

Development of the 2001 Year Model Civic

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ABSTRACT

In developing the new model Civic, high performance targets were set for comfort, efficiency, and style based on the overall concept of a “comfortable life,” as well as for collision safety, driving stability, and noise and vibration. The engine and chassis have a compact design to ensure a wide cabin space relative to the vehicle’s outer dimensions, and a flat floor was achieved with a centralized under-floor layout for the exhaust and fuel systems, thus achieving a “comfortable space.” In addition excellent fuel economy of 19.4 km/L in the 10-15 mode was achieved, and the Civic also obtained J-LEV certification. Further, the high performance targets were achieved in the areas of driving stability, noise and vibration performance, and collision safety performance.

1. Introduction

Since the first generation of the nameplate, Honda’s concept for the Civic has been “an advanced compact car for the people.”

Twenty-eight years after the first Civic was introduced, many changes in society have resulted in numerous changes in the role of the automobile. As we look toward the future, we must ask ourselves: What will constitute “advanced?” What will signify “performance for the people?”

While passenger vehicles in general have not changed much over the past 10 years, a new type of vehicle, the sport-utility vehicle (Light Truck), has gained much popularity. We decided that this trend signified a growing desire among the car-buying public for a more comfortable, useful automobile that was suited to their lifestyle.

We therefore constructed a concept that focused on what was essential in a lifestyle-oriented vehicle; which is different than a sport-utility vehicle that offers performance that goes beyond what is needed in everyday life. In addition, we continued to focus on collision safety performance.

2. Concept and development objectives

One conclusion reached by our development team was that consumer values were changing toward an emphasis not on the specific pluses and minuses of a given product,

but on whether the product improved one’s overall quality of life. This includes consideration of the utility of the product. Therefore, we established the concept of a “comfortable life” as one of our main aims. In terms of achieving this aim, we realized that a car should provide “comfort,” “efficiency,” and “stylishness” as indicated in Fig. 1.

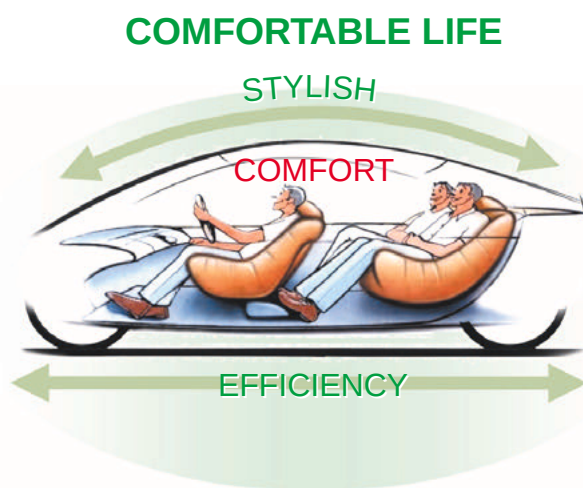


Fig. 1 Product concept

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- **Comfort:** We decided that the car should be spacious enough for four adults to relax in comfort, a degree of roominess not previously available in earlier cars of this class. We also sought to achieve a full flat floor and a visually pleasing space.
- **Efficiency:** We wanted to make the external dimensions as compact as possible. In order to reconcile this goal with our aim for a spacious interior, we created a new layout for the engine compartment.

We also established a fuel economy target of 19.4 km/L, which exceeds the standard of 1.5L for this class.

- **Stylishness:** We sought to achieve a sporty styling that would identify the car as a passenger vehicle, and not as a minivan or a Light Truck.

In regard to safety performance, we sought to achieve a high level of safety performance through many objectives, including but not limited to the following:

- Further advances to our pedestrian injury reduction technology.
- Achieving a four-star EU-NCAP rating.
- Satisfying internal safety requirements for car to car frontal collisions with a two-ton passenger vehicle.

3. Package Layout

In configuring the package layout, we sought to achieve both a spaciousness that surpassed that of other passenger vehicles, as well as a comfortable driving position.

We developed an efficient package layout that would accommodate four adults comfortably even though the body of the vehicle is compact. By saving space in the engine compartment and reducing the amount of space occupied by the rear suspension, we were able to extend the spacing between the front and rear seats by 70 mm while reducing the exterior length by 165 mm (compared with the earlier Civic Ferio), as shown in Fig. 2.

In addition to enlarging the luggage capacity to a level that is equivalent to or better than that of competitor vehicles in Europe, our efforts to reduce the amount of space occupied by the rear suspension resulted in a widening of the distance between the wheel wells by 142 mm and a further reducing of the protrusions into the luggage space, which improved the utility of this area.

In order to enhance visibility and to make it easier to get in and out of the vehicle, we raised the seats by 50 mm compared with the earlier Civic Ferio. However, the seats

are still 40 to 120 mm lower than those in a Light Truck, allowing us to retain a passenger vehicle-like driving position.

We kept the floor at the same height as in earlier model Civics and eliminated the floor tunnel, allowing us to achieve the world's lowest flat floor. In order to take advantage of the flat floor, we incorporated the dashboard-mounted gearshift and adopted a foot-pedal parking brake. Furthermore, we raised the ceiling in the passenger compartment by 90 mm in order to make movement inside the compartment easier. As a result, it is possible to walk between the left and right seats and between the front and back seats. The flat floor and the higher ceiling also contribute to the increased leg and head room.

4. Engine

4.1 Development aims

In order to achieve some of the development concepts established for the new Civic, we re-examined the powertrain, starting with its basic framework. Basing our efforts on a compact design suited for the vehicle package, we decided to try to improve fuel economy by improving combustion and reducing friction in the engine and by improving the efficiency of the CVT. We also decided to try to reduce emissions by adopting a lean NOx catalyst and by enhancing the exhaust system.

Our specific engine development targets were as follows:

- To achieve the best fuel economy in the class of mass market vehicles in Japan.
- To achieve low emissions (JLEV) for all grades of 2001 model year Civics. (acquire J-LEV certification).
- To develop a compact design that is 10% smaller than the 2000 model Civic.
- To achieve high responsiveness within the range of normal operation.

