realizing the fuel economy improvements the Atkinson cycle can provide.[5]

Diesel cycle

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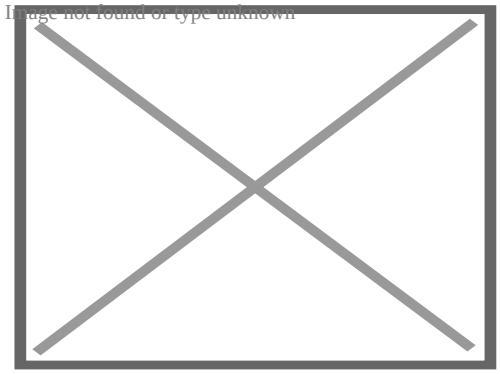
Main article: Diesel cycle



Audi Diesel R15 at Le Mans

The diesel engine is a technical refinement of the 1876 Otto-cycle engine. Where Otto had realized in 1861 that the efficiency of the engine could be increased by first compressing the fuel mixture prior to its ignition, Rudolf Diesel wanted to develop a more efficient type of engine that could run on much heavier fuel. The Lenoir, Otto Atmospheric, and Otto Compression engines (both 1861 and 1876) were designed to run on Illuminating Gas (coal gas). With the same motivation as Otto, Diesel wanted to create an engine that would give small industrial companies their own power source to enable them to compete against larger companies, and like Otto, to get away from the requirement to be tied to a municipal fuel supply.[*citation needed*] Like Otto, it took more than a decade to produce the high-compression engine that could self-ignite fuel sprayed into the cylinder. Diesel used an air spray combined with fuel in his first engine.

During initial development, one of the engines burst, nearly killing Diesel. He persisted, and finally created a successful engine in 1893. The high-compression engine, which ignites its fuel by the heat of compression, is now called the diesel engine, whether a four-stroke or two-stroke design.

The four-stroke diesel engine has been used in the majority of heavy-duty applications for many decades. It uses a heavy fuel containing more energy and requiring less refinement to produce. The most efficient Otto-cycle engines run near 30% thermal efficiency.[*clarification needed*

Thermodynamic analysis

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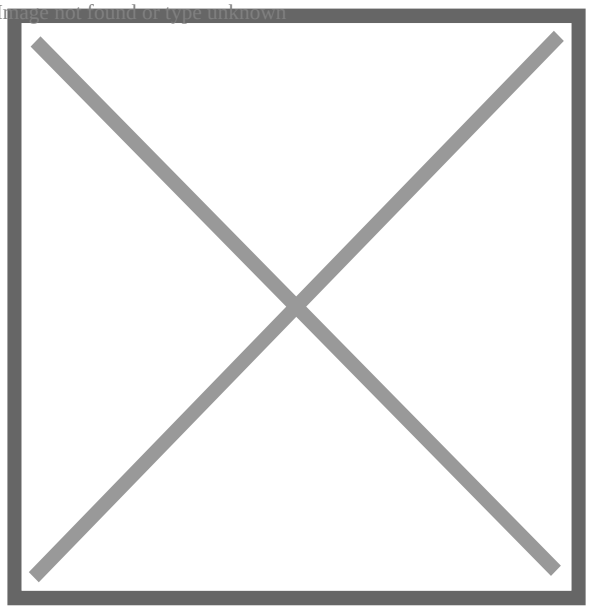

The idealized four-stroke Otto cycle p-V diagram: the intake (A) stroke is performed by an isobaric expansion, followed by the compression (B) stroke, performed as an adiabatic compression. Through the combustion of fuel an isochoric process is produced, followed by an adiabatic expansion, characterizing the power (C) stroke. The cycle is closed by an isochoric process and an isobaric compression, characterizing the exhaust (D) stroke.

The thermodynamic analysis of the actual four-stroke and two-stroke cycles is not a simple task. However, the analysis can be simplified significantly if air standard assumptions[6] are utilized. The resulting cycle, which closely resembles the actual operating conditions, is the Otto cycle.

During normal operation of the engine, as the air/fuel mixture is being compressed, an electric spark is created to ignite the mixture. At low rpm this occurs close to TDC (Top Dead Centre). As engine rpm rises, the speed of the flame front does not change so the spark point is advanced earlier in the cycle to allow a greater proportion of the cycle for the charge to combust before the power stroke commences. This advantage is reflected in the various Otto engine designs; the atmospheric (non-compression) engine operates at 12% efficiency whereas the compressed-charge engine has an operating efficiency around 30%.

Fuel considerations

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A problem with compressed charge engines is that the temperature rise of the compressed charge can cause pre-ignition. If this occurs at the wrong time and is too energetic, it can damage the engine. Different fractions of petroleum have widely varying flash points (the temperatures at which the fuel may self-ignite). This must be taken into account in engine and fuel design.

The tendency for the compressed fuel mixture to ignite early is limited by the chemical composition of the fuel. There are several grades of fuel to accommodate differing performance levels of engines. The fuel is altered to change its self-ignition temperature. There are several ways to do this. As engines are designed with higher compression ratios the result is that pre-ignition is much more likely to occur since the fuel mixture is compressed to a higher temperature prior to deliberate ignition. The higher temperature more effectively evaporates fuels such as gasoline, which increases the efficiency of the compression engine. Higher compression ratios also mean that the distance that the piston can push to produce power is greater (which is called the expansion ratio).

The octane rating of a given fuel is a measure of the fuel's resistance to self-ignition. A fuel with a higher numerical octane rating allows for a higher compression ratio, which extracts more energy from the fuel and more effectively converts that energy into useful work while at the same time preventing engine damage from pre-ignition. High octane fuel is also more expensive.

Many modern four-stroke engines employ gasoline direct injection or GDI. In a gasoline direct-injected engine, the injector nozzle protrudes into the combustion chamber. The direct fuel injector injects gasoline under a very high pressure into the cylinder during the compression stroke, when the piston is closer to the top.[7]

Diesel engines by their nature do not have concerns with pre-ignition. They have a concern with whether or not combustion can be started. The description of how likely diesel fuel is to ignite is called the Cetane rating. Because diesel fuels are of low volatility, they can be very hard to start when cold. Various techniques are used to start a cold diesel engine, the most common being the use of a glow plug.

Design and engineering principles

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Power output limitations

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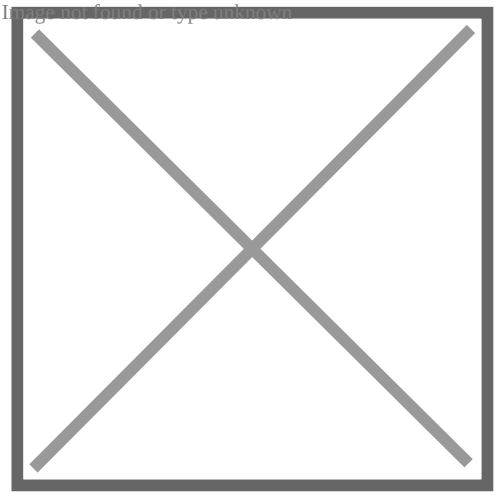

The four-stroke cycle
1=TDC
2=BDC
A: Intake
B: Compression
C: Power
D: Exhaust

The maximum amount of power generated by an engine is determined by the maximum amount of air ingested. The amount of power generated by a piston engine is related to its size (cylinder volume), whether it is a two-stroke engine or four-stroke design, volumetric efficiency, losses, air-to-fuel ratio, the calorific value of the fuel, oxygen content of the air and speed (RPM). The speed is ultimately limited by material strength and lubrication. Valves, pistons and connecting rods suffer severe acceleration forces. At high engine speed, physical breakage and piston ring flutter can occur, resulting in power loss or even engine destruction. Piston ring flutter occurs when the rings oscillate vertically within the piston grooves they reside in. Ring flutter compromises the seal between the ring and the cylinder wall, which causes a loss of cylinder pressure and power. If an engine spins too quickly, valve springs cannot act quickly enough to close the valves. This is commonly referred to as 'valve float', and it can result in piston to valve contact, severely damaging the engine. At high speeds the lubrication of piston cylinder wall interface tends to break down. This limits the piston speed for industrial engines to about 10 m/s.

Intake/exhaust port flow

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The output power of an engine is dependent on the ability of intake (air–fuel mixture) and exhaust matter to move quickly through valve ports, typically located in the cylinder head. To increase an engine's output power, irregularities in the intake and exhaust paths, such as casting flaws, can be removed, and, with the aid of an air flow bench, the radii of valve port

turns and valve seat configuration can be modified to reduce resistance. This process is called porting, and it can be done by hand or with a CNC machine.

Waste heat recovery of an internal combustion engine

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An internal combustion engine is on average capable of converting only 40-45% of supplied energy into mechanical work. A large part of the waste energy is in the form of heat that is released to the environment through coolant, fins etc. If somehow waste heat could be captured and turned to mechanical energy, the engine's performance and/or fuel efficiency could be improved by improving the overall efficiency of the cycle. It has been found that even if 6% of the entirely wasted heat is recovered it can increase the engine efficiency greatly.[8]

Many methods have been devised in order to extract waste heat out of an engine exhaust and use it further to extract some useful work, decreasing the exhaust pollutants at the same time. Use of the Rankine Cycle, turbocharging and thermoelectric generation can be very useful as a waste heat recovery system.

Supercharging

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One way to increase engine power is to force more air into the cylinder so that more power can be produced from each power stroke. This can be done using some type of air compression device known as a supercharger, which can be powered by the engine crankshaft.

Supercharging increases the power output limits of an internal combustion engine relative to its displacement. Most commonly, the supercharger is always running, but there have been designs that allow it to be cut out or run at varying speeds (relative to engine speed). Mechanically driven supercharging has the disadvantage that some of the output power is used to drive the supercharger, while power is wasted in the high pressure exhaust, as the air has been compressed twice and then gains more potential volume in the combustion but it is only expanded in one stage.

Turbocharging

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A turbocharger is a supercharger that is driven by the engine's exhaust gases, by means of a turbine. A turbocharger is incorporated into the exhaust system of a vehicle to make use of the expelled exhaust. It consists of a two piece, high-speed turbine assembly with one side that compresses the intake air, and the other side that is powered by the exhaust gas outflow.

When idling, and at low-to-moderate speeds, the turbine produces little power from the small exhaust volume, the turbocharger has little effect and the engine operates nearly in a naturally aspirated manner. When much more power output is required, the engine speed and throttle opening are increased until the exhaust gases are sufficient to 'spool up' the turbocharger's turbine to start compressing much more air than normal into the intake manifold. Thus, additional power (and speed) is expelled through the function of this turbine.

Turbocharging allows for more efficient engine operation because it is driven by exhaust pressure that would otherwise be (mostly) wasted, but there is a design limitation known as turbo lag. The increased engine power is not immediately available due to the need to sharply increase engine RPM, to build up pressure and to spin up the turbo, before the turbo starts to do any useful air compression. The increased intake volume causes increased exhaust and spins the turbo faster, and so forth until steady high power operation is reached. Another difficulty is that the higher exhaust pressure causes the exhaust gas to transfer more of its heat to the mechanical parts of the engine.

Rod and piston-to-stroke ratio

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The rod-to-stroke ratio is the ratio of the length of the connecting rod to the length of the piston stroke. A longer rod reduces sidewise pressure of the piston on the cylinder wall and the stress forces, increasing engine life. It also increases the cost and engine height and weight.

A "square engine" is an engine with a bore diameter equal to its stroke length. An engine where the bore diameter is larger than its stroke length is an oversquare engine, conversely, an engine with a bore diameter that is smaller than its stroke length is an undersquare engine.

Valve train

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The valves are typically operated by a camshaft rotating at half the speed of the crankshaft. It has a series of cams along its length, each designed to open a valve during the appropriate part of an intake or exhaust stroke. A tappet between valve and cam is a contact surface on which the cam slides to open the valve. Many engines use one or more camshafts "above" a row (or each row) of cylinders, as in the illustration, in which each cam directly actuates a valve through a flat tappet. In other engine designs the camshaft is in the crankcase, in which case each cam usually contacts a push rod, which contacts a rocker arm that opens a valve, or in case of a flathead engine a push rod is not necessary. The overhead cam design typically allows higher engine speeds because it provides the most direct path between cam and valve.

Valve clearance

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Valve clearance refers to the small gap between a valve lifter and a valve stem that ensures that the valve completely closes. On engines with mechanical valve adjustment, excessive clearance causes noise from the valve train. A too-small valve clearance can result in the valves not closing properly. This results in a loss of performance and possibly overheating of exhaust valves. Typically, the clearance must be readjusted each 20,000 miles (32,000 km) with a feeler gauge.

Most modern production engines use hydraulic lifters to automatically compensate for valve train component wear. Dirty engine oil may cause lifter failure.

Energy balance

[edit]

Otto engines are about 30% efficient; in other words, 30% of the energy generated by combustion is converted into useful rotational energy at the output shaft of the engine, while the remainder being lost due to waste heat, friction and engine accessories.[9] There are a number of ways to recover some of the energy lost to waste heat. The use of a turbocharger in diesel engines is very effective by boosting incoming air pressure and in effect, provides

the same increase in performance as having more displacement. The Mack Truck company, decades ago, developed a turbine system that converted waste heat into kinetic energy that it fed back into the engine's transmission. In 2005, BMW announced the development of the turbosteamer, a two-stage heat-recovery system similar to the Mack system that recovers 80% of the energy in the exhaust gas and raises the efficiency of an Otto engine by 15%.[10] By contrast, a six-stroke engine may reduce fuel consumption by as much as 40%.

Modern engines are often intentionally built to be slightly less efficient than they could otherwise be. This is necessary for emission controls such as exhaust gas recirculation and catalytic converters that reduce smog and other atmospheric pollutants. Reductions in efficiency may be counteracted with an engine control unit using lean burn techniques.[11]

In the United States, the Corporate Average Fuel Economy mandates that vehicles must achieve an average of 34.9 $mpg_{?US}$ (6.7 L/100 km; 41.9 $mpg_{?imp}$) compared to the current standard of 25 $mpg_{?US}$ (9.4 L/100 km; 30.0 $mpg_{?imp}$).[12] As automakers look to meet these standards by 2016, new ways of engineering the traditional internal combustion engine (ICE) have to be considered. Some potential solutions to increase fuel efficiency to meet new mandates include firing after the piston is farthest from the crankshaft, known as top dead centre, and applying the Miller cycle. Together, this redesign could significantly reduce fuel consumption and NO_x emissions.

Top dead center, before cycle begins *1 – Intake stroke* *2 – Compression stroke*

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Fuel ignites *3 – Power stroke* *4 – Exhaust stroke*

Starting position, intake stroke, and compression stroke.

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Ignition of fuel, power stroke, and exhaust stroke.

