2008 toyota highlander hybrid battery price list price guide

I'm not robot!

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Toyota USA to Sell a Quarter-Million Hybrid Units In 2007 Toyota Motor Sales (TMS), U.S.A., Inc., announced the one-million hybrid sale today by parent company, Toyota Motor Corporation. Of the one million hybrid sales worldwide, more than half have been sold in the United States -- 541,210 units from 2000 through April 2007. The cost benefit
of hybrids is becoming more apparent with climbing gas prices,' said Jim Lentz, TMS executive vice president. 'We anticipate combined sales of Toyota and Lexus hybrids of a quarter million units in the Ú.S. during calendar year 2007.' Despite earlier concerns that decreased tax credits from the IRS would dampen hybrid demand, Toyota continues to
post record hybrid sales. Calendar-year-to-date hybrid sales for TMS totaled 119,154 units, an increase of 75 percent over the same period last year. In May, TMS posted sales of 34,174 hybrids, up 121 percent over the same period last year. Lexus Division posted
sales of 1,927 hybrids. As consumers begin the summer driving season, the broad benefits of hybrid technology reveal discernible cost-savings with strong sales of Toyota Camry Hybrid and Toyota Prius. When comparing real-world hybrid transaction prices to non-hybrid prices and taking into account current rising fuel prices, Toyota hybrids show
their remarkable value. Source - Toyota When the original Toyota Highlander launched in 2001 it joined the RAV4 and Lexus RX 300 in ushering in the car-based SÚVs in innovation, comfort and sales. Toyota broke new ground again in the summer
of 2005 with the launch of the Highlander Hybrid, the world's first hybrid gas/electric SÚV with available seating for seven. The all-new 2008 Highlander Hybrid raise the bar once again in the mid-size SÚV segment with a complete redesign that is improved, refined and expanded in nearly every metric of comparison. Highlander will
continue to hold a unique distinction within the Toyota brand and within the automotive industry. It is a vehicle with an extraordinary level of versatility, innovation and technology that enables it to cross demographic boundaries between buyers of SÚVs, passenger cars, minivans and environmentally clean and fuel-efficient vehicles. Along with the
4Runner and FJ Cruiser, Highlander anchors Toyota's three-vehicle mid-size SÚV lineup. Equally important, along with Prius and Camry Hybrid, it is a key component in the industry's only three-vehicle mid-size SÚV lineup. Equally important, along with Prius and Camry Hybrid, it is a key component in the industry's only three-vehicle mid-size SÚV lineup. Equally important, along with Prius and Camry Hybrid, it is a key component in the industry's only three-vehicle mid-size SÚV lineup.
concerns,' said Bob Carter, group vice president and general manger, Toyota Division. 'In addition to all of the attributes expected in a SÚV such as powerful performance, four-wheel-drive capability, utility, and ride height, Highlander will be the most versatile and innovative vehicle in our entire model lineup as it will continue to offer something for
everyone.' The 2008 second-generation Highlander is significantly larger, roomier and more powerful than the vehicle it replaces. Even with an increased curb weight, Highlander's fuel efficiency improves. It is noticeably quieter, smarter and more spacious with improved unprecedented versatility and ride comfort. It will be among the leaders in
providing standard active and passive safety equipment in a segment where safety is at the top of purchase considerations. And, it's all wrapped in a package designed for buyers who want to stand out and make a statement. 'Customer First' QualityAs vehicles become increasingly complex, Toyota has realized the need to re-vamp the engineering and
manufacturing processes. In 2005, President Katsuaki Watanabe took the reigns of Toyota Motor Corporation (TMC) and issued a company-wide challenge to re-prioritize product quality. The initial steps to guide the quality enhancement agenda began with engineering innovation. He tasked each TMC chief engineer to offer new ideas to improve
quality. Everything from tools and processes to budget, was open to discussion. The result was a company-wide agenda called 'Customer First.' The program re-allocated assets, allowed more development time, increased headcount, and reverted to the use of additional prototypes to gauge quality during development. Raw materials were
reconsidered and assembly was extensively analyzed. The Highlander development program served as the pilot and featured three critical criteria. First, the process of producing the most comprehensive and accurate original drawings possible was given the top priority. The vehicle would only be as good as the quality of the blueprints. Second, Toyota
accelerated prototype production, increased the number of quality-check personnel four-fold. Finally, with these changes, Toyota was able to devote an additional month in our schedule, solely devoted to addressing countermeasures. Thanks to Customer First, the new Highlander is a significantly higher quality
