MOTOR SPORTS

1 Introduction

Exhibits at the 2017 Tokyo Motor Show focused on the sweeping once-in-a-century changes facing the automotive industry, namely the rise of connected and automated vehicles, the sharing economy, and growing vehicle electrification. Despite these trends, 2017 was a year in which motor sports reaffirmed its key role in communicating the enjoyment of driving, the unique ability of cars to inspire and move people, and to demonstrate that cars will not simply become commodities in the future.

2017 was also a positive year for Japanese motor sports. In car racing, Takuma Sato won the Indianapolis 500, and Toyota made a successful return to the World Rally Championship (WRC). At the top levels of Japanese domestic car racing, the leading drivers were challenged by up-and-coming young racers, leading to absorbing high-level race series. Furthermore, outside Japan, Toyota also won both the drivers' and manufacturers' titles in the NASCAR Cup Series. Less positively, Honda continued to struggle in Formula 1 and Toyota failed to erase the bad memories of 2016 at the 24 Hours of Le Mans. Motor sports also continues to face serious issues affecting the future, with the difficulties encountered by various automakers leading to Porsche deciding to follow Audi out of the FIA World Endurance Championship (WEC), and Mercedes announcing their withdrawal from the German Touring Car Masters (DTM). The appeal of motorcycle racing was given a boost by the decision of KTM AG to join the MotoGP World Championship in 2017. The 2017 MotoGP title race went down to the final round, with 2018 promising to be an even more exciting season.

2 Car Racing Trends

Table 1 lists the main categories of car races held inside and outside Japan, and the results of each competition.

2. 1. Trends in Japan

In 2017, Super GT, the pinnacle of Japanese domestic car racing, saw its first technical regulation changes for three years since 2014. There were no major changes to the rules in Super Formula and other race categories.

2. 1. 1. Super GT (Fig. 1[1])

2017 was the fourth year since the technical regulations of Super GT were harmonized with DTM. In the three years since 2014, vehicles have become faster, increasing the load on tires and brakes. Therefore, with the aim of decreasing downforce by approximately 25%, the shapes of standardized parts such as the front and rear under cowls were altered, and the previous two types of aerodynamic specifications were integrated into one. However, no major changes were made to the specifications of other standard parts, such as the monocoque. Super GT uses 2.0-liter inline 4-cylinder turbocharged engines with a fuel restrictor flow limitation of 95 kg/h. 2017 saw the re-introduction of fuel restrictor limitations once the weight handicap of a car exceeded 50 kg. A total of 8 rounds were held, including the fourth running of an overseas round at the Buriram United International Circuit in Thailand.

Furthermore, with the aim of achieving complete harmonization with the regulations of DTM, each series held demonstration runs at the other's events. In Germany, this demonstration was hosted at Hockenheim, and three

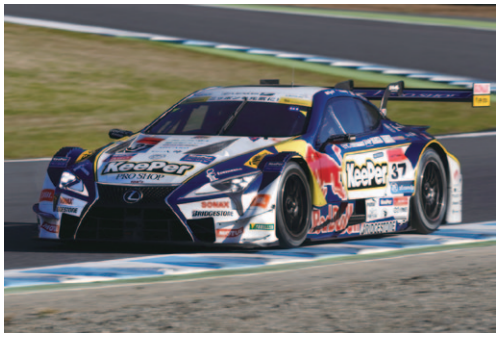

Fig. 1 TOM's Lexus LC500 (car No. 37) racing in Super GT.

Table 1 Details and results of major car racing categories in 2017.

