

Concepts from Tokyo

Sturm und drang and a couple of hurricanes landed on these far eastern isles of Japan in full force. The **Mercedes-Benz** SLR, **Audi** LeMans Quattro, **Bentley** Continental GT, **Porsche** Carrera GT, **Ferrari** Enzo, **Alfa Romeo** 8C Competizione, **Bugatti** Veyron, **Ford** GT, and **Cadillac** Sixteen, to name some, made their imposing appearances at the Hakuhari Messe, the site of the biennial Tokyo Motor Show.



The Japanese chose not to resort to Kamikaze (literally means "God's wind") tactics to fend off those exotic offensive weapons. In fact, **Nissan** president Carlos Ghosn let it be known that the company's next-generation ultra-high-performance GT-R coupe would not happen until 2007, an unusually long lead-time in the industry where months are normally quoted. **Toyota** kept mum on a rumored super sports car project powered by a Formula One-inspired V10 engine.

Instead, the Japanese adopted a kinder and gentler approach with concept vehicles named Serenity, Kiwami, Ibuki, and Fuga (the three Japanese words meaning sublime, breath, and elegance, respectively). The show imparted a quieter and more

subdued impression than in the past, as observed by many a foreign visitor. This was probably because dance and song routines were curtailed on the press days, and fewer women adorned the wheeled exhibits.

Fuel cells everywhere

Toyota's show theme was "Ecology and Emotion," which might have been shared by the other members of the Japanese industry, if not in exact wording. The show had the greatest number of fuel-cell vehicles ever gathered under one roof. Both Toyota and **Honda** have now delivered models to selected private customers, as well as to the government and municipal agencies in Japan and the U.S. Nissan, **Mitsubishi**, **Daihatsu**, and heavy-vehicle specialist **Hino** have received road-worthiness certifications and are evaluating their fuel-cell vehicles on the public road. **Suzuki** will join soon with its mini fuel-cell car using **GM's** stack. Mitsubishi employs **DaimlerChrysler's** fuel-cell system, Daihatsu and Hino the parent Toyota's.

GM saw it worthwhile to field-test its Hydrogen3 vehicle in Tokyo, and has been running an example for **FedEx** delivery duties. DaimlerChrysler has announced a lease plan of the A-Class fuel-cell car.

All these fuel-cell vehicles are based on volume and limited-production architectures. Toyota and Honda are



GM HydroGen3 tackles delivery duties in Tokyo for FedEx.



Toyota Fine-N packs its fuel cell under floor.

among the few companies at the leading edge of fuel-cell-vehicle technologies, yet they are not as ambitious or optimistic as GM with their "commercialization" plans, which may happen toward the latter part of the 2010-2020 time frame. Yet, they are now probing unique and specific fuel-cell-vehicle architectures in Toyota's Fine-N and Honda's Kiwami concepts.

Toyota's Fine is coined from Fuel cell INnovative Emotional Next-generation. The company had shown a sports car version, the Fine-S, at the 2003 North American International Auto Show in Detroit. The Fine theme places its FCHV (fuel cell hybrid vehicle) system (with emphasis on H) under the floor, not unlike GM's Hy-wire concept, but with a unitary body structure versus the latter's body-on-a-skateboard. Four in-wheel motors mounted on 22-in wheels, each putting out 25 kW and 110 N•m (81 lb•ft), propel the Fine-N. The fuel-cell system is Toyota's latest and is only 150 mm (5.9 in) in height. It employs an in-house developed and produced lithium-ion secondary battery pack. Gaseous hydrogen is stored in three tanks at 700 MPa (101 ksi)—twice the pressure of the "production" FCHV. Steering, acceleration, deceleration, and braking are all by-wire. The Fine-N seats four in its roomier-than-LS430 cabin, and is 4355 mm (174.5 in) long on a 3100-mm (122.0-in) wheelbase, 1820 mm



Honda Kiwami has its major fuel-cell components in central tunnel.



Suzuki's Mobile Terrace is based on GM's Hy-wire skateboard platform.