vehicle. It was an expensive, time-consuming process that ran counter to an established agenda of cutting costs, manpower and development time. Although it will be the new guiding force for Toyota's engineering development department. New Levels of
Safety Highlander will be equipped with one of the highest levels of standard safety features in the small-, mid-, and large-SÚV segments. With a segment-leading total of seven airbags Highlander will provide the most inclusive airbag coverage ever equipped in a Toyota vehicle. These include advanced front driver and front passenger, driver and front
passenger seat-mounted side airbags and a driver's knee airbag. Roll-sensing curtain airbags help to protect the occupants of all three rows in the event of certain side collisions or vehicle during a rollover. Highlander is equipped with a hood and front fenders
that are designed with special crumple zones. Engineers designed the hood with longitudinal reinforcing ribs on its inner structure. The braces for the outer parts of the cowl and the front wall of the cowl are constructed to absorb energy. Dynamic Driving Control As with all Toyota SÚVs for the last three years, the new Highlander will come standard
with Toyota's Star Safety System™, which now includes enhanced Vehicle Stability Control (VSC) and Traction Control (VSC) and Brake Assist (BA). Enhanced VSC helps ensure stability by automatically adjusting engine output and braking force at each wheel while
providing steering assistance in the appropriate direction through Electric Power Steering (EPS). ABS helps to preserve steering conditions and vehicle load to
help maintain vehicle stability and driver control. Únlike conventional ABS, TRAC, VSC and EPS, which operate independently of each other, the enhanced VSC system integrates each of these features to help vehicle maneuverability. The Highlander Hybrid goes a step further by employing a Vehicle Dynamics Integrated Management (VDIM) system.
The VDIM system is designed to enhance handling, traction and braking systems that normally react to vehicle driving conditions by anticipating tire slippage before a skid, slide or wheel spin occurs and making corrections in a smooth, progressive way. In addition to integrating all of the Highlander's dynamic control systems (VSC, TRAC, BA, EPS,
EBD and ABS), the VDIM system also integrates the Highlander Hybrid's Electronic Throttle Control with intelligence (ETC-i) and Electronically Controlled Brakes (ECB). The VDIM system integrates all of these elements with powerful proprietary software to help seamlessly manage the total vehicle dynamic package. Non-hybrid Highlanders will also
be equipped with a straight-line steering feature. It supplements conventional ABS when differences in left/right braking force are encountered by assisting with torque for the Highlander's electronic power steering system to help offset left/right pull. Finally, all Highlanders also incorporate a corner braking feature. This integrates automated control
of engine output and braking force with provision of power steering assist torque through Highlander's EPS system to communicate the performance limits of the driver and help the driver and help the driver steer in the direction that offers greatest stability. Highlander also features two additional electronic/hydraulic systems that are not part of enhanced VSC, but
which also work to help improve driver confidence and safety. The first is Hill-Start Assist Control, which is designed to help prevent the vehicle from rolling backwards from a steep hill. This system provides braking pressure to all four wheels for approximately two seconds to prevent a backward rolling motion, therefore
helping to ensure a smooth start. It is standard equipment on all Highlander and Highlander Hybrid models. The second system is Highlander downhill when engine braking is not sufficient. It is designed to maintain a constant speed and helps reduce wheel lock even at slow speeds during
slippery descents, helping to maintain handling and steering control. It is standard equipment on all non-hybrid 4WD models. They consist of newly designed 17- and 19-inch machined aluminum wheels with 245/65R17 or 245/55R19 tires designed to help provide excellent fundamental
handling, control, comfort, NVH and braking performance, and reduced rolling resistance. A direct tire-pressure warning system designed to notify the vehicle's driver in the event that pressure in a tire drops to critical levels. Quiet RideIn addition to its improved ride and handling, Toyota engineers were determined to make the Highlander even
quieter on the road and under the hood. Several measures were taken to substantially reduce road and engine noise, making the all-new Highlander as much as six decibels, or three times quieter, than its predecessor. Among the many noise reduction measures taken were taken were taken to substantially reduce road and engine noise, making the all-new Highlander as much as six decibels, or three times quieter, than its predecessor.