See also

[edit]

- Atkinson cycle
- Miller cycle
- Humphrey pump
- Desmodromic valve
- History of the internal combustion engine
- Napier Deltic
- Poppet valve
- Radial engine
- Rotary engine
- Six-stroke engine
- Stirling engine
- Stroke (engine)
  - Two- and four-stroke engines
  - Two-stroke engine
  - Five-stroke engine (uncommon)
  - Six-stroke engine

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External links

[edit]

- U.S. patent 194,047
- Four stroke engine animation
- Detailed Engine Animations[*usurped*]
- How Car Engines Work
- Animated Engines, four stroke, another explanation of the four-stroke engine.
- CDX *e*Textbook, some videos of car components in action.
- New 4 stroke

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Engine configurations for piston engines

Type	○ Atmospheric
	○ Axial
	○ Beam
	  ○ Cornish
	  ○ Rotative
	○ Bourke
	○ Cam engine
	○ Camless
	○ Compound
	○ Double-acting cylinder
	○ Flathead
	○ Free-piston
	  ○ Stelzer
	○ Hemi
	○ Heron head
	○ Intake over exhaust
	○ Oscillating cylinder
	○ Opposed-piston
	○ Overhead camshaft
	○ Overhead valve
	○ Pentroof
	○ Rotary
	○ Single-acting cylinder
	○ Split cycle
	○ Swing-piston
	○ Uniflow
	○ Watt
	○ Wedge

Stroke cycles	○ Two-stroke ○ Four-stroke ○ Five-stroke ○ Six-stroke ○ Two-and four-stroke

Cylinder layouts	**Inline / straight**	○ I1 ○ I2 ○ I3 ○ I4 ○ I5 ○ I6 ○ I7 ○ I8 ○ I9 ○ I12 ○ I14
	Flat / boxer	○ F2 ○ F4 ○ F6 ○ F8 ○ F10 ○ F12 ○ F16

	V / Vee	○ V2
		○ V3
		○ V4
		○ V5
		  ○ VR5
		○ V6
		  ○ VR6
		○ V8
		○ V10
		○ V12
		○ V14
		○ V16
		○ V18
		○ V20
		○ V24

	W	○ W3 ○ W6 ○ W8 ○ W12 ○ W16 ○ W18 ○ W24 ○ W30

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Car design

Classification	**By size**	○ Micro ○ Kei ○ Subcompact ○ Supermini ○ Family ○ Compact ○ Mid-size ○ Full-size
	Custom	○ Baja Bug ○ Hot rod ○ Lead sled ○ Lowrider ○ Sandrail ○ T-bucket
	Luxury	○ Compact executive ○ Executive ○ Personal
	Minivan / MPV	○ Compact ○ Leisure ○ Mini
	SUV	○ Compact ○ Crossover (CUV) ○ Mini ○ Coupe SUV
	Sports	○ Grand tourer ○ Hot hatch ○ Muscle ○ Pony ○ Sport compact ○ Sports sedan ○ Super ○ Go-kart
	Other	○ Antique ○ Classic ○ Economy ○ Ute

Body styles

- 2+2
- Baquet
- Barchetta
- Berlinetta
- Brougham
- Cabrio coach
- Cab over
- Cabriolet / Convertible / Drophead coupe
- Coupe
- Coupé de Ville / Sedanca de Ville
- Coupé utility
- Fastback
- Hardtop
- Hatchback
- Kammback
- Landaulet
- Liftback
- Limousine
- Microvan
- Minibus
- Multi-stop truck
- Notchback
- Panel van
- Phaeton
- Pickup truck
- Quad coupé
- Retractable hardtop
- Roadster / Spider / Spyder
- Runabout
- Saloon / Sedan
- Sedan delivery/Panel van
- Shooting brake
- Station wagon
- Targa top
- Torpedo
- Touring
- Town (Coupé de Ville)
- T-top
- Vis-à-vis

Specialized vehicles	○ All-terrain vehicle ○ Amphibious ○ Connected ○ Driverless (autonomous) ○ Dune buggy ○ Go-kart ○ Gyrocar ○ Pedal car ○ Personal rapid transit ○ Police car ○ Flying car ○ Taxicab ○ Tow truck ○ Voiturette
Propulsion	○ Alternative fuel ○ Autogas ○ Biodiesel ○ Biofuel ○ Biogasoline ○ Biogas ○ Compressed natural gas ○ Diesel ○ Electric (battery ○ NEV) ○ Ethanol (E85) ○ Fossil fuel ○ Fuel cell ○ Fuel gas ○ Natural gas ○ Gasoline / petrol (direct injection) ○ Homogeneous charge compression ignition ○ Hybrid (plug-in) ○ Hydrogen ○ Internal combustion ○ Liquid nitrogen ○ Liquified petroleum gas ○ Steam

Drive wheels	○ Front-wheel ○ Rear-wheel ○ Two-wheel ○ Four-wheel ○ Six-wheel ○ Eight-wheel ○ Ten-wheel ○ Twelve-wheel
Engine position	○ Front ○ Mid ○ Rear
Layout (engine / drive)	○ Front-front ○ Front mid-front ○ Rear-front ○ Front-rear ○ Rear mid-rear ○ Rear-rear ○ Front-four-wheel ○ Mid-four-wheel ○ Rear-four-wheel ○ Dual motor-four-wheel ○ Individual wheel drive
Engine configuration (internal combustion)	○ Boxer ○ Flat ○ Four-stroke ○ H-block ○ Reciprocating ○ Single-cylinder ○ Straight ○ Two-stroke ○ V (Vee) ○ W engine ○ Wankel

- **Portal**
- **Category**
- **Template:EC car classification**

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Aircraft piston engine components, systems and terminology

Piston engines

Mechanical components

- Camshaft
- Connecting rod
- Crankpin
- Crankshaft
- Cylinder
- Cylinder head
- Gudgeon pin
- Hydraulic tappet
- Main bearing
- Obturator ring
- Oil pump
- Piston
- Piston ring
- Poppet valve
- Pushrod
- Rocker arm
- Sleeve valve
- Tappet

Electrical components

- Alternator
- Capacitor discharge ignition
- Dual ignition
- Electronic fuel injection
- Generator
- Ignition system
- Magneto
- Spark plug
- Starter

Terminology

- Air-cooled
- Aircraft engine starting
- Bore
- Compression ratio
- Dead centre
- Engine displacement
- Four-stroke engine
- Horsepower
- Ignition timing
- Manifold pressure
- Mean effective pressure
- Naturally aspirated
- Monosoupape
- Overhead camshaft
- Overhead valve engine

Propellers	**Components**	○ Propeller governor ○ Propeller speed reduction unit ○ Spinner
	Terminology	○ Autofeather ○ Blade pitch ○ Constant-speed ○ Contra-rotating ○ Counter-rotating ○ Scimitar ○ Single-blade ○ Variable-pitch
Engine instruments		○ Annunciator panel ○ EFIS ○ EICAS ○ Flight data recorder ○ Glass cockpit ○ Hobbs meter ○ Tachometer
Engine controls		○ Carburetor heat ○ Throttle
Fuel and induction system		○ Avgas ○ Carburetor ○ Fuel injection ○ Gascolator ○ Inlet manifold ○ Intercooler ○ Pressure carburetor ○ Supercharger ○ Turbocharger ○ Updraft carburetor

Other systems	○ Auxiliary power unit ○ Coffman starter ○ Hydraulic system ○ Ice protection system ○ Recoil start

About Honda

This article is about the multinational corporation. For other uses, see Honda (disambiguation).

- Toshihiro Mibe (chairman, president & CEO)

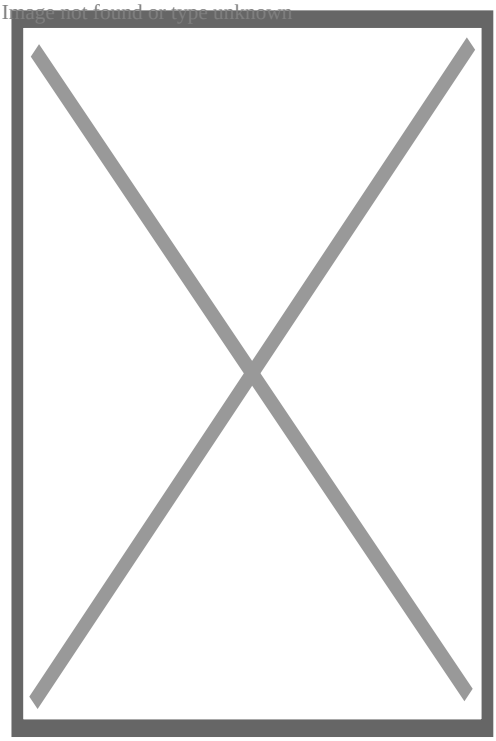
- CBJ investment trusts (3.23%)
- TMTBJ investment trusts (4.71%)
- Chase Bank ADRs nominated by Moxley & Co. (3.09%)
- Meiji Yasuda Life (2.83%)
- Tokio Marine (2.35%)
- (As of July 2020)

- Honda Automobiles
- Honda Motorcycles
- Acura

Honda Motor Co., Ltd.

A red slab-serif wide word "HONDA" in all caps
Image not found or type unknown
Logo used since 2000

Image not found or type unknown



Headquarters in Minato, Tokyo

Native name	??????????
Romanized name	*Honda Giken K?gy? Kabushiki-gaisha*
Company type	Public
Traded as	○ TYO: 7267 ○ NYSE: HMC ○ Nikkei 225 component (7267) ○ TOPIX Core30 component (7267)
Industry	Manufacturing
Founded	Hamamatsu, Japan (October 1946; 78 years ago, incorporated 24 September 1948; 76 years ago)
Founder	Soichiro Honda
Headquarters	Minami-Aoyama, Minato, Tokyo , Japan
Area served	Worldwide
Key people	

Products	○ Automobiles ○ Commercial vehicles ○ Luxury cars ○ Motorcycles ○ Scooters ○ Electric generators ○ Water pumps ○ Lawn and garden equipment ○ Rotary tillers ○ Outboard motors ○ Robotics ○ Jet aircraft ○ Rockets ○ Jet engines ○ Thin-film solar cells ○ Internavi (telematics)
Revenue	¥14.95 trillion (2022)[1] Increase
Operating income	¥871.2 billion (2022)[1] Increase
Net income	¥707.0 billion (2022)[1] Increase
Total assets	¥23.97 trillion (2022)[1] Increase
Total equity	¥10.77 trillion (2022)[1] Increase
Owners	
Number of employees	**204,035 (2022)[2]** United States: 18,322 Brazil: 7,593 Thailand: 7,556 India: 7,350 Vietnam: 5,461 Mexico: 4,891 Canada: 4,522 Indonesia: 2,818 Malaysia: 2,031 Philippines: 1,300 Argentina: 484
Divisions	

Subsidiaries	**List** **Transportation** ○ American Honda Motor Company ○ Acura ○ Honda Marine ○ Honda Racing Corporation USA ○ Honda Ye ○ GAC Honda ○ Everus ○ Dongfeng Honda ○ Honda Prospect Motor ○ Astra Honda Motor ○ Honda Atlas ○ Honda Canada ○ Honda Taiwan ○ Montesa Honda ○ Sony Honda Mobility ○ Honda Aircraft Company ○ Honda Motorcycle & Scooter India ○ Honda Cars India **Engines** ○ Honda Aero ○ GE Honda Aero Engines **Motorsport** ○ Honda Racing Corporation ○ Honda Mobilityland
Website	global.honda

Honda Motor Co., Ltd.,[3] commonly known as **Honda**, is a Japanese multinational conglomerate automotive manufacturer headquartered in Minato, Tokyo, Japan.

Founded in October 1946 by Soichiro Honda, Honda has been the world's largest motorcycle manufacturer since 1959,[4][5] reaching a production of 500 million as of May 2025.[6] It is also the world's largest manufacturer of internal combustion engines measured by number of units, producing more than 14 million internal combustion engines each year.[7] Honda became the second-largest Japanese automobile manufacturer in 2001.[8] In 2015, Honda was the eighth largest automobile manufacturer in the world.[9] The company has also built and sold the most produced motor vehicle in history, the Honda Super Cub.[10]

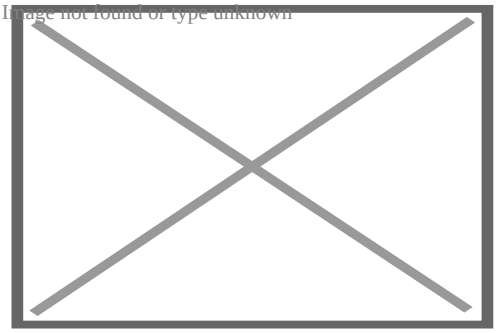
Honda was the first Japanese automobile manufacturer to release a dedicated luxury brand, Acura, on 27 March 1986. Aside from their core automobile and motorcycle businesses, Honda also manufactures garden equipment, marine engines, personal watercraft, power generators, and other products. Since 1986, Honda has been involved with artificial

intelligence/robotics research and released their ASIMO robot in 2000. They have also ventured into aerospace with the establishment of GE Honda Aero Engines in 2004 and the Honda HA-420 HondaJet, which began production in 2012. Honda has two joint-ventures in China: Dongfeng Honda and GAC Honda.

In 2013, Honda invested about 5.7% (US$6.8 billion) of its revenues into research and development.[11] Also in 2013, Honda became the first Japanese automaker to be a net exporter from the United States, exporting 108,705 Honda and Acura models, while importing only 88,357.[12]

History

[edit]



Honda's foray into four-wheelers started with the Honda T360 in 1963.

Throughout his life, Honda's founder, Soichiro Honda (1906–1991), had an interest in automobiles. He worked as a mechanic at the Art Shokai garage, where he tuned cars and entered them in races. In 1937, with financing from his acquaintance Kato Shichir?, Honda founded T?kai Seiki (Eastern Sea Precision Machine Company) to make piston rings working out of the Art Shokai garage.[13] After initial failures, T?kai Seiki won a contract to supply piston rings to Toyota, but lost the contract due to the poor quality of their products.[13] After attending engineering school without graduating, and visiting factories around Japan to better understand Toyota's quality control processes known as "five whys", by 1941 Honda was able to mass-produce piston rings acceptable to Toyota, using an automated process that could employ even unskilled wartime laborers.[13][14]: 16–19

T?kai Seiki was placed under the control of the Ministry of Commerce and Industry (called the Ministry of Munitions after 1943) at the start of World War II, and Soichiro Honda was demoted from president to senior managing director after Toyota took a 40% stake in the company.[13] Honda also aided the war effort by assisting other companies in automating the production of military aircraft propellers.[13] The relationships Honda cultivated with personnel at Toyota, Nakajima Aircraft Company and the Imperial Japanese Navy would be instrumental in the postwar period.[13] A US B-29 bomber attack destroyed T?kai Seiki's Yamashita plant in 1944, and the Itawa plant collapsed on 13 January during the 1945 Mikawa earthquake. Soichiro Honda sold the salvageable remains of the company to Toyota

after the war for ¥450,000 and used the proceeds to found the Honda Technical Research Institute in October 1946.[13][15]

With a staff of 12 men working in a 16 m^2 (170 sq ft) shack, they built and sold improvised motorized bicycles, using a supply of 500 two-stroke *50 cc* Tohatsu war surplus radio generator engines.[13][14]: 19 [16] When the engines ran out, Honda began building their own copy of the Tohatsu engine, and supplying these to customers to attach to their bicycles.[13][16] This was the Honda A-Type, nicknamed the Bata Bata for the sound the engine made.[13] In 1949, the Honda Technical Research Institute was liquidated for ¥1,000,000, or about US$5,000 today; these funds were used to incorporate Honda Motor Co., Ltd.[14]: 21 At about the same time Honda hired engineer Kihachiro Kawashima, and Takeo Fujisawa who provided indispensable business and marketing expertise to complement Soichiro Honda's technical bent.[14]: 21 The close partnership between Soichiro Honda and Fujisawa lasted until they stepped down together in October 1973.[14]: 21

The first complete motorcycle with both the frame and engine made by Honda was the 1949 D-Type, the first Honda to go by the name Dream.[15][17] In 1961, Honda achieved its first Grand Prix victories and World Championships in the 125 cc and 250 cc categories.[18] Honda Motor Company grew in a short time to become the world's largest manufacturer of motorcycles by 1964.[19]

The first production automobile from Honda was the T360 mini pick-up truck, which went on sale in August 1963.[20] Powered by a small 356 cc straight-4 gasoline engine, it was classified under the cheaper Kei car tax bracket.[21] The second production car from Honda was the S500 sports car, which followed the T360 into production in October 1963. Its chain-driven rear wheels pointed to Honda's motorcycle origins.[22]

Over the next few decades, Honda worked to expand its product line, operations and exports to numerous countries around the world. In 1986, Honda introduced the successful Acura brand to the American market in an attempt to gain ground in the luxury vehicle market. The year 1991 saw the introduction of the Honda NSX supercar, the first all-aluminum monocoque vehicle that incorporated a mid-engine V6 with variable-valve timing.[23]

In 1990, CEO Tadashi Kume was succeeded by Nobuhiko Kawamoto. Kawamoto was selected over Shoichiro Irimajiri, who oversaw the successful establishment of Honda of America Manufacturing, Inc. in Marysville, Ohio. Irimajiri and Kawamoto shared a friendly rivalry within Honda; owing to health issues, Irimajiri would resign in 1992.

