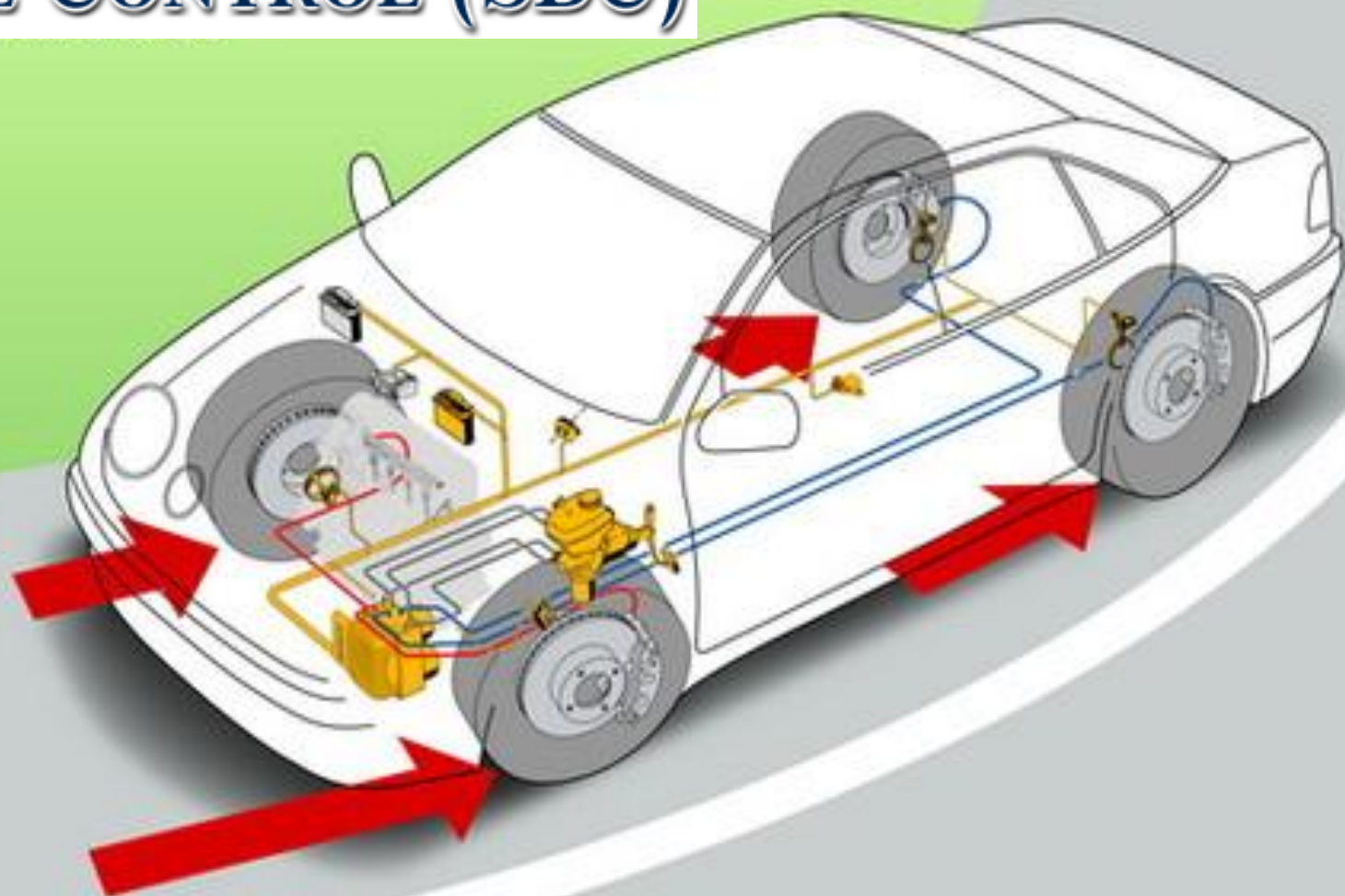


Electro-hydraulic brake SBC

SENSOTRONIC BRAKE CONTROL (SBC)



WHAT IS SBC...?