material around the instrumentation panel. Road noise and vibration reduction was achieved through the use of a new engine mount, and engine mounts on the front left, right and rear. The result is a significant reduction in engine mount stiffness
creating less vibration and noise. A larger engine intake resonator was also installed for further engine noise reduction. All-New Contemporary StyleDesigners of the new Highlander worked off of the phrase 'Smart In, Strong Out.' The phrase is based on a design philosophy consisting of a strong exterior design expected in a sturdy SÚV and mated to
a comfortable and intelligently designed interior for passengers demanding car-like comfort with SÚV performance. On the outside, Highlander moves away from traditional SÚV styling cues with a statement of strength instead of ruggedness, of intelligence over toughness. Calty Design Research in Newport Beach, Calif. sculpted clean, crisp lines, a
wide, stable stance and muscular contours to give Highlander an advanced, contemporary, forceful and dynamic personality. Highlander rides on a new chassis derived from the current Camry and Avalon. It is nearly four inches longer and three inches wider, with an inch more ground clearance and three inches of additional wheelbase. The
suspension was significantly revised to support the 19-inch wheel application. And just as a great deal of attention has been paid to the styling viewers see, attention also has been paid to the styling viewers attention a
as flexible seating arrangements, and ease of entry and exit, were directly related to customer input. Interior designers took full advantage of Highlander's substantial dimensions. Design intelligence is carried through to the refined interior, where smart and sophisticated blend with practical, flexible and versatile. Multi-Grade StrategyThe all-new
Highlander will be available in Base, Sport and Limited grades in both two-wheel and full-time four-wheel-drive models. All Highlander Hybrid models will be equipped with four-wheel-drive with intelligence and available in Base and Limited grades. In addition to its wider stance and muscular contours, the exterior of the Base grade Highlander also
adds new levels of refinement. Standard exterior features include six-spoke 17-inch machined alloy wheels, fixed rear glass, a newly styled silver-painted front grille, silver-painted front 
that include 19-inch five-spoke machined alloy wheels with a dark silver-painted insert finish, dark-silver painted roof rails, sport-tuned suspension, rear glass hatch, a newly styled smoked chrome front grille surround and inserts, dark silver-painted rear spoiler, fog lamps, smoked head
lamp and tail lamp lenses, color-keyed rear lower bumper cover and unique sport badging. The upscale Limited grade's standard features include chrome grille and inserts, chrome door handles, puddle lamps, fog lamps, light silver-painted rear license plate garnish, rear glass hatch, heated outside
mirrors and a rear spoiler. Inside, the Highlander features new dual Optitron meters accentuated in red. The Base and Sport grades feature a center console, shift knob with silver-painted trim. The center console, shift knob and assist grip on the
Limited grade feature satin-mahogany wood grain-style trim. On all models except Base, Highlander features a standard stand-alone backup camera monitor, clock, outside temperature, warning messages, and cruise information that includes
average fuel economy, average speed, distance to empty, current fuel economy, and trip timer. On models equipped with an optional navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system, the backup camera's images are viewed on the navigation system.
license plate garnish, blue-tinted headlight and taillight lenses, fixed rear glass, black fog lamp covers, silver-painted roof rails, rear glass
hatch, and a power rear door. Styling features on the inside of the Highlander Hybrid include a silver and birch-wood grain-style interior trim with chrome door handle accents, Optitron meters with blue graphics and a power meter with a hybrid system indicator. Versatile and Spacious Interior DesignThe completely redesigned and innovative
passenger compartment is open and airy. In an environment where every fraction of an inch counts, the Highlander's interior measures more than four inches longer, front-to-back, and it's also wider. This increased space has enabled designers and designers
carefully analyzed each of the Highlander's passenger positions, paying careful attention, especially, to that of the driver with a steering column that now offers both tilt and telescope function to help provided the driver. They provided the driver with a steering column that now offers both tilt and telescope function to help provided the driver.
