



## **Technology clip – water injection: draft voice-over.**

### **00:00–00:18 (Intro)**

With the BMW M4 Coupe, BMW M GmbH has developed a high-performance sports car specifically designed to deliver unbeatable driving dynamics and honed for use on the race track. The car's heartbeat – a high-revving six-cylinder in-line engine with M TwinPower Turbo technology and pronounced motor racing genes – plays a key role in the high-performance character of the overall concept behind this car.

### **00:19–00:36 (Safety Car, engine compartment)**

Just as it did last year, the BMW M4 Coupe will once again serve as the Safety Car for the 2015 MotoGP season. In this extremely performance-oriented race series, in which the world's leading motorcycle racers battle it out for points and positions, the Safety Car also needs to make a convincing case for itself with the right performance attributes for the job at hand. With that in mind, the BMW M GmbH engineers have equipped the high-performance engine with an innovative water injection system, giving it a noticeable boost in power along with added benefits in terms of both fuel economy under full load and exhaust emissions.

### **00:37–00:46 (Animation: light load)**

The performance level and boost in power achieved in the BMW M4 MotoGP Safety Car places enormous demands on charge air cooling. This is especially true of turbocharged engines generating high boost pressure, as the intake air already gets very hot in the turbocharger's compressor.

### **00:47–01:03 (Animation: medium load)**

An intercooler brings the temperature down as required, but there are also physical limits to what it can do as the demands on the engine increase.

### **01:04–01:07 (Animation: heavy load/full load)**

Under full load, in particular, there is a danger that the permitted temperature in the combustion chamber will be exceeded. The result would be uncontrolled, knock-inducing combustion and consequent power loss.

### **01:08–01:20 (Animation: water injection)**

This is where the BMW M GmbH engineers bring the innovative water injection system into play. The water is injected into the plenum of the intake manifold as a fine spray. When the water vaporises, the intake air cools significantly before it enters the combustion chambers. As a result, the final

compression temperature in the combustion chamber – and therefore the engine’s tendency to “knock” – is reduced, enabling the turbocharged engine to use higher boost pressure and earlier injection timing. The bottom line is that the water injection system increases output and torque while at the same time ensuring outstanding fuel economy and emissions figures.

#### **01:21–01:30 (System overview)**

The water injection system has an impressively space-saving design. The three injectors are positioned in the air plenum, while the compact water tank is located in the luggage compartment and houses all the relevant components, such as the water pump, sensors and valves.

#### **01:31–01:34 (Closing image)**

Following the rigorous testing for the BMW M4 Coupe’s deployment in the MotoGP World Championship, the water injection system will also be introduced in a series-produced BMW M model in the near future. BMW M GmbH thus remains true to its philosophy of bringing exclusive motor sport technology directly from the race track to the road.