4.2 Engine overview and major specifications

Fig. 3 shows the engine, and Table 1 lists the major specifications. We made many changes in the layout of the intake system to produce a more compact design, including changing the positions of the components, making associated enhancements in the cylinder block, and adopting a plastic intake manifold. Furthermore, we placed the air cleaner and the intake resonator chamber above the engine and

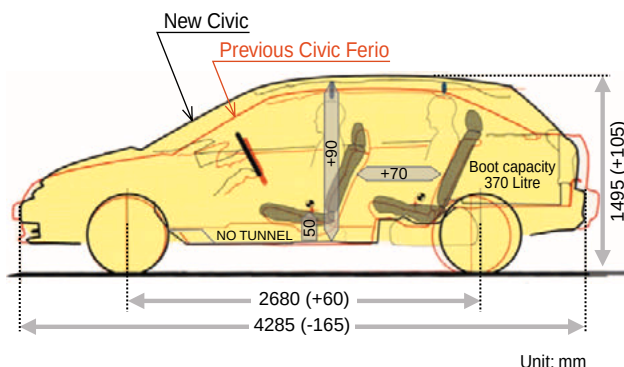


Fig. 2 Package layout



Fig. 3 View of 2001 model year lean-burn engine

Table 1 Engine specifications

Engine code	D15B	
Cylinder configuration	In-line 4-cylinder	
Bore × stroke (mm)	75 × 84.5	
Displacement (cm ³)	1493	
Compression ratio	10.2 : 1	
Valve train	SOHC VTEC	
Number of valves	4 per cylinder	
Valve diameter (mm)	In.	30
	Ex.	26
Fuel supply system	Programed fuel injection	
Ignition system	Programed ignition	
Max. power (kW/rpm)	77 / 5800	
Max. torque (N-m/rpm)	139 / 4200	

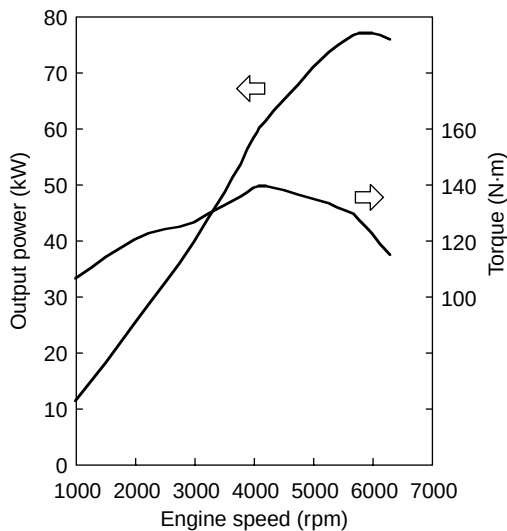


Fig. 4 Engine performance

transmission in order to make the powertrain, as a whole, more compact, while simultaneously allowing us to modularize the design.

Many of the components in the engine have been newly designed. For example, the design of the combustion chamber configuration was changed by modifying the shape of the piston crown and various parts were modified to reduce friction in each area and to reduce emissions.

Fig. 4 shows the engine performance curve. The output characteristics are set with an emphasis on low-speed torque in accordance with control of the gear ratio in the CVT. The result is a balance between high fuel economy and linear driveability within the range of normal operation.

4.3 Higher Fuel Economy Technology

In the course of developing our higher fuel economy technology, we set high objectives for ourselves in regards to the engine, the CVT, and body, as shown in Fig. 5, and we achieved a fuel economy of 19.4 km/L.

4.3.1 Positioning of mode fuel economy

Fig. 6 shows the relationship between vehicle weight and 10-15 mode fuel economy. In general, a vehicle

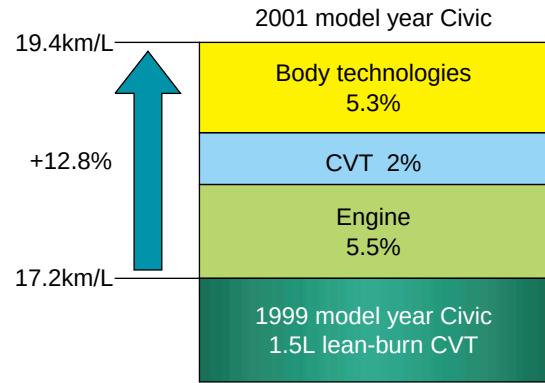


Fig. 5 Ratio of contribution to 10-15 mode fuel economy improvements

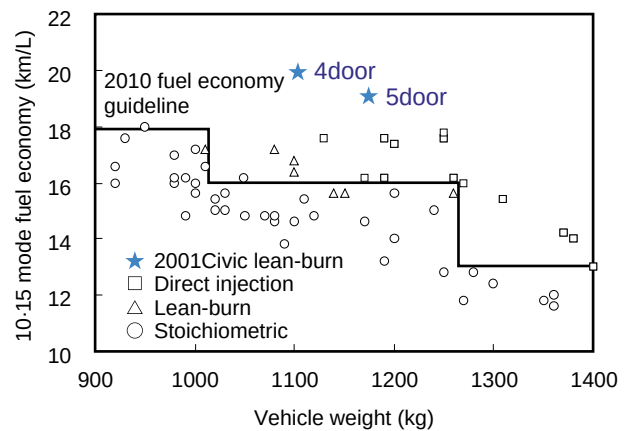


Fig. 6 Relationship between vehicle weight and 10-15 mode fuel economy in production gasoline-fueled vehicles

equipped with a lean-burn engine achieves 10% better fuel economy than a vehicle equipped with a conventional stoichiometric air-fuel ratio engine, while a vehicle equipped with a direct injection (DI) engine achieves an additional 8% improvement in fuel economy. However, a Civic equipped with our newly developed lean-burn engine achieves an 8 to 12% improvement in fuel economy over a vehicle equipped with a DI engine.

4.3.2 Means of improving engine combustion through intake port and combustion chamber design

In order to stabilize and combust the lean air-fuel mixture that flows into the cylinder, it is necessary to create an easily ignitable air-fuel mixture in the vicinity of the spark plug and then rapidly spread the combustion to the surrounding lean mixture. In order to accomplish this, it is necessary to generate a good balance of swirling and tumbling within the cylinder. The swirl intake port that we developed for this engine produces a stronger tumble component than the conventional port shape. As shown in Fig. 7, the shape of the intake port that we developed produces a swirl ratio of 2.6, a tumble ratio of 2.0 and a swirl slope [alpha] of 37 degrees. In experimental results with 1.0L to 1.8L lean-

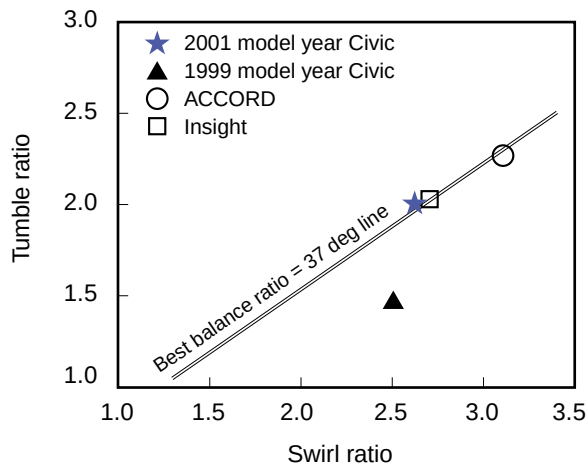


Fig. 7 Relationship between swirl and tumble intensity

burn engines, this swirl slope demonstrated a good correlation with the lean-limit characteristics, and served as a valid metric of intake port shape designs.