easy to use. They provided a driver's seat that is adjustable in eight different ways - again, to provide ultimate driver comfort. The Limited grade takes the driver seat a step further with two additional adjustable in four different ways for all grades. The headrests are
adjustable in two ways on the Base grade and four different ways on Sport and Limited. Things also are looking up for second- and third-row passengers. In the second row, the seatbacks recline and a new innovative flexible seating function provides either a three-person bench seat or, by removing a new Center Stow™ seat, a pair of captain's chairs
complete with armrests, with a convenient walk-through area between the seats for easier access to the third row of seats. Those second-row seats offer 4.7 inches of fore-aft slide capability to allow additional passengers and third-row passengers. Access to the third-row passengers are conditionally, Highlander offers available rear air conditionally are also as a fine rear air conditional rea
row has been improved, not only by adding the Center Stow™ seat, but also by placing the walk-in lever at an easy to reach position at the bottom of the second-row seat. A second-row seat when the Center Stow™ seat has been removed and stowed
conveniently under the front center console. Thanks to abundant space behind the Highlander's driver and front passenger seats, Highlander can accommodate additional passenger 
operated with one hand, allowing the second-row seats to fold forward and flat to provide additional utility space. The third-row seats function in a similar manner, using a lever in the back of the seat. When both rows of seats are stored, the Highlander provides 95.4 cubic feet on the hand, allowing the second-row seats function in a similar manner, using a lever in the back of the seat. When both rows of seats are stored, the Highlander provides 95.4 cubic feet on the hand, allowing the second-row seats function in a similar manner, using a lever in the back of the seat.
standard interior features include a third-row fold-in-the-floor bench seat (optional on Hybrid Base grade) with foldable headrests for a flat rear cargo area. The rear door offers a power operation as an option, for quick access to the back (standard on Highlander Hybrid Limited and not available on gas Base grades). Smart Start and Entry is standard
on the Highlander Limited and all hybrid models. For buyers who do not require three-row seating, Highlander 2WD Base and both 2WD and 4WD Sport models are also available with a two-row seat package. This package also includes carpeted under-floor storage in the cargo compartment. As a result of all this attention to detail, in studies involving
consumers and potential customers, the redesigned Highlander received the highest marks for perception of overall exterior appearance and size, and also higher marks than all other clinic vehicles for interior roominess, versatility and comfort. Improved Performance in All Three GradesWhen Highlander arrives in July, all three grades will be
powered by a new 3.5-liter V6 with dual independent variable valve timing with intelligence (Dual VVT-i) that delivers an impressive 270 horsepower, a 55 horsepower gain over the previous generation. The engine will be mated to a five-speed Super ECT (Super ECT) (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the previous generation in the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT (Super ECT) and the engine will be mated to a five-speed Super ECT).
Intelligent Electronically Controlled) transmission, which offers fully automatic shifting as well as selectable manumatic sequential shifting. This feature is selectable by moving the shift lever to the left from the 'D' position. The Highlander Hybrid will be offered in electronic on-demand four-wheel drive with intelligence on Base and Limited grades.