(71.7 in) wide, and 1495 mm (58.9 in) tall. Toyota insiders assured the media that the Fine-N is a running car; the earlier Fine-S was a mockup.

The Honda Kiwami is about the same size as the Fine-N at 4500 mm (177.2 in) long on a 2870-mm (113.0-in) wheelbase and 1820-mm (71.7-in) width, but is very low at 1250 mm (49.2 in). It is also a four-door, four-seat "sports" sedan. It is built around the new letter-H powerplant configuration, with a dc motor driving each axle; the axle motors are the vertical bars of H. A tall and wide longitudinal frame/tunnel is the horizontal bar, and accommodates, from the front: ultracapacitor, fuel-cell stack, and "next-generation" hydrogen storage. The tunnel/frame shape does not seem to portend gaseous or even liquid storage, so Honda may have a novel idea or material solution in mind.

Osamu Suzuki of Suzuki Motor Co., who possesses uncanny business and engineering acumen, is ensuring that Suzuki maintains its technological presence by field-testing a mini fuel-cell car using GM's stack technology. The Mobile Terrace is Suzuki's idea of multi-seat, versatile people carrier on the GM Hy-wire skateboard platform. A tall B-pillarless box with two forward- and two rearward-sliding doors, it accommodates six people in various seat arrangements.



Jeep's Treo concept vehicle could be powered by a fuel cell.



Yamaha's scooter fuel cell is a direct-methanol type.

Jeep Treo designers looked a decade or more into the future. This compact future Jeep is based on a new fuel cell, twin motor, all-wheel-drive platform. It is 3235 mm (127.4 in) long, 1680 mm (66.1 in) wide, and 1585 mm (62.4 in) tall. The by-wire steering wheel/column and pedals as well as meter cluster are in a single module that slides for left- or right-hand driving.

The smallest among fuel-cell vehicles in size, but not in research expenditures, asserted an attending engineer, was the motorcycle manufacturer **Yamaha's** mini scooter called FC06. The same engineer explained that hydrogen storage by pressurized gas or sealed liquid would be unsuitable in an exposed two-wheeler, thus the choice of direct-methanol polymer exchange membrane fuel cell. The system is enclosed within the scooter's backbone frame. A brushless dc motor drives the rear wheel. An additional bonus is a 300-W ac outlet that may be used for powering electrical appliances or for emergency use. Yamaha advocates light electric two-wheel vehicles; one of its catalog models is the electric Passol scooter.



The Toyota PM electric runabout raises to allow easy ingress/egress.

EV resurgence?

Recent rapid advancement in storage battery technology has motivated some Japanese OEMs to renew their research efforts for electric vehicles (EVs), as well as incorporate such batteries with production and prototype internal combustion engine (ICE)/electric hybrid vehicles.

Toyota's PM, short for personal mobility, is a curious, single-seat runabout. Its length, wheelbase, and height are variable to suit driving conditions. In the entry/exit mode, it looks as if it is standing on its front toes, enabling the driver to easily enter and exit through a front-opening canopy. It lowers itself, extending its length and wheelbase in high-speed cruise mode. Motive power is supplied by two rear in-wheel dc brushless motors, which in the highest vehicle posture can run in opposite directions, and with the front wheels steered independently and inwards, the vehicle can turn on a proverbial dime.

Toyota is building a fleet of PMs for the Expo 2005 to be held in the prefecture of Aichi (where Toyota has its headquarters, R&D centers, and facto-



Nissan's Effis employs a compact lithium-ion battery and Super Motor.

ries). PMs will be equipped with an advanced communication and information system to "meet, link, talk, and platoon." Platooning by Toyota's definition is an electronic tow-bar function, the lead vehicle towing a number of following PMs without the following drivers operating controls.

Toyota's latest nickel/metal hydride storage battery, as employed in the new Prius, forthcoming Lexus RX/Toyota Highlander hybrid vehicles, and FCHV, must be one of the most advanced of its kind. The rectangular cassette-type cell is compact and space-efficient, and possesses high energy density. In its three generations of development and refinement, it has proven reliable and durable. Toyota has built a dedicated battery rebuild facility that is sitting idle, according to a senior engineering executive. A joint Toyota/Panasonic company produces the Ni/MH battery.

