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Akio Toyoda, left, and Masamichi Kogai shake hands for the first time since May 2015

Toyota, Mazda form capital alliance on common view toward car making

Toyota Motor Corporation and Mazda Motor Corporation have entered a capital alliance after two years of collaborative discussions. Amid the growing number of newcomers like U.S. IT giants to next-generation mobility, Toyota and Mazda have found that they share a common passion for making better cars. Highlights of their agreement include the establishment of a joint venture to produce vehicles in the U.S., jointly develop electric vehicles (EVs), and maintain an equal partnership.

Different from alliance with Subaru

In October 2005, Toyota formed a capital alliance with Fuji Heavy Industries Ltd. (currently Subaru Corporation), and Toyota began to produce the Camry at Subaru of Indiana Automotive, Inc. (SIA) in the U.S. The two companies recognized a synergy from the beginning of the partnership. In 2008, they entered an agreement for joint development of the front-engine, rear-wheel drive (FR) sports car, the Toyota 86/Subaru BRZ, for

which it is difficult to obtain a profit by a single carmaker. As a result, the two companies have built a positive relationship.

The Toyota-Mazda alliance also relies on the same tactics as those used in the Toyota-Subaru alliance: vehicle production in the U.S. and joint development of difficult-to-be-profitable EVs. There is a difference, though, between the Toyota-Mazda and Toyota-Subaru alliances. Subaru accepted a capital injection from Toyota, a new parent in place of the struggling General Motors. However, Mazda and Toyota will take equal stakes of 50 billion yen each. Toyota showed its respect for Mazda's efforts toward car making after it broke away from Ford Motor Company.

Serious about working together

Toyota Vice President Shigeki Terashi said at a press conference held on August 4, in Tokyo, "The agreed items suggest our resolution in a really serious manner to go together in the future. An equal stake is one evidence."

The U.S. joint venture will have an annual production capacity of 300,000 vehicles, with a capital investment of USD\$1.6 billion. Toyota plans to produce the Corolla using one assembly line, whereas Mazda will make a new crossover model for the U.S. market starting in 2021. For the U.S. market, Mazda currently exports its vehicles from Japan and Mexico. The company now captures a sustainable growth with local production in the U.S.

The development of EVs is an urgent issue for the two carmakers. Even Toyota, which produces 10 million vehicles per year, has not engaged in mass production of EVs. Environmental regulations in China, India, the U.K., and France are moving toward greater production of EVs. "Not only for hardware but also for software for vehicle controls, we will jointly develop a platform for EVs, ranging from under 660cc engine minivehicles to light trucks," said Terashi.

Welcoming newcomers from another industry

Naming Google, Apple, and Amazon, Toyota President Akio Toyoda welcomed them with "Carmakers cannot make the future alone." At the same time, he insisted, "We have a proud and long history of supporting the mobility society." Mazda President Masamichi Kogai also stressed, "For the next 20-30 years, Mazda will continue to build a small but independent brand by bringing exiting cars." The common view toward cars is the base of the two carmakers' alliance (*Daily Automotive News, August 7 issue*).

Mazda to introduce compression ignition gasoline engine "SkyActive-X" in 2019

Mazda Motor Corporation announced on August 8 that it will introduce the next-generation



Mazda President Kogai at the press conference on August 8

gasoline engine "SkyActive-X" featuring the world's first commercial use of compression ignition (CI). Homogeneous charge compression ignition (HCCI) technology was employed. Mazda developed the new engine using its proprietary method called Spark Controlled Compression Ignition (SPCCI).

SPCCI overcomes two issues that have impeded commercialization of compression ignition gasoline engines: maximizing the zone in which compression ignition is possible and achieving a seamless ignition and spark ignition.

The new engine is expected to help fuel economy by approximately 20-30 percent compared with the conventional engine-powered vehicle. Compression ignition and a supercharger together to improve fuel economy together deliver unprecedented engine response and increase torque by 10-30 percent over the current SkyActive-G gasoline engine. SkyActive-X even equals or exceeds the latest SkyActive-D diesel engine in fuel efficiency. Compression ignition makes possible a super lean burn that improves engine efficiency up to 20-30 percent over the current SkyActive-G.

Mazda's Director Kiyoshi Fujiwara said, "CI in the gasoline engine is an ideal that engineers in the world pursue. Nothing can beat it as combustion technology. The big advancement has been completed."

The carmaker also disclosed its long-term vision. It aims to reduce corporate average "well-to-wheel" carbon dioxide emissions to 50 percent of 2010 levels by 2030 and achieve a 90 percent reduction by 2050. In line with this policy, Kogai said, "we will continue efforts to perfect the internal combustion engine, which will help power most of cars worldwide for many years to come." The carmaker, beginning in 2019, will start introducing EVs and other electric drive technologies in regions that use a high ratio of clean energy for power generation or that restrict certain vehicles to reduce air pollution. Mazda will also begin testing autonomous driving technologies currently being developed in line with the company's human-centered Mazda Co-Pilot Concept, in 2020, aiming to make the system standard equipment by 2025 (*Daily Automotive News, August 9 issue*).