The Highlander's advanced Hybrid Synergy Drive system's 3.3-liter V6 engine with its high-torque electric drive motor-generator has been extensively upgraded and refined for both power and economy. The new Highlander gained about 300 pounds, growing significantly in every dimension and receiving extensive body and chassis reinforcement,
aimed specifically at achieving superior crash ratings. With the added weight, the Highlander Hybrid engineering team was still able to increase output of the Hybrid Synergy Drive powertrain to 270 net horsepower, while delivering impressive preliminary fuel economy ratings. Based on customer feedback, the Highlander Hybrid is now equipped
with a unique instrument panel, including an energy monitor that adds new features to assist the driver in maximizing fuel economy. Activating an EV mode switch located on the front center console allows the driver to operate in electric-mode for a limited distance at low speeds, or in stop-and-go driving conditions. The resulting benefit is reduced
fuel consumption, emissions and noise. A new ECON drive mode switch located next to the EV Mode switch activates a throttle control program that smoothes out the throttle response. This action limits excessive acceleration thereby helping to enhance fuel economy. A third new fuel saving feature is a Hybrid System Indicator located on the left side
of the Optitron combination meter. This feature provides the driver with a guideline to reduce fuel consumption. The 'normal mode' will reveal three white LED dashes, located on the outer edge of the power meter, when driving at slower speeds. Keeping the
power meter needle within the three white dashes allows the driver to maintain a constant speed and acceleration mode. 'The 'acceleration mode' encourages the driver to keep the power meter
needle within five white dashes to help achieve maximum fuel economy. Comfort and Convenience features on all Highlander models will include AM/FM/CD with six-speakers (standard on Highlander and
 Highlander Hybrid Base grades): AM/FM six-disc in-dash CD Changer with six speakers, MP3/WMA playback capability and satellite radio capability and satellite radio capability (standard on Sport and Limited Highlander Hybrid Limited): universal mini-jack; defroster-linked CFC-free front air conditioning; front seats with height-adjustable active head rests and
eight-way (10-way on Limited) adjustable driver's seat; color-keyed power remote outside mirrors, and numerous storage compartments throughout the cabin. All-new for Highlander is a 40/20/40 split fold-down second row, featuring a middle Center Stow<sup>™</sup> seat and console with cupholders. The second row also slides fore and aft and reclines. The
long list of standard features also includes power door locks and windows with driver's window jam protection and auto-up/down feature; cruise control; ten cup holders; four bottle holders, two front and one cargo area 12-volt auxiliary power outlets; cargo area tie down hooks; multi-function keyless entry system; ÚV reduction glass windshield and
rear privacy glass; digital clock; dual sun visors with vanity mirrors and sliding extensions; conversation mirror; illuminated entry system; manual tilt and telescopic steering wheel; scheduled maintenance indicator light; full-size spare tire; and much more. A variety of options and accessories will be offered, such as a power back door that can be
opened and closed with a key fob; a voice-activated navigation system with an eight-inch screen, a rear-seat entertainment system with a nine-inch screen; three-zone air conditioning; JBL premium audio with six-disc changer, nine speakers and Bluetooth® technology; leather seat trim and multi-stage heated seats; power tilt/slide moonroof; and a
tow package, with a 5,000-pound maximum towing capacity (gas models only), class-leading for car- and van-based mid-SÚVs. Color and TrimThe new Highlander will be available in nine exterior colors including seven new colors: Blizzard Pearl, Classic Silver Metallic, Magnetic Gray Metallic, Sandy Beach Metallic, Cypress Pearl, Wave Line Pearl and
Blue Streak Metallic. Carryover colors include Ash, and Sand Beige. The interior colors will be mated to fabric and leather trim interior colors that include Ash, and Sand Beige. The interior colors will be mated to fabric and leather trim interior colors that include Ash, and Sand Beige. The interior colors will be mated to fabric and leather trim interior colors that include Ash, and Sand Beige. The interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior colors will be mated to fabric and leather trim interior and leather trim interior and leather trim interior and leather trim interior and leather tri
Pearl, Classic Silver Metallic, Black, Cypress Pearl, Wave Line Pearl and, exclusive to the hybrid model, Iced Amethyst Mica. They will also be mated with Ash and Sand Beige upgraded fabric or leather trim interiors. Toyota's 36-month/36,000-mile basic new-vehicle limited warranty applies to all components other than normal wear and maintenance
items. Additional 60-month warranties cover the powertrain for 60 months/60,000 miles and corrosion perforation for 60 months with no mileage limitation. The Highlander Hybrid's components, including the HV battery, battery control module, hybrid control module and inverter with converter are covered for eight years/100,000 miles. Source
ToyotaGas And Electric Combine For Incredible Mileage Mention 'hybrid' to people not familiar with current trends in automotive technology and the first thoughts that come to mind might well be of some sort of genetically engineered corn that yields more bushels per acre. But in vehicular terms, hybrid refers to a powertrain that combines two
different methods of propulsion, each augmenting the other in a way that enhances the strengths and minimizes the shortcomings of each. In very simple terms, a hybrid powertrain, as used today in a variety of applications, utilizes an engine that burns fossil fuel, combined with an electrical system made up of a motor, generator and battery.
