
MOTOR SPORTS

1 Introduction

In 2019, the world of motor sports was given a boost by the combined efforts of manufacturers to promote the enjoyment of mobility, such as Honda and Toyota agreeing to jointly host and participate in the 2019 Suzuka Motorsports Fan Thanks Day.

Stable regulations continued to encourage fierce battles in all categories of car racing in Japan, with the champions of many series being decided only in the final race. Outside Japan, Honda won its first races in Formula 1 for thirteen years, winning three times over the course of the season. There were also many other positive topics of interest, as Toyota scored its second successive victory at the 24 Hours of Le Man and won the driver's title in the World Rally Championship (WRC). In addition, Formula E continued to attract new works teams, including Nissan, and is continuing to solidify its foundations as a recognized category of racing. For Japanese manufacturers, in which fields to participate and how to attract the attention of the public will remain topics of attention for the future.

In the field of motorcycle racing, Honda and Kawasaki won their fourth and fifth successive manufacturers' titles in MotoGP and the Superbike World Championship, respectively, demonstrating a powerful reminder of those companies' technical capabilities.

2 Car Racing Trends

2.1. Trends in Japan (Table 1)

Super GT delivers high-level competitive races involving multiple vehicle and tire manufacturers, and continues to attract great popularity. It is one of the few series around the world that still allows competitive tire development, something that is very appealing to fans. Super Formula introduced its first new chassis for six years and boosted its global appeal as a series for drivers aiming to gain a Super License. Rallying also attracted atten-

tion by holding a candidate event with an eye on hosting an official WRC round in Japan for the first time in ten years.

(1) Super GT (Fig. 1)

The 2019 season was the third and final year to use the GT500 class regulations that were introduced in 2017. All the entrants continued to boost the performance of the aerodynamic and engine areas that allow competitive technical development. As a result, four of the eight rounds saw new course records set. Super GT allows competitive tire development by the participating tire manufacturers, and improvements to these tires probably made a major contribution to the faster times.

The GT300 class attracted a full slate of twenty-nine entries under three different performance categories. Twenty-two cars raced under the FIA GT3 regulations, four followed the unique "mother chassis" (MC) rules, and three adopted the JAF GT300 rule book.

Although it is planned to adopt the same Class One rules as the German Touring Car Masters (DTM) series in 2020, the final DTM round in Hockenheim in October allowed participation by three Super GT cars (one from each manufacturer) ahead of the official introduction. In addition, after the end of the season, fifteen Super GT cars were joined by seven DTM cars in a twenty-two car mixed race at Fuji Speedway in November.

(2) Super Formula (Fig. 2)

Super Formula upgraded its standard chassis from the SF14 to the SF19 (both manufactured by Dallara Automobili) and added the halo cockpit protection device. The overtaking system procedure was also changed, from the five bursts of 20 seconds allowed previously to a total limit of 100 seconds. Although the limitation on the number of times was lifted, once the 100-second limit is reached, the system can no longer be used and the rear caution lamp starts to blink slowly, adding a new strategic element to the racing battles.