Category			Outline of races	Outline of vehicles	Participating Japanese manufacturers	2017 champions		Remarks
						Drivers	Manufacturers	
World championships	F1		19 rounds (circuits: Melbourne, Sepang, Shanghai, Monaco, Austria, Brazil, Suzuka, Russia, Abu Dhabi, etc.)	Dedicated race cars (formula) 2.0-liter inline 4-cylinder turbocharged engines + energy regeneration	Honda	Lewis Hamilton	Mercedes	
	WEC	LMP1	9 rounds (circuits: Silverstone, Spa, Nürburgring, Le Mans, Mexico, America, Fuji, Shanghai, Bahrain, etc.)	Dedicated race cars (prototypes) 2 WD (HVs may be 4 WD) HVs: free engine design + energy regeneration Non HVs: max. 5.5-liter engines	Toyota	Earl Bamber Timo Bernhard Brendon Hartley	Porsche	
		LMP2		Dedicated race cars (prototypes) 2 WD 4.6-liter 8-cylinder NA engines		Ho-Pin Tung Oliver Jarvis Thomas Laurent		
		LM-GTE		2 WD cars based on commercially available vehicles Max. 5.5-liter NA engines Max. 4.0-liter turbocharged engines	—	James Calado Alessandro Pier Guidi	Ferrari	
	Rally	WRC class	13 rounds on general roads (Monte Carlo, Sweden, Mexico, Argentina, UK, etc.)	4 WD cars based on commercially available vehicles Max. 2.0-liter turbocharged engines	Toyota	Sébastien Ogier	M-Sport World Rally Team	
		WRC-2 class	13 rounds on general roads (held at same venues as the WRC class)	4 WD cars based on commercially available vehicles 1.6-liter turbocharged engines		Pontus Tidemand		
		WRC-3 class	9 rounds on general roads (Monte Carlo, France, Italy, UK, etc.)	2 WD cars based on commercially available vehicles (mainly FWD) 1.6-liter turbocharged engines Max. 2.0-liter NA engines		Nil Solans		
		JWRC class	6 rounds on general roads (Turkey, Portugal, Germany, etc.)	FWD cars based on commercially available vehicles 1.0-liter turbocharged engines		Nil Solans		Used the Ford Fiesta Age 29 or younger
	Touring cars		20 rounds at 10 venues (circuits: Monza, Nürburgring, Argentina, Motegi, Macao, Qatar, etc.)	2 WD cars based on commercially available vehicles 1.6-liter 4-cylinder Direct-injection turbocharged engines	Honda	Thed Björk	Volvo	Folded in 2017
International series	Super GT	GT500 class	8 rounds (circuits: Okayama, Fuji, Autopolis, Sugo, Suzuka, Thailand, Motegi)	Front-engine RWD (Honda: mid-engine RWD) based on commercially available vehicles 2.0-liter inline 4-cylinder turbocharged engines Standardized body dimensions (ground height, width, wheelbase, etc.) and main components	Toyota Nissan Honda	Ryo Hirakawa Nick Cassidy		
		GT300 class		Open specifications, including engine conversion based on commercially available vehicles, displacement, turbocharging, driving wheels, etc. FIA GT3 vehicles	Toyota Nissan Subaru	Nobuteru Taniguchi Tatsuya Kataoka		
	DTM		9 rounds (circuits: Hockenheim, Nürburgring, Brands Hatch, Shanghai, etc.)	Front-engine RWD cars based on commercially available vehicles, 4.0-liter V8 NA engines	—	René Rast	Audi	
	IndyCar		17 rounds on oval circuits (Indianapolis, Phoenix, Toronto, Long Beach, etc.)	Dedicated race cars (formula) 2.2-liter V6 twin-turbocharged engines Ethanol fuel	Honda	Josef Newgarden		
	FIA Formula E		12 rounds on specially designed courses in cities (Hong Kong, Morocco, Argentina, France, Belgium, U.S., etc.)	Dedicated race EVs Power units: motor-generator unit (MGUs) (linked to rear axle), batteries: standardized		Lucas di Grassi		
Japanese championships	Super Formula		7 rounds (circuits: Suzuka, Fuji, Motegi, etc.)	Dedicated race cars (formula) 2.0-liter inline 4-cylinder direct-injection turbocharged engines	Toyota Honda	Hiroaki Ishiura		The seventh round (the JAF Grand Prix) was canceled due to an approaching typhoon.

Table 1 Details and results of major car racing categories in 2017 (continued).