Toyota has developed and is now producing lithium-ion batteries for a super-economy version of the Vitz small hatchback in its own battery plant. This battery, too, is a cassette-type cell each rated at 3.6 V and 12 A•h. Four cells are

used in line to power the starting motor, electric pump for CVT, heater pump, and other electric equipment during idle-off operation (the engine shuts off when the vehicle is at a stop).

Nissan's Effis, obviously meaning efficient, is an electric city commuter employing two significant EV technologies.

One is a compact lithium-ion battery employing a laminated cell in place of conventional cylindrical or rectangular cassette types. Typically, laminated cells would require larger terminals because of the battery type's high output, and sealing would also become an issue due to the gas produced by repeated charging and discharging. Nissan reports that it has successfully solved these two major issues. Laminated cells may be stacked or laid flat. The short and tall Effis may seat up to 3.5 occupants (three adults and a child) or two adults and luggage. The thin, compact, lithium-ion battery pack is located under a flat floor.

The other Nissan technology is the Super Motor, which employs two coaxial rotors within the single casing. A new technique of applying compound currents to the electromagnets and inner and outer rotors has been perfected, according to Nissan. One Super Motor each at the front and rear with the rotors controlled independently can drive all wheels. One Super Motor can also function as a propulsion motor and a generator, as in a hybrid or fuel-cell vehicle.

The Elica is a grand project undertaken by the Fujisawa campus engineering department of Keio University with sponsorship and technical cooperation of 38 companies including several major Japanese automotive suppliers. The university's electric-vehicle laboratory has already produced such impressive vehicles as Iza and Kaz, the latter an eight-wheel, eight-seat, 6.7 m (22 ft) long car dwarfing a stretched limo. The Kaz was displayed at the 2003 NAIAS on the basement floor.

The Elica is a shorter "sedan" seating five, though still at 5.1 m (16.7 ft) in length, retaining eight wheels in front and rear tandems. The Elica shown at Tokyo was a mockup; however, Tokyo R&D, a respected racing car constructor, concept car builder, and electric vehicle specialist, is engineering and building a prototype. The Elica is a pure electric



Subaru's SSHEV is short for sequential series hybrid-electric vehicle.

vehicle with energy supplied by a lithium-ion battery system of 31 kW•h (55 kW•h for an acceleration trial involving 0-400 m [0-1300 ft] acceleration in 11.8 s and reaching 0.8 g) and 332 V. Each in-wheel motor is rated at 60 kW (80 hp) and 100 N•m (74 lb•ft). The Elica project team's target maximum speed is 400 km/h (249 mph), which it hopes to attain on the famous Nardo proving ground in southern Italy in 2004.

Fuji Heavy Industries, maker of **Subaru** cars and small commercial vehicles, is a strong proponent of lithium-ion batteries. Their NLE battery is a compound manganese lithium-ion type. President Kyoji Takenaka emphasizes the type's benefits of using common and inexpensive manganese in place of cobalt—a rare and poisonous substance. This battery is being developed by **NEC Lamillion Energy Ltd.**, a joint company of Fuji and electronics maker **NEC**.

As the letter L and the name Lamillion indicated, it also uses a laminated cell type that is thin in size and light in mass. The battery's exceptionally high energy density and cost-effectiveness are so promising that Takenaka predicts the advent of primarily electric (with an "ICE or fuel cell as secondary onboard charging source") vehicles in two or three vehicle generations henceforth. To showcase Takenaka's point, Fuji displayed two concept vehicles: one pure electric runabout and the other a high-performance electric/ICE (note the order) hybrid roadster.

The R1e is the EV based on a shortened two-door body of the soon-to-be-launched Subaru R2 mini car. A 240-V permanent-magnet synchronous motor operates on 240 V and drives the front wheels via a reduction geartrain. The



Toyota will put its THS-II in the Kruger/Highlander SUV.

battery is obviously the new NLE manganese lithium-ion type.