Along with flow within the cylinder, the build up of the air-fuel mixture within the cylinder is also an important element of lean combustion. We ran a computer simulation of the distribution of the air-fuel mixture within the cylinder for different types of intake port shapes. The conditions for our calculations were an average air-fuel ratio A/F of 22 (air surplus factor: 1.5), and a fuel injection timing of 40 degrees after the intake TDC. Fig. 8 shows the air-fuel mixture distribution within the cylinder at 40 degrees before compression TDC, which corresponds to the ignition timing in an actual engine. The pictures in Fig. 8 depict horizontal and vertical cross sections in the vicinity of the center electrode of the ignition plug. Compared with the earlier port, the new port builds up the dense air-fuel mixture in the region of the center electrode of the plug. As shown in Fig. 9, good correlation was achieved with our test results for

Ne = 1500rpm
P intake = 48kPa
A/F (averaged) = 22
Crank angle = 40deg BTDC.

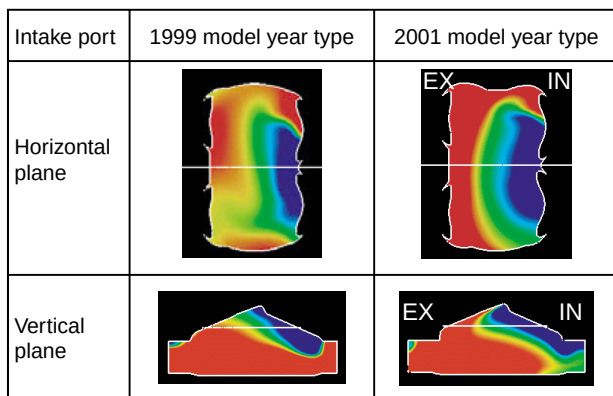


Fig. 8 Effect of intake port shape on in-cylinder A/F distribution

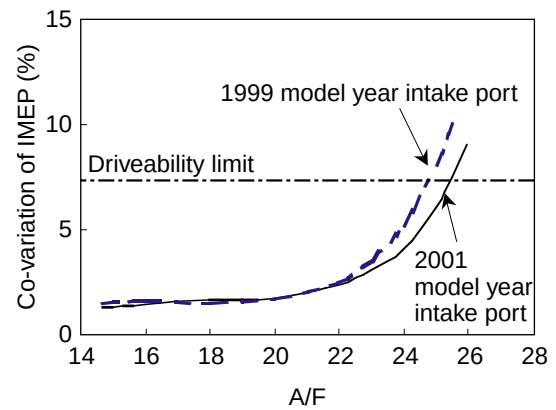


Fig. 9 Comparison of lean-limit characteristics according to intake port shape

improved lean-limit combustion characteristics.

We also ran simulations and tests on the shape of the combustion chamber. Based on these tests, we selected a bowl-shaped piston crown and we optimized the cylinder head clearance to thereby further improve output.

4.3.3 Reducing friction

In order to improve fuel economy, it is not only important to improve combustion, it is also important to reduce friction.

We adopted the following friction reduction technologies:

- Micro-dimple (MD) processing in the pistons.
- Low-tension piston rings.
- Reduction of the crank pin width.

Piston skirt MD processing creates small dimples on the piston skirt surface by shooting roughly spherical ceramic beads (with an average diameter of 40 μ m) at the piston skirt surface at speeds of up to 100 m/s. We were able to confirm that this enhances the oil film retention performance between the piston and the cylinder, resulting in a reduced piston friction loss and an increased seizure load limit.

In addition to these low friction technologies, we adopted other technologies, including a roller cam follower, reducing the load on the valve spring, and using low-viscosity engine oil (0W-20/SJ/GF2). As a result, we were able to reduce friction in the engine as a whole by 12% compared to earlier models.

4.3.4 CVT

The CVT enables driving in the low end fuel consumption ratio (Brake Specific Fuel Consumption: BSFC) range of the engine, which is suitable for improved fuel economy. Honda has been mass producing CVTs for the Civic since 1996. In the new Civic model, we attempted to improve transmission efficiency for the new powertrain by improving the CVT oil pressure control system and reducing side pressure on the belt.

Fig. 10 shows a comparison of the driving range of the newly developed CVT versus the 4AT. The engine operating range is kept in the low rpm range and controlled to operate in the low BSFC range.

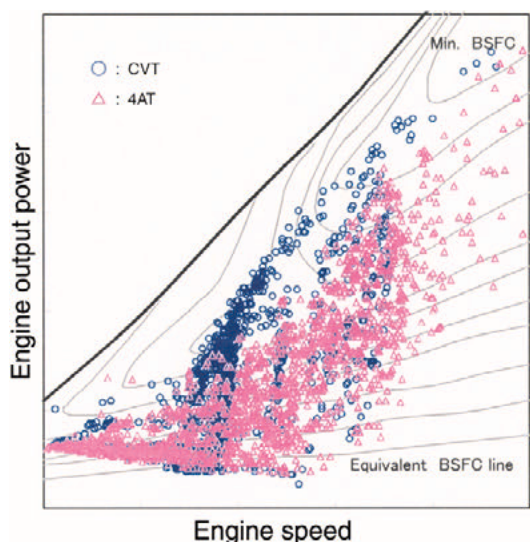


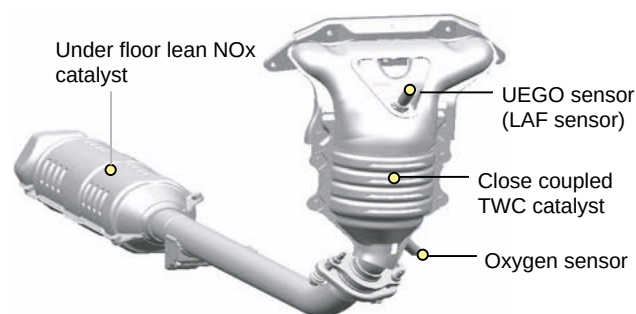
Fig. 10 Comparison of 10-15 mode driving range

4.4 Low emission technology

When we examined the emission system, we decided to set our emission target at J-LEV designation, which means emissions must be no more than 50% of Japan's requirements for the year 2000.

4.4.1 Exhaust system

Fig. 11 shows the exhaust system for this engine. In order to assure conversion performance in the cold and stoichiometric ranges, we positioned a three-way catalyst (TWC) in the close-coupled exhaust manifold; and, in order to assure NO_x reduction in the lean-burn region, we applied an under floor NO_x adsorption reduction type TWC.

Fig. 11 Layout of NO_x adsorption reduction type three way catalyst system

4.4.2 Multi-hole injector

We adopted a four-hole multi-hole type injector for the fuel injector valve. This type of injector reduces the amount of gasoline that adheres to the intake port when the spray is atomized, which resulted in a 14% decrease in hydrocarbons (HC) during a cold start, as shown in Fig. 12. This also allowed us to make the injector valve 33% smaller and 65% lighter.

