ARTICLE

TESTING KERS TECHNOLOGY

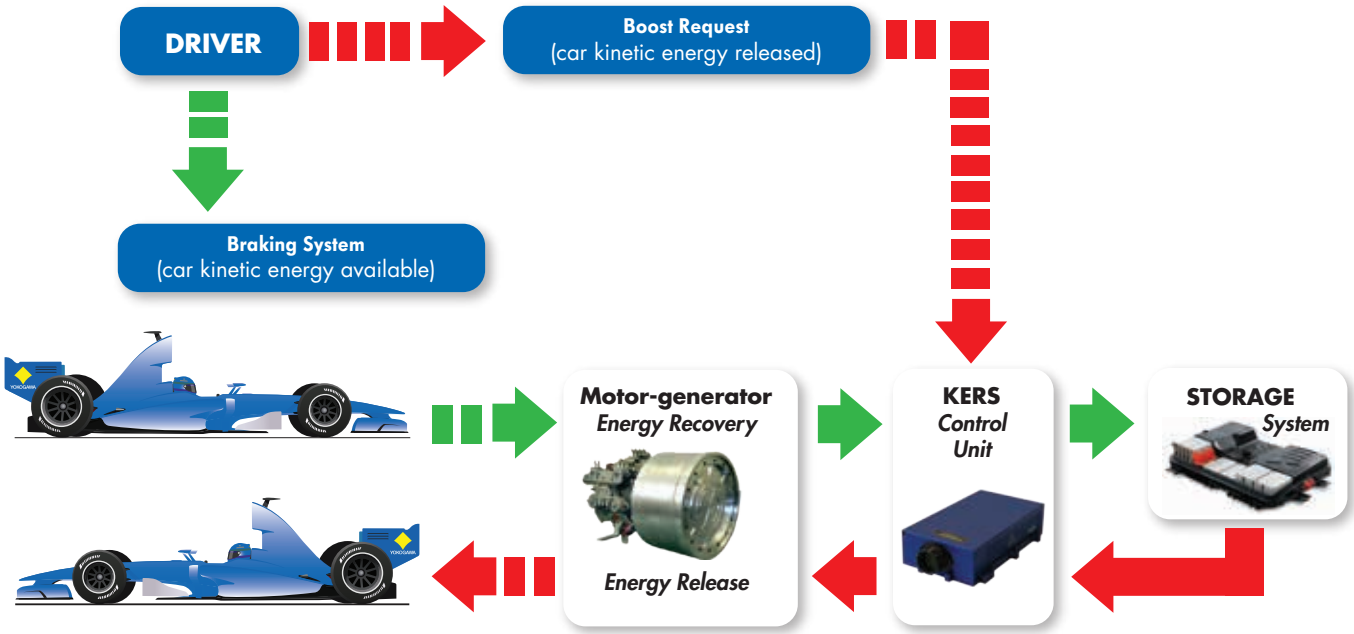
Formula 1 is a sport which has transformed over the years into a billion dollar business. The sport has become so popular and with a wide global audience base it has become an attraction for hundreds of multinational companies. Formula 1 has a long-standing history of providing technological developments, which are applicable not only to fast racing cars but also to the general automotive industry. One of these developments is the Kinetic Energy Recovery System (KERS), also known as regenerative braking, which is becoming one of the most widely discussed subjects in technical universities and automobile companies.

by: Hafeez Najumudeen
Yokogawa Europe

What is KERS?

A Formula 1 car has kinetic energy when it runs and when the brake is applied this kinetic energy is converted into a huge amount of heat energy, which would normally be wasted. This is not the case in a KERS equipped car. With the KERS system, when the driver breaks this kinetic energy is converted to electrical energy. Formula 1 cars have an electric motor and batteries setup that is used to convert and store this energy in the car. The electric motor is mounted at one end of the engine crankshaft. When the brakes are applied, this electric motor captures a portion of the rotational force and converts the kinetic energy into electrical energy, which is stored in the battery bank. When the driver presses the KERS or the boost button, the stored energy is converted back to kinetic energy, which gives the Formula 1 car additional horsepower for a limited duration.

The KERS system was first introduced in 2009 and only a few F1 teams used the technology. In 2010, KERS was banned, but it was reintroduced in 2011. It is now being used by most of the F1 teams. Even though the KERS system adds an extra 35 kg weight which gives a challenge to the balance of the F1 car, it does offer the driver approximately 80 bhp extra for up to 6.67 seconds per lap. This extra capacity can be released in one go or at different



KINETIC ENERGY RECOVERY SYSTEM
KERS block diagram

Yokogawa's high precision power analysers are used in the development of KERS in the F1 industry.

points which gives the driver an added advantage during overtaking or defending positions. The KERS system is not only intended to help in overtaking/defending to create additional excitement in the race, but also it is a step towards bringing the sport close to "greenness".

Testing KERS systems

Yokogawa's high precision power analysers are used in the development of KERS in the F1 industry. They enable engineers to test various parameters in both R&D and production of the KERS system. Electric motor testing is a main application area for Yokogawa's high precision WT1800 and WT3000 power analysers. They assist users in the measurement of electrical output, efficiency and losses in electric motors. The ability to connect 6 power inputs to a single WT1800 helps customers to evaluate motor input/output efficiency. Additionally, the motor evaluation function simultaneously measures voltage, current and power as well as changes in rotation speed and torque derived from sensors. These sensors also enable the shaft power and direction of rotation to be measured. The 6 inputs of the WT1800 also help customers to evaluate the battery charge and discharge characteristics, and the inverter's efficiency. The Yokogawa WT3000 is the world's most stable and accurate power analyser providing the highest guaranteed accuracy of 0.02%.

Electric motor testing is a main application area for Yokogawa's high precision WT1800 and WT3000 power analysers.

Conclusion

The success of technologies such as KERS in Formula 1 is based on how efficient all the resources are used. High-precision power analysers are key products that will enable R&D and production units to build an efficient system.

QUALITY ■ INNOVATION ■ FORESIGHT

YOKOGAWA

YOKOGAWA EUROPE B.V.
Euroweg 2, 3825 HD,
Amersfoort, NL
Tel. +31 88 464 1000
Fax +31 88 464 1111
tmi@nl.yokogawa.com