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HYBRID ELECTRIC VEHICLES

Power Split Configuration

Power split hybrids combine the best aspects of both series and parallel hybrids to create an extremely efficient system. This system divides the engine power along two paths: one goes to the generator to produce electricity and one goes through a mechanical gear system to drive the wheels. The series path is generally avoided because it is less efficient. The main additional feature is that the engine, generator and motor speeds are decoupled, allowing additional freedom in control.

The most common configuration, called an input split is composed of a power split device (transmission), two electric machines and an engine.

Several variations of the power split have been implemented, each providing different advantages:

- In a single mode power split hybrid, the first electric machine is used to control the engine speed while the second one provides the remainder of the power required to follow the vehicle trace.
- A two mode power system is composed of a compound mode, in addition to the input mode. In this case, the size of the electric machine can be minimized as each motor is used to control the engine speed in different conditions. In addition to minimizing the electric machine power requirements, the system efficiency can be further improved by reducing the energy recirculation through the use of the fixed gears.
- Numerous additional variations have been patented and are currently being researched.

The main multi-mode power split effects:

- Smaller electric machine peak power and sizes, especially for large vehicles
- Addition of clutches to transmission increases spin and pump losses
- ICE may not be at its optimum point during the fixed gear mode
- Higher tractive capability during fixed gear model