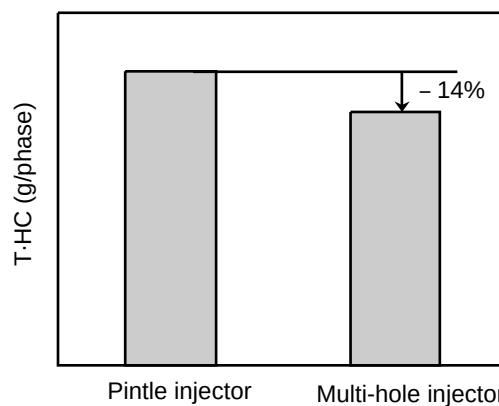


Fig. 12 LA-4 cold transient mode emission

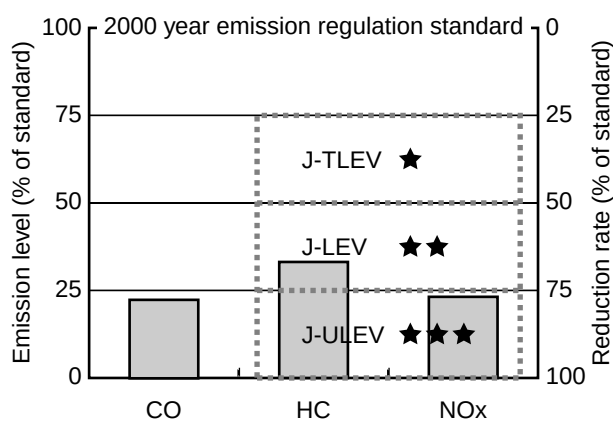


Fig. 13 11 mode emission

4.4.3 Actual emission levels achieved

In addition to the low-emission technologies that we have described up to this point, we also sought to optimize engine control when switching from lean-burn to a stoichiometric air-fuel ratio, and in the EGR range. This allowed us to attain the high fuel economy of 19.4 km/L in the 10-15 mode while also achieving J-LEV designation.

5. Transmission

We established two types of transmission concepts, the CVT and the 4AT. We then developed transmissions with excellent environmental performance (i.e. efficiency) and feeling in accordance with each concept.

In the CVT, the advantages of smooth shifting through hydraulic control of the launch clutch system and modifications of the oil pressure control system contributed to our achievement of the high fuel economy of 19.4 km/L. In addition, by combining this transmission with an engine that provides excellent torque at low speeds, we were able to attain linear characteristics in the power delivery resulting in smooth driving and a tighter acceleration feeling.

The 4AT ranges from 1.4L (EU specifications) to 1.7L/4WD. We were able to improve fuel economy without sacrificing driveability by adding a special linear solenoid for lockup control and a long torsion damper spring system.

5.1 CVT

It is possible to obtain the optimum gear ratio at all times with the CVT due to the continuously variable system of a metallic belt and two pulleys as shown in Fig. 14. Combined with the low loss launch clutch system, the CVT contributes to the high fuel economy of the Civic. We also reviewed each part of the oil pressure control system, further refining how the engine and the transmission work together, which resulted in further improvements in fuel economy.

By adopting a small linear solenoid valve, an oil pressure feedback type pulley pressure control valve, and a 3-way ON/OFF solenoid, we increased the precision of the pulley clamp pressure, and reduced the loss due to the belt-pulley interaction. This, in turn, reduces oil pump loss, thanks to the improved precision of the pulley pressure when shifting, especially in the neutral hydraulic pressure range.

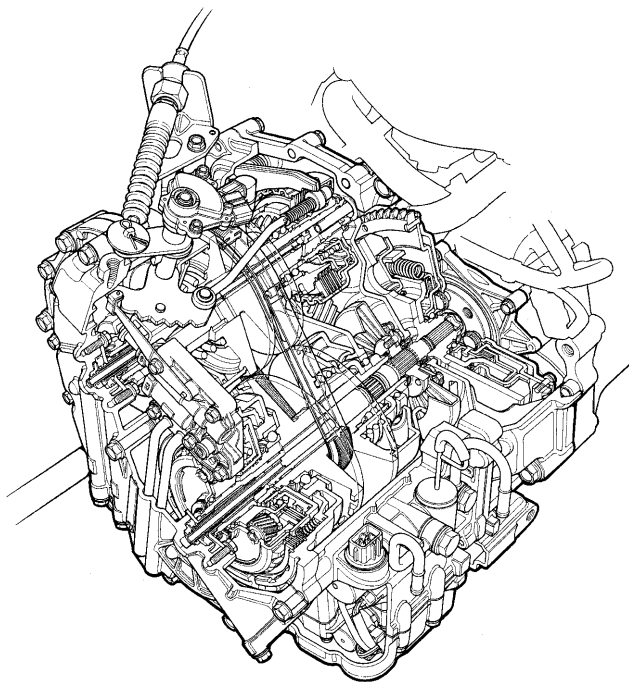


Fig. 14 CVT (Honda MultiMatic)

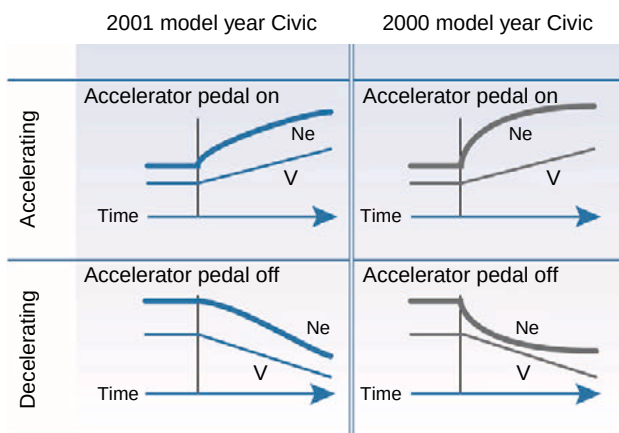


Fig. 15 Improvement of CVT shifting feel (Linear vehicle speed (V) - engine speed (Ne) feel)

We optimized the CVT's ratio transition response, the AMSS (Acceleration Map Select System) response range, and the CVT's ratio transition control by increasing the number of downhill maps for the PROSMATEC (described below). Then, by combining this CVT with a new engine that provides excellent torque at low speeds, we produced the linear response shown in Fig. 15, achieving a feeling that more closely matches the human senses.

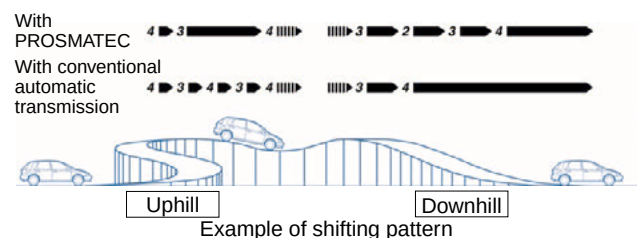
5.2 4AT

We achieved a balance between driveability and fuel economy by incorporating the active L/C system (Active Lock-up Clutch System) in the fully electronically controlled 4-speed AT.