Category		Outline of races	Outline of vehicles	Participating Japanese manufacturers	2017 champions		Remarks
					Drivers	Manufacturers	
Japanese championships	F3	17 races in 8 rounds (circuits: Suzuka, Okayama, Motegi, Sugo, Fuji)	Dedicated race cars (formula) 2.0-liter inline 4-cylinder direct-injection NA engines 2.0-liter port injection NA engines	Toyota Tomei Engine Toda Racing	Mitsunori Takaboshi		Five rounds were held concurrently with Super Formula races.
	JRC	9 rounds on general roads (Karatsu, Wakasa, Toya, Tsumagoi, Hokkaido, Shinshiro)	Commercially available vehicles Divided into 6 classes (JN1 to JN6) based on displacement and layout (4WD, 2WD).		JN6 Hiroshi Yanagisawa Co-driver: Naoki Kase		
Others	Dakar Rally	Held in South America (Paraguay, Bolivia, Argentina) over total distance of 9,000 km. Start: Paraguay (Asunción), finish: Buenos Aires	Cars based on commercially available vehicles, dedicated racing trucks NA gasoline engines or turbocharged diesel engines	Toyota Auto Body Co., Ltd. Hino	Stéphane Peterhansel	Peugeot	

German manufacturers returned the privilege by racing at Motegi in November. In the GT300 class, the championship attracted 30 entries, unchanged from 2016. Cars entered under three different performance categories defined by the "mother chassis" (MC) rules, the FIA GT3 regulations, and the JAF GT300 rule book.

2. 1. 2. Super Formula (Fig. 2[1])

The 2017 Super Formula series was the fourth year of the current regulations that adopt the SF14 chassis manufactured by Dallara Automobili and a standardized NRE engine also used by the GT500 series. There were no major changes to the regulations in 2017. Although Super Formula adopts the same fuel restrictor flow limitation of 95 kg/h as Super GT, one distinguishing feature of this series is the adoption of different size restrictors depending on the circuit. Tires are supplied by a single manufacturer, with Yokohama Rubber being the official tire supplier of Super Formula since 2016. Although the Dallara SF14 is rated as a high-performance chassis, the introduction of a new chassis with an even higher level of dynamic and safety performance is being considered for 2019.

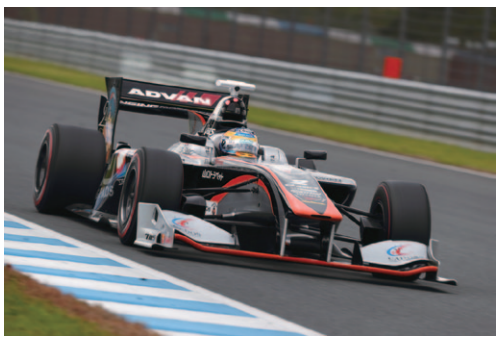

Fig. 2 Hiroaki Ishiura of the P.mu/cerumo•INGING team driving car No. 2 in Super Formula.

2. 1. 3. All-Japan Formula Three (F3) Championship

In 2017, there were 22 participants in F3, 11 "C" class cars and 11 "N" class cars that adopted the older vehicle regulations. 2017 was the fifth year since the introduction of direct injection 2.0-liter engines in class C. There are currently five engine suppliers, including TOM'S, Toda Racing, and Tomei Engine. One issue of the F3 championship has been the standardization of engine regulations between European and Japanese manufacturers. However, specification changes to engines manufactured by Japanese manufacturers registered in 2013 should finally be approved in time for the 2018 season. However, with Europe considering a switch to direct injection turbocharged engines in 2019, the supply of engines is likely to be an issue in the future. Furthermore, the TOM'S 3GE engine, which has been a long-term mainstay in the N class, will be replaced by a Volkswagen engine from 2018.

2. 1. 4. FIA Formula 4 (F4)

2017 was the third year of the F4 Japanese Championship, which began in 2015. In 2017 again, fourteen races were held, two at each of seven of the eight Super GT rounds. A total of 35 cars participated in 2017, providing a thrilling spectacle in an event that has become firmly established as an important entry formula series and a proving ground for drivers wanting to step up into higher categories.

2. 1. 5. Japanese Rally Championship (JRC)

2017 was the second year after the JRC adopted six classes in 2016. The flagship four-wheel drive (4WD) JN6 class attracted around ten entrants. Although the JN1 class allows the participation of hybrid and electric vehicles, the majority (more than ten) of entrants used conventional internal combustion engines and participation

in this class was low. The championship featured a total of nine rounds, with three races (at Rally Hokkaido and the International Rally of Tsumagoi) being held under international rules. The 2017 JRC was held on various road surfaces: one on snow (tarmac), six on regular tarmac, and two on gravel. The total points of each participant toward the titles was calculated from the best seven finishes.

