

## Background paper

### Vectron: extended locomotive concept

**Efficient multimodal rail transportation is an important success factor not only for individual companies, but also for entire national economies and cross-national markets. Fast, economical rail links between major international ports, inland freight transshipment centers, metropolitan regions, and producers and customers all across Europe are, for example, important prerequisites for shifting as much goods traffic as possible from road to rail and thus reducing CO<sub>2</sub> emissions. With the new Vectron locomotive, Siemens is offering a product for passenger and freight transport that has been designed to meet increasingly changeable requirements and transport tasks in Europe. Siemens will be presenting new variants at InnoTrans 2012.**

The Vectron product concept consists of single- and multi-system locomotives for the European AC and DC networks for fast passenger services and interoperable cross-border freight services. These alternative versions allow operation in four different line voltage systems and various performance classes. Development work focused not only on investment protection, environmental compatibility and flexibility, but also on ease of retrofitting and conversion. The Vectron is also attractive to customers who want to buy smaller numbers of units.

In the standard configuration, the locomotives are designed for a maximum speed of 160 km/h. With a corresponding preliminary equipment package, the Vectron can be upgraded to a fast 200 km/h version without the need for any major modifications. Nor is it necessary to replace the bogies. A special feature of the Siemens vehicle concept is the internal deformation zone, the front end. It has a detachable connection to the carbody, which makes it easy to replace in the event of an accident.

Vectron is a product with wide-ranging options for a variety of traction needs. The Vectron portfolio also includes a medium-range AC locomotive with 5.6 megawatts (MW) for applications where not so much power is required. This version is especially suitable for hauling lower loads. One such example is its use in regional passenger transport services for top speeds of 160 km/h.

## Technical data of the Vectron medium-power AC locomotive

Wheel arrangement	Bo'Bo'
Voltage system	25 kV AC, 50 Hz 15 kV AC, 16.67 Hz
Max. power	5,200 kW
Starting tractive effort	300 kN
Maximum speed	160 km/h
Track gauge	1,435 mm to 1,668 mm

For shunting movements, the concept of the "shunting diesel module" has been developed. As an option, the diesel-generator unit can be installed or retrofitted on the the Vectron DC and AC. The power rating of the diesel engine is 180 kW. It has integrated preheating and meets the Stage IIIb emissions standard. All maintenance work can be performed from the corridor side with the diesel still installed. The concept combines electric and diesel systems in one locomotive and allows changeover between both propulsion systems. The concept caters especially to small and private operators. In freight traffic in particular, for example in container ports, there are numerous possible applications which can lead to savings in costs. This concept will be presented at InnoTrans on the Vectron medium-power AC locomotive.

The concept of the Vectron's flexible, removable front end allows low-cost implementation of alternative configurations. In freight traffic, double-heading operation is often required to haul heavy loads. If this is planned as the permanent operating mode, a double-locomotive configuration can make sense. This can save two of the four driver's cabs. Instead, the two Vectrons are each provided with a simplified, straight-edged front end and are coupled back to back. This principle, however, can also be applied to passenger service. By using a simple front end that replaces one of the two cabs, the customer gets a locomotive that has a lower purchase price, can be used as a power car and provides a visually attractive transition to the trailing coaches.

For more information about the Vectron, visit <http://www.siemens.com/press/innotrans2012>