Ⓢ Sensotronic Brake Control (SBC) is the name given to an innovative electronically controlled brake system which will fit to future passenger car models.

Ⓢ With Sensotronic Brake Control electric signals are used to pass the driver's braking commands onto a microcomputer which processes various sensor signals simultaneously and, depending on the particular driving situation, calculates the optimum brake pressure for each wheel.

BRAKE PEDAL



✱ In the Sensotronic Brake Control, a large number of mechanical components are simply replaced by electronics.

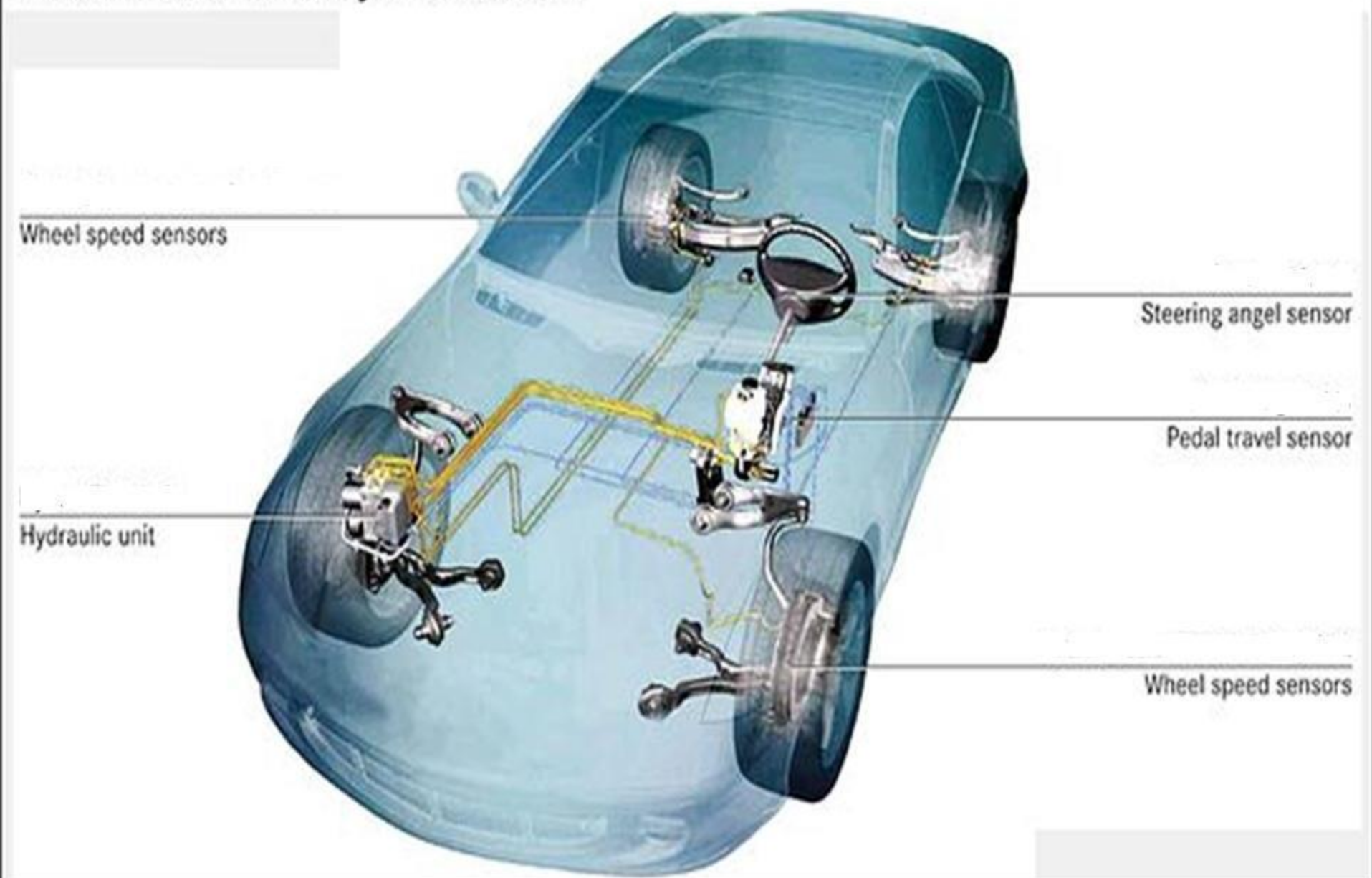
✱ Sensors gauge the pressure inside the master brake cylinder as well as the speed with which the brake pedal is operated, and pass these data to the SBC computer in the form of electric impulses.