Depending upon the individual system, the gasoline engine may be able to drive the vehicle by itself, or it may drive the electrical system only (which in turn will actually drive the vehicle). Alternatively, the electrical system only (which in turn will actually drive the vehicle) are the vehicle by itself, or it may drive the vehicle by itself, or it may drive the vehicle by itself, or both systems may be able to drive the vehicle by itself, or it may drive the vehicle by itself
automotive internal combustion piston engine has been developed to an impressively high state of refinement. It delivers power levels, meets emissions and fuel economy requirements, while satisfying customer demands for smoothness, quietness, reliability and cost that would have been considered unthinkable just a few years ago. Plus there's a
basic problem that faces almost every vehicle on the road: Each of them has an engine that is, most of the time, larger than it needs to be. A typical four-door sedan may have an engine rated at, say, 200 horsepower. That vehicle requires the full 200 horsepower very little of the time, normally only for guick passing maneuvers or while climbing steep
hills. The vast majority of the time the engine is operating at a small fraction of its fully rated output. Once the sedan is accelerated up to freeway speed, as little as 20 or 30 horsepower may be needed to keep it moving. In fact, many drivers may seldom, if ever, call upon the full power output of the engines under their cars' hoods. What people really
need is 200 horsepower every once in a while, maybe 100 horsepower from time to time, and about 30 or 40 horsepower most of the time. The fuel economy and emissions benefits of such a powertrain should be obvious. Could an electric car do that? The pure electric vehicle is quiet and smooth and generates none of the smog-forming emissions
currently regulated for vehicles with gasoline engines. But after over a century of research, the pure electric car has the same handicap it had 100 years ago—limited range are a couple of other major concerns: While a car with a gasoline engine can be completely refueled in a few minutes, literally hours are required
to charge up an electric car. And while the gasoline vehicle runs just as well on the last drop of fuel as on the first, the further an electric car goes, the more its performance drops—because the battery is discharging—so the last of its 'range' is at a pace that becomes increasingly slow. In simple terms, the electric car doesn't have enough when it's
needed; the conventional gasoline car has too much when it's not needed. The hybrid helps solve both those issues. The road vehicle, because it has to deal with the widely varying speeds and conditions of traffic, has a more difficult duty cycle. Starts, stops, short trips, family vacations, stuck in traffic jams—all these create fuel economy and emissions
problems. To deal with this, the typical automotive hybrid system is comprised of a relatively small gasoline engine, which drives either the wheels, sometimes in concert with the engine. A battery pack supplies the electric motor, and a
generator makes the electrical power to recharge the battery. Sophisticated electronic controls watch over all these parts. As software is to computers, it's the controls that make the whole package work in harmony. Hybrid Synergy Drive (HSD). HSD is featured in the
second-generation Toyota Prius, which launched in 2003 as a 2004 model year vehicle; the Toyota Highlander Hybrid, which launched in 2005 as a 2006 model year vehicle, and the Camry Hybrid assembled in the Únited States. Hybrid Synergy Drive in the
Prius and in the Camry HybridWith its Hybrid Synergy Drive, the Prius provides a case study of how these components work together. The Prius has a 1.5-liter, four-cylinder gasoline engine is linked to the drive wheels
and a generator directly via a unique transmission and, whenever it's running, it can also drive a generator supplies electrical power to the electric motor or charges the battery, as needed. Most of the time when the Prius comes to a stop, the gasoline engine is shut down. This means no unnecessary
idling or wasted fuel while stuck in traffic or at stop signs. When accelerating from rest at a normal pace, and up to mid-range speeds, the Prius is powered by the electric motor, which recharges the battery. Once up to
speed and driving under normal conditions, the engine runs with its power split: part of this power split: part of this power streams from the engine is continuously controlled to maintain the most efficient equilibrium. If the need arises for sudden
acceleration, such as a highway passing maneuver or a quicker start from rest, both the gasoline engine and the electric motor drive the wheels. During braking and other types of deceleration, kinetic energy normally lost is converted into electrical energy, which is then stored in the battery. The state of charge of the battery is constantly monitored,
and whenever needed the generator is powered by the gasoline engine, in that it's the engine to provide the necessary charge. The result is a vehicle powered by a gasoline engine, in that it's the engine is only as big as it needs to be. It isn't
even running all the time, and if sudden acceleration is called for, both the gasoline engine and electric motor share the load. The engine in hybrid vehicles like the Prius run exclusively on gasoline, while the electrical portion of the power system never needs to be plugged in for a charge. There's no cord and no waiting. You can fill up at any normal
gas station anywhere. The Camry Hybrid system differs slightly from Prius. Camry Hybrid Synergy Drive produces a combined 187 horsepower. The first part of Hybrid Synergy Drive for Camry Hybrid Synergy Drive produces a combined 187 horsepower. The first part of Hybrid Synergy Drive for Camry Hybrid Synergy Dr
transmission. (posted on conceptcarz.com) The second part combines a small, high-torque 40-hp electric motor, an ultra-small inverter with a specially designed compact battery, and a transaxle to seamlessly combine power from the electric motor, an ultra-small inverter with a specially designed compact battery, and a transaxle to seamlessly combine power from the electric motor, an ultra-small inverter with a specially designed compact battery, and a transaxle to seamlessly combine power from the electric motor, an ultra-small inverter with a specially designed compact battery.