The B9 Scrambler concept is a styling exercise and running test-bed vehicle for Fuji's SSHEV (short for sequential series hybrid-electric vehicle) system. The system adapts to Subaru's longitudinal inline all-wheel-drive drivetrain. An opposed four-cylinder SOHC 2.0-L engine producing 140 hp (101 kW), is placed in the front overhang in the familiar Subaru AWD fashion, fitted with a 50-kW generator. A power split/transfer with two-way clutch and two ratios, as well as a 100-kW propulsion motor, are placed aft of the engine/generator.

The vehicle moves off and operates up to 80 km/h (50 mph) on electric power, drawing energy from the manganese lithium-ion pack of 60-kW output at 288 V. The engine starts automatically and the generator charges the batteries when required and cuts out when charging is completed. In high-speed operation above 80 km/h (50 mph), the engine takes over driving via a high-ratio split/transfer device. For spirited ICE driving, a low-ratio split/transfer is engaged. For short bursts of acceleration, both the motor and engine provide propulsion in the low ratio.

The B9 Scrambler is equipped with Subaru's Active Driving Assist, employing stereo cameras (two CCD cameras functioning as human eyes), preview control unit coordinating electronic throttle, brakes and vehicle dynamic system, and a central data and navigation display.

Other OEMs and suppliers actively researching and developing lithium-ion batteries include Mitsubishi in cooperation with **Japan Storage Battery** and **Litel**, as well as **Hitachi**.



Daihatsu UFE-II adopts Toyota's ICE/electric hybrid system.

As a leader in the ICE/hybrid race, Toyota is outpacing the competition with the recently launched second-generation Prius. The Japanese giant displayed two larger vehicles employing the second-generation Toyota Hybrid System (THS-II) with the 3.3-L V6 engine in a Lexus RX prototype and Toyota Highlander. The system is basically a beefed-up version of the Prius unit, retaining the planetary-gear power split/transfer, which functions as an electric/mechanical CVT.

Toyota had launched another hybrid system in the Japanese-market Estima and Alphard minivans that adopts a belt-and-pulley-type CVT driving the front wheels. The engine for this system is the 2.4-L inline four-cylinder unit shared with the Camry. The THS-C system is combined with a sophisticated electric rear-wheel drive and advanced chassis control. Toyota has since determined that the new THS-II, with the planetary unit, is capable of handling higher torque and is more cost-effective, thus the adaptation to bigger SUVs.

Toyota recently demonstrated a trio of "track" Priuses. The ICE powertrain portion is now a mildly tweaked version of the conventional four-cylinder 1.5-L engine producing 99 hp (74 kW) at 6500 rpm, versus the stock Prius' Atkinson-



Honda IMAS is a development of the Insight IMA theme.



Mazda's Miata-sized Ibuki is based on a shortened RX-8 platform.

cycle late-inlet-closing unit putting out 77 hp (57 kW) at 5000 rpm. The propulsion motor is now rated at 60 kW (82 hp), versus the stock 50 kW (68 hp) at a higher voltage of 550 V. The maximum system output is thus 107 kW (145 hp), versus the stock car's 82 kW (111 hp) at 85 km/h (53 mph). Maximum torque is unchanged at 478 N•m (353 lb•ft). The 28-cell Ni/MH battery pack receives additional cooling and its output is hiked to 34 kW (46 hp) versus the stock 25 kW (34 hp). With the body gutted but retaining air-conditioning and power windows, and the chassis appropriately tuned, the track Prius is a bundle of fun.

The CS&S (for concept sports and specialty), a two-seat roadster first shown at the Frankfurt Motor Show, carries the THS-II power pack amidships behind the cockpit driving the rear wheels, combined with electric front-wheel drive. Toyota is said to be toying with yet another variant



The Mazda gasoline/hydrogen RX-8 employs an electrically assisted turbocharger and electric propulsion motor.

of the midship THS-II and all-wheel-drive concept having a more powerful ICE/motor combination.

