Flexible Direct Injection

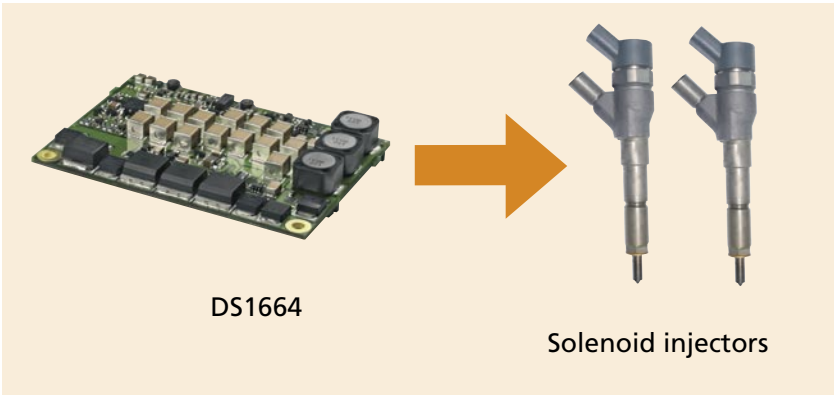
- RapidPro module for direct injection
- Variable control of injectors
- Software-configurable module

In the endeavor to cut fuel consumption, exhaust gas emission, and noise emission, and at the same time boost engine power, automobile manufacturers are employing new combustion chamber processes, and new injection methods and strategies. The PS-DINJ 2/1 (DS1664) is a new direct injection module which when used in conjunction with the RapidPro prototyping platform provides universally configurable control electronics for direct injection diesel and gasoline engines with solenoid injectors. The current and voltage signals are software-configurable, so the module can be adapted to different injectors and is therefore reusable, saving time and costs.

Developing Better Injection Systems

The optimization of injection systems for gasoline and diesel vehicles today requires flexible control of the injection components, particularly in advance development. The available production ECUs are usually not suitable for this task, as they are tailored to their specific production applications and therefore inflexible. The control solutions frequently used up to now were expensive, and had to be modified or developed for each project, also at great cost. The modular RapidPro prototyping platform from dSPACE is a completely new approach, and is moreover extremely efficient. Because it is software-configurable, the new DS1664 module can be adapted to a large number of different solenoid injectors. The RapidPro system's modular design can handle injection systems with up to 12 cylinders.

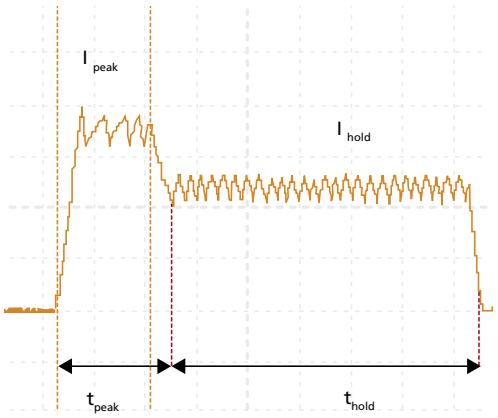
For further information, please see www.dspace.com/goto?releases



▲ *DS1664 module plus RapidPro prototyping platform: universal, configurable control electronics for gasoline and diesel direct injection systems.*

Universal Injector Control

The DS1664 module requires two slots in a RapidPro Power Unit and provides integrated current control for the peak current I_{peak} and the hold current I_{hold} (see illustration), and a voltage control for the boost voltage (software-configurable between 6 and 100 V). An external boost voltage can be fed in. Safety and fault detection functions such as short circuit and overtemperature detection are also on-board. The control signals for injection start and duration $t_{peak}+t_{hold}$



▲ *Typical current curve during injector control.*

are generated by the RapidPro Control Unit and can be freely parameterized in real time via a Simulink® blockset. Up to 10 injections per cylinder (pre-, post-, and main injections) can be implemented at a resolution of 0.1° crankshaft angle within one engine cycle. One module can control up to two injectors (sequentially) depending on the operating mode. In single operation mode, the maximum output current is software configurable between 2 A and 30 A, continuously up to 15 A (in dual mode 20 A/10 A).