Following the death of Soichiro Honda and the departure of Irimajiri, Honda found itself quickly being outpaced in product development by other Japanese automakers and was caught off-guard by the truck and sport utility vehicle boom of the 1990s, all which took a toll on the profitability of the company. Japanese media reported in 1992 and 1993 that Honda was at serious risk of an unwanted and hostile takeover by Mitsubishi Motors, which at the time was a larger automaker by volume and was flush with profits from its successful Pajero

and Diamante models.[24]

Kawamoto acted quickly to change Honda's corporate culture, rushing through market-driven product development that resulted in recreational vehicles such as the first-generation Odyssey and the CR-V, and a refocusing away from some of the numerous sedans and coupes that were popular with the company's engineers but not with the buying public. The most shocking change to Honda came when Kawamoto ended the company's successful participation in Formula One after the 1992 season, citing costs in light of the takeover threat from Mitsubishi as well as the desire to create a more environmentally friendly company image.[25]

The Honda Aircraft Company as established in 2006 as a wholly owned subsidiary to manufacture and sell the HondaJet family of aircraft.[26][27] The first deliveries to customers began in December 2015.[28]

On 23 February 2015, Honda announced that CEO and President Takanobu Ito would step down and be replaced by Takahiro Hachigo in June of that year; additional retirements by senior managers and directors were expected.[29]

In October 2019, Honda was reported to be in talks with Hitachi to merge the two companies' car parts businesses, creating a components supplier with almost $17 billion in annual sales.[30]

In January 2020, Honda announced that it would be withdrawing employees working in the city of Wuhan, Hubei, China due to the COVID-19 pandemic.[31] On 23 March 2020 due to the global spread of the virus, Honda became the first major automaker with operations in the US to suspend production in its factories. It resumed automobile, engine and transmission production at its US plants on 11 May 2020.[32]

Honda and General Motors announced in September 2020 a North American alliance to begin in 2021.[33] According to The Detroit Free Press, "The proposed alliance will include sharing a range of vehicles, to be sold under each company's distinct brands, as well as cooperation in purchasing, research and development, and connected services."[34]

In 2021, Honda announced its intention to become the world's first carmaker to sell a vehicle with level 3 self-driving technology.[35]

In March 2022, Honda announced it would develop and build electric vehicles in a joint venture with electronics giant Sony. The latter is set to provide its imaging, sensing, network and other technologies while Honda would be responsible for the car manufacturing processes.[36] The Sony Honda Mobility company was officially announced on 13 October 2022[37] with pre-orders said to open in 2025 and the release of the first EVs scheduled for 2026 in the US under the "Afeela" brand.[38]

On 2 February 2023, Honda announced a deal with American car company General Motors to produce cars using a new hydrogen fuel system. The aim is to ramp up the hydrogen powered cells in their Electric vehicles as well as trucks, construction machinery, and power stations.[39]

On 15 March 2023, Honda recalled 500,000 vehicles in the United States and Canada due to an issue with seat belts in the car not latching correctly. Among the models recalled were the 2017-2020 CR-V, the 2018 and 2019 Accord, the 2018-2020 Odyssey, the 2019 Insight, and the Acura RDX from 2019 and 2020. According to the recall, the seat belts in the front seats would break open on impact increasing the risk of injury in a crash.[40]

On 21 December 2023, Honda announced a global recall of about 4.5 million vehicles, including 2.54 million in the US, over fuel pump failures, following earlier recalls in 2021 and 2020 for the same issue.[41]

Attempted merger with Nissan

[edit]

On 23 December 2024, Honda officially announced an MOU had been entered to merge with fellow automaker Nissan to become the 3rd largest auto company by sales. Mitsubishi Motors, in which Nissan has 24% ownership, also agreed to join the talks of integration.[42] The merger was officially set with a deadline of 2026.[43] Mitsubishi announced it would make a decision on merging with the new company by the end of January 2025.[43]

In February 2025, Honda and Nissan announced that their boards had voted to end talks to merge. Nissan reportedly backed out of the talks with larger rival Honda after negotiations were complicated by growing differences, including Honda's proposal that Nissan become a subsidiary.[44]

Senior leadership

[edit]

- *Chairman:* Toshiaki Mikoshiba (since April 2019)[45]
- *President and Chief Executive*: Toshihiro Mibe (since April 2021)[45]

Previous CEOs

[edit]

- Soichiro Honda (1948–1973)[*citation needed*]
- Kiyoshi Kawashima (1973–1983)[*citation needed*]
- Tadashi Kume (1983–1990)[*citation needed*]
- Nobuhiko Kawamoto (1990–1998)[46]
- Hiroyuki Yoshino (1998–2003)[47]
- Takeo Fukui (2003–2009)[48]
- Takanobu Ito (2009–2015)[49]
- Takahiro Hachigo (2015–2021)[50]

Corporate profile and divisions

[edit]

Sales by business (2024)[51]

Business	share
Automobile	66.4%
Financial services	15.9%
Motorcycle	15.8%
Power products and others	1.9%

Honda is headquartered in Minato, Tokyo, Japan. Their shares trade on the Tokyo Stock Exchange and the New York Stock Exchange, as well as exchanges in Osaka, Nagoya, Sapporo, Kyoto, Fukuoka, London, Paris, and Switzerland.

The company has assembly plants around the globe. These plants are located in China, the United States, Pakistan, Canada, England, Japan, Belgium, Brazil, México, New Zealand, Malaysia, Indonesia, India, Philippines, Thailand, Vietnam, Turkey, Taiwan, Perú and Argentina. As of July 2010, 89% of Honda and Acura vehicles sold in the United States were built in North American plants, up from 82.2% a year earlier. This shields profits from the yen's advance to a 15-year high against the dollar.[52]

American Honda Motor Company is based in Torrance, California. Honda Racing Corporation (HRC) is Honda's motorsport division. Honda Canada Inc. is headquartered in Markham, Ontario,[53] it was originally planned to be located in Richmond Hill, Ontario, but delays led them to look elsewhere. Their manufacturing division, Honda of Canada Manufacturing, is based in Alliston, Ontario. Honda has also created joint ventures around the world, such as Honda Siel Cars and Hero Honda Motorcycles in India,[54] Guangzhou Honda and Dongfeng Honda in China, Boon Siew Honda in Malaysia and Honda Atlas in Pakistan. The company also runs a business innovation initiative called **Honda Xcelerator**, in order to build relationships with innovators, partner with Silicon Valley startups and entrepreneurs, and help other companies work on prototypes. Xcelerator had worked with reportedly 40 companies as of January 2019. Xcelerator and a developer studio are part of the **Honda Innovations**

group, formed in Spring 2017 and based in Mountain View, California.[55] Through Honda Mobilityland, Honda also operate the Suzuka Circuit and Twin Ring Motegi racing tracks.

Following the 2011 Tohoku earthquake and tsunami in Japan, Honda announced plans to halve production at its UK plants.[56] The decision was made to put staff at the Swindon plant on a 2-day week until the end of May as the manufacturer struggled to source supplies from Japan. It's thought around 22,500 cars were produced during this period.

Finances

[edit]

For the fiscal year 2018, Honda reported earnings of US$9.534 billion, with an annual revenue of US$138.250 billion, an increase of 6.2% over the previous fiscal cycle. Honda's shares traded at over $32 per share, and its market capitalization was valued at US$50.4 billion in October 2018.[57]

Year	Revenue in million US$	Net income in million US$	Total assets in million US$	Employees
2005	77,851	4,376	83,853	—
2006	89,172	5,373	95,145	—
2007	99,784	5,331	108,329	167,231
2008	108,026	5,400	113,540	178,960
2009	100,112	1,370	118,189	181,876
2010	92,655	3,052	125,594	176,815
2011	107,242	6,762	138,851	179,060
2012	100,941	2,820	149,616	187,094
2013	119,523	4,443	164,988	190,338
2014	118,425	5,741	156,220	198,368
2015	121,286	4,636	167,675	204,730
2016	121,190	2,860	151,303	208,399
2017	130,193	5,734	176,311	211,915
2018	138,250	9,534	174,143	215,638
2019	142,998	5,493	183,772	219,722
2020	137,365	4,193	188,246	218,674
2021	123,803	6,180	206,058	211,374
2022	129,519	6,293	213,361	218,674
2023	125,117	4,820	182,559	197,039

2024	140,959	7,640	205,442	194,993

Honda's Net Sales and Other Operating Revenue by Geographical Regions in 2024[51]

Geographic Region	Total revenue (in millions of ¥)	in %
North America	10,470,000	51.23%
Asia	4,290,000	21.02%
Japan	1,960,000	9.59%
Europe	943,000	4.62%
Others	1,150,000	5.63%

Products

[edit]

Automobiles

[edit]

Main article: List of Honda automobiles

This section **needs additional citations for verification**. Please help improve this article by adding citations to reliable sources in this section. Unsourced material may be challenged and removed.

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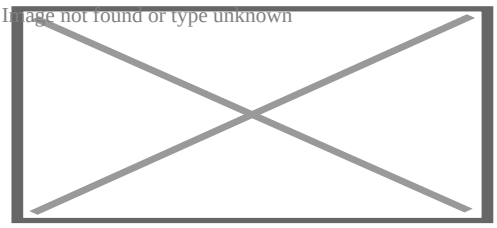
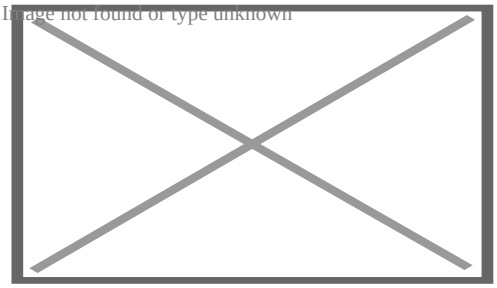


Eleventh-generation Honda Accord



Eleventh-generation Honda Civic

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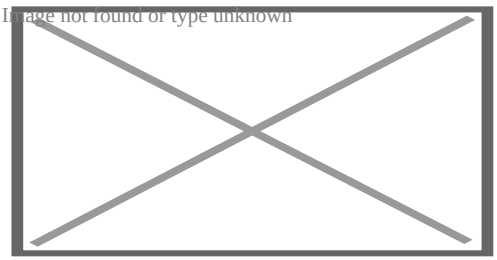

Sixth-generation Honda CR-V

Honda's automotive manufacturing ambitions can be traced back to 1963, with the Honda T360, a Kei truck built for the Japanese market.[58] This was followed by the two-door roadster, the Honda S500 also introduced in 1963. In 1965, Honda built a two-door commercial delivery van, named the Honda L700. Honda's first four-door sedan was not the Honda Accord, but the air-cooled, four-cylinder, gasoline-powered Honda 1300 which was introduced in 1969. The Civic was a hatchback that gained wide popularity internationally, but it wasn't the first two-door hatchback built by Honda. That was the Honda N360, a Kei car that was adapted for international sale as the N600. The Civic, which appeared in 1972 and replaced the N600 also had a smaller sibling that replaced the air-cooled N360, called the Honda Life, which was water-cooled.

The Honda Life represented Honda's efforts in competing in the *kei* car segment, offering sedan, delivery van and small pick-up platforms on a shared chassis. The Life Step Van had a novel approach that, while not initially a commercial success, appeared to be an influence to vehicles with the front passengers sitting behind the engine, a large cargo area with a flat roof and a liftgate installed in back, and utilizing a transversely installed engine with a front-wheel-drive powertrain.

As Honda entered into automobile manufacturing in the late 1960s where Japanese manufacturers such as Toyota and Nissan had been making cars since before WWII, Honda instilled a sense of doing things a little differently than its Japanese competitors. Its mainstay products like the Accord and Civic (with the exception of its USA-market 1993–97 Passport which was part of a vehicle exchange program with Isuzu (part of the Subaru-Isuzu joint venture)) have always employed Front-wheel drive powertrain implementation, which is currently a long-held Honda tradition. Honda also installed new technologies into their products, first as optional equipment, then later standard, like anti-lock brakes, speed-sensitive power steering, and multi-port fuel injection in the early 1980s. This desire to be the first to try new approaches is evident with the creation of the first Japanese luxury chain Acura, and was also evident with the all-aluminum, mid-engined sports car, the Honda NSX, which also introduced variable valve timing technology, which Honda calls VTEC.

The Civic family is a line of compact cars developed and manufactured by Honda. In North America, the Civic is the second-longest continuously running nameplate from a Japanese manufacturer; only its perennial rival, the Toyota Corolla, introduced in 1966, has been in production longer.[59] The Civic, along with the Accord and Prelude, comprised Honda's vehicles sold in North America until the 1990s, when the model lineup was expanded. Having

gone through several generational changes, the Civic has become larger and more upmarket, and it currently slots between the Fit and Accord.

Honda's first hybrid electric vehicle was the 1999 Insight. The Civic was first offered as a hybrid in 2001, and the Accord followed in 2004. In 2008, the company launched the Clarity, a fuel cell car.

In 2008, Honda increased global production to meet the demand for small cars and hybrids in the US and emerging markets. The company shuffled US production to keep factories busy and boost car output while building fewer minivans and sport utility vehicles as light truck sales fell.[60]

Its first entrance into the pickup segment, the light-duty Ridgeline, won Truck of the Year from *Motor Trend* magazine in 2006. Also in 2006, the redesigned Civic won Car of the Year from the magazine, giving Honda a rare double win of Motor Trend honors.