2.2. Trends outside Japan

The FIA World Touring Car Championship (WTCC) folded in 2017. With the WEC also affected by declining entries from works' teams, organizers are looking for ways to alter regulations in line with the current environment surrounding the sport, with changes being made to conventional vehicle categories.

2.2.1. FIA Formula One World Championship (F1)

2017 was the fourth season from 2014 that F1 adopted a hybrid powertrain combining a 1.6-liter V6 engine with a single turbocharger and an energy recovery system (ERS). However, 2017 saw the scrapping of the token system that restricted the scope of powertrain changes with the aim of narrowing differences between manufacturers. As a result, limitations on development were lifted. Wider tires and wings also made the cars more aerodynamically stable. Of Japanese manufacturers, Honda continued to participate as an engine supplier.

2.2.2. FIA World Rally Championship (WRC) (Fig. 3[1])

In 2017, the engine air restrictor was expanded from 33 to 36 mm, increasing the horsepower of the 1.6-liter direct injection turbocharged engine from 320 to 380 horsepower or more. Wider bodies were adopted and greater flexibility given to aerodynamics part design. Despite Volkswagen's withdrawal from the championship, an exciting series was ensured by Toyota's first participation for eighteen years and the return of a works team from Citroën. The driver's title was won by Sébastien Ogier racing Fords for the M-Sport World Rally Team. This result prompted Ford to provide greater support to the team, marking the return of the company to the WRC as a factory entry in 2018. Since 2011, participants are permitted to choose tires manufactured by Michelin, Pirelli, or DMACK. WRC events are supported by accompanying WRC-2, WRC-3, and Junior WRC category races.

2.2.3. FIA World Endurance Championship (WEC)

Including the 24 Hours of Le Mans, the 2017 WEC featured a total of nine rounds. Porsche and Toyota competed for honors in the top LMP1-H class after the withdrawal of Audi. Entries in the non-hybrid LMP1-L class decreased to a single vehicle, meaning that a title was not awarded in 2017. Since Porsche also announced its withdrawal from the WEC at the end of the 2017 season, changes were considered to standardize LMP1 into a single category in 2018. The regulations were also changed in the LMP2 class to achieve further cost reductions. Chassis suppliers were limited to four companies and a single engine manufacturer was adopted.

2.2.4. FIA World Touring Car Championship (WTCC) (Fig. 4[2])

After the withdrawal of works teams from Citroën and Lada, two manufacturers, Honda and Volvo, competed for the WTCC title. The WTCC folded in 2017 and was re-launched as the FIA World Touring Car Cup (WTCR) under the TCR technical regulations in 2018. These regulations allow a wide range of manufacturers to supply cars cheaply. However, because these cars are based on conventional commercially available models, performance will differ from car-to car. As a result, it will be necessary to adopt some form of performance adjustment between vehicles in races. It will be interesting to note how successful the WTCR proves to be without the participa-

Fig. 3 Toyota Yaris racing in the WRC.

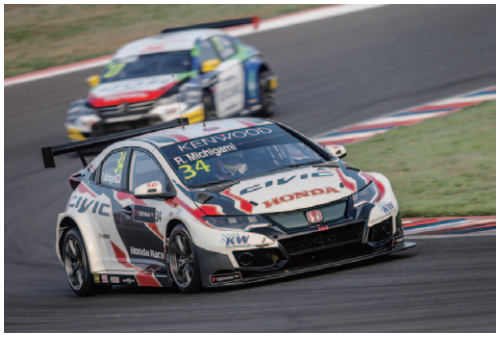

Fig. 4 Honda Civic racing in the WTCC.

tion of works' teams.

2. 2. 5. FIA World Rallycross Championship (WRX)

The 2017 WRX was held over twelve rounds on mixed courses featuring both tarmac and gravel sections. WRX races are extremely entertaining, resembling short horse races of four to six laps in stadiums that allow the spectators to see every part of the action. The 2017 series featured no regulation changes, and the entrants are 4WD cars with 2.0-liter turbocharged engines. A world championship for electric vehicles adopting the same format is currently being considered.

