

Yamaha Motor Safety Vision and Technology Briefing

November 11, 2022

Today's Agenda

HIDAKA, Yoshihiro

- President, CEO and Representative Director

■ 1: Yamaha Motor Safety Vision

MARUYAMA, Heiji

- Senior Executive Officer and Director,
Chief General Manager of Technical Research & Development Center

■ 2: Yamaha Motor Approach to Riding Assist

■ 3: Yamaha Motor Safety Activities and Measures

■ 4: Q & A

Hidaka, Yoshihiro

- President, CEO and Representative Director

History of Yamaha Motor

Pursuing safe riding, turning, and stopping from the time of establishment

Commitment from YAHAMA brand's first motorcycle, YA-1 in 1955




ヤマハ 125
2サイクル 125cc.

現金正価 ¥ 138,000

優美なスタイル! 素晴らしい加速性! 安定した操縦性!

特徴

- 洗練された「デザイン」
- 堅牢な車体と素晴らしい消費効果
- 前進四段「フットチェンジ」と各段「ニュートラル」
- エンジンミツシヨンの無故障
- 自動進角付「イグニツシヨンダイナモ」
- 電圧調整に「カーボンパイル」使用
- キツクが軽く始動が容易
- 「トーションダンパー」付の湿式多板クラッチ
- 車輪の取外し極めて容易
- 燃料混合比 20:1

"Elegant style! Great acceleration! Stable maneuverability!"

History of Yamaha Motor

Riding Safety Education starting with Moped License Class in 1969

To ensure that our products are used correctly, safely, enjoyably and helpfully...



