Hydraulic clutch actuator

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Function

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by pressing the pedal. The force exerted is transmitted by several components and passed on to the actual clutch system. The process takes place in reverse on releasing the pedal. With a hydraulic clutch actuation system, so-called "Peak Torque Limiters (PTL)" prevent the occurrence of torque peaks and excessively rapid clutch engagement. A frequency modulator ensures that the vibration caused by the crankshaft does not affect the pedal.

Design of hydraulic clutch actuator

A hydraulic clutch actuation system consists of the following components:

- Pedal
- Clutch master cylinder
- Clutch pipe
- Clutch slave cylinder or CSC

Clutch master cylinder

In addition to their basic function, modern clutch master cylinders have to be designed for a variety of extra tasks. The following functions must be implemented to enhance safety, comfort and response:

- Cruise control system
- Starting lock
- Electric parking brake
- Torque adjustment
- Automatic stop-start

These extra tasks have to be reconciled with the demand for a further reduction in both the space required and the weight involved whilst guaranteeing quick and easy installation.

The clutch master cylinder is directly linked to the pedal. The piston inside it moves when force is applied to the pedal. The piston translates the force exerted by the driver into a mechanical command and passes it on to the clutch slave cylinder or CSC by way of the clutch pipe.

Clutch pipe

The clutch pipe links the pedal and the gearbox and so may also possibly transmit vibration. Such

interference must be eliminated in order to give the driver a reliable feeling for the correct pressure point and to ensure comfortable operation of the pedal.

The clutch pipe is filled with hydraulic fluid. It conveys the pedal pressure exerted by the driver and absorbed by the clutch master cylinder to a clutch slave cylinder or a CSC. These components react to increasing pressure by disengaging the clutch and decreasing pressure by engaging the clutch.

Clutch slave cylinder

Inevitable clutch wear must never affect reliable operation of the CSC or clutch slave cylinder and compensation therefore has to be provided. The clutch slave cylinder must be of compact lightweight design whilst at the same time ensuring top performance and efficiency.

The clutch slave cylinder absorbs the pressure from the clutch pipe and transmits it to the release lever. This is implemented by the hydraulic fluid moving a piston forwards or backwards. The clutch is disengaged or engaged depending on the direction of motion.

CSC

The CSC performs the same task as the clutch slave cylinder by directly transmitting force to the diaphragm spring tongues of the clutch.

Safety

Proper operation of the clutch actuation system is absolutely essential to be able to drive a vehicle with manual gearbox. Total reliability and a long service life must therefore be guaranteed.

From the point of view of the driver, a reliable feeling for the correct pressure point is crucial.

The hydraulic fluid for the clutch actuation system should be replaced regularly in accordance with the manufacturer’s specifications—a task that can be carried out quickly and professionally by an independent automotive workshop.
Experienced technicians can identify early signs of wear on master cylinders, slave cylinders, or lines and replace them as needed. Only replacement parts of OE (original equipment) quality should be used to ensure precise pressure transmission and a consistent clutch engagement point over the long term.

The important factors for car manufacturers and their suppliers are a slim design, quick and easy installation and the increasing use of resource-preserving and recyclable materials.

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