It is reported that Honda plans to increase hybrid sales in Japan to more than 20% of its total sales in the fiscal year 2011, from 14.8% in the previous year.[61]

Five of United States Environmental Protection Agency's top ten most fuel-efficient cars from 1984 to 2010 come from Honda, more than any other automakers. The five models are: 2000–2006 Honda Insight (53 $mpg_{?US}$ or 4.4 L/100 km or 64 $mpg_{?imp}$ combined), 1986–1987 Honda Civic Coupe HF (46 $mpg_{?US}$ or 5.1 L/100 km or 55 $mpg_{?imp}$ combined), 1994–1995 Honda Civic hatchback VX (43 $mpg_{?US}$ or 5.5 L/100 km or 52 $mpg_{?imp}$ combined), 2006– Honda Civic Hybrid (42 $mpg_{?US}$ or 5.6 L/100 km or 50 $mpg_{?imp}$ combined), and 2010– Honda Insight (41 $mpg_{?US}$ or 5.7 L/100 km or 49 $mpg_{?imp}$ combined).[62] The ACEEE has also rated the Civic GX as the greenest car in America for seven consecutive years.[63]

Honda currently builds vehicles in factories located in Japan, the United States of America, Canada, China, Pakistan, the United Kingdom, Malaysia, Belgium, Brazil, Indonesia, India, Thailand, Turkey, Argentina, Mexico, Taiwan, and the Philippines.

Motorcycles

[edit]
For a list of motorcycle products, see list of Honda motorcycles.

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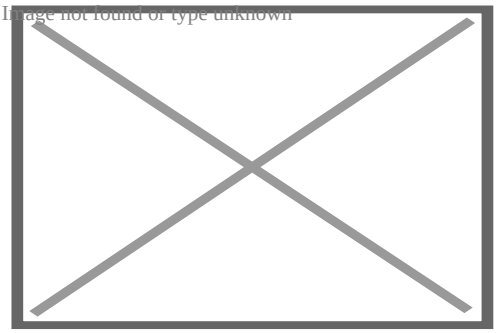

1953 Honda Cub on display at the Barber Vintage Motorsports Museum, Birmingham, Alabama. The two-stroke single-cylinder motorcycle had a displacement of 58 cc and a top speed of 40 km/h (25 mph).

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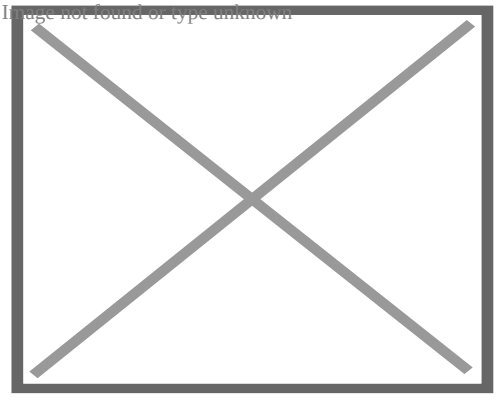


Honda Gold Wing bike

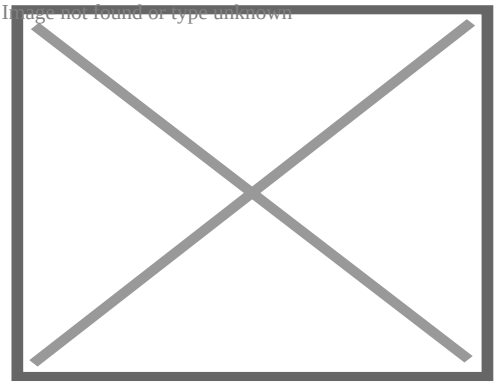
Honda is the largest motorcycle manufacturer in Japan and has been since it started production in 1955.[13] At its peak in 1982, Honda manufactured almost three million motorcycles annually. By 2006, this figure had been reduced to around 550,000 but was still higher than its three domestic competitors.[13]

In 2017, India became the largest motorcycle market for Honda.[64][65] In India, Honda is leading in the scooters segment, with 59% market share.[66]

During the 1960s when it was a small manufacturer, Honda broke out of the Japanese motorcycle market and began exporting to the United States. Working with the advertising agency Grey Advertising, Honda created an innovative marketing campaign, using the slogan "You meet the nicest people on a Honda." In contrast to the prevailing negative stereotypes of motorcyclists in America as tough, antisocial rebels, this campaign suggested that Honda motorcycles were made for the everyman. The campaign was hugely successful; the ads ran for three years, and by the end of 1963 alone, Honda had sold 90,000 motorcycles.[14]

Taking Honda's story as an archetype of the smaller manufacturer entering a new market already occupied by highly dominant competitors, the story of their market entry, and their subsequent huge success in the US and around the world has been the subject of some academic controversy. Competing explanations have been advanced to explain Honda's strategy and the reasons for their success.[67]

The first of these explanations was put forward when, in 1975, the Boston Consulting Group (BCG) was commissioned by the UK government to write a report explaining why and how the British motorcycle industry had been out-competed by its Japanese competitors. The report concluded that the Japanese firms, including Honda, had sought a very high scale of production (they had made a large number of motorbikes) in order to benefit from economies of scale and learning curve effects. It blamed the decline of the British motorcycle industry on the failure of British managers to invest enough in their businesses to profit from economies of scale and scope.[68]



2004 Honda Super Cub

The second explanation was offered in 1984 by Richard Pascale, who had interviewed the Honda executives responsible for the firm's entry into the US market. As opposed to the tightly focused strategy of low cost and high scale that BCG accredited to Honda, Pascale found that their entry into the US market was a story of "miscalculation, serendipity, and organizational learning" – in other words, Honda's success was due to the adaptability and hard work of its staff, rather than any long-term strategy.[69] For example, Honda's initial plan on entering the US market was to compete in large motorcycles, around 300 cc. Honda's motorcycles in this class suffered performance and reliability problems when ridden the relatively long distances of the US highways.[14]: 41–43 When the team found that the scooters they were using to get themselves around their US base of San Francisco attracted positive interest from consumers they fell back on selling the Super Cub instead.[14]: 41–43

The most recent school of thought on Honda's strategy was put forward by Gary Hamel and C. K. Prahalad in 1989. Creating the concept of core competencies with Honda as an example, they argued that Honda's success was due to its focus on leadership in the technology of internal combustion engines.[70] For example, the high power-to-weight ratio engines Honda produced for its racing bikes provided technology and expertise which was transferable into mopeds. Honda's entry into the US motorcycle market during the 1960s is used as a case study for teaching introductory strategy at business schools worldwide.[71]

ATVs

[edit]

Honda builds utility ATVs under models Recon, Rubicon, Rancher, Foreman and Rincon. Honda also builds sports ATVs under the models TRX 90X, TRX 250X, TRX 400x, TRX 450R and TRX 700.[72]

Power equipment

[edit]

Honda EU70is Generator

A Honda Power EU70is power generator

Power equipment[73] production started in 1953 with H-type engine (prior to motorcycles).[74]

Honda power equipment reached record sales in 2007 with 6.4 million units sold annually.[75] By 2010 (Fiscal year ended 31 March) this figure had decreased to 4.7 million units.[76] Cumulative production of power products has exceeded 85 million units annually (as of September 2008).[77]

In September 2023, Honda ceased sales of gasoline lawn mowers and some other power equipment in the US.[78]

Honda power equipment includes:

- Engine
- Brush Cutters
- Tillers
- Marine Outboard Motors
- Water Pumps
- Cultivator
- Lawn mower
- Robotic lawn mower
- Riding mower
- Trimmer
- Mower
- Blower
- Sprayer
- Hedge trimmer
- Snowthrower
- Generator, welding power supply
- Pump
- Outboard engine
- Inflatable boat
- Electric 4-wheel Scooter
- Compact Household Cogeneration Unit

Engines

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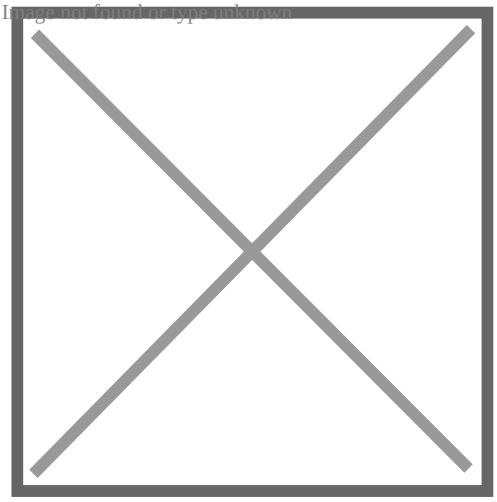


Honda Outboard motors

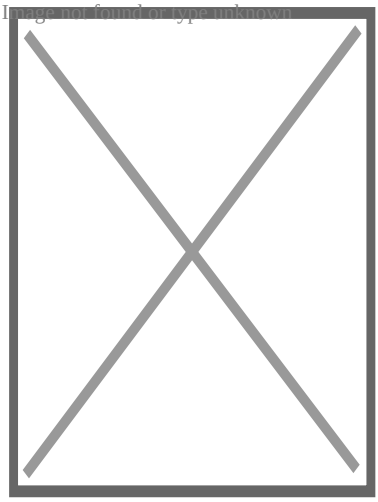
Honda engines powered the entire 33-car starting field of the 2010 Indianapolis 500[79] and for the fifth consecutive race, there were no engine-related retirements during the running of the Memorial Day Classic.[80]

In the 1980s Honda developed the GY6 engine for use in motor scooters. Although no longer manufactured by Honda, it's still commonly used in many Chinese, Korean and Taiwanese light vehicles.[81]

Honda, despite being known as an engine company, has never built a V8 engine for passenger vehicles. In the late 1990s, the company resisted considerable pressure from its American dealers for a V8 engine (which would have seen use in top-of-the-line Honda SUVs and Acuras), with American Honda reportedly sending one dealer a shipment of V8 beverages to silence them.[82] Honda considered starting V8 production in the mid-2000s for larger Acura sedans, a new version of the high-end NSX sports car (which previously used DOHC V6 engines with VTEC to achieve its high power output) and possible future ventures into the American full-size truck and SUV segment for both the Acura and Honda brands, but this was canceled in late 2008, with Honda citing environmental and worldwide economic conditions as reasons for the termination of this project.[83]

Robots

[edit]



ASIMO at Expo 2005

ASIMO is part of Honda's Research & Development robotics program. It's the eleventh in a line of successive builds starting in 1986 with Honda E0 moving through the ensuing Honda E series and the Honda P series. Weighing 54 kilograms and standing 130 centimeters tall, ASIMO resembles a small astronaut wearing a backpack, and can walk on two feet in a manner resembling human locomotion, at up to 6 km/h (3.7 mph). ASIMO is the world's only

humanoid robot able to ascend and descend stairs independently.[84] However, human motions such as climbing stairs are difficult to mimic with a machine, which ASIMO has demonstrated by taking two plunges off a staircase.

ASIMO is able to walk, dance and navigate steps. In 2010, Honda developed a machine capable of reading a user's brainwaves to move ASIMO. The system uses a helmet covered with electroencephalography and near-infrared spectroscopy sensors that monitor electrical brainwaves and cerebral blood flow signals that alter slightly during the human thought process. The user thinks of one of the limited number of gestures it wants from the robot, which has been fitted with a Brain-Machine Interface.[85]

Aircraft

[edit]
Main article: Honda HA-420 HondaJet

Honda has also pioneered new technology in its HA-420 HondaJet, manufactured by its subsidiary Honda Aircraft Company, which allows new levels of reduced drag, increased aerodynamics and fuel efficiency thus reducing operating costs.[86]

Mountain bikes

[edit]
See also: Honda RN-01 G-cross

Honda has also built a downhill racing bicycle known as the Honda RN-01. It is not available for sale to the public. The bike has a gearbox, which replaces the standard derailleur found on most bikes.

Honda has hired several people to pilot the bike, among them Greg Minnaar. The team is known as Team G Cross Honda.

Rockets

[edit]

In 2019, Honda began development of rocket engines.[87] In June 2025, Honda successfully conducted a launch and landing test of an reusable launch vehicle in Taiki, Hokkaido.[88][89] Honda has stated that they aim to make a sub-orbital spaceflight in 2029.[90][91]

Former products

[edit]

Solar cells

[edit]

Honda's solar cell subsidiary company Honda Soltec (Headquarters: Kikuchi-gun, Kumamoto; President and CEO: Akio Kazusa) started sales throughout Japan of thin-film solar cells for public and industrial use on October 24, 2008, after selling solar cells for residential use in October 2007.[92] Honda announced in the end of October 2013 that Honda Soltec would cease business operations in the Spring of 2014 except for support for existing customers and the subsidiary would be dissolved.[93]

Motorsports

[edit]
Main article: Honda in motorsport
See also: Honda Racing Corporation and Honda Racing Corporation USA

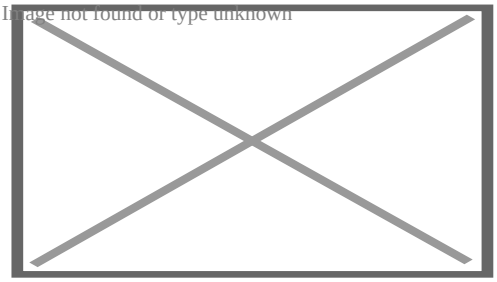
Honda has been active in motorsports, like Formula One, MotoGP and others, since the early years of the company. Since 2022, Honda's general motorsport activities have been managed by its motorsport subsidiary Honda Racing Corporation (HRC). Prior to 2022, Honda's motorcycle racing activities were run by HRC since it was founded in 1982, while its automobile racing activities were run as projects within the Honda Motor Company itself.[94]

Honda Performance Development (HPD) was established in 1993 as the company's North American motorsport subsidiary, and for 2024 HPD became Honda Racing Corporation USA (HRC US) to form a global motorsports organization.[95] Honda also owns two Japanese race tracks, the Suzuka Circuit and Mobility Resort Motegi (formerly Twin Ring Motegi), which it established in 1962 and 1997, respectively, and which are managed by Honda Mobilityland.

Automobiles

[edit]

See also: Honda in Formula One



Max Verstappen won the 2021 Formula One World Championship with a Honda power unit.

Honda entered Formula One for the first time in 1964, just one year after starting the production of road cars, making both engine and chassis. Honda achieved their first victory at the 1965 Mexican Grand Prix, and another win at the 1967 Italian Grand Prix, before they withdrew after the 1968 season. They returned to the sport in 1983 as an engine manufacturer, remaining until 1992. This period saw Honda dominate Grand Prix racing,[96] as between 1986 and 1991 they won five consecutive Drivers' Championships with Nelson Piquet, Ayrton Senna and Alain Prost, and six Constructors' titles with Williams and McLaren.[97] A third stint from 2000 to 2008, initially as engine maker and later also as team owner, yielded 17 podiums, including one win, and second place in the 2004 constructors' standings. They returned as a power unit supplier for the second year of the hybrid era in 2015 and initially struggled, but intense development saw them become race winners again by 2019, and in 2021 they won the World Drivers' Championship with Max Verstappen and Red Bull Racing.[98] Honda formally left Formula One after 2021 to focus its resources on carbon neutral technologies, but an arrangement was made for it to extend power unit supply for Red Bull until 2025.[99][100] While no longer a works team, RedBull Racing still displayed Honda on their engine cover in this extended deal. As the series introduced more sustainable regulations, Honda announced it will formally rejoin in 2026 to provide power units to Aston Martin as a works team.[101]

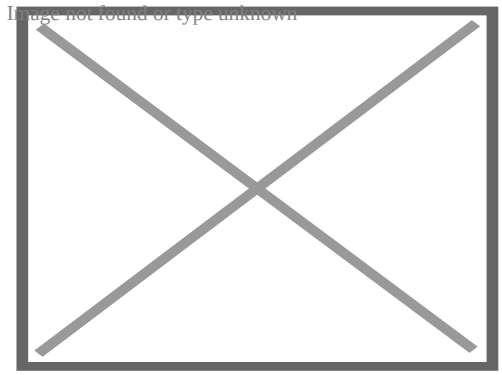
Honda debuted in the CART IndyCar World Series as an engine supplier in 1994, and the company won six consecutive Drivers' Championships and four Manufacturers' Championships between 1996 and 2001.[102] In 2003, Honda transferred its effort to the IRL IndyCar Series. In 2004, Honda won the Indianapolis 500 for the first time and claimed the Drivers' and Manufacturers' Championships, a feat which it repeated in 2005.[102] From 2006 to 2011, Honda was the series' lone manufacturer, before manufacturer competition returned for 2012. Since 2012, Honda's turbocharged V6 engines have won the Indianapolis 500 several times as well as claimed multiple Drivers' and Manufacturers' titles.[103] In the Japanese Super Formula Championship, Honda-powered cars have won the championship numerous times since 1981, with their title tally in the double digits. In Formula Two, Honda engines dominated the premier series in 1966 and scored multiple titles in the early 1980s.