2. 2. 6. FIA Formula E Championship

2017 was the third season for this series. Although two teams withdrew, the maximum field of twenty cars from ten teams was filled by new entrants from Jaguar and the Chinese team Techeetah, indicating that Formula E has become fully established as a race series. The quietness of the cars allows Formula E to run on specially designed courses in cities, creating a wholly new format of motor sports. Although the batteries currently used by Formula E cars cannot last the whole race distance, a new single battery manufacturer is being considered to supply higher performance batteries from 2019.

3 Motorcycle Racing Trends

Table 2 lists the main categories of motorcycle races held inside and outside Japan, and the results of each competition.

As a result of the efforts and close cooperation between the series organizers, promoters, and manufacturers that develop the bikes and run the teams in the planning and running of each series, 2017 saw exciting races across all motorcycle race categories.

In MotoGP, the pinnacle of motorcycle road racing, 2017 was the second season after the adoption of unified engine control unit (ECU) software. As each team gained a greater understanding of this software, the performance gaps between teams narrowed compared to 2016, increasing the number of close races. Satellite teams had greater opportunities to rise to the top and four different

Table 2 Details and results of major motorcycle racing categories in 2017.

Category			Outline of races	Outline of vehicles	Participating Japanese motorcycle manufacturers	2017 champions	
						Riders	Manufacturers
World championships	Road races	MotoGP	Competition for position by racing around a circuit (approximately 110 km). Races are held in different countries and the total of points awarded at each race determines the annual standings. MotoGP is the highest class.	Dedicated bikes for MotoGP with 4-stroke max. 1,000 cc engines	Honda Yamaha Suzuki	Marc Márquez	Honda
		Moto2		Dedicated bikes combining a 4-stroke 600 cc commercially available engine and bodies developed by each constructor	Honda (engine supplier)	Franco Morbidelli	Kalex
		Moto3		Commercially available or dedicated racing bikes with a 4-stroke 250 cc engine	Honda	Joan Mir	Honda
	Superbikes		Same competition style as road racing, but uses a two-heat system of two races in each round.	Bikes with a commercially available max. 1,000 cc engine (2-cylinder bikes are permitted a max. displacement of 1,200 cc.)	Honda Yamaha Kawasaki	Jonathan Rea	Kawasaki
	Endurance		Road races in which teams compete for position with two or three riders alternating stints on a single bike over an extended period of time (8 or 24 hours).	Bikes with a commercially available max. 1,000 cc engine (2-cylinder bikes are permitted a max. displacement of 1,200 cc.)	Honda Yamaha Suzuki Kawasaki	David Checa Mike Di Meglio Niccolò Canepa	Yamaha
	Motocross	MXGP	Competition for position on a motocross (unpaved dirt or sand) track that lasts for 30 minutes + 2 laps (two-heat system). Races are held in different countries and the total of points over a year determines the standings.	Dedicated motocross bikes with a 4-stroke max. 450 cc or 2-stroke max. 250 cc engine	Honda Yamaha Suzuki Kawasaki	Antonio Cairoli	KTM
		MX2		Dedicated motocross bikes with a 4-stroke max. 250 cc or 2-stroke max. 125 cc engine		Pauls Jonass	KTM
	Trials		Competition to complete set courses within a time limit without a foot touching the ground.	Dedicated trials bikes (no displacement restrictions)	Honda	Toni Bou	Honda
Japanese championships	Road races (JSB1000)		Competition for position by racing around a circuit. Races are held at different tracks and the standings are determined by points obtained over a year.	Bikes with a generally commercially available max. 1,000 cc engine (2-cylinder bikes are permitted a max. displacement of 1,200 cc.)	Honda Yamaha Suzuki Kawasaki	Takumi Takahashi	Honda
	IA1 (motocross)		Highest class of the All Japan Motocross Championship. Competition for position on a motocross track lasting for roughly 30 minutes. Races are held at different tracks and the standings are determined by points obtained over a year.	Dedicated motocross bikes. The IA1 class features dedicated motocross bikes with a max. 4-stroke 450 cc or 2-stroke 250 cc engine.	Honda Yamaha Suzuki Kawasaki	Kei Yamamoto	Honda
	IA super (trials)		Competition to complete set courses within a time limit without touching the ground. Highest class of the All Japan Trial Championship.	Dedicated trials bikes (no displacement restrictions)	Honda Yamaha	Tomoyuki Ogawa	Honda