The long torsion damper that we adopted in the lock-up clutch dampens torque fluctuations from the engine, resulting in a reduction in vibration and an expansion of the lock-up region. We were also able to reduce oil pressure fluctuations by adopting a special linear solenoid for the lock-up clutch. In addition, in the acceleration range, the system appropriately controls the lock-up feedback control in accordance with the engine torque and driving conditions, thus improving fuel economy without sacrificing driveability.

5.3 Hill climb and descent

We adopted PROSMATEC in both the CVT and the electronically controlled four-speed AT. As shown in Fig. 16, the PROSMATEC system evaluates the driving conditions on the basis of the throttle opening, the rate of acceleration, etc., and optimizes the shifting timing accordingly. This system provides for smoother driving by suppressing unnecessary shifting when going uphill, and optimally controlling engine braking when going downhill.



PROSMATEC :
PROgressive Shift schedule MANagement TEChnology

Fig. 16 Image of shifting pattern with PROSMATEC

6. Chassis

6.1 Decreasing the engine room size

For the front suspension, we adopted a newly developed strut system (Fig. 17) that is more compact and beneficial when shortening the nose of the car. Furthermore, as shown in Fig. 18, the modularized engine design allowed us to place the steering gearbox in a higher position that provides more clearance, which in turn allowed us to position the engine farther back. The placement of the steering gearbox

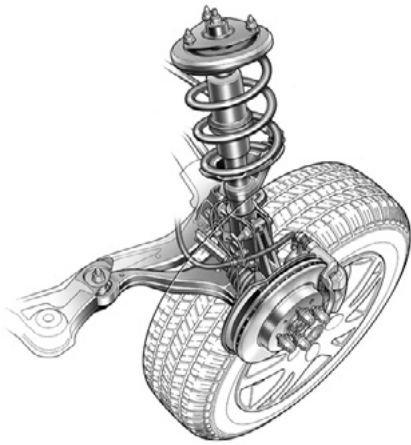


Fig. 17 Front toe control link McPherson strut suspension

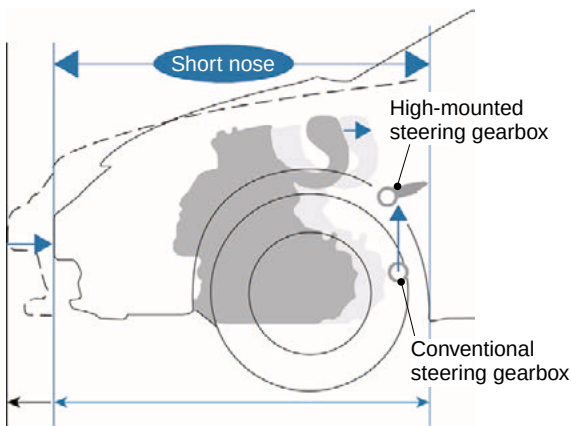


Fig. 18 Short-nose layout

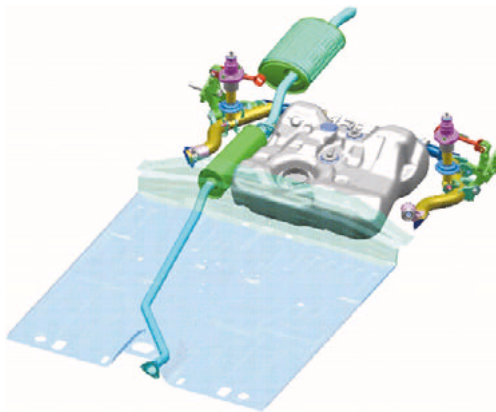


Fig. 19 Flat floor package

also permitted us to smoothly link the left and right side frames, allowing for the efficient absorption of energy from collisions. As a result of all of these modifications, we were able to shorten the nose of the vehicle considerably.

6.2 Rear floor centralized layout for a flat floor

In typical automobile design, the vehicle exhaust system is routed through a center tunnel in the vehicle floor. However, in the new Civic, the exhaust system is positioned

under the right side of the floor, and the prechamber is positioned adjacent to the fuel tank. This placement allowed us to achieve a full flat floor with no floor tunnel. For the 50-liter fuel tank, we adopted a resin mold that afforded us great flexibility in shaping the tank. Furthermore, we also made efficient use of the space under the floor, by, for example, placing the canister behind the fuel tank.

For the rear suspension, we adopted the newly-developed double wishbone suspension shown in Fig. 20. By reducing the front-to-back length of the suspension, compared to the previous Civic model design, and by positioning the rear seat farther back, we were able to enlarge the cabin. In addition, by locating the springs and dampers under the floor, we were able to minimize protrusions into the luggage compartment, resulting in more luggage space.

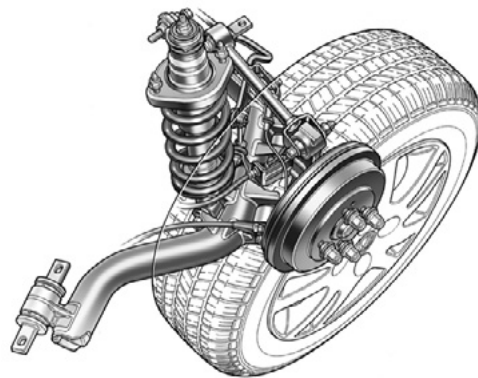


Fig. 20 Rear reactive link double wishbone suspension

6.3 Suspension

6.3.1 Toe control characteristics

As shown in Fig. 21, the long tie rods that originate near the center of the vehicle are the component of the front suspension that allowed us to minimize and straighten the toe angle change throughout the wheel stroke, providing stability at high speeds and linear handling.

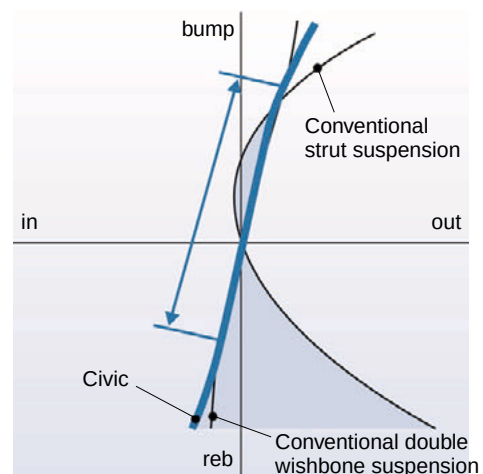


Fig. 21 Straightening the front suspension toe curve

6.3.2 Brake force steering stabilization

We adopted a reactive link that provides toe-in performance, which is effectively brake force steering, during braking. By allowing the flexing of the reactive link when brake force is generated, and as the compliance bushing (which is positioned at an angle) is displaced in direction A, as shown in Fig. 22, the trailing arm gets pulled in the toe-in direction, producing the appropriate toe-in characteristics and providing brake stability.