Daihatsu, compact and light car specialist in the Toyota group, adapted the parent company's THS with its own Atkinson-cycle, gasoline direct-injection, inline three-cylinder 660-cm³ engine, and put it in an aerodynamic, light-weight coupe body with gull-wing doors called UFE-II (standing for ultra fuel efficiency II). The body is made of composite materials, and has a mass of 570 kg (1256 lb). It is fitted with unusually narrow 115/65R16 tires to reduce rolling resistance. Daihatsu claims a Japanese urban fuel economy of 60 km/L (142 mpg).

Hybrids go mainstream

Honda's IMAS sports coupe concept is a logical, albeit more costly, development of the Insight IMA theme. The aerodynamic (a 0.20 Cd is claimed) vehicle is largely made of carbon-fiber-reinforced plastic and aluminum and has a mass of just 700 kg (1543 lb). Honda hopes to better 40-km/L (96-mpg) fuel economy with the IMAS. Measuring 4050 mm (159.4 in) in length, 1755 mm (69.1 in) in width, and 1300 mm (51.2 in) in height, the car is a 2+2.

Mazda's Ibuki is a study of a light-weight roadster sports car hinting what the next generation will be like, if not in



The Mercedes-Benz F500 Mind is a V8 diesel/electric hybrid.

actual styling but surely in its technical configuration. It is an adaptation of the RX-8 architecture with its ICE/electric motor powertrain pushed further rearwards from the front axle center. The layout would have overcrowded the dashboard area, had it retained HVAC there, severely limiting legroom. So the latter, now electrically driven, is relocated behind the cockpit. Layout engineer Isao Tohda happily reports that the occupants receive more air. Combined power output is 132 kW (180 hp) and 180 N•m (133 lb•ft). A 42-V battery supplies energy to the propulsion-assist motor.

Mazda's Technical Research Center has resumed its research and development of the hydrogen-fueled rotary engine. The standard-power RENESIS two-rotor engine is modified to run on either gasoline or hydrogen. The latter is supplied from a 350-MPa (50.8-ksi) gaseous storage tank via a regulator and sequentially injected into the rotor chamber from two side-by-side injectors positioned on the top of the housing. The injector is a modified CNG type made by **Keihin**. The engine retains the standard two-injector strategy for gasoline operation, located on the intake side of the housing as in the base RENESIS.



Nissan Serenity reflects this Tokyo Motor Show's trend of Japonism.



Lexus' LF-S shows the premium brand's new design direction.

In its current naturally aspirated form, the engine's output is reduced in hydrogen operation from the gasoline RENESIS' 154 kW (210 hp) and 222 N•m (164 lb•ft) to 81 kW (110 hp) and 120 N•m (89 lb•ft). Mazda is working on two new technologies to regain performance. One is an electrically assisted turbocharger. An integral electric motor assists spin of the turbine in the engine's low-mid rpm zone, starting from 1000 rpm, until sufficient exhaust pressure builds up. The other is a hybrid system, employing a motor/starting motor/generator drawing energy from a 144-V battery pack. Yuji Takamori, General Manager, vehicle technology laboratory of the research center, confides that the electrically assisted turbocharger may be employed as an auxiliary regenerative unit to the motor/generator.

The Mercedes-Benz arm of DaimlerChrysler must value the Japanese



The HSC (Honda Sports Car Concept) has a V6, and is bigger and lower than the NSX.

market, choosing the Tokyo Motor Show for past significant world premiers including the Maybach and F400 concepts. This year it presented another and a rare show surprise, the extraordinary F500 Mind concept powered by a V8 diesel and electric hybrid. The diesel produces 184 kW (250 hp), while the motor is rated at 50 kW. A 300-V battery pack provides electric energy for propulsion. The vehicle moves off on electric power; the motor is the motive unit in stop-and-go conditions or in other situations for which the ICE does not operate at optimal efficiency, explains Mercedes-Benz. When more power is demanded, the diesel cuts in to provide brisk acceleration. Mercedes claims a 20% improvement in fuel consumption as compared with a conventional common-rail diesel power.