Table 1 Details and Results of Major Car Racing Categories in 2019

Category	Outline of races	Outline of vehicles	Participating Japanese manufacturers	2019 champions		Remarks		
				Drivers	Manufacturers			
World championships	F1	21 rounds (circuits: Bahrain, Shanghai, Monaco, Spielberg, Singapore, Sochi, Suzuka, Abu Dhabi, São Paulo, etc.)	Dedicated race cars (formula) 1.6-liter V6 turbocharged engines + energy regeneration	Honda	Lewis Hamilton	Mercedes		
	WEC	LMP1	Season held over 8 rounds between 2018 and 2019 (circuits: Spa, Le Mans, Silverstone, Fuji, Shanghai, Sebring, Spa, Le Mans) Dedicated race cars (prototypes) 2 WD (HVs may be 4 WD) HVs: free engine design + energy regeneration Non HVs: free engine design	Toyota	Fernando Alonso/ Kazuki Nakajima/ Sébastien Buemi	Toyota		
		LM-GTE			Kevin Estre/ Michael Christensen	Porsche		
	Rally	WRC class	13 rounds on general roads (Monte Carlo, Sweden, Mexico, Argentina, UK, etc.)	4 WD cars based on commercially available vehicles Max. 1.6-liter turbocharged engines	Toyota	Ott Tänak/ Martin Järveoja	Hyundai	The final round in Australia was cancelled.
	Touring cars	30 races at 10 venues (circuits: Marrakech, Hungaroring, Nürburgring, Zandvoort, Ningbo, Suzuka, Macao, Sepang, etc.)	2WD cars based on commercially available vehicles (FWD) 1.75- to 2.0-liter turbocharged engines HVs not permitted.	Honda	Norbert Michelisz			
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 (same as DTM) Standardized body dimensions (ground height, width, wheelbase, etc.) and main components	Toyota Nissan Honda	Kazuya Oshima Kenta Yamashita			
		GT300 class	Open specifications, including conversion based on commercially available vehicles, displacement, turbocharging, driving wheels, etc. FIA GT3 vehicles	Toyota Nissan Honda Subaru	Shinichi Takagi Nirei Fukuzumi			
	IndyCar	17 rounds on oval circuits (Indianapolis, Laguna Seca, Toronto, Long Beach, etc.)	Dedicated race cars (formula) 2.2-liter V6 twin-turbocharged engines, ethanol fuel	Honda	Josef Newgarden			
	FIA Formula E	13 rounds on specially designed courses in cities (Hong Kong, Morocco, Mexico, Rome, Paris, Berlin, New York, etc.)	Dedicated race EVs Power units: motor-generator unit (MGU) (linked to rear axle), batteries: standardized	Nissan	Jean-Eric Vergne			
	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	Nick Cassidy			
	F3	20 races in 8 rounds (circuits: Suzuka, Okayama, Motegi, Sugo, Fuji, Autopolis)	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	Sacha Fenestraz			
Japanese championships	JRC	9 rounds on general roads (Karatsu, Yokote, Tsumagoi, Hokkaido, Shinshiro)	Commercially available vehicles Divided into 6 classes (JN1 to JN6) based on displacement and layout (4 WD, 2 WD).		JN1 : Toshihiro Arai/ Naoya Tanaka JN2 : Tomoyuki Shinkai/ Yuichi Ando JN3 : Yuta Yamamoto/ Mami Yamamoto JN4 : Masato Sekine/ Kohei Kusaka JN5 : Tomoyuki Amano/ Yukiko Inoue JN6 : Satoshi Okura/ Koji Toyota		The tenth round was cancelled.	
Others	Dakar Rally	In 2019, held entirely in Peru. Total length: 5,500 km Start/finish: Lima	Cars based on commercially available vehicles, dedicated racing trucks NA gasoline engines or turbocharged diesel engines	Toyota Toyota Auto Body Co., Ltd. Hino	Nasser Al-Attiyah/ Matthieu Baumel	Toyota		



Fig. 1 Super GT: Lexus LC500⁽¹⁾



Fig. 2 Super Formula: VANTELIN TEAM TOM'S⁽¹⁾



Fig. 3 JRC: Subaru WRX STI Driven by Toshihiro Arai and Naoya Tanaka⁽²⁾

(3) All-Japan Formula Three (F3) Championship

Starting in 2013, this was the seventh year of the regulations requiring a direct injection 2.0-liter engine combined with a standardized chassis from Dallara. The 2019 Japanese Formula 3 Championship attracted fifteen entries with twenty drivers and five different engine suppliers. The series was fought over twenty races in eight rounds, six of which were held in conjunction with Super Formula events.

The 2019 season attracted global attention with the participation of teams from both Japan and Europe.

However, the long 41-year history of the All-Japan F3 Championship came to a close in 2019 following the reorganization of global formula racing categories. From 2020, the All-Japan F3 Championship will be renamed Super Formula Lights and will be held as a unique Japanese category using a new chassis.

(4) Japanese Rally Championship (Fig. 3)

After the final round in Iwaki, Fukushima Prefecture, was cancelled due to Typhoon Hagibis (typhoon No. 19 of 2019), the 2019 Japanese Rally Championship consisted of a total of nine events: one held on snow, four on tarmac (paved roads), and four on gravel. Of these events, round five (Tsumagoi in Gunma Prefecture) and round seven (Obihiro in Hokkaido) were held in conjunction with the FIA Asia Pacific Rally Championship. 2019 proved to be an exciting season with no major accidents or incidents, and an average of 56 cars participating in each round.