1969: Yamaha Moped License classroom

History of Yamaha Motor

Continuing research and development for Rider Assist Technologies

1971

DISC BRAKE



XS650E

1982

Unified Brake System



XS1100

2006

Chip Controlled Throttle



YZF-R6

2015

Slide Control & Lift Control System



YZF-R1

2016

Cornering Lamp



FJR1300

2020

Standing Assist



TRICITY300

2020

Y-Connect

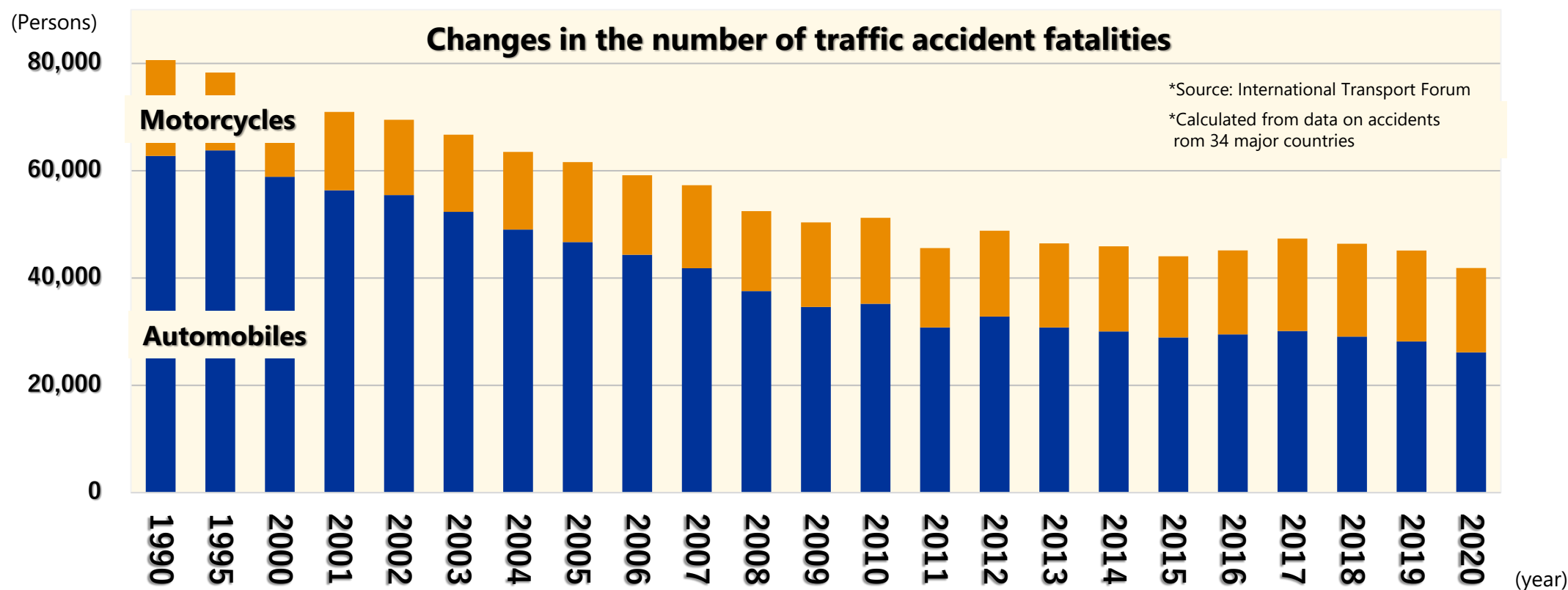


NMAX

Changes in the World ~ Development and penetration of safety technologies ~

Slowly increasing trend in number of fatal motorcycle accidents between 1990 and 2020

The Stockholm Declaration aims to reduce the number of deaths and injuries by 50% or less (compared to 2020) by 2030



Yamaha Motor Safety Vision

Yamaha Motor Long-term Vision

Toward 2030

ART for Human Possibilities
~ Let's strive for greater happiness~

ART for Human Possibilities

Advancing
×
Robotics

Rethinking
×
Solution

Transforming
×
Mobility

We will Advance the use of Robotics, Rethink Solution and Transform Mobility to expand human possibilities for a better society and more fulfilling life.

Yamaha Motor Safety Vision

Development ideal "*Jin-ki Kanno*"

Technology born from Jin-Ki Kanno seeks to deliver users the seductive exhilaration felt when they truly become one with their machine

Yamaha Motor Safety Vision

Development ideal "*Jin-ki Kanno*"

Technology born from Jin-Ki Kanno seeks to deliver users the seductive exhilaration felt when they truly become one with their machine

Safety Vision "*Jin-Ki Kanno* × *Jin-Ki Anzen*"

Basing our approach to safety on technologies, user skills, and connectivity, Yamaha Motor aims to create a world free of accidents together with our customers in which users can experience the joy and Kando that comes from progressing their own skills and abilities while having fun at the same time.

**Kando* is a Japanese word for the simultaneous feelings of deep satisfaction and intense excitement that we experience when we encounter something of exceptional value.

MARUYAMA, Heiji

- Senior Executive Officer and Director,
Chief General Manager of Technical Research & Development Center