CONTROL UNIT



- ⊗ The central control unit under the bonnet is the centerpiece of the electro-hydraulic brake.
- ⊗ The microcomputer, software, sensors, valves and electric pump work together and allow totally novel, highly dynamic brake management.
- ⊗ In addition to the data relating to the brake pedal actuation, the SBC computer also receives the sensor signals from the other electronic assistance systems. For example, ESP which makes available the data from its steering angle and turning rate.

Sensotronic Brake Control by Mercedes-Benz

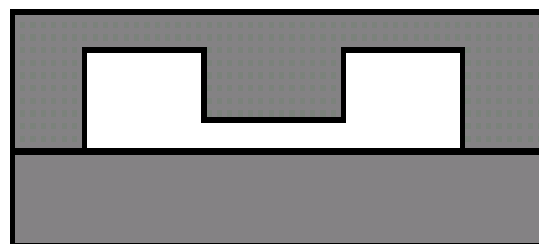
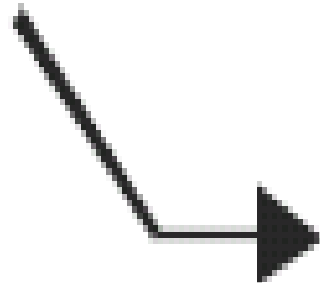


PRESSURE SENSOR



1. High precision and reliability are most desired functions in modern sensor design.
2. The conversion of pressure in the specific case, into an electrically measurable value is performed through piezo-resistive elements implanted on the surface of the silicon chip.
3. Two different sensitivities: a higher one in a low-pressure range (0 to 30 bar), and a lower one at higher pressures (up to 250 bar).