6.3.3 Rear ground contact rigidity

We were able to attain a high rear suspension rigidity by achieving high rigidity in the rear bushings, hub bearings, and trailing arms, in addition to the high-stiffness body. By making the car solidly rigid against lateral forces and enabling the full performance of the front and rear suspensions, we were able to achieve tightness and stability.

6.3.4. Roll posture

We reviewed the roll center height and the front-to-back balance of the roll theoretical arm length according to the suspension geometry, and assured a front-down roll axis. We were able to optimize the roll posture by linearly increasing the turning pitch angle as the turning lateral acceleration increases during cornering.

6.4 Steering

We decided to use the low power loss Electronic Power Steering (EPS). By adopting the small and lightweight pinion

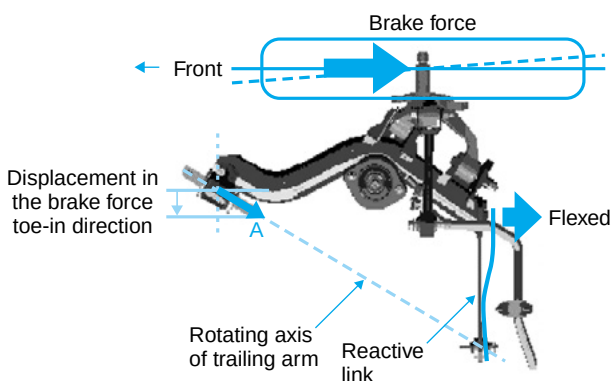


Fig. 22 Characteristic of the rear suspension under braking

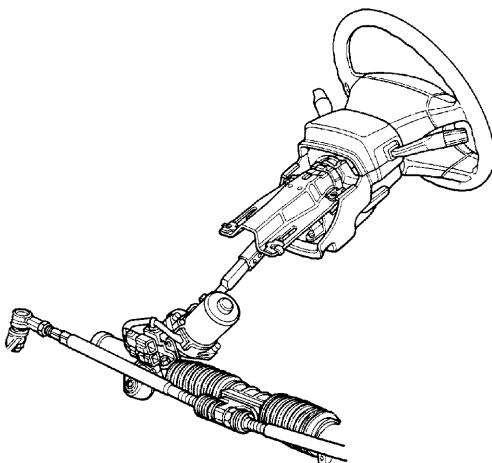


Fig. 23 EPS (Electrical Power Steering)

shaft assist type shown in Fig. 23, we achieved better fuel economy. We set the EPS control with an emphasis on enhancing the feeling of direct control while cornering and a feeling of stability at high speeds. By increasing the steering gear ratio, we achieved quicker handling, and enhanced control at lower speeds. By tuning the front compliance bushing characteristics and by mounting the steering gearbox in a higher position, we refined the aligning torque rigidity. In this way we were able to find a balance between optimizing the change in vehicle posture according to the steering angle at high speeds and achieving a high ratio, allowing us to achieve steering with a linear feel.

6.5 Braking

When we set the brake pedal ratio and the master power characteristics, we were aiming for braking that feels solid at low foot pressures. We made ABS, EBD and brake assist standard equipment on all models. ABS is the four-wheel antilock braking system and EBD is the Electronically controlled Braking force Distribution system; which controls the distribution of the braking force to the front and rear wheels when the brakes are applied, as shown in Fig. 24. Brake assist supplements the foot pressure that is applied to the brake in an emergency braking situation, as shown in Fig. 25.

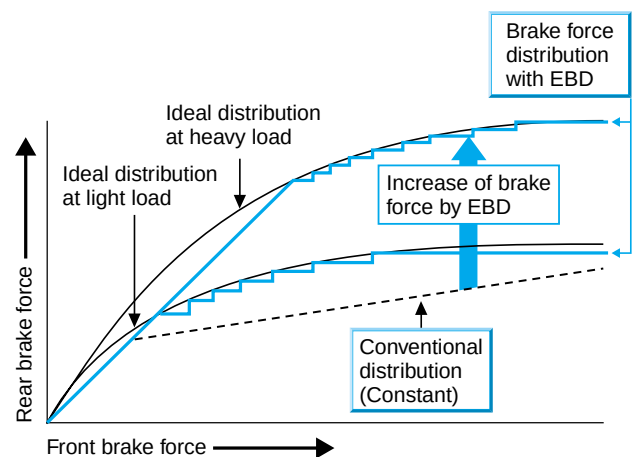


Fig. 24 Characteristic of EBD (Electronic Brake force Distribution)