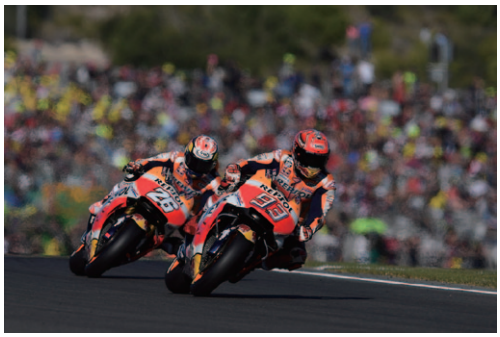

Fig. 5 Marc Márquez (No. 93) racing in MotoGP.

riders took the podium eight times. The 2017 series resulted in thrilling races that met the expectations of organizers and promoters.

One issue in the 2016 season was the use of winglets. After the regulations were changed on safety grounds, teams still managed to adopt various innovative designs in 2017.

The Riders' Championship came down to a two-way battle between Marc Márquez and Andrea Dovizioso, with Márquez (Fig. 5[2]) securing his second consecutive title and fourth in total at the very last race. Although factory teams continued to dominate the top of the rankings, riders from satellite teams such as Johann Zarco and Daniel Pedrosa also managed to infiltrate the top ranks.

In Moto2, Franco Morbidelli won the Rider's Championship with eight wins, with Thomas Lüthi in second place with two wins. Both these riders were rewarded with a promotion to MotoGP in 2018.

Joan Mir won the Moto3 Rider's Championship with ten wins. Honda took the Moto3 Constructors' Championship with seventeen wins out of eighteen races, and supplied bikes to the top seven riders.

Looking at the series that are based on commercially available motorcycles, seven manufacturers competed in the 2016 Superbike World Championship (WSB). Despite strong competition from the world's leading riders, Jonathan Rea won his third consecutive world championship. In the All Japan Road Race Championship, Takumi Takahashi racing for the "MuSASHi RT HARC-PRO. Honda" team won his first Riders' Championship.

At the Suzuka 8 hours Endurance Road Race, which was the fifth round of the Endurance World Championship, the Yamaha factory team repeated its victory of the previous year. Motorcycle racing is attracting more and more spectators each year as the organizers react to trends in the overall motorcycle world.

As an example, the Motocross World Championship has adopted the following changes to its regulations. From the 2010 season, the International Motorcycling Federation (FIM) introduced a measurement method called "2 meter max" with the aim of strengthening sound level regulations. This has a close correlation with the acoustic power level (LwA) generated under full-throttle acceleration. This method measures the maximum sound level of a stationary bike brought rapidly to maximum engine speed. After this method was introduced, teams began to intentionally manipulate ECU data to lower the engine speed during measurement, which prompted the FIM to change the measurement device. From the 2016 season, the FIM began to use a device that measures the engine speed based on exhaust pulsation and the sound level at the same time. By increasing the accuracy of engine speed detection, regulatory non-compliance was successfully eliminated in 2017.

One of the major attractions of motocross is the start, in which all the riders line up together in a single horizontal line behind a start gate that drops down. Until 2017, the road surface in front of the start gate was part of the course and many riders used their feet or hands to prepare ruts in the surface and ensure grip prior to the start. From the 2017 season, a steel mesh was placed on the course in front of the bikes (Fig. 6[2]), creating an equal surface for all the riders. This mesh has a standard design, which ensures an equal start regardless of the course. Riders and mechanics are forbidden from entering inside the area of the mesh before the start, and event organizers are able to sweep the dirt or sand un-

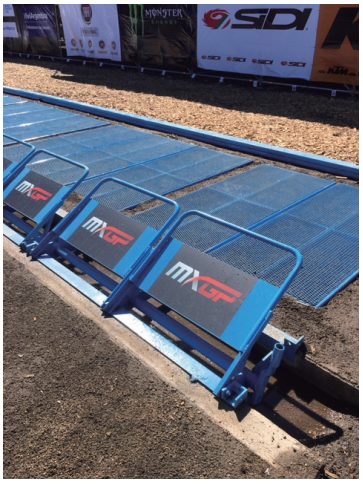

Fig. 6 New start gate used in the Motocross World Championship.

der the mesh.