Yamaha Motor Approach to Riding Assist

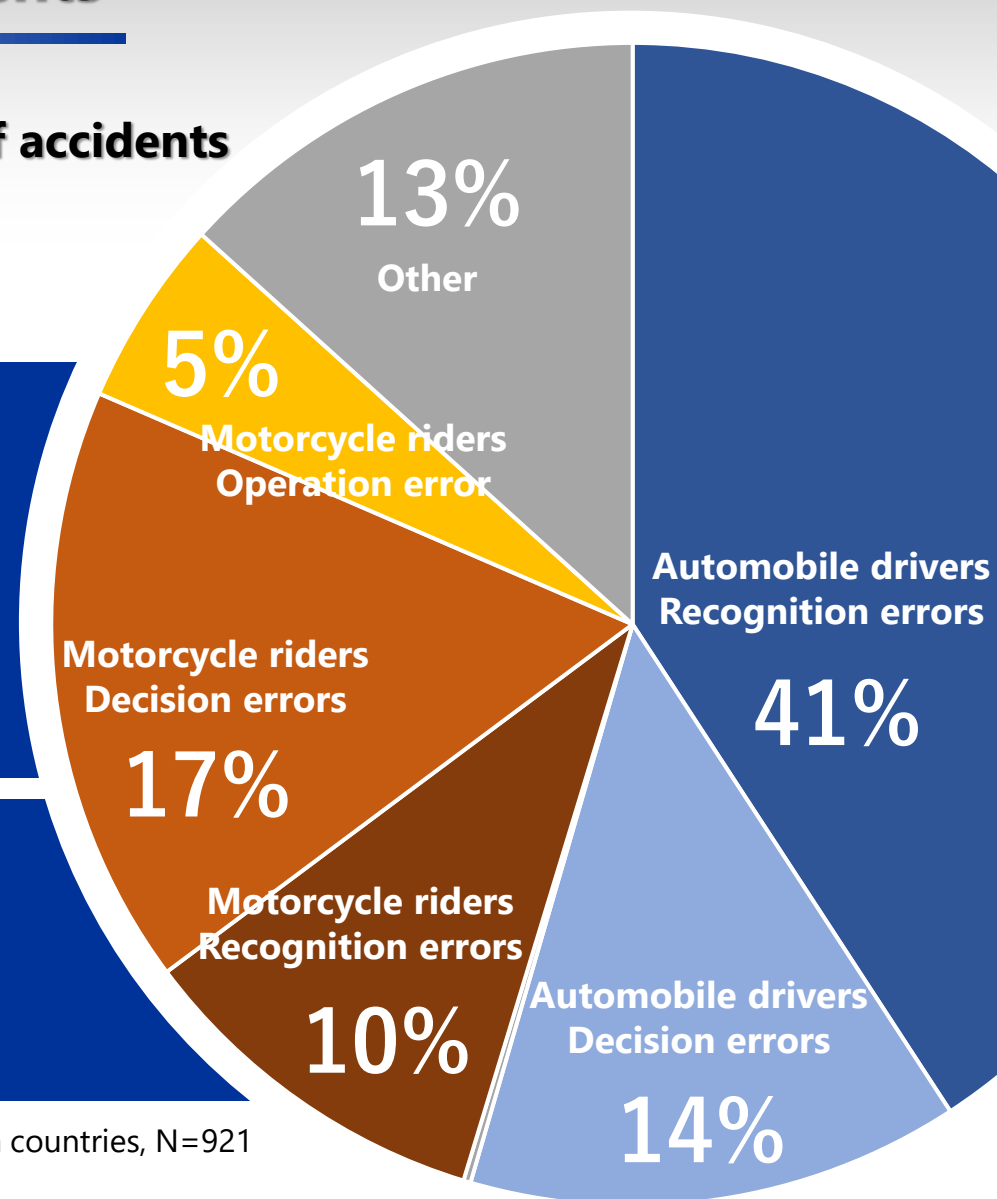
Causes of Motorcycle-related Accidents

Motorcycle riders and automobile drivers have the same causes of accidents

“Recognition and Decision errors”

Motorcycle riders **Recognition errors : 10%**
 Decision errors : 17%
 Operation errors : 5%

Automobile drivers **Recognition errors : 41%**
 Decision errors : 14%



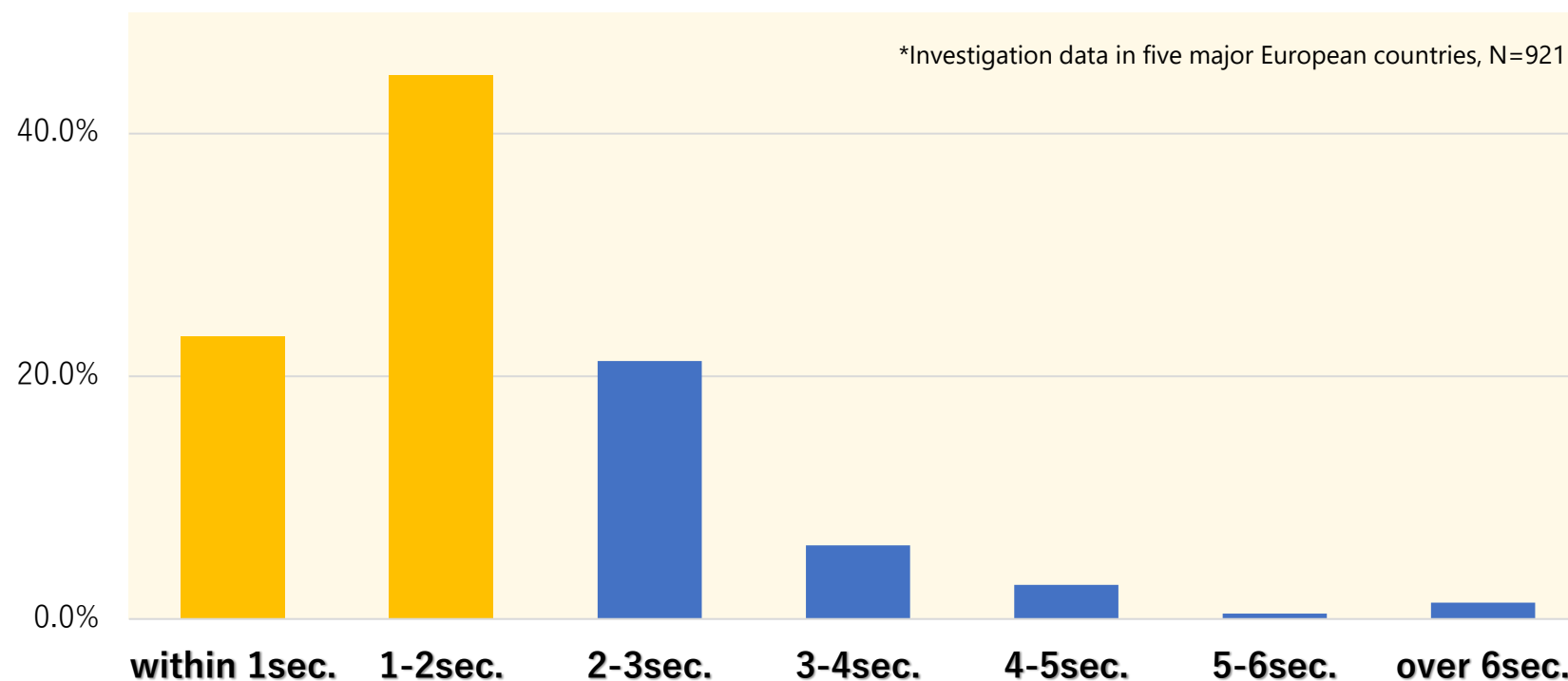
*Investigation data in five major European countries, N=921