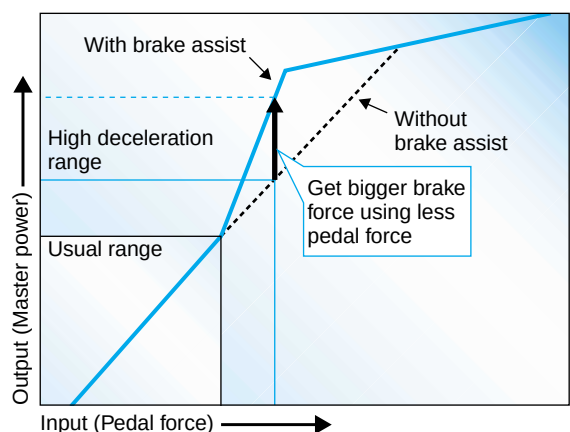


Fig. 25 Characteristic of brake assist

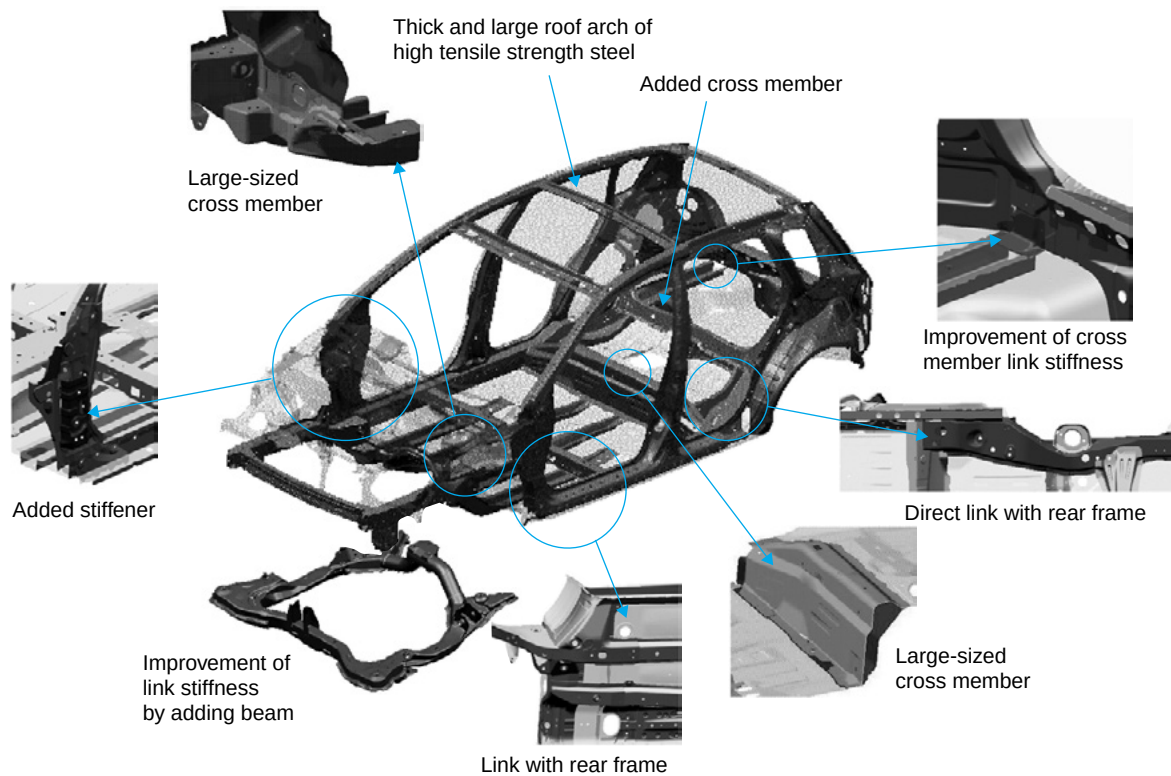


Fig. 26 High-stiffness body construction

7. Body

7.1 High-stiffness body

As shown in Fig. 26, we constructed a strong body framework based on the newly developed platform by enlarging the cross sections of each component, adding stiffeners, strengthening joints, etc. Furthermore, we enhanced the stiffness of the body by reinforcing the bulkhead, reinforcing the damper housing in the front section, reinforcing the housing between the left and right dampers and reinforcing the rear end of the frame, for example. As

shown in Fig. 27, the result of all of this reinforcement was an 80% increase in torsional stiffness compared to earlier models, as well as increases in front lateral stiffness and rear lateral stiffness.

7.2 NV performance

Based on a high-precision body structure that provided high stiffness and high energy absorption, we took steps to remedy the sources of noise and vibration and their transmission paths thoroughly. We were able to effectively reduce transmitted noise without increasing the total weight

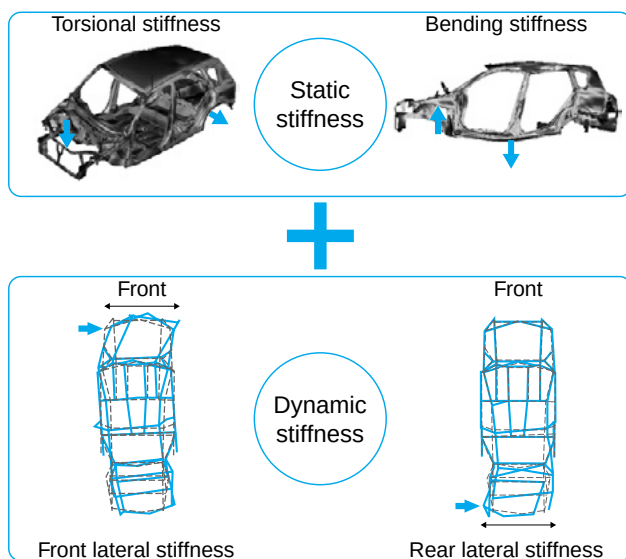


Fig. 27 High-stiffness body analysis

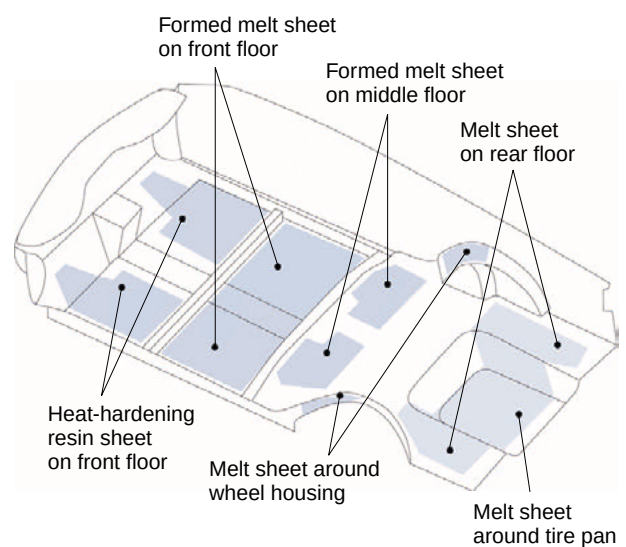


Fig. 28 Application of damping material

of damping material while still expanding the surface area over which the damping material is applied and by using it in combination with sound absorbing material. Furthermore, by effectively using soundproofing and sound absorbing materials elsewhere throughout the vehicle, we were able to greatly reduce road noise and vibration from the engine. Fig. 28 shows the locations where damping material is used, and Fig. 29 shows the locations where soundproofing and sound absorbing materials are used.

As shown in Fig. 30, we placed the engine mounts in the optimal locations on the main inertial axis, and we adopted liquid sealed type mounts for the transmission mount and the engine side mount. We also reduced the transmission of vibration by using aluminum high-rigidity brackets, etc., thereby greatly suppressing vibration from the engine to achieve a more comfortable ride.

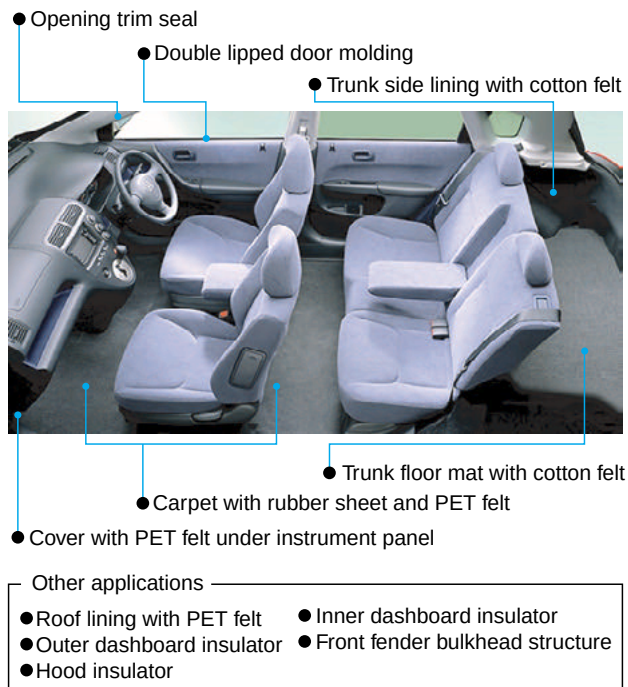


Fig. 29 Application of soundproofing/sound absorbing material

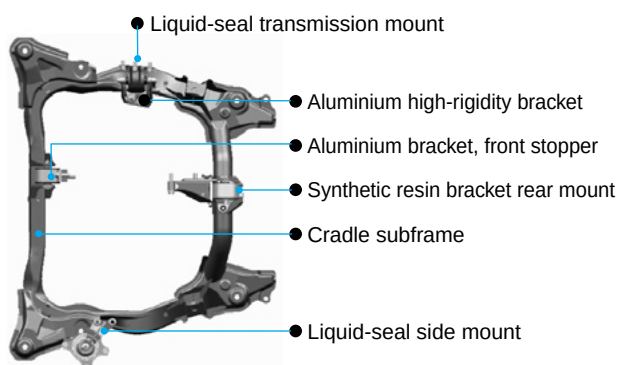


Fig. 30 Layout of engine mounts

7.3 Collision Safety Performance

As shown in Fig. 31, we decided on a front frame structure that effectively distributes and absorbs impact energy through an energy absorbing side-frame combined with a cradle-shaped sub-frame, and a floor construction that distributes impact from the sub-frame in three directions. In addition, by using high tensile strength steel for over 57% of the body components, we were able to produce a high energy absorbing structure.