Several changes were made to the technical regulations. In the top JN1 class (four-wheel drive cars with an engine displacement exceeding 2,500 cc), Group R5 cars under FIA regulations were allowed to enter. The JN6 class was also introduced, which allows automatic transmissions and electric vehicles. Cars in this class are likely to be critically important for maintaining interest in motor sports in the future. Although no R5 cars took part in

the JN1 class in 2019, signs of a generational change were apparent as a young driver showed devastating speed to win three races after participating for the first time in round four (Kumakogen, Ehime Prefecture), finally taking second place in the driver's championship. In addition, with vehicles using continuously variable transmissions (CVTs) and the presence of female drivers, there are high expectations for the JN6 class in 2020.

In contrast, solutions to various issues, such as dealing with large crowds at certain events (such as guidance to gallery stages and parking areas, and the like), are hopefully being pursued. 2020 will see the first WRC event held in Japan for ten years. With the eyes of global rally fans upon Japan, the Japanese Rally Championship should prove to be even more exciting and also feature the participation of new cars.

2. 2. Trends outside Japan (Table 1)

Continuing on from 2018, the major World Championships saw engrossing battles in Formula 1 (F1), the World Endurance Championship (WEC), and the WRC, with Japanese manufacturers finding conspicuous success in all three. Of particular note, a car powered by Honda engines took third place in the F1 driver's championship, a promising sign for 2020. In its fifth season, Formula E adopted its second-generation car and attracted the participation of several prominent manufacturers. The hosting of events in major cities around the world also proved a talking point. It was also decided to give Formula E official world championship status from the 2020-21 season. In addition, with the world of esports (sporting competitions using video games) proving a good fit with motor sports, various organizations, including the International Automobile Federation (FIA) and Automobile Club de l'Ouest (ACO) are hosting official affiliated series.



Fig. 4 F1: Aston Martin Red Bull Racing⁽³⁾

**(1) FIA Formula One World Championship (F1)
(Fig. 4)**

In 2019, the technical regulations were revised for the first time in two years since 2017. To encourage overtaking, the sizes and specifications of aerodynamic devices at the center of the front and rear wings were changed. Previously, the minimum weight of an F1 car was defined as including the driver. In 2019, the minimum driver weight was set to 80 kg and the minimum car weight to 660 kg. This should reduce the burden on the driver by eliminating the need for unhealthy weight reduction. Outside qualifying, the amount of fuel allowed in races was increased from 105 to 110 kg to enable drivers to drive at full power for longer. Lewis Hamilton took the Drivers' Championship for the third consecutive year, his sixth title in total.

(2) FIA World Rally Championship (WRC) (Fig. 5)

Continuing on from 2018, the 2019 WRC received entries from four works' teams (Toyota, Citroen, Hyundai, and Ford) and a total of thirteen rounds were held. Driving for Toyota, Ott Tänak won his sixth Drivers' Championship after narrowly missing out in 2018. The Manufacturers' Championship was closely contested until the last race. Unfortunately, the Australian round was canceled due to the massive bushfires in the region, which allowed Hyundai to clinch their first ever world title. In 2020, it was also determined to hold a round of the WRC in Japan, which should help to further raise the profile of the WRC in that country.

**(3) FIA World Endurance Championship (WEC)
(Fig. 6)**

The two-year super season that was held from 2018 to 2019 ended with Toyota winning two consecutive races at Le Mans. As the only works team competing in the WEC, Toyota came home with both Drivers' and Manufacturer's titles. The 2019 to 2020 season opened in Au-



Fig. 5 WRC: Toyota Yaris⁽¹⁾



Fig. 6 WEC: Toyota TS050 Hybrid⁽¹⁾

gust and is planned to continue until the 2020 Le Mans event. The regulations in this season incorporate so-called success handicaps that adjust the performance of the cars to eliminate the lap-time advantage of the points leaders. This enabled the privateer team Rebellion Racing to win the third race of the season at Shanghai.

(4) World Touring Car Cup (WTCR)

This was the second year of this new series, which was born from a merging of World Touring Car Championship (WTCC) and TCR touring car rules. Unlike other events, the WTCR has no manufacturers' title, and instead features battles between drivers and privateer teams. WTCR cars are front-wheel drive 4- or 5-door saloons or hatchbacks equipped with mass-produced turbocharged engines with a displacement between 1,750 and 2,000 cc and power of around 350 hp. In 2020, a new common engine control unit (ECU) will be adopted and the sole tire supplier will change from Yokohama to Good-year.

(5) FIA Formula E Championship (Fig. 7)

This, the fifth season of Formula E was held between December 2018 and July 2019. Two new hosts were added, bringing the total number of events to thirteen in twelve locations around the world. The number of entrants has also increased, reaching twenty-two for this season. Audi and Jaguar continued their participation, and were joined by BMW, as well as Nissan from Japan.