In sports car racing, Honda won the 24 Hours of Le Mans in 1995 in the GT2 class,[104] and in 2010 and 2012 they won in the LMP2 category.[105] Honda made their factory debut in the Super GT Series (previously known as the All-Japan GT Championship) in 1997, and in 2000 they won their first championships.[106] Since then, they have won several further titles, uniquely with both mid- and front-engined cars.[106] Through their Acura and HPD divisions, Honda has also competed in sports prototype racing, beginning with the Spice-Acura prototypes that won the IMSA GT Lights championship in 1991, 1992 and 1993. Acura joined the American Le Mans Series in 2007 and won the 12 Hours of Sebring in class on their debut, before winning the championship in both the LMP1 and LMP2 classes in 2009. The cars were rebranded as HPDs for 2010, after which they won multiple titles in the ALMS and also won the FIA World Endurance Championship in the LMP2 class. Acura returned to prototype racing in 2018 in the DPi class of the IMSA SportsCar Championship, winning championship titles in 2019, 2020 and 2022 as well as the 24 Hours of Daytona overall in 2021, 2022, and 2023.[107] Honda's GT3 car won both the IMSA GTD and Super GT GT300 titles.[108][109]

During the Group A era of the Japanese Touring Car Championship, Honda won seven manufacturers' titles and six drivers' titles in the sub-1,600 cc division between 1986 and 1993.[110] The following Super Touring era of touring car racing saw Honda win the Japanese and North American championships in 1996 and 1997, while in Europe Honda's Super Touring cars claimed over 40 wins across the British, German and European series. After the collapse of the Super Touring regulations in the early 2000s, Honda remained involved in the British Touring Car Championship, where their cars would win multiple championships in the mid-2000s and throughout the 2010s. Honda entered the World Touring Car Championship in late 2012, and in 2013 they won the Manufacturers' World Championship. Honda's TCR car won the global TCR Model of the Year award in 2019, 2020, and 2024.[111]

Motorcycles

[edit]



Honda RC212V raced by Dani Pedrosa

HRC combines participation in motorcycle races throughout the world with the development of high-potential racing machines. Its racing activities are an important source for the creation of leading-edge technologies used in the development of Honda motorcycles. HRC also contributes to the advancement of motorcycle sports through a range of activities that include sales of production racing motorcycles, support for satellite teams, and rider education programs.

Soichiro Honda, being a race driver himself, could not stay out of international motorsport. In 1959, Honda entered five motorcycles into the Isle of Man TT race, the most prestigious motorcycle race in the world. While always having powerful engines, it took until 1961 for Honda to tune their chassis well enough to allow Mike Hailwood to claim their first Grand Prix victories in the 125 and 250 cc classes. Hailwood would later pick up their first Senior TT wins in 1966 and 1967. Honda's race bikes were known for their "sleek & stylish design" and exotic engine configurations, such as the 5-cylinder, 22,000 rpm, 125 cc bike and their 6-cylinder 250 cc and 297 cc bikes.

In 1979, Honda returned to Grand Prix motorcycle racing with the monocoque-framed, four-stroke NR500. The FIM rules limited engines to four cylinders, so the NR500 had non-circular, 'race-track', cylinders, each with 8 valves and two connecting rods, in order to provide sufficient valve area to compete with the dominant two-stroke racers. The experiment failed. For the 1982 season, Honda debuted its first two-stroke race bike, the NS500 and in 1983, Honda won their first 500 cc Grand Prix World Championship with Freddie Spencer. Since then, Honda has become a dominant marque in motorcycle Grand Prix racing, winning a plethora of top-level titles with riders such as Mick Doohan and Valentino Rossi. Honda also head the number of wins at the Isle of Man TT having notched up 227 victories in the solo classes and Sidecar TT,[112] including Ian Hutchinson's clean sweep at the 2010 races.[113]

The outright lap record on the Snaefell Mountain Course was held by Honda, set at the 2015 TT by John McGuinness at an average speed of 132.701 mph (213.562 km/h) on a Honda CBR1000RR,[114] bettered the next year by Michael Dunlop on a BMW S1000RR at 133.962 mph (215.591 km/h).[115]

In the Motocross World Championship, Honda has claimed seventeen world championships. In the World Enduro Championship, Honda has captured eight titles, most recently with Stefan Merriman in 2003 and with Mika Ahola from 2007 to 2010. In motorcycle trials, Honda has claimed three world championships with Belgian rider Eddy Lejeune.

Electric and alternative fuel vehicles

[edit]

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2009 Honda Civic GX hooked up to Phill refueling system

Compressed natural gas

[edit]

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Two clean vehicle versions of the Honda Civic.
Top: a Brazilian flexible-fuel vehicle.
Bottom: a US gasoline-electric hybrid.

The Honda Civic GX was for a long time the only purpose-built natural gas vehicle (NGV) commercially available in some parts of the US.[116][117] The Honda Civic GX first appeared in 1998 as a factory-modified Civic LX that had been designed to run exclusively on compressed natural gas. The car looks and drives just like a contemporary Honda Civic LX, but does not run on gasoline. In 2001, the Civic GX was rated the cleanest-burning internal combustion engine in the world by the US Environmental Protection Agency (EPA).[118][119]

First leased to the City of Los Angeles, in 2005, Honda started offering the GX directly to the public through factory trained dealers certified to service the GX. Before that, only fleets were eligible to purchase a new Civic GX. In 2006, the Civic GX was released in New York, making it the second state where the consumer is able to buy the car.[120]

In June 2015, Honda announced its decision to phase out the commercialization of natural-gas powered vehicles to focus on the development of a new generation of electric vehicles such as hybrids, plug-in electric cars and hydrogen-powered fuel cell vehicles. Since 2008, Honda has sold about 16,000 natural-gas vehicles, mainly to taxi and commercial fleets.[121]

Flexible-fuel

[edit]

Honda's Brazilian subsidiary launched flexible-fuel versions for the Honda Civic and Honda Fit in late 2006. As other Brazilian flex-fuel vehicles, these models run on any blend of hydrous ethanol (E100) and E20-E25 gasoline.[122][123] Initially, and in order to test the market preferences, the carmaker decided to produce a limited share of the vehicles with flex-fuel engines, 33 percent of the Civic production and 28 percent of the Fit models.[122][123] Also, the sale price for the flex-fuel version was higher than the respective gasoline versions, around US$1,000 premium for the Civic, and US$650 for the Fit, despite the fact that all other flex-fuel vehicles sold in Brazil had the same tag price as their gasoline versions.[123][124][125] In July 2009, Honda launched in the Brazilian market its third flexible-fuel car, the Honda City.[126]

During the last two months of 2006, both flex-fuel models sold 2,427 cars against 8,546 gasoline-powered automobiles,[127] jumping to 41,990 flex-fuel cars in 2007,[128] and reaching 93,361 in 2008.[129] Due to the success of the flex versions, by early 2009 a hundred percent of Honda's automobile production for the Brazilian market is now flexible-fuel, and only a small percentage of gasoline version is produced in Brazil for exports.[130]

In March 2009, Honda introduced the world's first flex-fuel motorcycle in the Brazilian market. Manufactured by its Brazilian subsidiary, Moto Honda da Amazônia, the CG 150 Titan Mix is priced at approximately US$2,700.[131][132][133]

Hybrid electric

[edit]

Image not found or type unknown

Honda CR-Z, the first sports coupe hybrid to come with a six-speed manual transmission

In late 1999, Honda launched the first commercial hybrid electric car sold in the US market, the Honda Insight, just one month before the introduction of the Toyota Prius, and initially sold for US$20,000.[134][135] The first-generation Insight was produced from 2000 to 2006 and had a fuel economy of 70 miles per US gallon (3.4 L/100 km; 84 mpg$_{?imp}$) for the EPA's highway rating, the most fuel-efficient mass-produced car at the time.[134][135] Total global sales for the Insight amounted to only around 18,000 vehicles.[135] Cumulative global sales reached 100,000 hybrids in 2005 and 200,000 in 2007.[136]

Honda introduced the second-generation Insight in Japan in February 2009, and released it in other markets through 2009 and in the US market in April 2009. At $19,800 as a five-door hatchback it will be the least expensive hybrid available in the US.[137]

Image not found or type unknown

2010 Honda Insight hybrid electric vehicle (second generation)

Since 2002, Honda has also been selling the Honda Civic Hybrid (2003 model) in the US market.[134] It was followed by the Honda Accord Hybrid, offered in model years 2005 through 2007. Sales of the Honda CR-Z began in Japan in February 2010, becoming Honda's third hybrid electric car in the market.[138] As of February 2011, Honda was producing around 200,000 hybrids a year in Japan.[139]

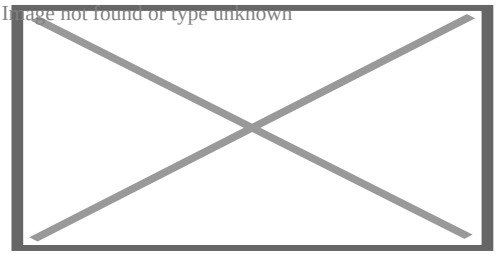
Sales of the Fit Hybrid began in Japan in October 2010, at the time, the lowest price for a gasoline-hybrid electric vehicle sold in the country.[140] The European version, called Honda Jazz Hybrid, was released in early 2011.[141] During 2011 Honda launched three hybrid models available only in Japan, the Fit Shuttle Hybrid, Freed Hybrid and Freed Spike Hybrid.[136]

Honda's cumulative global hybrid sales passed the 1 million unit milestone at the end of September 2012, 12 years and 11 months after sales of the first generation Insight began in

Japan November 1999.[136] A total of 187,851 hybrids were sold worldwide in 2013, and 158,696 hybrids during the first six months of 2014.[142][143] As of June 2014, Honda has sold more than 1.35 million hybrids worldwide.[136][142][143]

Hydrogen fuel cell

[edit]



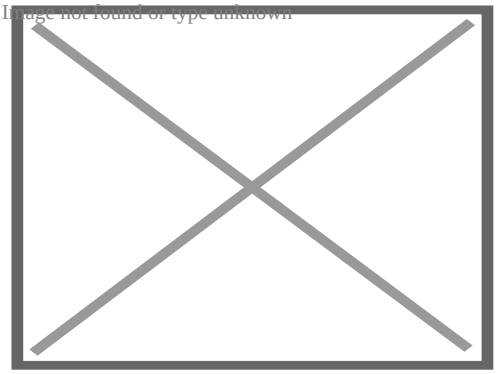
Honda FCX Clarity hydrogen fuel cell vehicle

In Takanezawa, Japan, on 16 June 2008, Honda Motors produced the first assembly-line FCX Clarity, a hybrid hydrogen fuel cell vehicle. More efficient than a gas-electric hybrid vehicle, the FCX Clarity combines hydrogen and oxygen from ordinary air to generate electricity for an electric motor. In July 2014 Honda announced the end of production of the Honda FCX Clarity for the 2015 model.[144] The vehicle itself does not emit any pollutants and its only by-products are heat and water. The FCX Clarity also has an advantage over gas-electric hybrids in that it does not use an internal combustion engine to propel itself. Like a gas-electric hybrid, it uses a lithium ion battery to assist the fuel cell during acceleration and capture energy through regenerative braking, thus improving fuel efficiency. The lack of hydrogen filling stations throughout developed countries will keep production volumes low.[145] Honda will release the vehicle in groups of 150. California is the only US market with infrastructure for fueling such a vehicle, though the number of stations is still limited. Building more stations is expensive, as the California Air Resources Board (CARB) granted $6.8 million for four H2 fueling stations, costing US$1.7 million each.[146][147][148] Honda views hydrogen fuel cell vehicles as the long-term replacement of piston cars, not battery cars.[149]

Honda introduced the CR-V e:FCEV in February 2024 in the US. It is a plug-in hybrid fuel cell version of the CR-V that is equipped with an electric motor, two high-pressure hydrogen tanks with a total capacity of 4.3 kg (9.5 lb) and a 17.7 kWh battery with plug-in charging capability.[106] It was also launched in Japan as the only version of the CR-V sold in the country, imported from the Marysville, Ohio assembly plant in the US. This model began production on 5 June 2024.[150] The later revealed to includes an H2 credit.[151]

Plug-in electric vehicles

[edit]



Honda Fit EV concept unveiled at the 2010 Los Angeles Auto Show

The all-electric Honda EV Plus was introduced in 1997 as a result of CARB's zero-emissions vehicle mandate and was available only for leasing in California. The EV plus was the first battery electric vehicle from a major automaker with non-lead–acid batteries The EV Plus had an all-electric range of 100 mi (160 km). Around 276 units were sold in the US and production ended in 1999.[152][153]

The all-electric Honda Fit EV was introduced in 2012 and has a range of 82 mi (132 km).[154] The all-electric car was launched in the US to retail customers in July 2012 with initial availability limited to California and Oregon.[155] Production is limited to only 1,100 units over the first three years. A total of 1,007 units have been leased in the US through September 2014.[156][157][158] The Fit EV was released in Japan through leasing to local government and corporate customers in August 2012. Availability in the Japanese market is limited to 200 units during its first two years.[159] In July 2014 Honda announced the end of production of the Fit EV for the 2015 model.[144]

The Honda Accord Plug-in Hybrid was introduced in 2013 and has an all-electric range of 13 mi (21 km)[160] Sales began in the US in January 2013 and the plug-in hybrid is available only in California and New York.[161] A total of 835 units have been sold in the US through September 2014.[156][157][158] The Accord PHEV was introduced in Japan in June 2013 and is available only for leasing, primarily to corporations and government agencies.[162]

The Honda e was launched in 2020 and has an electric range of 137 mi (220 km). It is an electric supermini that is retro styled, similar to the first-generation Honda Civic. Following this, the Honda e:Ny1 was launched in 2023, with an electric range of 256 mi (412 km) on the top spec model. It is Honda's first electric SUV.

In April 2022, Honda and General Motors announced a joint venture to develop low-cost electric vehicles based on GM's Ultium architecture in order to beat Tesla vehicles in sales.