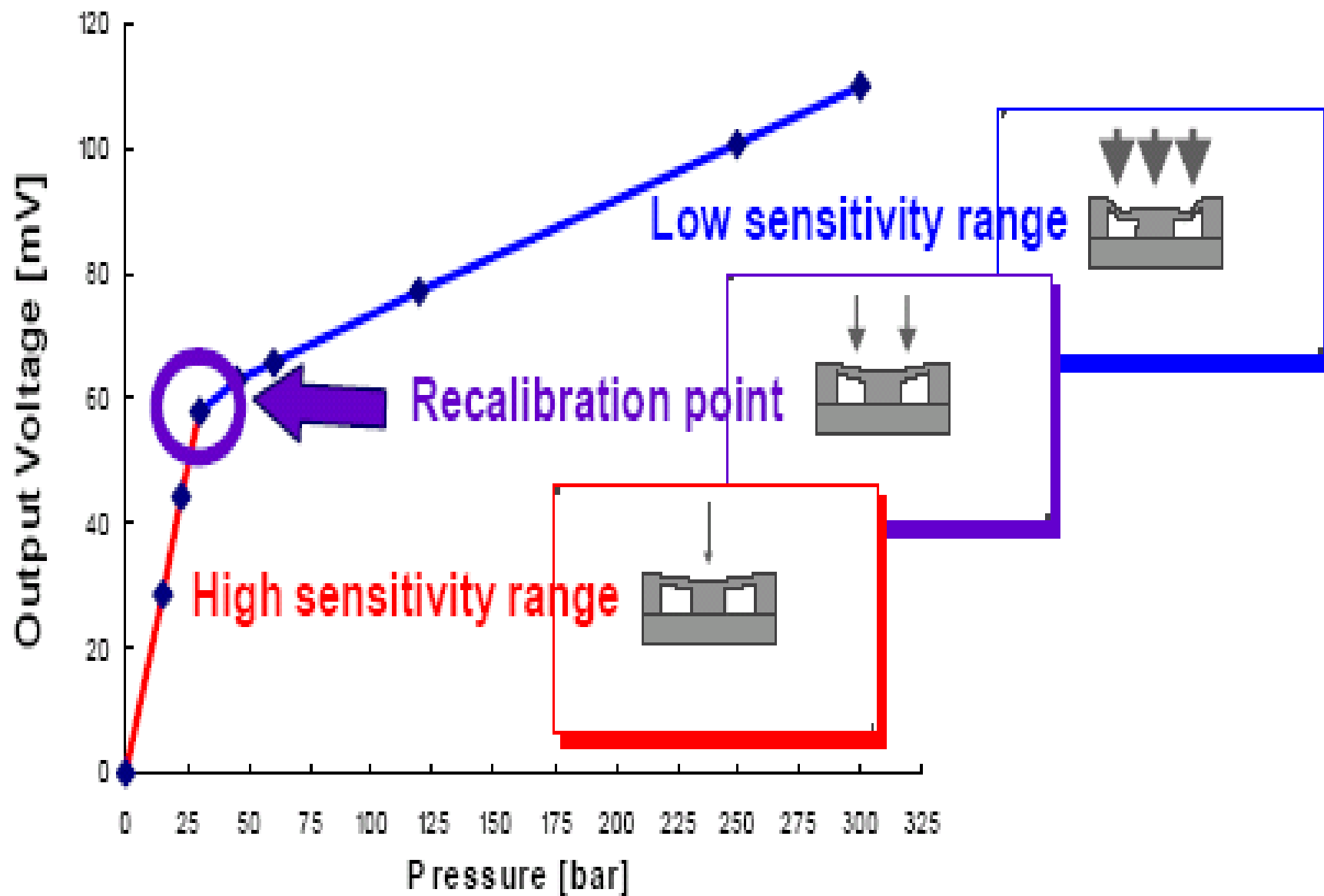
Membrane



Silicon bulk

Fig. 1: Diagram of the sensor chip profile.

Simulated Sensor Response



SENSOR DESIGN



- ➡ Defining a concept for a new sensor is no trivial job. Putting this into a realizable design is even more complex and requires a good deal of experience in sensor manufacturing and simulation techniques. The transducer chip design has been conceived in collaboration between EADS (European Aerospace Defense and Space company) with the contribution of the Technical University of Berlin.