Described as "a research laboratory on wheels," the F500 features a unique door system in its four-door fastback sedan body. The system allows the doors to be opened in two different ways: with conventional front-hinged, rear-opening or via center-opening. In the latter, the B-pillar stump moves rearwards with the



Nissan's Redigo has laterally sliding roof panels.



Hyundai's Japanese design center penned the NEOS-II.

rear door, providing a 1900 mm (74.8 in) wide opening. The upper cabin is more like a cage with glass roof, supported by a hefty inner pillar growing from between the front seats. The structure allows a very thin roof section.

Japonism and near-production prototypes

Japanese designers are awakening to their roots, and "Japonism" is a predominant theme in concept cars. Carlos Ghosn drove onto Nissan's center stage in a roadster called Jikoo, meaning time and space. The curious car is to commemorate the 400th anniversary of Japan's capital, Edo, since renamed Tokyo, and the Shogunate that established the city. It also relives the spirit of Nissan's founding fathers, and its design is a homage to the 1935 Datsun Roadster.

The body is made of hand-beaten metal with some intricate surfaces and lines, and the headlamps shine through "Japanese paper screen" lenses. The long nose houses storage compartments in its forward end, and the rear deck a jump seat. Aluminum wheel patterns are reminiscent of the Shogun's coat of arms, at the sight of which Edo commoners must prostrate. Interior materials are daintily old-Edo. One interesting electronic feature is the Edo Navi, a display



Mitsubishi's SE•RO is powered by a mid-mounted three-cylinder engine.



Nissan's Jikoo celebrates Edo's (Tokyo's) anniversary.



Nissan's Fuga is likely to succeed the Infiniti M45.



Daihatsu's see-through 2+2 on a light-car platform.



The Suzuki Concept-S2 has a three-piece electrically storing hardtop.



The C-Note is Nissan's proposal for a "premium compact."



Suzuki's S-Ride seats two occupants in tandem.



Mitsuoka Motor, Japan's "ninth automaker," showed the Zero roadster.

showing current location as well as a corresponding map of the Edo period.

Blending British design flair with Japanese DNA was the idea behind Nissan's design studio in central London in an old British Railways switchyard in the Paddington basin appropriately named Rotunda. The company invited noted creative designer Sebastian Conran of Conran and Partners to interpret Japonism in the form of the Nissan Cube Cubic, a tall and stretched box that seats up to six people in its compact body. The result is the Cube3+Conran & Partners, retaining the original car's perky looks with quality British interior.

Serenity is Nissan's proposal for a next-generation multipurpose sedan seating up to six occupants in superb

comfort. Again, Japanese DNA is its design theme. The 4700 mm (185.0 in) long, 1780 mm (70.1 in) wide, and 1550 mm (61.0 in) tall five-door car with center-opening doors is powered by the a VQ35 V6 engine and Xtronic belt-and-pulley CVT driving the front wheels.

Toyota is extending its Lexus premium brand to the Japanese market. In the process, it is officially establishing the Lexus Division at its headquarters with product planners, engineers, and designers assigned to conceive, design, and develop future Lexus products. The LF-X and LF-S are precursors to Lexus' flagship SUV and sports sedan, the latter likely the 2007 Aristo/GS sedan. The two LFs are to be powered by the quad-cam 4.3-L V8 engine.

HSC stands for Honda Sportscar concept, a possible future NSX. The HSC's dimensions include an overall length 180

mm (7.1 in) shorter than the current NSX's at 4250 mm (167.3 in), with a 130 mm (5.1 in) longer 2680-mm (105.5-in) wheelbase. A naturally aspirated quad-cam V6 of over 300-hp (224-kW) output is placed transversely behind the cockpit. The body is made of carbon-fiber-reinforced plastic, suggesting a huge hike in price if put into production.

Tall boxes are popular in Japan. Nissan's Redigo is an airy box with laterally sliding glass roof panels that are stored in the longitudinal roof bar. It is based on the company's small-car platform and powered by an inline four-cylinder engine driving the front wheels via CVT and an electric motor driving the rear ones on demand.