CO2 Reduction Effect

(based on JARA System)

The use of Reuse Parts saved
2,500 tons of CO2 emissions
in July 2017

The reference figure represents the difference of carbon dioxide (CO2) emissions at the vehicle repair using genuine (new) parts and recycled parts.*

*: Based on "Green Point System", which was jointly developed by the Japan Automotive Parts Recyclers Association and Waseda University Environmental Research Institute using a life cycle assessment (LCA) technique.

San tools expand subsidy program

According to the transport ministry, applicants seeking subsidies for purchasing scan tools (vehicle diagnostic devices) are increasing. As of August 4, applications totaled 201 since the program was launched on July 24, already exceeding the 10 percent range of the budget. The raised upper limit for subsidies and the addition of tablet-linked type scan tools for coverage might have contributed to the increase.

Inter Support Co., provider of the general purpose scan tool "G-Scan," attributed the increase to the rise in the upper limit of coverage under the subsidy system. The company offers relatively expensive products, whereas others mostly sell low-priced scan tools focused on simple and limited maintenance work, such as oil refills and battery replacement. The adoption rate of scan tools by car repair shops in Japan has achieved 80 percent.

In this fiscal year, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) widened coverage of the subsidy program to include tablet-linked scan tools in addition to single-purpose tools. The tablet-linked types are easy to use and can operate wirelessly. This is the fifth launch of MLIT's subsidy program, indicating that the ministry eyes the car repair industry as one that will continue to spend money on such tools to keep pace with advanced technologies in new vehicles. The installation rate for automated brake systems (collision impact mitigating brakes) in approximately 40 percent of all new vehicles at present is expected to reach nearly 100 percent in 2020.

Vehicle technologies are advancing rapidly. Toyota launched the second-generation Prius PHV in February 2017, and Nissan will release the fully redesigned LEAF electric car equipped with an auto parking feature in September 2017. MLIT aims to support the technological capability of car repair businesses, especially independent shops,



Tablet-linked scan tools are included in the subsidy program



Hybrid vehicles represent a very small part of total ELVs today. The market share for hybrids will certainly increase in the future.



Most plastics are landfilled as Automotive Shredder Residue (ASR).

by launching the scan tool subsidy program (*Daily Automotive News, August 8 issue*).

Hybrid vehicles increase in ELV acceptance

The acceptance rate of hybrid vehicles to total acceptance of end-of-life-vehicles (ELVs) was 0.26 percent in 2016— a very small part of total ELVs for now. However, considering that 20 years have passed since the first hybrid car—the Toyota Prius—was released in 1997, the number of hybrid ELVs is highly likely to increase year by year, as the average lifespan of an ELV is approximately 15 years. For recycling businesses, the ability to recycle hybrid vehicles (i.e., dismantling and producing recycled parts) is becoming inevitable.

The number of accepted hybrid ELVs was 8,179 units in 2016, up 39.4 percent from a year earlier. Of that, over 1,000cc engine hybrids represented 7,921 units, up 56.4 percent, and under 660cc engine hybrids were up 56.4 percent to 258. Total acceptance of ELVs identified as 3,096,790 units. Hybrid vehicles accounted for 0.26 percent, up from 0.00 percent in 2007, 0.1 percent in 2014, and 0.19 percent in 2016.

The recycler group NGP held its 20th Hybrid Car Seminar in mid-June this year to strengthen knowledge and technology regarding hybrid vehicles (*Daily Automotive News, July 28 issue*).

MLIT, MOE to prolong launch of eco-premium program

The transport and environment ministries decided to prolong the launch of its Eco Premium Car program (planned launch was set for April 2018), thereby reducing recycling fee of the car built from numerous recycled plastic parts. The program is expected to start in April 2023.

The Ministry of Land, Infrastructure, Transport and Tourism and the Ministry of Environment have been discussing the program since last September as one for which the Specific Purpose Recycling Deposit is spent. Through this program, the buyer of a new car that uses lots of recycled plastics is expected to qualify for a reduction of 10,000 to 15,000 yen in recycling fee.

In a passenger car, approximately 150 kilograms of resin or plastics is used. Ultimately, approximately 320,000 tons are used each year. However, the majority of such plastics are landfilled as Automotive Shredder Residue (ASR). Only 5 percent of plastics are recycled. The ministries aim to reduce environmental stress and recyclers' business operations by promoting the use of recycled plastic parts made from ELVs (*Daily Automotive News, August 2 issue*).

Welcome to JARA Partner Rebuilt Parts Maker

Urawa Industry, Matsui Universal Joint Corp.

Urawa Industry, a division of Matsui Universal Joint Corporation, is a rebuilt parts maker of drive shafts and power steering gears, and manufacture and sells CV outer joints. Matsui Universal Joint Corporation supplies propeller shafts and universal joints to carmakers. Urawa Industry is seeking value-added products that surpass the genuine parts as well as human resource development in the automotive recycling industry, which is facing hard times.