Key Points

70% of overall motorcycle accidents happen in the blink of an eye.

Difficult avoidance maneuvers

Occurred "within 2 seconds of the accident trigger"



Riding Assist - 4 approaches

1

Assist for motorcycle riders' negligence

- Risk prediction riding assist

2

Assist for automobile drivers' negligence

- Preventing damage and defensive riding assist

3

Assist for things that happen in the blink of an eye

- Emergency avoidance riding assist

4

Assist in case of emergency

- Damage mitigation

Yamaha Motor Safety Activities and Measures

Three Pillars that Support "*Jin-Ki Kanno* × *Jin-Ki Anzen*"

Technology

Assist recognition, decision, operation and damage mitigation

Skills

Assist customers in acquiring safety knowledge and experience and improving their riding skills

Connectivity

Increase the number of connections between the Cloud, people and machines to assist in providing safety feedback to "people and machines"

Radar-linked Unified Brake System

The world's first Radar-linked Unified Brake System using millimeter wave radar



■ Provides riders with security and comfort

- Adjusts front and rear brake distribution according to the relative speed of the vehicle ahead, even with constant brake input
- Adjusts front and rear suspension damping force at the same time
- Contributes to high deceleration and good stability

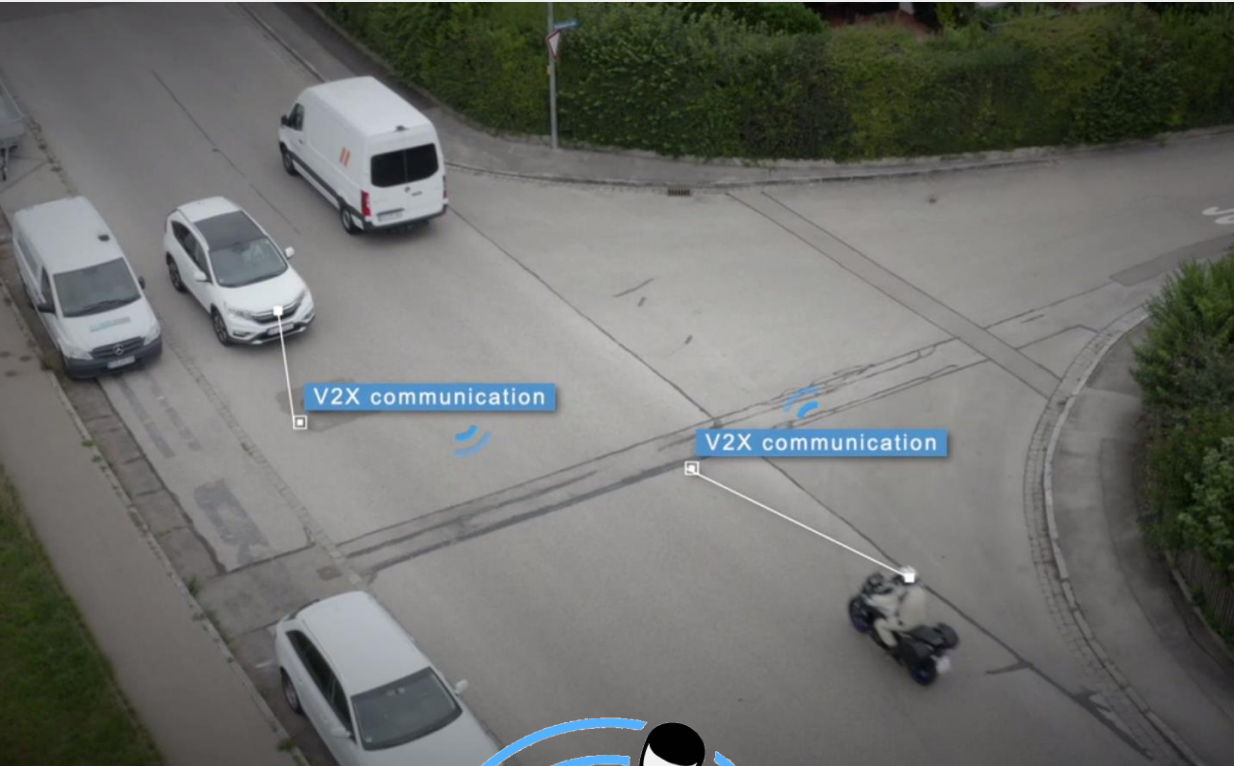
■ Electronic control system

Adaptive cruise control (ACC) & Unified brake linking millimeter wave radar

- Speed control that automatically performs constant speed cruising, deceleration, and acceleration
- Rider intervention request displayed when it is determined that the rider may be approaching too closely while ACC is activated
- Assists the rider to add braking force when the system judges that the braking force is insufficient, and the rider may be approaching too closely



Cooperative Intelligent Transport Systems



Exchange information such as each other's position and speed through wireless communication



Connected Motorcycle Consortium

- 18 member organizations including motorcycle manufacturers, universities, traffic safety research institutes, industry associations, and user groups
- Activities to promote the spread of motorcycle-cooperative intelligent transport systems



Advanced Motorcycle Stability Assist System

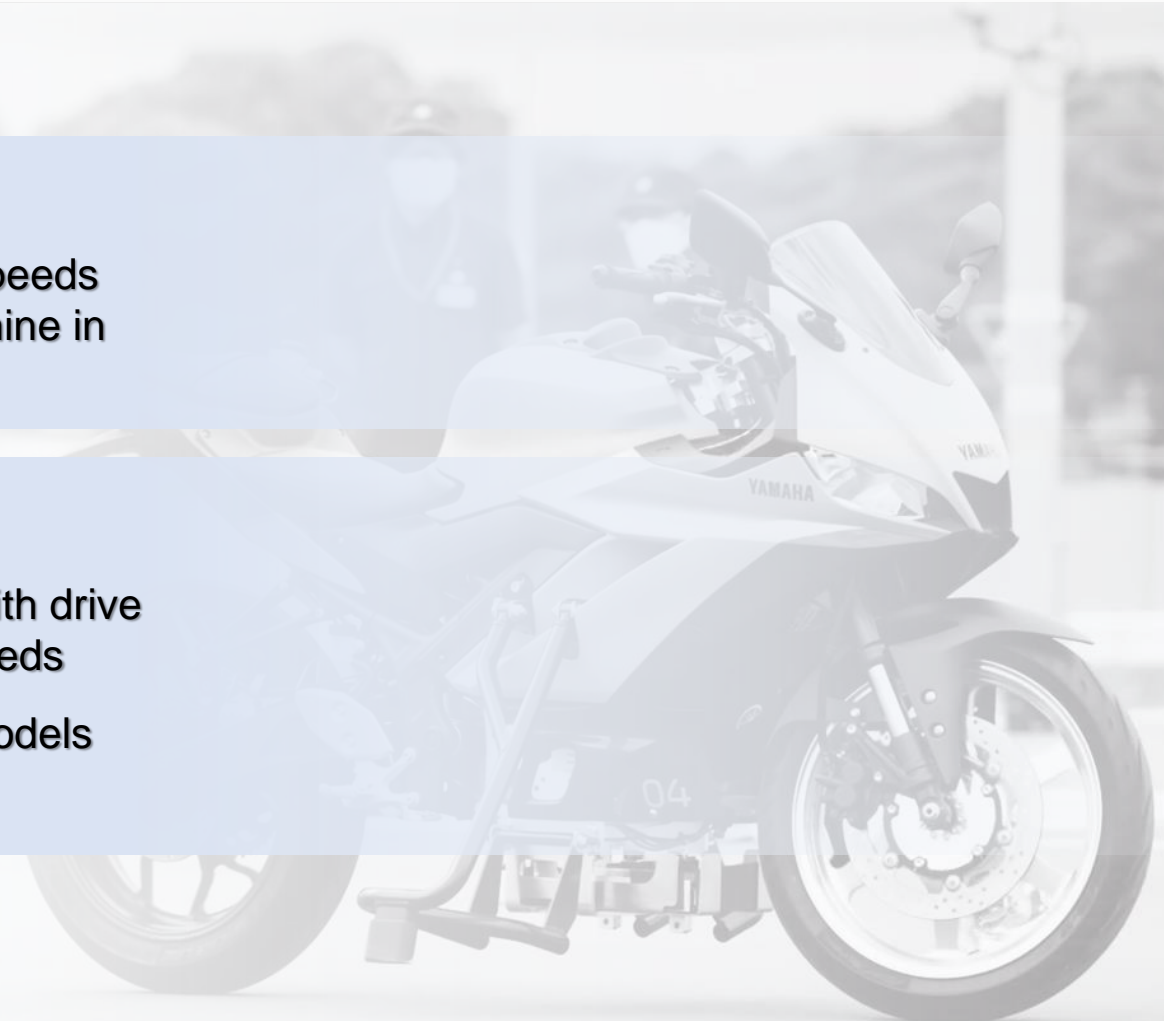
Motorcycle stabilization assist system using drive force and steering force control