Korea's top OEM, **Hyundai**, with an over 70% share of its home market, has research and design centers in the U.S., Europe, and Japan, although the manufacturer's penetration in the Japanese market is still miniscule. The NEOS-II, still a styling mockup, is the Japanese studio's brave attempt at creating a smart tall crossover vehicle.

Mitsubishi's aluminum bodied SE•RO is a mini featuring wraparound windshield and backlite, and it is powered by a new-generation inline three-cylinder 660-cm³ engine in a mid-underfloor location. The i concept sedan shown at



Honda's ASM minivan is a size smaller than the U.S. Odyssey.



The Toyota NLSV has a large sliding door on the curbside.



Suzuki's Landbreeze may be the next-generation Jimny (Samurai) SUV.



The XL-C will be Daihatsu's premium light car.



Tokyo R&D displayed the RD200 (top) and a road-going Japanese GT contender.

the Frankfurt show is also on this mid-underfloor platform with the triple enlarged to 1.0 L. In both cars, a belt-and-pulley CVT is employed. The exceptionally tall SE•RO qualifies as a light car in the Japanese classification, staying within 3.4 m (134 in) in length, with a 1.48-m (58.3-in) width and 2.0-m (78.7-in) height.

Daihatsu and Suzuki are pushing their respective open-air motoring envelop with the former's D-Bone and the latter's S-Ride. The buggy-like D-Bone seats four in its open body. Based on Daihatsu's all-wheel-drive light-vehicle platform, it is a doable design, according to Managing Director Kiyokazu Seo. Suzuki's two-seat concept, this one placing occupants in tandem in a skeletal body, also uses the running gear of a light car. Suzuki has designed two side-by-side two-seat runabouts, the Twin gasoline and hybrid twins, so these concepts may happen.

The Suzuki Concept S2 employs a unique three-piece retractable top that turns this 2+2 coupe into a proper convertible with no part left unstored. This car is based on Suzuki's front-wheel-drive small-car platform powered by a DOHC 1.6-L engine and semi-automatic six-speed MTA transmission.

Mitsuoka Motor is now Japan's ninth carmaker, replacing **Isuzu**, which has departed the passenger car arena and now is concentrating in medium- and heavy-commercial vehicles. Its Zero roadster is a spartan, British backyard-special-type car, while the Nouera is also a '50s-looking sedan, based on a major OEM's product.

The 2003 Tokyo Motor Show presented previews of soon-to-be-launched Japanese cars. Nissan's Fuga is the next-generation Cedric/**Infiniti** M45 sedan on a stretched and widened FM (front midship) platform. The FM platform has already produced the G35, 350Z, and Japan-only Stagea wagon. The C-Note is Nissan's proposal for a "premium compact car" for four people. Honda is readying a proper minivan, the ASM, for the Japanese market, after launching a bold low-down three-row car inheriting the name Odyssey. Suzuki's Landbreeze hints at the next-generation Jimny/Samurai mini-SUV.

NLSV stands for new life support vehicle in a typical Toyota acronym. It should have a new name when introduced in the showroom. An interesting feature of this tall box is a single large electrically operated sliding door on the curbside. The driver-side has two doors.

Daihatsu's XL-C will be the company's premium light car with styling reminiscent of the '60s.

Tokyo R&D's ambition is to build (at the joint British venture factory) its Vemac sports car series. Its first attempt, the RD180, was a respectable performer with good creature comforts; however, its cost was prohibitively high because of the longitudinal placement of a Honda-sourced 1.8-L inline four and a special transaxle. The new RD200 is powered by the transverse Honda VTEC 2.0-L four combined with a Honda six-speed transmission, allowing pricing of the car at a "competitive" five million yen (\$45,000 at \$1:¥110 rate). The most expensive must be Tokyo R&D's RD350, a road-going version of the RD350R, currently contending in the Japanese GT Championship series racing in the senior 500-hp (373-kW) category. Chairman Akihiro Irimajiri, designer of the magnesium hull of Honda's last Formula One contender in the '60s, tells that its cost, not the sticker, must be in the stratospheric region of eighty million yen, far exceeding the price of Ferrari's fabulous Enzo.

Jack Yamaguchi