Electrohydraulic brake system—the first approach to brake-by-wire technology
Electrohydraulic Brake System - The First Approach to Brake-By-Wire Technology
960991

As new smart systems for passenger cars are assisting me driver to handle manoeuvres in critical and normal situations, brake systems are required to fulfill the compatibility and interface demands. These advanced brake systems will be operated in a remote mode during normal braking and for autonomous brake interventions. BOSCH is developing a brake-by-wire system on a hydraulic basis, called "Electrohydraulic Brake EHB™". Brake pressure buildup is supplied by a high pressure accumulator. Generation of the high pressure is done by an electric motor driven pump, similar to current ABS-systems.

Pressure at the wheel brakes is individually controlled by closed-loop pressure control, consisting out of inlet, and outlet valves, pressure sensor and corresponding algorithm. It is specified, that this control must be completely noiseless, proportional, fast, and highly accurate. To raise the acceptance of such a system, it will be introduced with a conventional hydraulic backup. The backup actuates the front wheel brakes. In the normal operating mode the master cylinder is switched to a hydraulic pedal travel simulator to give the right feeling and sensitivity at the brake pedal.

The system comes together with ABS, ASR, and VDC functions, optimized by using the wheel brake cylinder pressure information and proportional brake pressure control. It incorporates electronic brake force distribution between front and rear and even left and right, thus improving stopping distances and stability, making better use of the rear brakes than conventional systems.

It can be shown that ABS and other regulations can be done fully hidden for the driver. No noise from the pressure control or pedal reactions are noticed.

Autonomous vehicle guiding systems, such as advanced cruise control, collision avoidance (assist) systems, necessary for Intelligent Vehicle Highway System IVHS, and functional upgrading like hill-holder systems, and parking aids will have an ideal brake basis to act on.

Further concepts of integrating various other drivetrain and comfort systems will have a brake system that fulfills their needs. Functional enhancement can be added to the brake system with minimal hydraulic modifications.

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Similar to electrohydraulic power steering, electrohydraulic brakes (EHB) are the first step toward full by-wire technology for braking. In these systems, traditional hydraulic brakes apply the braking force but a sensor on the brake pedal provides the driver’s input to an electronic control unit instead of the brake pedal linkage. An example of EHB is Robert Bosch Corp’s Sensotronic Brake Control (SBC) system that was first used on Mercedes-Benz SL sports car in the 2003 model. In the system, sensors gauge the pressure inside the master brake cylinder, as well as the speed with whic