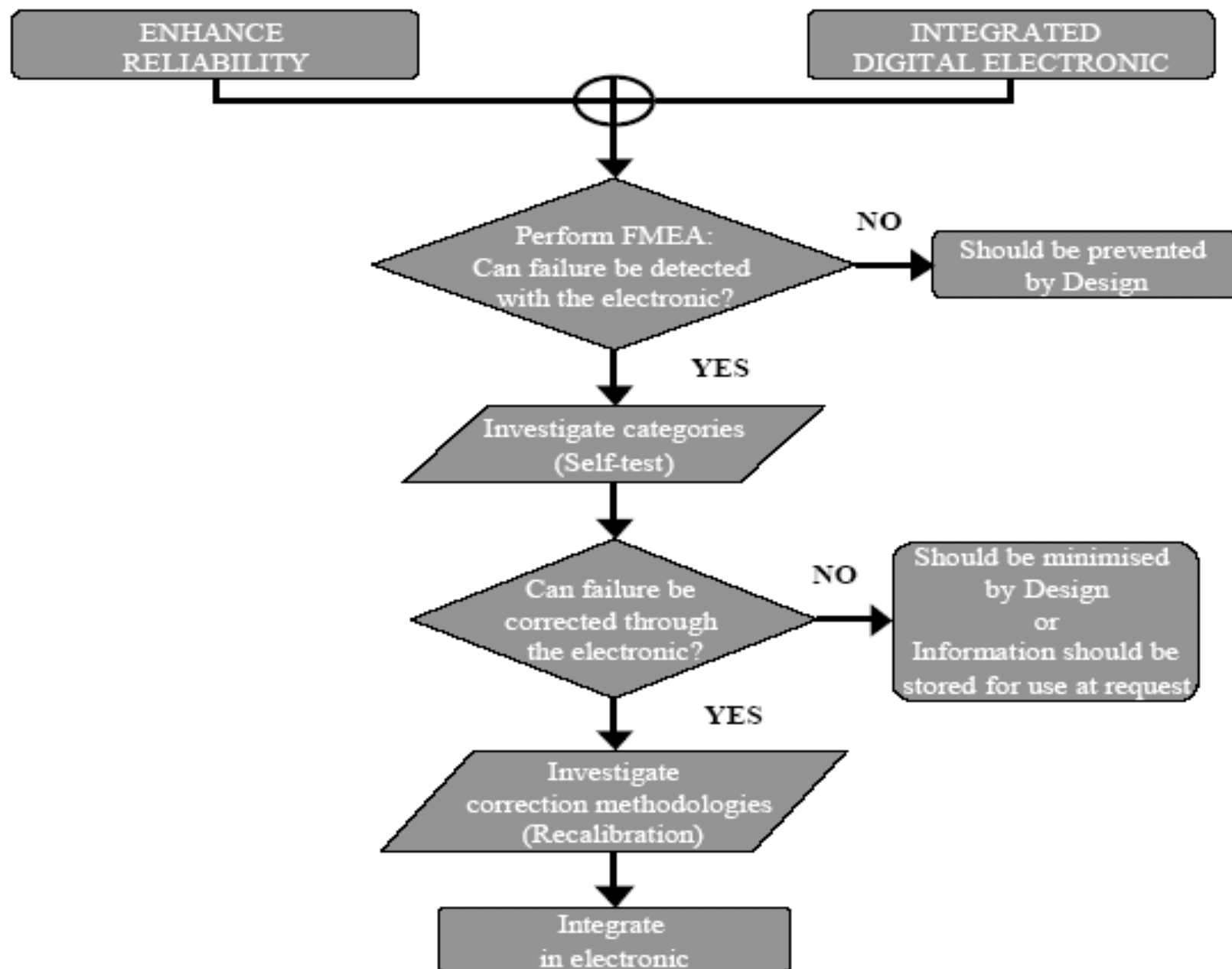


Fig. 3: Self-test and recalibration flow diagram with digital electronic.

