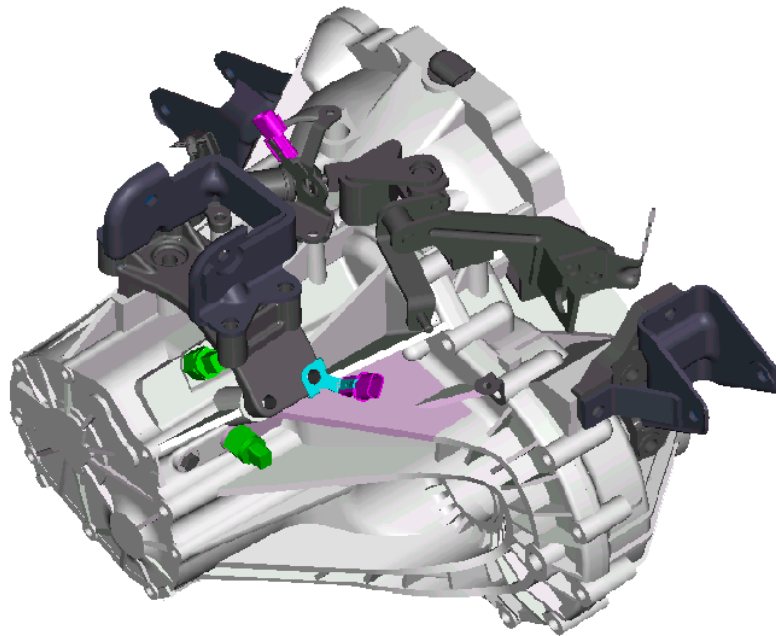


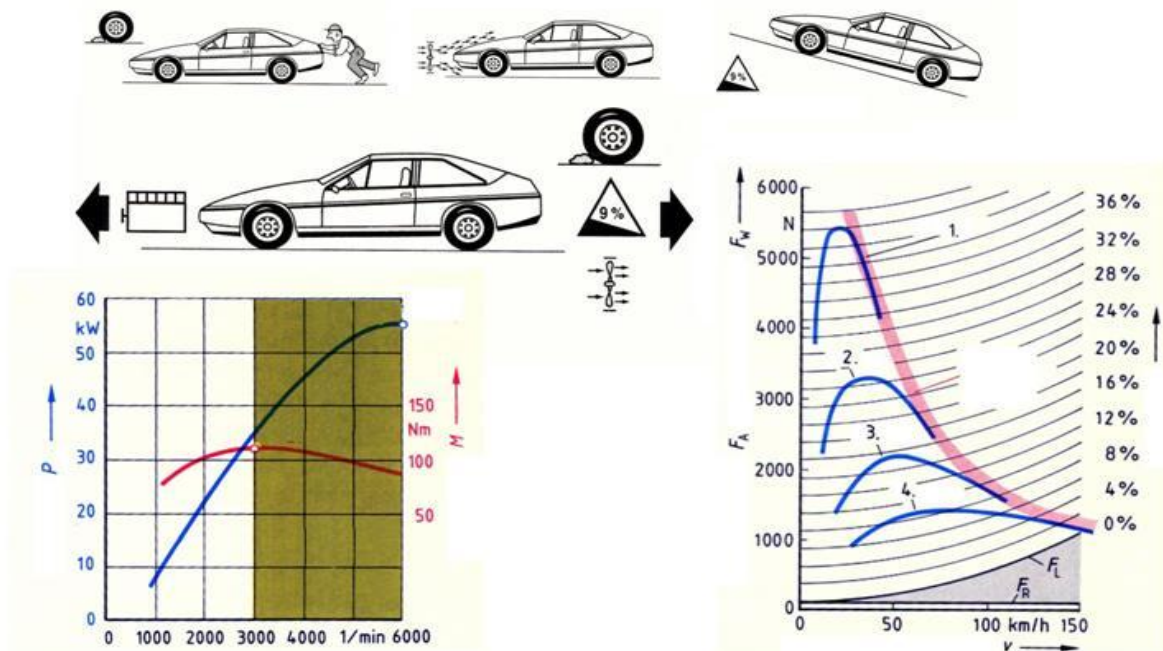
Manual Transmission 1



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Purpose of transmissions



In order to make a car move, it has to overcome several resistances. The three main resistances against vehicle movement are the: Rolling resistance, it is low at good tarmac and high at heavy off-road condition. Air resistance: it is low at low speed and high at high speed. It does not increase linear with the speed, but by the power of 2times in relation with the speed: at double speed the air resistance is four times higher etc. The air resistance of a vehicle depends also on its shape, expressed by the C_w value. This value is measured in a wind channel. The vehicle is positioned on a force measuring device, while it is subject to a defined wind speed. Gradient resistance on inclined roads; the steeper road the higher is the resistance. The maximum climbing ability may be restricted in the case of trailer towing. The sum of all resistances requires a power train performance according to the dynamic condition of the vehicle. As the engine has a limited range of sufficient power and torque, as well as a maximum engine speed allowance, a system to adopt to adjust the torque and speed to the actual requirements. This device is called transmission. The transmission changes the engine speed and torque to the value required to drive the car. To overcome the inertia force of the vehicle from standstill to motion, high torque at low wheel speed is needed. The transmission changes the relatively high speed /low torque of the engine to low speed / high torque. Once the car is in motion and is accelerating less torque but higher speed is required, therefore a transmission has several gears with different gear ratios to cope with this requirements.