Fig. 7 FIA Formula E: Nissan e.dams⁽⁴⁾

This season also saw the introduction of a second-generation car with a battery capacity of 54 kWh, almost twice the capacity of the previous car. Races in previous years required cars to be swapped part way through. This season brought major changes to the format, with race lengths set to 45 minutes + 1 lap, to be run entirely by a single car. This season also saw the introduction of a system called “attack mode” to races outside of qualifying. This system boosts the power of the car from 200 to 225 kWh and is an ingenious way of making the races even more exciting.

(6) Cooperation between the Automotive Industry and Esports

Following trends in computer gaming, esports is regarded as having a high potential for growth. With the value of the esports market predicted to reach 230 billion yen globally and 10 billion yen in Japan in 2022 (source: the Japan Esports Union), esports and esports organizations are blossoming on many different levels, from the international to the local and even municipal stages. In esports fields related to motor sports, various year-long series have been started up, including the Gran Turismo series inaugurated by FIA as a FIA GT championship, the F1 E-Sport series (Formula One Management), and a year-long WEC esports series (ACO).

Racing games differ greatly from other esports titles in that realistic motor sports skills are required alongside computer gaming skills. For this reason, these series are unique in offering an exciting and mutually beneficial fusion between esports and the real world. The automotive industry has high hopes for esports as a way of stimulating greater interest in real motor sports.

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 coopera-

tion between the series organizers, promoters, and manufacturers that develop the bikes and run the teams in the planning and running of each series, 2019 saw exciting races across all motorcycle race categories. MotoGP, the pinnacle of motorcycle road racing, was the focus of particular attention. The operation and regulations of MotoGP have been subject to a constant cycle of changes based on trial and error, evolving into a series that has gripped fans around the world.

Following on from 2018, the 2019 MotoGP season adopted a sole tire manufacturer, as well as common ECU hardware and software. This narrowed the performance differences between bikes and led to a series of highly contested races with ten or more riders running lap times within a second of each other. A glance at the final season results showed the factory teams in the top places. Marc Márquez (Honda, Fig. 8) won the most races (12) and took his sixth Riders' Championship, followed by Andrea Dovizioso (Ducati) and Maverick Vinales (Yamaha). At the same time, teams and riders participating in MotoGP for the first time also impressed. In particular, twenty-year-old Fabio Quartararo of Petronas Yamaha SRT showed impressive speed in qualifying despite the fact that 2019 was his first season in MotoGP. He took six pole positions as well as five second- and two third-positions in races, enough to be feted as Rookie of the Year.

In Moto2, Alex Márquez (EG 0,0 Mark VDS) won five races and took his first Riders' Championship. Brad Binder (Red Bull KTM Ajo) took second and Thomas Luthi (Dynavolt Intact GP) took third. Alex Márquez, Brad Binder, and Iker Lecuona all stepped up to MotoGP in 2020.

In Moto3, five Japanese riders took part in all races. The opening race in Qatar was won by Kaito Toba (Honda Team Asia), who has been racing in Moto3 since 2017. In addition, Tatsuki Suzuki (SIC58 Squadra Corse) took his first win at the 13th round in San Marino in his fifth year in Moto3. Moto3 is an extremely open competition in which all riders have a chance of victory. The Riders' Championship was won by Lorenzo Dalla Porta (Leopard Racing) after eleven podium finishes and four wins.

Looking at the series that are based on commercially available motorcycles, five manufacturers competed in the 2019 Superbike World Championship (WSB). The first half of the season was dominated by a succession of wins by former GP rider Alvaro Bautista (Ducati) riding

Table 2 Details and Results of Major Motorcycle Racing Categories in 2019

Category		Outline of races	Outline of vehicles	Participating Japanese motorcycle manufacturers	2019 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 maximum 1,000 cc engines	Honda Yamaha Suzuki	Marc Márquez	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	Jérémy Guarnoni David Checa Erwan Nigon	Kawasaki
	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 maximum 4-stroke 450 cc or 2-stroke 250 cc engine	Honda Yamaha Kawasaki	Tim Gajser	Honda
	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 circuits and the total of points over a year determines the standings.	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	Katsuyuki Nakasuga	Yamaha
	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. IA1 class: dedicated motocross bikes with a maximum 4-stroke 450 cc or 2-stroke 250 cc engine	Honda Yamaha 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. 8 MotoGP: Honda RC213V⁽³⁾



Fig. 9 Superbike World Championship: Kawasaki Ninja ZX-10RR⁽⁵⁾

the new Panigale. However, Jonathan Rea (Kawasaki) fought back in the second half with a series of gritty performances and eventually took his fifth successive Riders' Championship (Fig. 9).