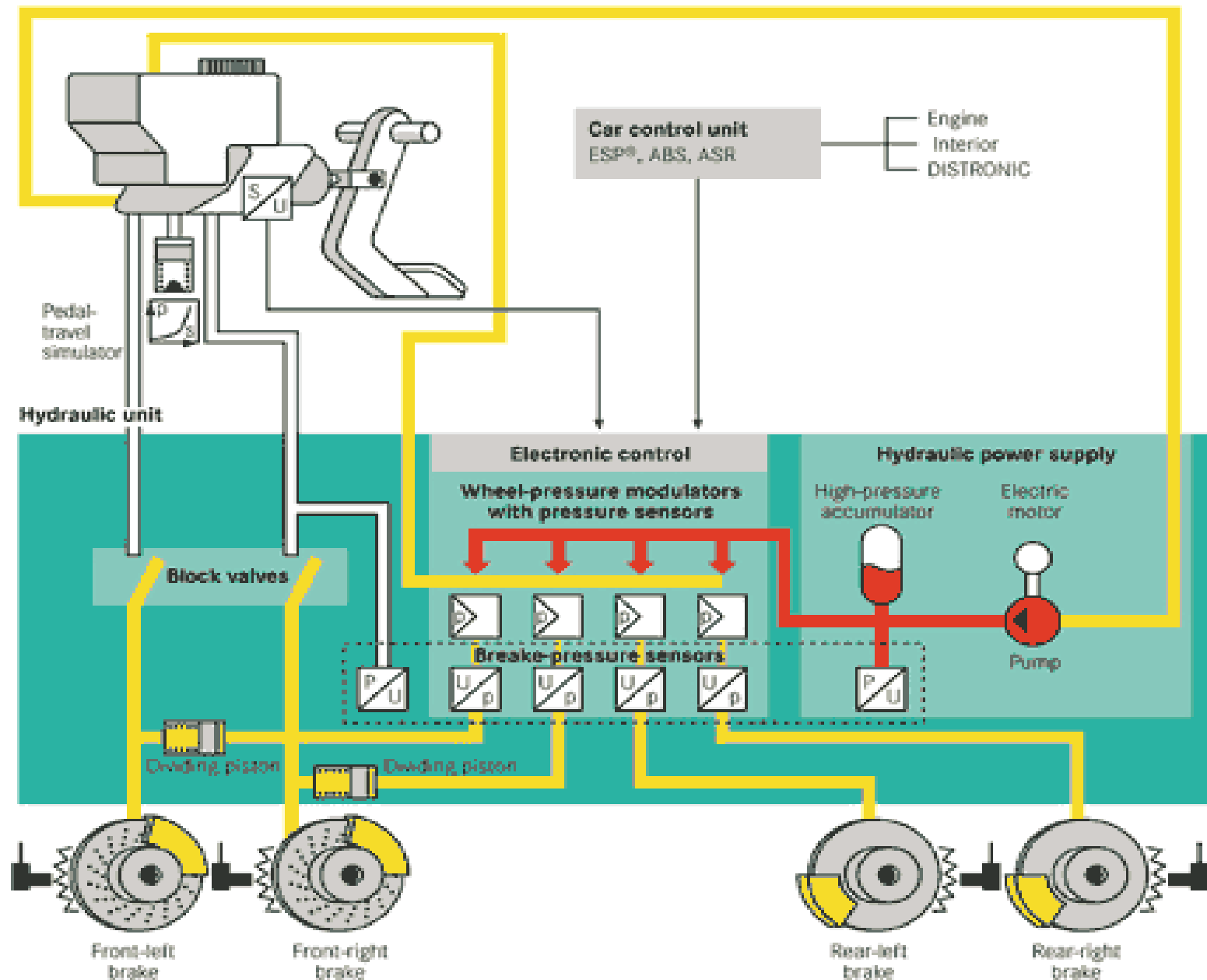
ELECTRONIC DESIGN



- ⌚ Electronic should be maintained to a low level of complexity.
- ⌚ A low level of integration has been chosen to enable more design flexibility.

Sensotronic Brake Control: The high-pressure brake system of the new Mercedes-Benz SL-Class

Actuation unit



FEATURES OF SENSOTRONIC BRAKE CONTROL



1. Emergency braking

SBC recognizes the driver's rapid movement from the accelerator onto the brake pedal as a clue to an imminent emergency stop and responds automatically: with the aid of the high-pressure reservoir, the system increases the pressure inside the brake lines and instantly presses the pads onto the brake discs so that they can get a tight grip the moment the driver steps onto the brake pedal.

2. Driving stability



- ✿ When there is a risk of swerving, the system interacts with the Electronic Stability Program (ESP) which keeps the vehicle safely on course through precise braking impulses at all wheels.
- ✿ SBC offers the benefits of greater dynamics and precision: thanks to the even faster and more accurate braking impulses from the SBC.

Previous model with conventional braking technology.