■ Provides riders with security and comfort

Control technology that stabilizes the vehicle even at low speeds allows everyone to enjoy a sense of oneness with the machine in comfort and with peace of mind.

■ Electronic control system

- Equipped with 6-axis Inertial Measurement Unit along with drive and steering actuators. Achieves stabilization at low speeds
- Adopts a structure that is highly applicable to existing models without changing the frame



Safety Classes Expansion

Experiential-type safety program: Yamaha Riding Feedback System

Analyzes each rider's riding conditions and provides feedback on points to improve skills

YRA Yamaha Riding Academy

受講日 受講場所
お名前 YRA ID #

1回目 加速/減速 ← 左回り 減速 加速
コーナリング ← 左回り 弱 強
コーナリング姿勢

2回目 加速/減速 ← 左回り 減速 加速
コーナリング ← 左回り 弱 強
コーナリング姿勢

インストラクター 加速/減速 ← 左回り 減速 加速
コーナリング ← 左回り 弱 強
コーナリング姿勢

インストラクターコメント
レッスンの走行では、加速と減速が更にはっきりとした操作になりました。目線もしっかりと前方を捉えています。
改善点としては、カーブの中でも減速が終了していない点です。インストラクターは、制動（赤い部分）は直線で終了しています。走行状況に応じた制動開始、強さについて改善してください。

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Feedback sheet for analysis and evaluation provided to students



Classes using Yamaha Riding Feedback System

Safety Classes Expansion

On-demand type safety program: Micro-Learning

Watch a 3-minute video on your smartphone or other device to help more riders learn about safe riding

■ Micro-learning menu examples

Item	Causes/key points
Type of accident	Intersection, collision, falling over, etc.
People	Recognition, Decision, operation, physical state, mental state, age, etc.
Vehicle	Tires, lights, brakes, steering wheel, mirrors, etc.
Environment	Road infrastructure, road surface, weather conditions, etc.
Road rules	Traffic signs, driver, lights, Horn, etc.
.....

"That scared me today!"

»»» Type of accident

»»» Intersections

»»» Accidents when turning left



**Accidents when
turning left
Micro-learning**

Connectivity Assist

Connection between people and machines

(reducing accidents caused by human errors)



Connection to various Cloud data



Connection to transportation infrastructure

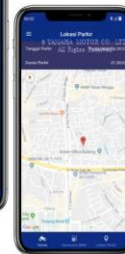
(reducing accidents caused by the environment)



Connection between app and machines

(reducing accidents caused by the vehicle)

Y-Connect - Fault notification
- Notification of maintenance recommendation timing



Connection between digital and people



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