YZR-M1

HISTORICAL PRESENTATION

From 2004 to 2009

By

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2004 Model - 0W-P3

Main development concept

•Improved rear tyre traction
•Maintain agility and handling characteristics

Key features **Chassis**

Objective: Maintain high cornering performance

1) Utilize proven packaging and dimensions

•In-line 4 cylinder engine with short wheelbase and long rear arm combination.

2) Combine high agility and handling with better traction from rear tyre.

•Longer rear arm compared to 2003 model
•Change weight distribution for lower center of gravity.

Key features **Engine**

Objective: Improved throttle linearity

1) Improved connection and feedback between rider throttle operation and engine power delivery

- Cross plane crankshaft technology with uneven firing order
- 4 valve cylinder head

2005 Model - 0W-P4

Main development concept

•All new chassis and engine design for best balance between handling and engine performance in **all** conditions

Key features **Chassis**

Good balance between opposing elements

Maintain agility but improve stability in all conditions:

•Wet & Dry
•Hot & Cold

1) Optimised for total package

•All-new frame
•Smaller engine outer dimensions
•Change the CoG (lower location of fuel tank)
•Reduce chassis movements: YAW, ROLL and PITCH

Key features **Engine**

Improve performance & character

Higher performance with lower fuel consumption

1) Higher performance achieved by:
* Gear drive of camshafts
* Change of bore & stroke

2) Improved power delivery compared to 04 M1
* Increase of top end power
* Reduce mid range power

3) Durability
*Change air intake layout for better cooling

2006 Model - 0W-R3

Main development concept

- Further detailed improvement of the dominant 2005 M1 model with introduction of next generation fly-by-wire technology

Key features **Chassis**

Improve agility & braking stability

1) Same concept as ’05 M1

2) New main frame design with modified rear suspension linkage area

Key features **Engine**

Optimum balance between improved performance & good fuel consumption

1) Change bore & stroke for higher rpm & higher power

2) Fully electronic throttle system:
•higher output: +5 HP
•higher rpm: +400 rpm
•fuel consumption: same as 2005

Engine Management System

Goal: More rider-friendly torque delivery

1) New engine brake control system

2) New electronic throttle management:
•Torque control
•Engine brake control
•Wheelie control
•Traction control
•Launch control

2007 Model - 0W-S4

FIM regulation change

1. Reduce engine capacity from 990cc to 800cc
2. Reduce fuel tank capacity from 22 litres to 21 litres
3. Restriction of the number of tyres: Front:14, Rear:17 per race weekend

Main development concept

Maximised cornering speed is key for competiveness

Key features **Chassis**

Maximise corner speed & agility

1) Modified chassis stiffness, well-balanced frame and rear arm

2) Improved aerodynamics with modified front fairing shape
(CdA: +/- 7 % reduction)

Key features **Engine**

Optimum balance – between high rev power & fuel consumption

1) New specification of EG

•Smaller dimensions:
•Width:-8mm,Height:-18mm, Axle:-5mm
•Bore & stroke > smaller SB ratio
•Weight: 3.5 kg lighter than ’06.
•Max revs: 2.000rpm more than ’06.
•Fuel consumption: lowered by 3%

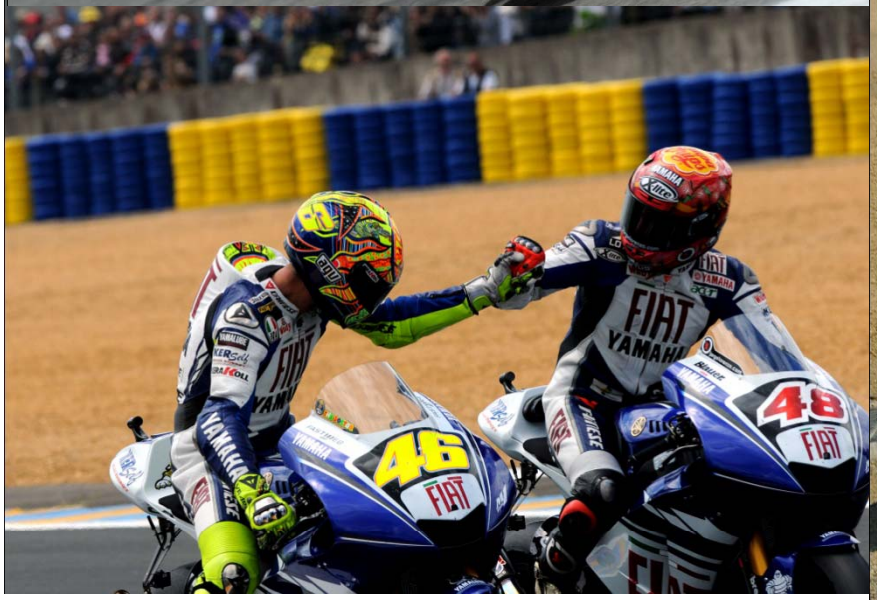
Engine Management System

Direct natural feeling – sophisticated control

1) Operation based on **real-time** vehicle dynamics.

Calculated bank angle & tyre frictional force
+
Calculated optimal torque
=
Regulated engine torque for
slide & wheelie control

2008 Model - 0W-S5



Main development goals

- Enhance tyre performance
- Improve engine power
- Reduce fuel consumption

Key features **Chassis**

Optimised geometry & rigidity

1) Optimises bike basic dimension
Front alignment, wheelbase, height C/G, weight distribution, rear dimensions

2) Change the rigidity
Increased: vertical and torsion movement
Decreased: lateral movement

3) Aerodynamics to improve cooling
for stable engine performance & reliability

(Results: Decrease in temperature of:
Water -10 degrees, Oil -15 degrees

Key features **Engine**

Less friction & better combustion

1) Cylinder head
Introduction of pneumatic valve spring
- weight of valve train 40% reduced.

2) Reduction of friction
New surface treatments and reduction of internal parts dimensions,
- 14 % friction reduction

Max. Power: +12%
Max Torque: +8%
Fuel consumption: Average +6%

Engine Management System

Direct natural feeling - sophisticated control

1) Operation based on **real-time** vehicle dynamics.

Calculated bank angle & tyre frictional force
+
Calculated optimal torque
=
Regulated engine torque for slide & wheelie control

2009 Model - 0W-S8

FIM regulation changes 2009

1. Tyre restriction – reduced number of tyres during race weekend
2. Practice schedule - 3 instead of 4 practice sessions (1 qualifying session)
3. Engine durability - maximum of 5 engines for the season

Main development goals

- Enhance tyre performance
- Enhance tyre mileage and performance
- Secure engine reliability

Key features **Chassis**

Frame rigidity balance for better handling in braking & turning

1) Frame rigidity
•Increased: vertical & lateral
•Decreased: torsion

2) High speed aerodynamics
•CdA down by 5% resulting in 1% higher top speed
•Based on keeping current YAW movement.
•Change the shape of front cowling & front fender frame

Key features **Engine**

Improve performance
Altered airbox, fuel system, combustion, reduced internal friction.
Max. Power: +4%
Max. Torque: +3%

Drivability
1) Focus on partial throttle performance
2) 10% more crankshaft inertia compared to ’08

Durability & CAE Technology
1) Piston temp. estimation analysis by CAE > 30 degree reduction comp. ‘to 08

Engine Management System

Development of engine control by vehicle dynamics

Calculate bank angle & tyre grip
+
Calculate optimised torque
=
Results in engine torque for traction control & wheelie control

New wheelie control system
1) From ’08 by front fork stroke parameter to pitch rate