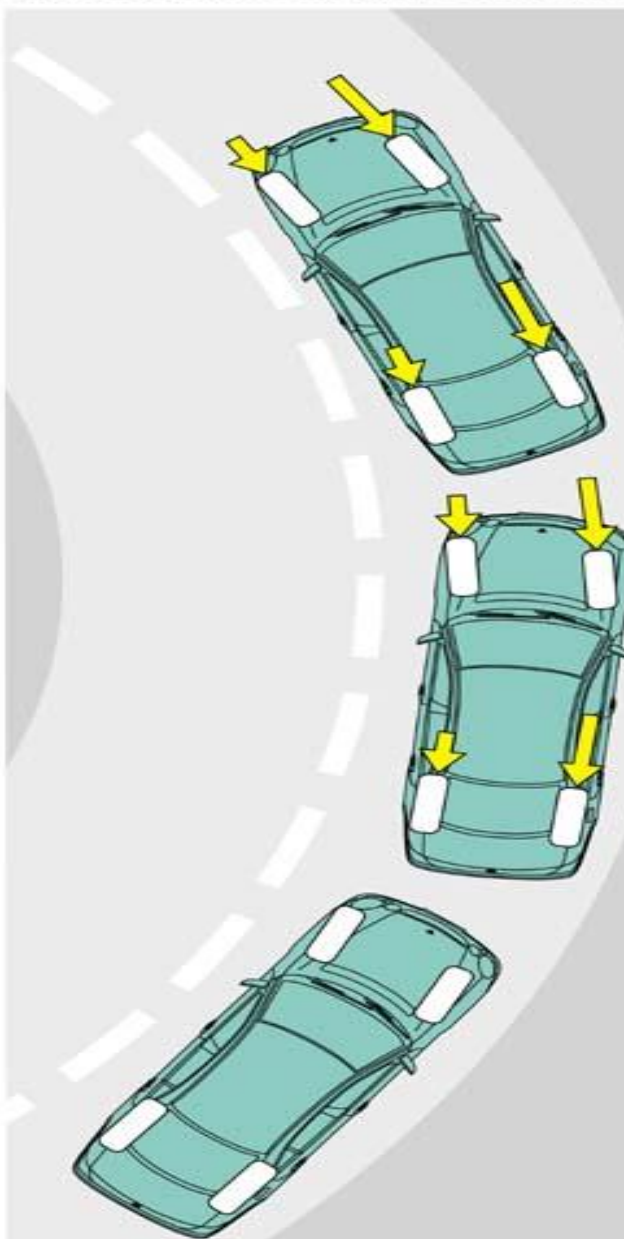


ESP® deployed:
the car has to be
stabilised by
means of brake
impulses.

Braking begins:
brake pressure is
distributed evenly
to all wheels.
Risk of skidding!

Curve entry point:
no braking.

New E-Class with Sensotronic Brake Control.