Never-changing attitude toward making things

"The demand for our products is declining, even

for drive shafts," said Tomonori Saotome, the division manager of the company. The auto recycling industry is entering hard times. "To make matters worse, the wind is against us. Materials of boots have changed from rubber to plastics," he added.

However, the company's policy toward making things has not changed. Saotome stated, "We don't want to make cheap products. We will continue to make ever better products so that we can see value-added products." The company's expertise in responding to carmakers' requirements for high quality is seen in the aftermarket business. Urawa Industry operates according to a completely integrated set of work processes ranging from research and design to development and production.

In-house production even for replacement parts

For example, the company replaces all outer

joints of drive shafts with new ones. It does not polish outer joints to avoid problems with stiffness and precision. All outer joints used for replacement are manufactured by the company. "They feature the abrasion resistance property that exceeds the genuine parts."

Furthermore, the company regards follow-up as a serious matter. "Our first priority is not to have the customers factory operations stop. We deliver products to the site no matter how long it takes." Kindness and honest services may be attracting repeat customers.

Urawa Industry is also active in human resource development. The company encourages employees to acquire qualifications for welding and operating numerical control (NC) machines. It also has a staff rotation system across working departments to foster multiskilled employees. "Our company will become a working team in which every employee is active and has a working theme."

Rebuilt parts for electric power steering (EPS)

The company has started manufacturing products for next-generation technologies. "Electrification of vehicles will progress and the parts will become few. We need to respond to the trend," said Saotome. The company began making rebuilt parts of EPS gears. "The situation might come in which we cannot do business only with rebuilt parts. We must go with the mindset of making parts" (*Daily Automotive News, August 17 issue*).

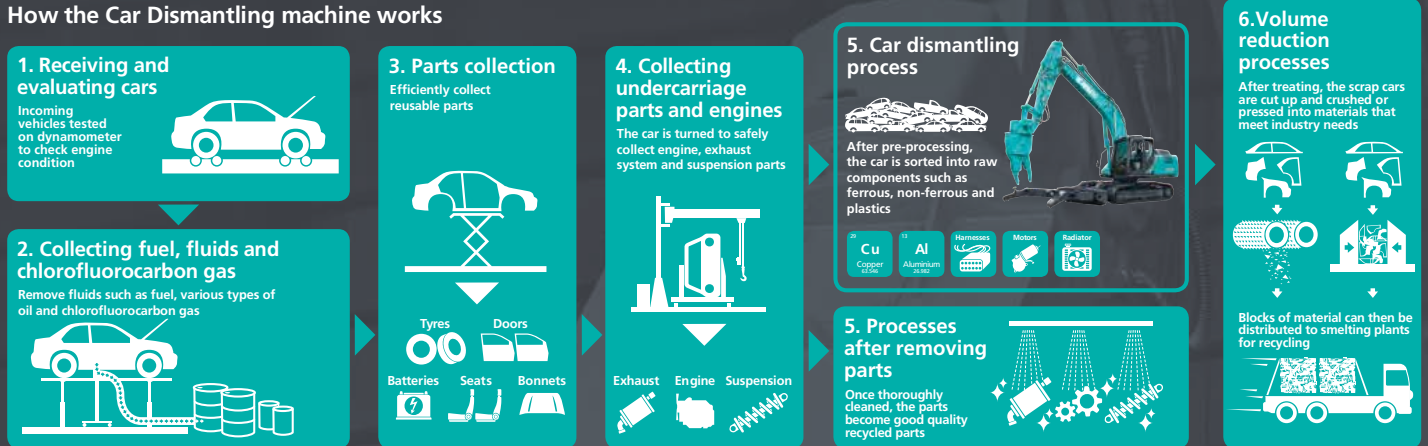


Building of Urawa Industry, Matsui Universal Joint Cooperation, left / robots introduced in the production process, center / The company has begun rebuilding electric power steering gear, eyeing future diffusion of next-generation technologies, right.



Dismantling process flow chart

How the Car Dismantling machine works



The Evolution of car dismantling industry by Kobelco

Four times* the vehicle dismantling capability compared with hand dismantling.

*In one day (Kobelco test figures)

15 vehicles >
One operative working by hand.

60 vehicles >
One operative in a Kobelco Car Dismantling machine.

Engine, Catalytic Agents, Body Steel, Seats, Windows, Wheels/Tyres, Suspension, Radiator, Brakes, Front & Rear Bumpers, Transmission, Doors, Harnesses

The machine's special attachment is designed to strip materials from End-of-Life Vehicles (ELV) safely and thoroughly

Improved recovery rate of rare earth metals

Fe Iron	Al Aluminum	Cu Copper	Pt Platinum	Pd Palladium
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Separation of these valuable materials is quicker and easier and can be performed with one Kobelco machine.



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