As described above, motorcycle racing both inside and outside Japan worked hard to attract more fans in 2017 by harnessing the efforts of the whole industry.

4 Motor Sports Tire Trends

In various categories of motor sports, a common trend has been to switch to single tire suppliers with the aims of reducing costs and creating equally competitive conditions. However, this trend appeared to settle down in 2017. Series that currently allow competition between tire manufacturers are likely to continue this approach in the future. A typical example is Super GT, which retains immense popularity in Japan. Other major series such as the WEC, WRC, and the Nürburgring Endurance Cup (VLN) also have open tire suppliers, but the classes in these series are essentially dominated by single suppliers and are not forums for open competition in the same way as Super GT, even when the races are used for technical development or to boost market share and sales through enhancing the performance of commercially available tires. In contrast, fierce tire development competition is continuing in speed-based series such as the All Japanese Dirt Trial Championship (JDC) and Japanese Gymkhana Championship (JGC), as well as in the JRC and the OK class of the All Japan Karting Championship. Tire competition is also a fixture in the 86/BRZ race series that started in 2013. This underlines the fact that Japan is home to a large number of race series with open tire competition.

Tire competition is important for several reasons, one being that the choice of tires is an important factor in determining the outcome of races. Although races are not determined just by the tires, and are affected by many other factors related to the engine, chassis, and other components, tires have a particularly major impact. Therefore, the continuous development of tires can attract considerable attention as a major selling point of some race series.

In contrast, the adoption of single suppliers (i.e., the equalization of race hardware) has the effect of increasingly balancing out differences in vehicle performance, turning race series into tense battles between drivers. Although this has its merits, it also has the adverse effect of rendering competitive developments duller and less spectacular, accelerating the drift of spectators away from the series. Another similar trend can be seen in recent circuit-based series, especially in the top categories of races. As aerodynamic research accelerates and the number of vehicles that rely on downforce increases, exciting close-quarter racing becomes more difficult. The result tends to be fewer spectacular races with frequent battles between cars and overtaking. For example, the objective of tweaks to the regulations in Super Formula (two-race, two tire specifications) (Fig. 7[3]) was to stop races turning into processions, and the manufacturer was required to supply tires with clearly defined characteristics to facilitate this goal. To further improve the situation in the future, if (for example) it becomes permissible to manufacture cars with less downforce that are capable of racing at closer quarters, it would be extremely simple to maintain the quality (i.e., the speed) of racing by increasing the grip of the tires.

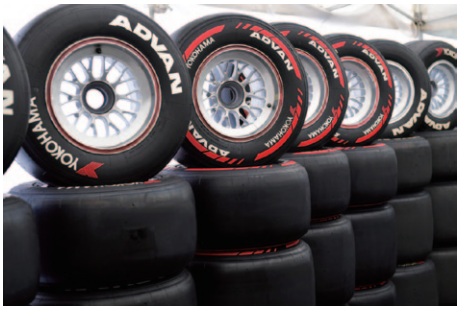

Fig. 7 Tires used in Super Formula (provided by Yokohama Rubber).

In other words, racing tires in the future are likely to face even higher demands for both characteristic controls and performance. In contrast, if it becomes possible to control the transient characteristics of tires on the vehicle side in the future through electrification of the car or through advances in control technologies, tire requirements will likely become more focused on essential factors, such as durability against load and high speeds, linearity, basic road-holding performance, and the size of the absolute tire friction circle. Tire manufacturers should work toward reducing weight, increasing stiffness, and saving resources by improving these basic tire performance factors through motor sports. At the same time, this will also serve to support and stimulate the popularity of motor sports in the future. Tire manufacturers also have the responsibility to feed back these lessons into general pneumatic tire technologies, and to continue commercializing the optimum tires demanded by the market.

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