In full frontal crashes, which tested the impact absorption of the design, as well as in frontal offset crashes, which further tested the protection of the passenger compartment, our design performed well in terms of reducing dummy measured injury assessment reference values and in minimizing deformation of the cabin. As a result, we achieved a body design that met our internal standard for a 55 km/h full frontal crash and a 64 km/h frontal offset crash. The body also passed tests for 55 km/h side crashes and 50 km/h rear-end crashes.

In addition, based on our analysis of collision statistics, we established a target collision of “a 50% frontal offset crash with a passenger vehicle in the two ton class with both vehicles traveling at 50 km/h.” Thanks to the efficient energy absorption and strong body construction, our design cleared this target.

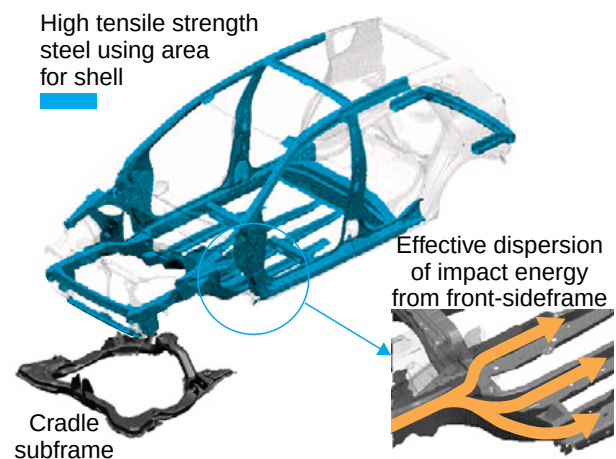


Fig. 31 High-efficiency energy absorbing shell

Table 2 Honda's G-CON technology and NCAP requirements

G-CON: Crash-impact control technology to reduce the occupants' injuries

	55 km/h Frontal crash test	64 km/h Frontal offset crash test
Honda G-CON	●	●
US NCAP	●	Under review
JAPANESE NCAP	●	●
EU NCAP	Under review	●

NCAP: New Car Assessment Program

Table 2 shows a comparison of our own targets and the New Car Assessment Program in various regions. Fig. 32 shows the results of a car-to-car frontal offset crash.

As shown in Fig. 33, the sides of the roof of the passenger compartment and the inside of each pillar contain an impact absorbing material designed to lessen the severity of head injuries by absorbing the impact of a person's head in the event of a collision.



Fig. 32 Car-to-car crash test (Right: Civic)

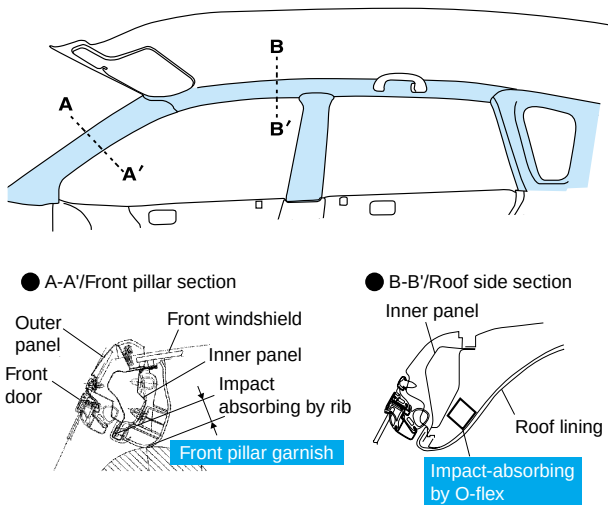


Fig. 33 Reducing the degree of injury to the head

7.4 Pedestrian injury reducing construction

We adopted an impact absorbing construction for the hood, hood hinges, wiper pivots, front fenders, and even the front bumper in order to lessen the severity of not only head injuries in the event of a collision with a pedestrian, but also to expand the area of injury reduction to include the legs.

8. Conclusion

In the course of developing the new Civic, we set high performance targets in terms of comfort, efficiency, and stylishness, all geared towards the concept of a "comfortable life," as well as for collision safety, driving stability, and noise and vibration.

As a result, we were able to achieve the compact size of a small passenger car, best-in-class fuel economy, and comfortable handling. We were also able to achieve a comfortable interior not found in previous passenger cars. Fig. 35 shows the special shape of this vehicle, which



Fig. 35 Appearance of the new Civic

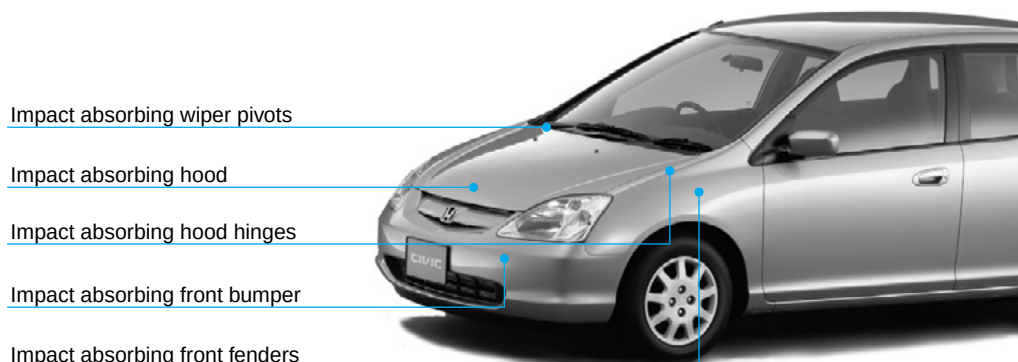


Fig. 34 Pedestrian injury reducing body

characterizes the balance between the compact size and comfort, a shape that says that this is a new design. In addition, the low, flat floor demonstrates the emphasis that we placed on “people” in our design efforts.

Furthermore, the performance targets were achieved in the areas of collision safety performance, driving stability, and noise and vibration.

The completion of this design was made possible through the cooperation of many people, both inside Honda and outside Honda. We wish to express our appreciation for their hard work.

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