In October 2023, the two companies announced that the joint venture has been cancelled due to slower-than-expected demand of electric vehicles and changing market conditions.[163] Although the upcoming Honda Prologue and Acura ZDX will use the Ultium architecture and will be manufactured by General Motors, future Honda electric vehicles will be designed solely by Honda and will be manufactured in Honda assembly plants.[164]

Batteries

[edit]

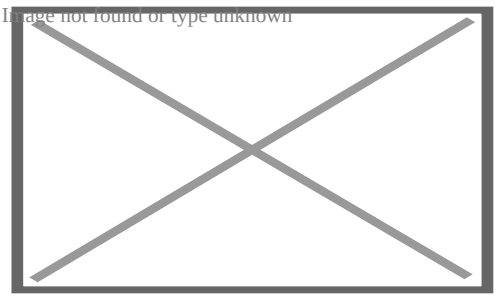
In August 2022, Honda and LG Energy Solution revealed a joint venture to establish a new lithium-ion battery factory in the United States, specifically for Honda and Acura electric vehicles. The initial goal was to produce 40 gigawatt hours of battery capacity.[165]

Marketing

[edit]

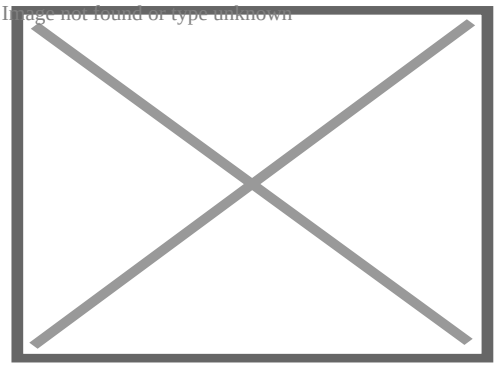
Japanese marketing

[edit]

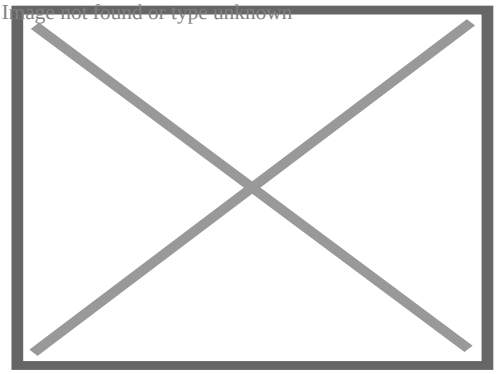


Honda Clio (Saitama, Japan)

Starting in 1978, Honda in Japan decided to diversify its sales distribution channels and created **Honda Verno**, which sold established products with a higher content of standard equipment and more sporting nature.[166][167] The establishment of *Honda Verno* coincided with its new sports compact, the Honda Prelude. Later, the Honda Vigor, Honda Ballade, and Honda Quint were added to *Honda Verno* stores. This approach was implemented due to efforts in place by rival Japanese automakers Toyota and Nissan.


Honda Primo (Osaka)

As sales progressed, Honda created two more sales channels, called **Honda Clio** in 1984, and **Honda Primo** in 1985. The *Honda Clio* chain sold products that were traditionally associated with Honda dealerships before 1978, like the Honda Accord, and *Honda Primo* sold the Honda Civic, kei cars such as the Honda Today, superminis like the Honda Capa, along with other Honda products, such as farm equipment, lawnmowers, portable generators, and marine equipment, plus motorcycles and scooters like the Honda Super Cub. A styling tradition was established when *Honda Primo* and *Clio* began operations in that all *Verno* products had the rear license plate installed in the rear bumper, while *Primo* and *Clio* products had the rear license plate installed on the trunk lid or rear door for minivans. The Renault Clio was sold in Japan at Nissan dealerships, but was renamed the Renault Lutecia.[168] Lutecia is derived from the name of *Lutetia*, an ancient Roman city that was the predecessor of Paris.


Honda Verno (2008)

As time progressed and sales began to diminish partly due to the collapse of the Japanese "bubble economy", "supermini" and "kei" vehicles that were specific to *Honda Primo* were "badge engineered" and sold at the other two sales channels, thereby providing smaller vehicles that sold better at both *Honda Verno* and *Honda Clio* locations. As of March 2006, the three sales chains were discontinued, with the establishment of *Honda Cars* dealerships.[169] While the network was disbanded, some Japanese Honda dealerships still use the network names, offering all Japanese market Honda cars at all locations.

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Honda Wing motorcycle dealership (Japan)

Honda sells genuine accessories through a separate retail chain called *Honda Access* for both their motorcycle, scooter, and automobile products. In cooperation with corporate group partner Pioneer, Honda sells an aftermarket line of audio and in-car navigation equipment that can be installed in any vehicle under the brand name Gathers, which is available at Honda Access locations as well as Japanese auto parts retailers, such as Autobacs. Buyers of used vehicles are directed to a specific Honda retail chain that sells only used vehicles called *Honda Auto Terrace*.

In the spring of 2012, Honda in Japan introduced *Honda Cars Small Store* which is devoted to compact cars like the Honda Fit, and *kei* vehicles like the Honda N-One and Honda S660 roadster.

All cars sold at Honda Verno

- Prelude, Integra, CR-X, Vigor, Saber, Ballade, Quint, Crossroad, Element, NSX, HR-V, Mobilio Spike, S2000, CR-V, That's, MDX, Rafaga, Capa, and the Torneo

All cars sold at Honda Clio

- Accord, Legend, Inspire, Avancier, S-MX, Lagreat, Stepwgn, Elysion, Stream, Odyssey (int'l), Domani, Concerto, Accord Tourer, Logo, Fit, Insight, That's, Mobilio, and the City

All cars sold at Honda Primo

- Civic, Life, Acty, Vamos, Hobio, Ascot, Ascot Innova, Torneo, Civic Ferio, Freed, Mobilio, Orthia, Capa, Today, Z, and the Beat

International marketing

[edit]

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A Honda dealership in Ontario, Canada

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A Honda dealership in Dreghorn, Scotland

In 2003, Honda released its *Cog* advertisement in the UK and on the Internet. To make the ad, the engineers at Honda constructed a Rube Goldberg Machine made entirely out of car parts from a Honda Accord Touring. To the chagrin of the engineers at Honda, all the parts were taken from two of only six hand-assembled pre-production models of the Accord. The advertisement depicted a single cog which sets off a chain of events that ends with the Honda Accord moving and Garrison Keillor speaking the tagline, "Isn't it nice when things just... work?" It took 100 takes to create the ad.[170]

Honda has done humor marketing such as its 1985 four-page "How to fit six Hondas in a two-car garage" print ad[171] or "descending so low in a parking garage, they pass stalagmites and a Gollum-like figure."[172]

In 2004, they produced the *Grrr* advert, usually immediately followed by a shortened version of the 2005 *Impossible Dream* advert. In December 2005, Honda released *The Impossible Dream* a two-minute panoramic advertisement filmed in New Zealand, Japan, and Argentina which illustrates the founder's dream to build performance vehicles. While singing the song "Impossible Dream", a man reaches for his racing helmet, leaves his trailer on a minibike, then rides a succession of vintage Honda vehicles: a motorcycle, then a car, then a powerboat, then goes over a waterfall only to reappear piloting a hot air balloon, with Garrison Keillor saying "I couldn't have put it better myself" as the song ends. The song is from the 1960s musical *Man of La Mancha*, sung by Andy Williams.

In 2006, Honda released its *Choir* advertisement, for the UK and the internet. This had a 60-person choir who sang the car noises as the film of the Honda Civic is shown.

In the mid to late 2000s in the United States, during model close-out sales for the current year before the start of the new model year, Honda's advertising has had an animated character known simply as Mr. Opportunity, voiced by Rob Paulsen. The casual-looking man talked about various deals offered by Honda and ended with the phrase "I'm Mr. Opportunity, and I'm knockin' ", followed by him "knocking" on the television screen or "thumping" the speaker at the end of radio ads. In addition, commercials for Honda's international hatchback, the Jazz, are parodies of well-known pop culture images such as *Tetris* and Thomas the Tank Engine.

In late 2006, Honda released an ad with ASIMO exploring a museum, looking at the exhibits with almost childlike wonderment (spreading out its arms in the aerospace exhibit, waving hello to an astronaut suit that resembles him, etc.), while Garrison Keillor ruminates on progress. It concludes with the tagline: "More forwards please". Honda also sponsored ITV's coverage of Formula One in the UK for 2007. However, they had announced that they would not continue in 2008 due to the sponsorship price requested by ITV being too high.

In May 2007, focuses on their strengths in racing and the use of the Red H badge – a symbol of what is termed as "Hondamentalism". The campaign highlights the lengths that Honda engineers go to in order to get the most out of an engine, whether it is for bikes, cars, powerboats – even lawnmowers. Honda released its Hondamentalism campaign. In the TV spot, Garrison Keillor says, "An engineer once said to build something great is like swimming in honey", while Honda engineers in white suits walk and run towards a great light, battling strong winds and flying debris, holding on to anything that will keep them from being blown away. Finally one of the engineers walks towards a red light, his hand outstretched. A web address is shown for the Hondamentalism website. The digital campaign aims to show how visitors to the site share many of the Hondamentalist characteristics.

At the beginning of 2008, Honda released – the *Problem Playground*. The advert outlines Honda's environmental responsibility, demonstrating a hybrid engine, more efficient solar panels, and the FCX Clarity, a hydrogen-powered car. The 90-second advert has large-scale puzzles, involving Rubik's Cubes, large shapes, and a 3-dimensional puzzle. On 29 May 2008, Honda, in partnership with Channel 4, broadcast a live advertisement. It showed skydivers jumping from an airplane over Spain and forming the letters H, O, N, D, and A in mid-air. This live advertisement is generally agreed to be the first of its kind on British television. The ad lasted three minutes.[173]

In 2009, American Honda released the *Dream the Impossible* documentary series, a collection of 5- to 8-minute web vignettes that focus on the core philosophies of Honda. Current short films include *Failure: The Secret to Success*, *Kick Out the Ladder* and *Mobility 2088*. They have Honda employees as well as Danica Patrick, Christopher Guest, Ben Bova, Chee Pearlman, Joe Johnston and Orson Scott Card. The film series plays at dreams.honda.com. In the UK, national television ads feature voice-overs from American radio host Garrison Keillor, while in the US the voice of Honda commercials is actor and wrestler John Cena.

In the North American market, Honda starts all of its commercials with a two-tone jingle since the mid-2010s.

Sports

[edit]

Ayrton Senna, the late F1 driver, once remarked that Honda played a pivotal role in his three world championships. He held deep respect for the company's founder, Soichiro Honda, and maintained a strong relationship with Nobuhiko Kawamoto, the chairman of Honda at the time. Senna even referred to Honda as "the greatest company in the world."[174]

As part of its marketing campaign, Honda is an official partner and sponsor of the North American National Hockey League, the Anaheim Ducks of the NHL, and the arena named after it: Honda Center. Honda also sponsored The Honda Classic golf tournament in the United States until 2023 and is a sponsor of the United States Major League Soccer. The "Honda Player of the Year" award is presented in United States soccer. The "Honda Sports Award" is given to the best female athlete in each of twelve college sports in the United States. One of the twelve Honda Sports Award winners is chosen to receive the Honda-Broderick Cup, as "Collegiate Woman Athlete of the Year".

Honda sponsored La Liga club Valencia CF starting from 2014–15 season.[175]

Honda has been a presenting sponsor of the Los Angeles Marathon since 2010 in a three-year sponsorship deal, with winners of the LA Marathon receiving a free Honda Accord. Since 1989, the Honda Campus All-Star Challenge has been a quiz bowl tournament for Historically black colleges and universities.

Facilities (partial list)

[edit]
Main article: List of Honda facilities

Sales

[edit]

Calendar year	Total US sales[176]
1992	768,845
1993	716,546
1994	788,230
1995	794,579

1996	843,928
1997	940,386
1998	1,009,600
1999	1,076,893
2000	1,158,860
2001	1,207,639
2002	1,247,834
2003	1,349,847
2004	1,394,398
2005	1,462,472
2006	1,509,358
2007	1,551,542[177]
2008	1,284,261[177]
2009	1,150,784[178]
2010	1,230,480[178]
2011	1,147,000[179]
2012	1,422,000[179]
2013	1,525,312[180]
2014	1,540,872
2015	1,586,551[181]
2016	1,637,942[182]
2017	1,641,429[183]
2018	1,604,828[184]
2019	1,608,170[184]

Production numbers

[edit]

For automobiles:

Calendar year	Global production
2009	3,012,000[185]
2010	3,643,000[185]
2011	2,909,000[179]
2012	4,110,000[179]
2013	4,112,000[186]
2014	4,513,769[187]
2015	4,543,838[188]

2016	4,999,266[189]
2017	5,236,842[190]
2018	5,357,013[191]

See also

[edit]

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- Comparison of Honda water-pumps
- Honda advanced technology
- Honda Airport
- Honda Battle of the Bands
- Honda G-Con
- Honda F.C., football (soccer) club
- Honda Heat, rugby union club
- Honda in motorsport
- Honda Racing Corporation USA
- Honda Type R
- List of Honda assembly plants
- List of Honda transmissions
- List of motor scooter manufacturers and brands

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Honda Motor Company

Divisions and subsidiaries	○ Acura
	○ American Honda
	  ○ Honda Aero
	  ○ Honda Marine
	○ Honda Australia
	○ Honda Canada
	  ○ Canada Manufacturing
	○ Honda Aircraft
	○ Honda Mobilityland
	  ○ Suzuka Circuit
	  ○ Mobility Resort Motegi
	○ Honda Performance Development
	○ Honda India
	  ○ Motorcycles
	○ Honda Mexico
	○ Honda Racing
	○ Honda Racing F1
	○ Honda Taiwan
	○ Honda UK

Joint ventures and shareholdings	○ Astra Honda Motor (50%)
	○ Dongfeng Honda (50%)
	  ○ Lingxi
	○ GE Honda Aero Engines (50%)
	○ GAC Honda (50%)
	  ○ Everus
	○ Hitachi Astemo (33.4%)
	  ○ Keihin
	  ○ Nissin
	  ○ Showa
	○ Honda China (65%)
	○ Honda Prospect Motor (51%)
	○ Sony Honda Mobility (50%)

Cars	○ Accord/Inspire
	○ Amaze
	○ Brio
	○ City/Ballade
	○ Civic
	  ○ Civic Type R
	  ○ Integra
	○ Crider/Envix
	○ Fit/Jazz/Life
	○ GT
	○ Prelude

Pickup trucks	○ Ridgeline
Crossovers/SUVs	○ Avancier/UR-V ○ BR-V ○ CR-V/Breeze ○ e:NP2/e:NS2 ○ Elevate/WR-V ○ HR-V/Vezel/XR-V ○ e:NS1/e:NP1/e:Ny1 ○ P7/S7 ○ Passport ○ Pilot ○ Prologue ○ WR-V ○ ZR-V/HR-V
Vans	○ Freed ○ Odyssey/Elysion ○ Odyssey (North America) ○ Stepwgn
Kei cars	○ N-Box ○ N-One ○ N-Van ○ N-WGN
	○ 1300 ○ Airwave ○ Ascot ○ Ballade

Concept

- 0 Saloon
- 0 SUV
- Project 2&4
- Argento Vivo
- CR-Z Concept
- CR-Z Concept 2009
- Dualnote
- EV-N
- FC Sport
- FCEV Concept
- 1999 FCX Concepts
- 2006 FCX concept
- HP-X
- HSC
- J-VX
- N7X
- New Small Concept
- OSM
- Quilt
- Remix
- Small RS
- Spocket
- Sports EV
- SUT Concept
- SUV e: Prototype
- SUV RS
- U-3X
- Urban EV
- WIC
- WOW
- Zero

