

## Driving the powertrain towards CO<sub>2</sub> Reduction

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As a result of the first signs of shrinking oil reserves and the increase in atmospheric CO<sub>2</sub> levels due to fossil fuel burning and its associated global warming, the automotive industry is coming under considerable pressure to reduce consumption and thus the emission of harmful greenhouse gases. The commitments entered into by leading countries together with industry and the anticipated legal regulations will require a progressive approach to the design of drive trains. Changes will be required to established engine and transmission concepts in order to eliminate all types of energy loss mechanisms. The Schaeffler Group is developing a range of products that can help to achieve reductions in consumption.

These measures can be subdivided into the following general categories:

- *Bearing arrangements with reduced friction in the engine and transmission:* The replacement of plain bearing arrangements by rolling bearing arrangements can give significant consumption advantages. In some cases, existing rolling bearing solutions can be replaced by concepts with lower friction losses.
- *New engine concepts:* With new internal combustion engine concepts, considerable consumption savings can be expected. These require valve train components that allow the necessary flexibility of valve lift and phase.
- *Solutions for more efficient automatic transmissions:* New concepts are also being offered in the field of transmissions with the goal of achieving automatic operation without the pump and drag torque losses involved in conventional automatic transmissions. Dual clutch transmissions are showing considerable potential for consumption savings in addition to the improvement measures taken in relation to the engine.
- *Hybrid drives:* A wide range of hybrid drive variants are under development that give further potential for consumption savings by means of stop/start functions, braking energy regeneration, boost function and extending to all-electric running.

With its comprehensive understanding of the systems involved and the broad scope of its product range for the drive train, the Schaeffler Group is ideally positioned to contribute solutions and components for the drive trains of the future (in order to meet the challenges of sustainability and climate protection). For each of the areas described above, namely reduced friction, valve train systems and transmission components, this paper presents examples and explains their design and function. It illustrates how supposedly small measures can together achieve considerable effects when operating in synergy.