completely shuts down, air conditioning and power steering systems are driven electrically. In addition, an 'ECO' button helps limit energy consumption by the climate control system and under certain conditions can help improve fuel economy. Highlander Hybrid is powered by Toyota's
Hybrid Synergy Drive powertrain specifically developed to meet the load-carrying requirements and performance expectations of mid-size sport-utility vehicle (SÚV) buyers. Its all-new high-speed electric motor operates at twice the speed and delivers more than twice the power as the motor used in the Prius, producing 167 horsepower alone. The gas
and electric motors combined produce 270 peak horsepower. The Highlander Hybrid has a standard towing capacity of 3,500 pounds. There are three motor-generators employed in the 4WD-i, each has a specific function and each does double
duty as both drive motor and generator (although MG1 is a starter and provides no motive force). The engine-driven generator (MG1) can charge the battery pack, which powers other electric motors as needed, while the front electric driven generator (MG1) can charge the battery pack through regenerative braking. Power
from the gas engine and MG2 is distributed to the drive wheels via a planetary gear units are used in the system. The Power-Split unit divides the engine's drive force two ways: one to drive the wheels and the other to drive MG1 so it may function as a
generator. The Motor Speed Reduction unit reduces the speed of MG2 and increases its drive torque, significantly boosting acceleration performance. In addition to its motor-generator duties, the crucial MG1 adds two functions: one as a starter motor for the gas engine; and two, by regulating the amount of electrical power it generates (which varies
its RPM), MG1 controls the output speed of the transaxle through the planetary gear set—without clutches or viscous couplings. This is one of the key elements of the hybrid powertrain and the reason why Highlander Hybrid eliminates the 'shift shock' that can typically be felt as even the most refined modern automatic transmissions change gears.
The innovative electric 4WD-i system employs a separate 50-kW electric motor (MGR) at the rear that provides up to 96 lb.-ft. of additional drive torque as required. The system electronically varies front and rear torque distribution depending on driving low
speed or stop-and-go driving conditions. The permanent-magnet front electric drive motor (MG2) produces peak torque from zero-to-1,500 RPM, giving the Highlander Hybrid powerful and instantaneous response that will be especially felt and appreciated in low- and mid-speed performance and in merging and passing maneuvers. Hybrid Synergy
Drive BenefitsThe real benefits, to both the owner and driver of Toyota's hybrid vehicles, are the utility and numbers. The Prius is roomy enough inside to meet the Environmental Protection Agency's (EPA) midsize category, while the Highlander Hybrid provides the versatility of a mid-size SÚV. The Prius accelerates from 0 to 60 mph in about 10
seconds, roughly equal to a four-cylinder gasoline-engine Toyota Camry. Highlander Hybrid 4WD models have an acceleration time of 7.3 seconds for 0 to 60 mph. Prius has a combined EPA mileage estimate of 46 mpg, giving it the best EPA rating of any vehicle sold in America today. Highlander Hybrid's combined city/highway estimated EPA fuel
efficiency rating of 26 mpg is more than double that of most V8 powered SÚVs. Camry Hybrid as SÚLEV, or Super Últra Low Emission Vehicle and the 2008 Camry Hybrid is certified as Advanced Technology Partial Zero Emissions
Vehicle (AT-PZEV). A decade ago, these combinations were unimaginable. Source - Toyota
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