	Motorcycles	○ CB series ○ CBF series ○ CBR series ○ CG125 ○ CJ series ○ CL series ○ CM/CMX series ○ CR series ○ CRF series ○ CTX series ○ CX series ○ DN-01 ○ Fury ○ GL series ○ NC700 series ○ NR series ○ NSR series ○ RC series ○ ST series ○ VF/VFR series ○ VT series ○ VTX series ○ XR/XL series ○ XRE300 ○ Transalp ○ Africa Twin ○ Deauville ○ Bros/HawkGT ○ NX250 ○ Pacific Coast ○ TL Series (Reflex) ○ Valkyrie ○ X4
Bikes		
	Scooters	○ Activa ○ Aero ○ Big Ruckus ○ Dio ○ Elite ○ EM1 ○ Express ○ Helix ○ Juno ○ CHF50 ○ Motocompo

Engines

- A-series
- B-series
- B20A
- C-series
- CVCC
- D-series
- E-series
- E07A
- F-series
- F20C
- G-series
- H-series
- J-series
- JNC1
- K-series
- L-series
- Circle L Diesel
- N-series Diesel
- P-engine
- R-series
- VTEC
- I-DSi
- HI3R
- HI4R
- HI5R
- HI6R
- HI7R
- HI8R
- HI9R
- HI10R
- HI11R
- HI12RT
- HI13RT
- HI14TT
- HI15TT
- HI16TT
- HI17TT
- HI18TT
- HR09E
- HR10EG
- HR-414E
- HR-417E
- HR-420E
- HR28TT
- HR35TT
- AR24e

Robots	○ Honda E series ○ Honda P series ○ ASIMO
People	○ Soichiro Honda ○ Takeo Fujisawa ○ Tadashi Kume ○ Shoichiro Irimajiri ○ Nobuhiko Kawamoto ○ Takeo Fukui ○ Tadao Baba ○ Takahiro Hachigo ○ Kenichi Nagahiro

Other	○ List of Honda vehicles
	  ○ automobiles
	  ○ motorcycles
	○ Honda Type R
	○ Honda Collection Hall
	○ Honda FC
	○ Mugen Motorsports
	○ Internavi
	○ Super Aguri F1 Team
	○ Takuma Sato
	○ Gil de Ferran
	○ Jenson Button
	○ *Geier v. American Honda Motor Co.*
	○ *Honda Motor Co. v. Oberg*
	○ Honda Malaysia Racing Team

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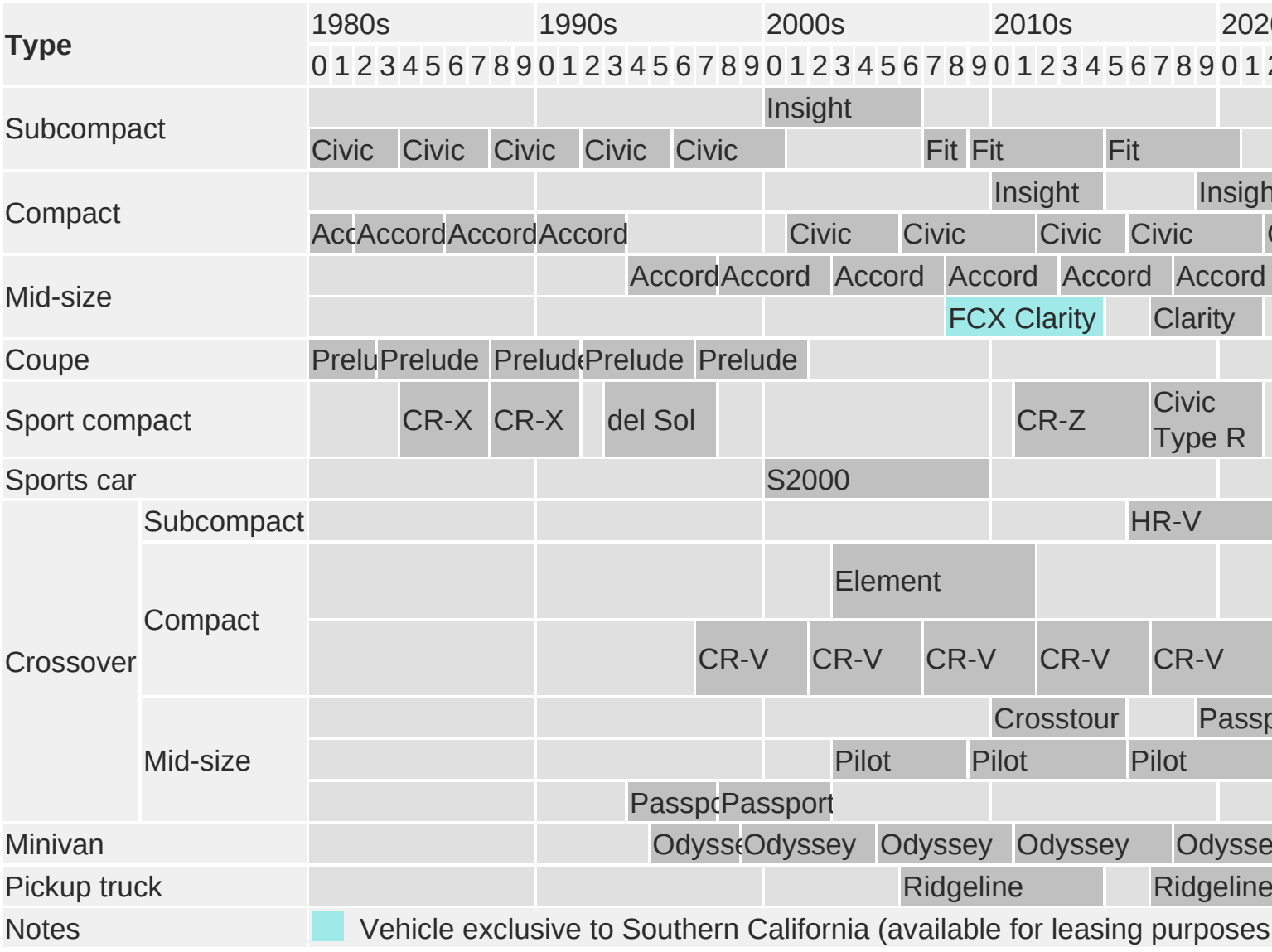

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Honda motorcycle timeline, 1970s (street) - next »

- Honda
- List of Honda motorcycles

Type	1970s									
	0	1	2	3	4	5	6	7	8	9
Scrambler	CL175				CL200					
	CL350				CL360					
	CL450									
Standard	CB100									
		CB125S								
	CB175			CB200					CM185 Twinstar	
					CB250					
	CB350				CB360			CB400T		
										CM400
			CB350F			CB400F				
	CB450				CB500T					
		CB500 Four			CB550					CB650
									CX500	
	CB750									
Sport										CB900F
									CBX	
Touring						GL1000 Gold Wing				
MotoGP										

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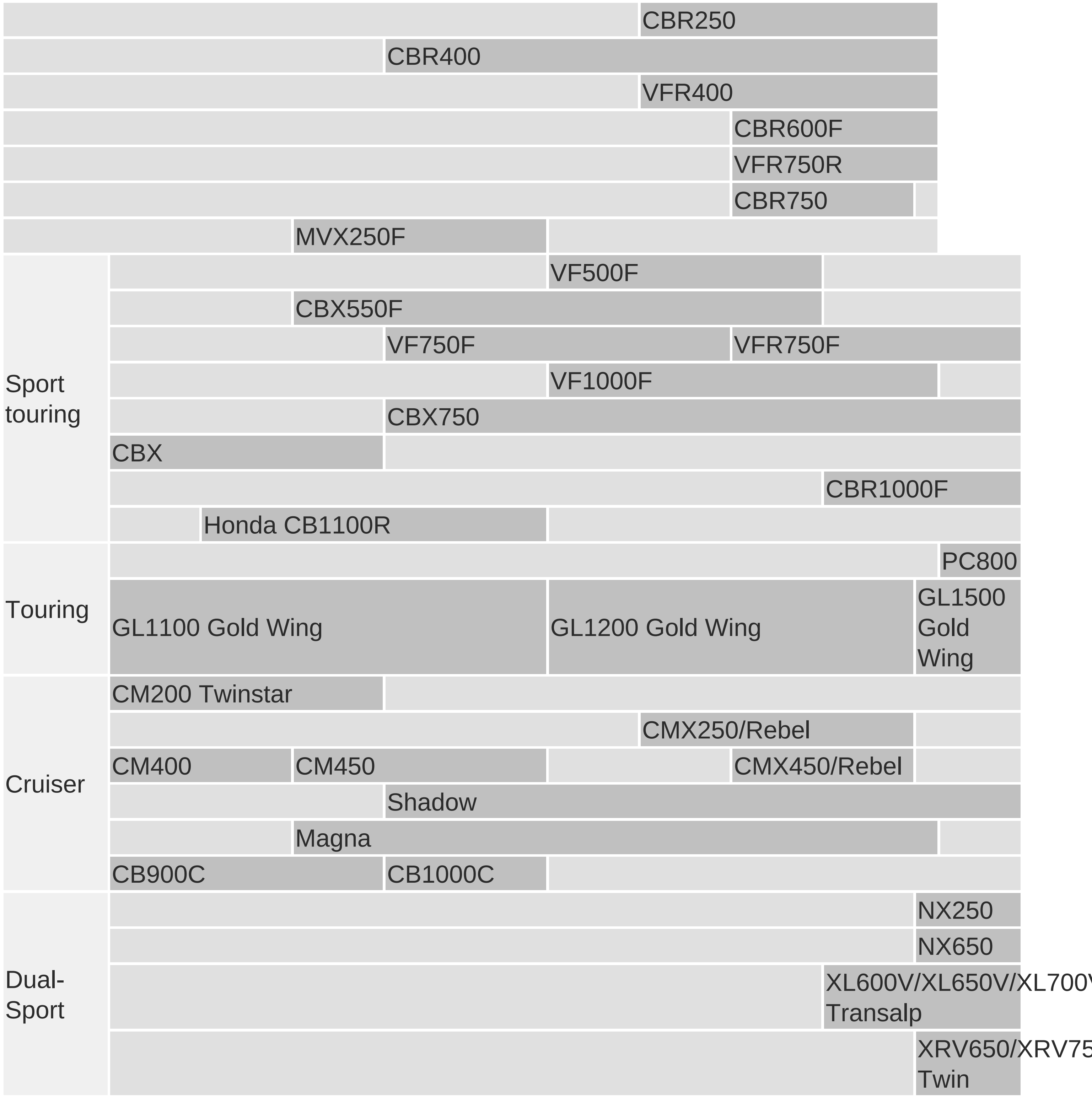
« previous - Honda motorcycle timeline, 1980s (street) - next »

- Honda
- List of Honda motorcycles
- Honda Racing Corporation

Type	1980s									
	0	1	2	3	4	5	6	7	8	9
Standard	CG125									
			CD125 Benly							
			CB125 Super Dream							
	CB250N		CB250 Nighthawk							
	CB250RS									
			VT250-FII				VTR250 Interceptor			VT250 Spada
		CBX400F								CB-1
	CB400N Super Dream									
	CB400T		CB450SC/Nighthawk							
			VF400F							
	CX500/GL500			CX650/GL650						
			Honda_Ascot_(motorcycle)							
						XBR500				GB500
										Honda NT650
			CB550SC/Nighthawk							
	CB650 / CB650C									
			CB650SC/Nighthawk							
					CB700SC/Nighthawk					
	CB750SC/Nighthawk									
	CB750 C,F,K,SC									
	CB900F									
				CB1100F	Sabre					
Sport										NSR125



CBR250
CBR400
VFR400
CBR600F
VFR750R
CBR750
MVX250F
Sport touring
VF500F
CBX550F
VF750F
VFR750F
VF1000F
CBX750
CBX
CBR1000F
Honda CB1100R
Touring
PC800
GL1100 Gold Wing
GL1200 Gold Wing
GL1500 Gold Wing
Cruiser
CM200 Twinstar
CMX250/Rebel
CM400
CM450
CMX450/Rebel
Shadow
Magna
CB900C
CB1000C
Dual-Sport
NX250
NX650
Transalp
Twin

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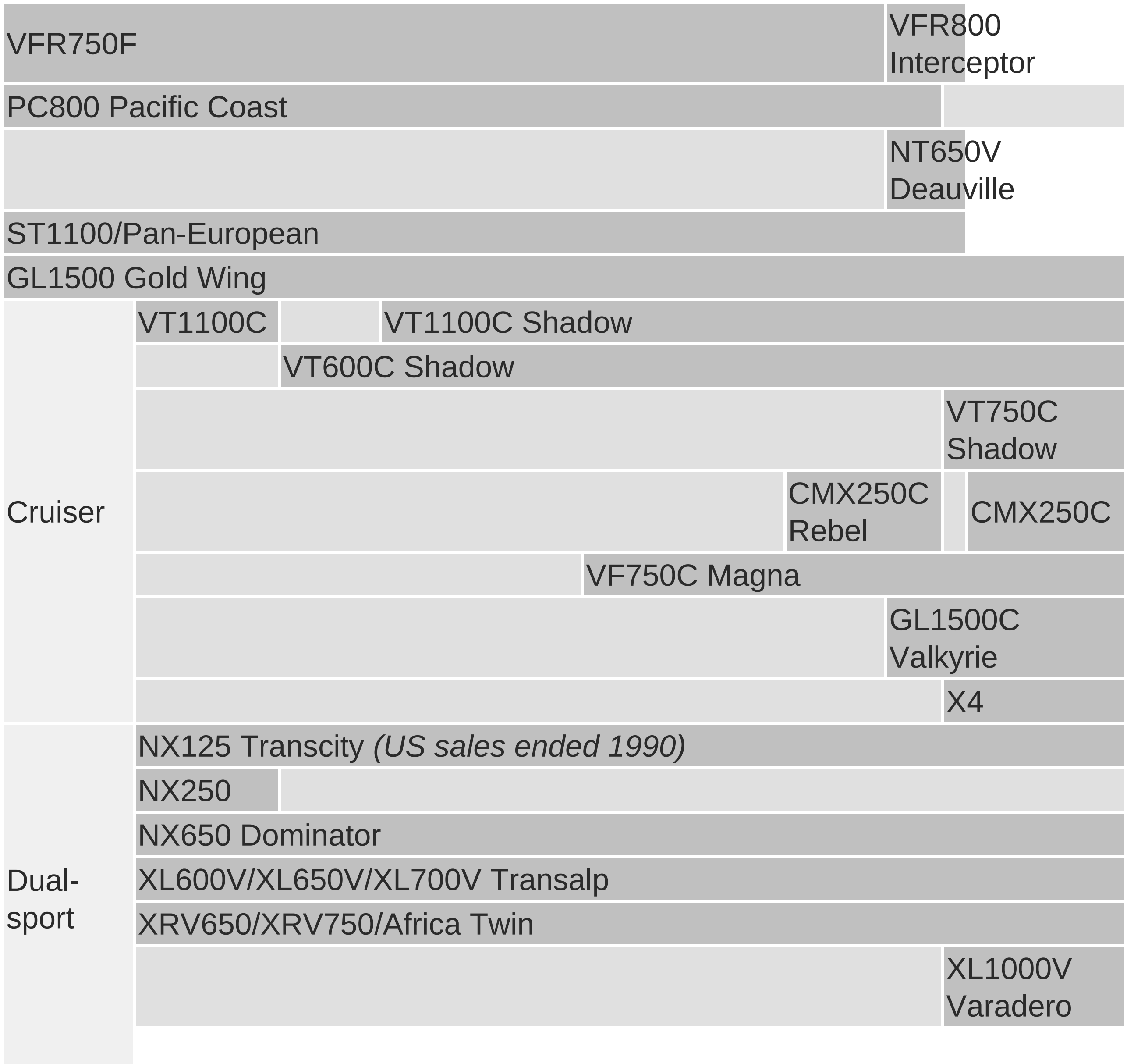
« previous - Honda motorcycle timeline, 1990s (street) - next »