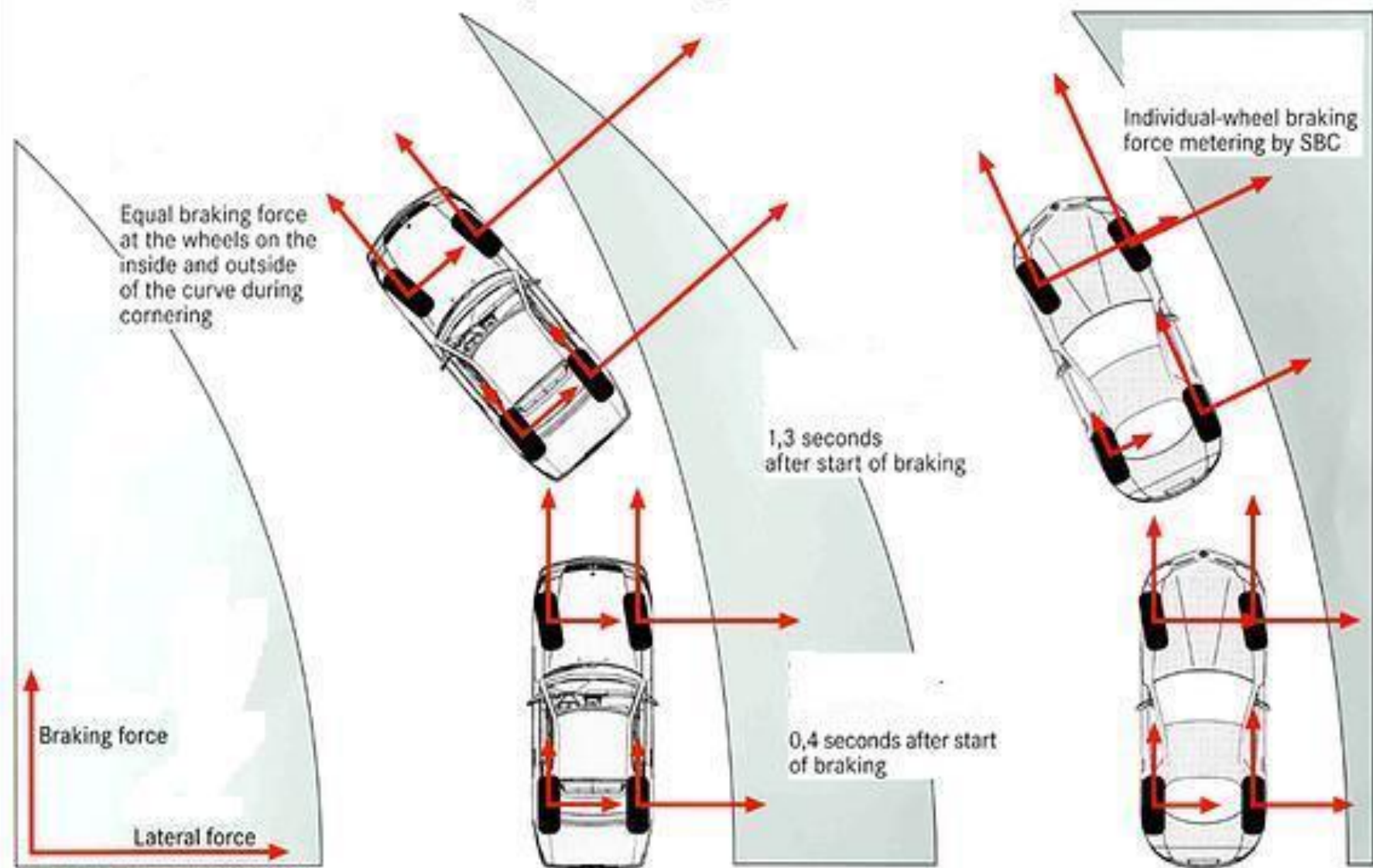


Thanks to SBC:
ESP® does not
have to intervene.

Start of braking:
the new E-Class
maintains stable
roadholding
because SBC only
directs the brake
pressure to the
wheels on the
outside of the curve
radius.

Curve entry point:
no braking.

Sensotronic Brake Control - Greater safety when braking on bends



3. Comfort



- SBC serve to increase brake comfort particularly during sharp deceleration.
- The usual vibration of the brake pedal does not occur which is not only a comfort feature but also offers measurable safety benefits

SBC ADD-ON FUNCTIONS :

- The **Soft-Stop function** of the SBC software ensures particularly gentle and smooth stopping during heavy traffic jams.
- On a wet road surface the system meters out short brake impulses at regular intervals to ensure that the water film on the brake discs dries off and that SBC can always operate with optimum effectiveness.
- On hills or steep drives the Sensotronic Brake Control **Drive-Away Assist** prevents the car from rolling backwards or forwards – stepping onto the brake pedal quickly but sharply is all it takes to activate the brake.

THE FUTURE



The advent of electronics in brake technology opens up new and promising opportunities in the disciplines of safety and comfort. By means of SBC we have also moved a considerable way closer to the realization of long-term objective, namely to be able to automatically guide the cars of the future along the roads with the aid of video cameras, proximity radar and advanced telematics. For such autonomous vehicle guidance, the experts need a computer-controlled brake system which automatically acts on the instructions of an electronic autopilot and stops the car safely.

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