In the All Japan Road Race Championship, Katsuyuki Nakasuga took his unprecedented ninth title on a Yamaha factory bike after a dramatic come-from-behind victory in the final event.

The Kawasaki factory team was a welcome reentrant in the Suzuka 8 hours Endurance Road Race, the home race of four of the participating bike manufacturers. Honda and Yamaha competed fiercely, separated by only

several minutes over the eight-hour race, before Kawasaki finally triumphed.

The MXGP class of the Motocross World Championship was won by Tim Gajser (Honda) for the second time and the first time in three years. Jeffrey Herlings (KTM), who won the championship in 2018 with some impressive displays of speed, was injured and could only take part in the final two races. Despite that, he put in two dominating performances and hopes are high for a good year in 2020.

The 2019 AMA Supercross World Championship was fought over fiercely by six riders and went to the final

race. Cooper Webb (KTM) triumphed in seven races after moving to the team and took his first title. In the All Japan Motocross Championship, the top IA1 class was won by Kei Yamamoto (Honda) in a very close series.

Following from last year, other series continued to see a number of new records set, including the thirteenth successive championship for Tony Bou in the FIM Trial World Championship, the seventh successive triumph by Tomoyuki Ogawa (Honda) in the All Japan Trial Championship, and the eighteenth successive win by a KTM ride in the bike class of the Dakar Rally.

As described above, motorcycle racing both inside and outside Japan worked hard to attract more fans in 2019 by harnessing the efforts of the whole industry, creating opportunities to raise media awareness throughout the season.

4 Motor Sports Tire Trends

Throughout motor sports, the recent trend of switching to sole tire suppliers to reduce costs and create equally competitive conditions is continuing. This has occurred in diverse events across four- and two-wheel series including F1 and MotoGP. In car racing, the WRC will switch to a single supplier in 2021, and the new ST1000 series for commercially available bikes that is due to begin in 2020 has also decided to use a sole tire supplier.

However, running against this trend as a series that is continuing to expand competition, Super GT in Japan is an example of a high-level event that is technically competitive on a global scale. Super GT has four tire suppliers: Bridgestone, Dunlop, Yokohama, and Michelin. Other series that allow competition between tire manufacturers include the OK class of the All Japan Karting Championship, the FIM Endurance World Championship, and the All Japan Road Race Championship.

In addition, some series also allow competition between tire manufacturers in the form of commercially available tires. In the PN class of the All Japan Gymkhana (JGC) series, growing calls for more environmentally friendly technology is also being reflected in tires. For example, in 2015, it introduced a rule that limited tires to those labeled by the Japan Automobile Tyre Manufacturers Association (JATMA), which specifies a pattern with continuous grooves around the tire or tires graded under European standards that specify a maximum rolling resistance. Despite tight vehicle regulations that al-



Fig. 10 JGC Series Tire: Dunlop Direzza $\beta 10^{(6)}$

low little room for modification, the number of participants in the PN class has continued to increase every year. Accompanying this increase, competition between tire manufacturers has become fiercer, with a number launching new grip-focused products in 2019 (Fig. 10).

In addition, although not an official all-Japan championship, the 86/BRZ Race series is also a popular event attracting a growing list of entrants each year. This series features the participation of several tire manufacturers, with fierce competition prompting the launch of new products on a regular basis.

More unusually, the 24 Hours of Nürburgring endurance race also allowed multiple tire suppliers, but introduced restrictions on developmental tires in 2016 to enhance safety and create equally competitive conditions. Tires must now be registered in advance and sample tires provided to the organizers before the race. Restrictions on tire specification types that can be used in races are also becoming increasingly stringent, with the number of available specifications cut from nine in 2018 to six in 2019.

As this demonstrates, all categories of motor sports spent 2019 looking for regulations to fit a range of different circumstances. The selection and application of improved regulations that reflect up-to-date requirements will continue to be an important feature of motor sports. This will require close cooperation between national sports authorities (ASN) such as the Japan Automobile Federation (JAF), other motor sports associations, organizers, and tire suppliers.

Note:

The Covid-19 pandemic occurred after the writing of this article and information about races and schedules in 2020 has now changed. Thank you for your understanding.