- Honda
- List of Honda motorcycles
- Honda Racing Corporation
- Repsol Honda

Type	1990s									
	0	1	2	3	4	5	6	7	8	9
Standard	CG125									
	VTR250 *(US)*							VTR250 *(Asia-Pacific)*		
	GB500				CB500 twin					
			Nighthawk 250							
		Nighthawk 750								
		CB250F Jade					CB250F Hornet			
	CB-1/CB400F		CB400SF							
	NT650 Hawk								CB600F Hornet, 599	
			CB1000SF							CB1300SF
Sport	NSR125									
	CBR250									
	CBR400RR									
					RVF400					
	CBR600F	CBR600F2				CBR600F3				CBR600F4
					RVF750					
				CBR900RR Fireblade						
								VTR1000F Superhawk		
	CBR1000F Hurricane							CBR1100XX Super Blackbird		
Touring	CBX750									


VFR750F
VFR800 Interceptor
PC800 Pacific Coast
NT650V Deauville
ST1100/Pan-European
GL1500 Gold Wing
Cruiser
VT1100C
VT1100C Shadow
VT600C Shadow
VT750C Shadow
CMX250C Rebel
CMX250C
VF750C Magna
GL1500C Valkyrie
X4
Dual-sport
NX125 Transcity (US sales ended 1990)
NX250
NX650 Dominator
XL600V/XL650V/XL700V Transalp
XRV650/XRV750/Africa Twin
XL1000V Varadero

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« previous - Honda motorcycle timeline, 2010s–present

- Honda
- List of Honda motorcycles
- Honda Racing Corporation
- Repsol Honda

Type	2010s										2020s	
	0	1	2	3	4	5	6	7	8	9	0	1
Standard/ Naked bike	CG125											
	CBF125					CB125F						
							Grom (MSX125)					
										Monkey		
									CB125R			
				Verza 150					CB150 Verza			
	MegaPro 150											
				CB150R Streetfire								
								CB150R (Thailand)				
	Tiger GL200											
					CB250F				CB250R			
	VTR250FI											
						CB300F			CB300R			
				CB400F								
	CB400SF											
				CB500F								
	CB600F Hornet, 599				CB650F					CB650R		
	CBF600											
			NC700S									
	CB1000R								CB1000R			
	CBF1000F											
	CB1100											
	CB1300SF											
Cruiser/ Chopper	CMX250C Rebel							CMX250 Rebel				

CMX300 Rebel
CMX500 Rebel
CMX1100 Rebel
NM4 Vultus
NSA700A DN-01
VT750C/VT750DC/VT750RS Shadow
VT1300CX Fury
VT1300CS Sabre
VT1300CR Stateline
VT1300CT Interstate
F6C Valkyrie

Sport

CBR125R
CBR150R
CBR250R
CBR250RR
CBR300R
CBR400R
CBR500R
CBR600F CBR650F CBR650R
CBR600RR
CBR1000RR Fireblade
RC213V-S

Touring/ Sport touring

NT700V Deauville
VFR800 Interceptor
NT1100
VFR1200F
ST1300 Pan-European CTX1300
GL1800 Gold Wing GL1800 Gold Wing

Dual-sport/

XL125V Varadero
CRF150L
CRF230X/CRF CRF250X/CRF250L
CRF450X
CRF450L
CB500X
XR650L
NC700X

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Japan Automotive industry in Japan

- Automotive industry
- Economy of Japan
- Transport in Japan

Vehicle producers	**Native manufacturers**	○ Aspark
		○ ASL
		○ Duesen Bayern
		○ GLM
		○ Honda
		  ○ Acura
		  ○ *Marusho*
		○ Isuzu
		  ○ UD Trucks
		○ Jiotto
		○ Kawasaki
		  ○ Kawasaki Motors
		○ Mazda
		  ○ *Amati*
		  ○ *Autozam*
		  ○ *?fini*
		  ○ *Eunos*
		  ○ *M2*
		  ○ *Xedos*
		○ Mitsubishi
		  ○ Mitsubishi Heavy Industries
		  ○ Mitsubishi Motors (66%)
		  ○ Mitsubishi Fuso (10.71%)
		○ Mitsuoka
		○ Nissan
		  ○ *Cony*
		  ○ *Datsun*
		  ○ Infiniti
		  ○ *Kurogane*
		  ○ *Ohta*
		  ○ *Otomo*
		  ○ *Prince*
		  ○ Shatai
		  ○ *Tama*
		○ Sony Honda Mobility
		○ Subaru Corporation
		  ○ *Blitzen*
		  ○ Subaru
		○ Suzuki
		  ○ *Hope*
		○ Takeoka
		○ Toyota
		  ○ Daihatsu
		  ○ *Scion*
		  ○ Lexus

Related topics	○ Japan Automobile Manufacturers Association ○ Tokyo Motor Show ○ Tokyo Auto Salon ○ Used vehicle exporting ○ National Highway ○ Expressways ○ Kei car/Kei truck

○ *Note*: Defunct companies and marques above are shown in *italics*

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Major and notable Japanese motorcycle marques

Current	○ Honda ○ Kawasaki ○ Suzuki ○ Yamaha

- Abe (1928~31)
- Abe Star (1930~59)
- ACE
- Aero
- Aikoku
- Aichi Kikai
- Aioi (c.1950s)
- Aisan (c. 1950)
- Aiwa Motor
- Akebono (1953)
- Akitsu (c.1950s)
- All Nations (c.1950s)
- Amano (c.1950s)
- Asahi
- BF Motor
- BIM
- Blue Bird
- BM
- Bridgestone
- Brother
- Cabton
- Center
- Chiyoda
- Daihatsu

Defunct

- Fuji
- Fujitsubo
- Giant
- Hirano
- Hodaka
- Hosk
- Hyogo
- Iwasaki
- Kurogane
- Kyoho
- Lilac
- Marusho
- Mazda
- Meguro
- Mitsubishi
- Miyata
- Mizushima
- NS
- New Era
- Nisshin
- Rikuo
- Shin Meiwa
- Showa Fujiya

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TOPIX 100 companies of Japan

Core 30

- Astellas
- Daiichi Sankyo
- Daikin
- FANUC
- Hitachi
- Honda
- Hoya
- Itochu
- KDDI
- Keyence
- Mitsubishi Corporation
- Mitsui & Co
- Mizuho
- MUFG
- Murata
- Nidec
- Nintendo
- NTT
- Recruit
- Seven & i Holdings
- Shin-Etsu
- SMC
- SoftBank
- SoftBank Group
- Sony Group
- Sumitomo Mitsui Financial
- Takeda
- Tokio Marine
- Tokyo Electron
- Toyota

Large 70	○ ÆON ○ Ajinomoto ○ ANA ○ Asahi Group Holdings ○ Asahi Kasei ○ Bandai Namco Holdings ○ Bridgestone ○ Canon ○ Chugai Pharmaceutical ○ Dai-ichi Life ○ Daiwa House ○ Denso ○ Eisai ○ ENEOS ○ Fast Retailing ○ Fujifilm ○ Fujitsu ○ Japan Exchange Group ○ Japan Post Holdings ○ JR Central ○ JR East ○ JR West ○ JT ○ Kao ○ Kirin ○ Komatsu ○ Kubota ○ Kyocera ○ Lasertec ○ M3.com ○ Marubeni ○ Mitsubishi Chemical ○ Mitsubishi Electric ○ Mitsubishi Estate ○ Mitsubishi Heavy Industries ○ Mitsui Fudosan ○ MS&AD ○ Nippon Steel ○ Nippon Yusen ○ Nissan ○ Nitori ○ Nomura ○ Olympus ○ Omron ○ Ono Pharmaceutical ○ Oriental Land ○ Orix

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Nikkei 225 companies of Japan

- 7&i
- Advantest
- ÆON
- AGC
- Ajinomoto
- Alps
- ANA
- Amada
- Aozora Bank
- Asahi Breweries
- Asahi Kasei
- Astellas
- Bandai Namco Holdings
- Bridgestone
- Canon
- Casio
- Chiba Bank
- Chuden
- Chugai
- Citizen Holdings
- Comsys
- CyberAgent
- Concordia Financial
- Credit Saison
- Dai-ichi Life
- Daiichi Sankyo
- Daikin
- Daiwa House
- Daiwa Securities
- Denka
- DeNA
- Denso
- Dentsu
- Disco
- DNP
- Dowa
- Ebara
- Eisai
- ENEOS
- Fanuc
- Fast Retailing
- Fuji Electric
- Fujifilm
- Fujikura
- Fujitsu
- Fukuoka Financial
- Furukawa Electric

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DJSI World companies

Americas

- Abbott Laboratories
- AbbVie
- Adobe
- Agilent Technologies
- Alphabet
- American Airlines Group
- Autodesk
- Banco Bradesco
- Banco do Brasil
- Bancolombia
- Biogen
- Canadian National
- CPKC
- Cisco
- Companhia Energética de Minas Gerais - CEMIG
- Cummins
- CVS Health Corporation
- DaVita
- Dow
- eBay
- Ecolab
- Edwards Lifesciences Corporation
- Elevance Health
- Palabella
- Fortinet
- General Mills
- Gilead Sciences
- Grupo Argos
- Grupo Sura
- Grupo Nutresa
- Healthpeak Properties
- Hess Corporation
- Hilton Worldwide
- Host Hotels & Resorts
- HP
- Illumina, Inc.
- Ingersoll Rand
- Itaú Unibanco
- Itaúsa
- Jacobs Solutions
- Kinross Gold Corporation
- Klabin
- Las Vegas Sands
- Lockheed Martin
- Lojas Renner
- Medtronic
- Microsoft

- Aberdeen Group
- Acciona
- AENA
- Allianz
- Alstom
- Amadeus IT Group
- Anglo American plc
- Arkema
- ASML Holding
- ASR Nederland
- Assicurazioni Generali S.p.A.
- Aviva
- Axa
- Banco Bilbao Vizcaya Argentaria
- Banco Santander
- Bankinter
- Billerud
- bioMérieux
- BNP Paribas SA
- Bureau Veritas
- CaixaBank
- Carrefour SA
- Castellum
- CNH Industrial
- Coca-Cola HBC
- Covivio
- Dassault Systèmes
- Deutsche Börse
- Deutsche Post
- Deutsche Telekom
- Diageo
- EDP Group
- Enagás
- Endesa
- Enel SpA
- Engie
- EQT
- Exxaro
- Ferrovial
- Galp Energia
- GEA Group
- Gold Fields
- Grifols
- GSK
- H&M
- Hera Group
- Hochtief

- Advanced Info Service
- Advantech Co
- Airports of Thailand Public Company Limited
- Ajinomoto Co., Inc.
- ANA Holdings
- ANZ Bank
- ASE Group
- Bangkok Dusit Medical Services
- Brambles Limited
- Bridgestone
- CapitaLand
- Cathay United Bank
- Central Pattana
- Central Retail Corporation
- Chailease Holding Company
- Chang Hwa Bank
- KGI Financial Holding
- Chugai Pharmaceutical Co.
- Chunghwa Telecom Co., Ltd.
- CP All
- CTBC Financial Holding
- Delta Electronics (Thailand) Public Company Limited
- Delta Electronics, Inc.
- Dentsu
- Dexus
- Doosan Enerbility
- Dr. Reddy's Laboratories Limited
- E Ink
- E.SUN Commercial Bank
- Far EasTone
- First Financial
- Fortescue (company)
- Fubon Financial Holding Co., Ltd.
- Fujitsu
- GPT Group
- Hana Financial Group Inc.
- Hindalco Industries
- Honda
- Hyundai Engineering & Construction
- Hyundai Glovis
- Hyundai Mobis
- Hyundai Motor Company
- Hyundai Steel
- Indorama Ventures Public Company Limited
- InnoLux Corporation
- ITOCHU Corporation
- JD.com

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500cc/MotoGP World Constructors' Champions

1949	AJS	1960	MV Agusta	19
1950	Norton	1961	MV Agusta	19
1951	Norton	1962	MV Agusta	19
1952	Gilera	1963	MV Agusta	19
1953	Gilera	1964	MV Agusta	19
1954	Gilera*	1965	MV Agusta	19
1955	Gilera	1966	Honda	19
1956	MV Agusta	1967	MV Agusta	19
1957	Gilera	1968	MV Agusta	19
1958	MV Agusta	1969	MV Agusta	19
1959	MV Agusta			

* Championship not officially recognized

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250cc/Moto2 World Constructors' Champions

1949	Moto Guzzi	1960	MV Agusta	19
1950	Benelli	1961	Honda	19
1951	Moto Guzzi	1962	Honda	19
1952	Moto Guzzi	1963	Honda	19
1953	NSU	1964	Yamaha	19
1954	NSU*	1965	Yamaha	19
1955	MV Agusta	1966	Honda	19
1956	MV Agusta	1967	Honda	19
1957	Mondial	1968	Yamaha	19
1958	MV Agusta	1969	Benelli	19
1959	MV Agusta			

* Championship not officially recognized

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125cc/Moto3 World Constructors' Champions

1949	Mondial	1960	MV Agusta	19
1950	Mondial	1961	Honda	19
1951	Mondial	1962	Honda	19
1952	MV Agusta	1963	Suzuki	19
1953	MV Agusta	1964	Honda	19
1954	NSU*	1965	Suzuki	19
1955	MV Agusta	1966	Honda	19
1956	MV Agusta	1967	Yamaha	19
1957	Mondial	1968	Yamaha	19
1958	MV Agusta	1969	Kawasaki	19
1959	MV Agusta			

* Championship not officially recognized

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International	ISNI
National	Germany United States Japan Czech Republic Israel
Other	MusicBrainz label Yale LUX

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Driving Directions in Will County

polaris atv ultimate series- ready pack

41.608177048358, -87.952142513859
Starting Point
Shorewood Home & Auto (Formerly Circle Tractor), 13639 W 159th St, Homer Glen, IL 60491, USA
Destination
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used atv mowers for sale

41.606342917118, -87.909382977642
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atv for sale illinois

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atv push mower

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atv illinois for sale

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ATV Repair

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honda atv dealers in illinois

41.589248669717, -88.005034547215
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atv stores in illinois

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used atv mowers for sale

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87.9510205!16s%2F
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87.97398929193,25.2z/data=!4m6!3m5!1s0x880e41f2e579f223:0xe5c5c23b2b8dc77a!8m2!3d41.598588!4d-
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87.9510205!16s%2F
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87.9510205!16s%2F
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87.9510205!16s%2F
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87.9510205!16s%2F
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87.913026040309,25.2z/data=!4m6!3m5!1s0x880e41f2e579f223:0xe5c5c23b2b8dc77a!8m2!3d41.598588!4
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+ready+pack
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88.017102969337&destination=Shorewood+Home+%26+Auto+%28Formerly+Circle+Tractor%29%2C+1363
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Frequently Asked Questions

and

**1.

Shorewood Home & Auto

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