

## Background paper

### A new tram generation: Avenio for The Hague

**The Rail Systems Division of Siemens AG is building 40 triple-articulated 100% low-floor Avenio trams for the transit operator HTM Materieel B.V. in The Hague. The Dutch seat of government was therefore the first city in the world in late 2011 to choose the new generation of the Avenio tram. The order for the 40 vehicles, which includes driver training, documentation and spare parts, is worth over 100 million euros. Siemens has also agreed with the customer on an option for up to 40 additional Avenio trams. The Avenio is built in the Siemens plant in Vienna, which employs around 900 people. The bogies are being produced in Graz. Shipment to The Hague is due to commence in February 2014, with the customer due to take delivery of the final vehicles about one year later.**

Along with the purchase price and quality, the Avenio's operating costs and sustainability were the crucial factors in HTM Materieel B.V.'s decision to place the order with Siemens. Preparations for production of the Avenio in Vienna are just getting underway. Each Avenio for The Hague is 35 meters long and offers seating for 70 passengers and standing room for a further 168. There are no steps in the aisle because the Avenio is an end-to-end low-floor tram.

The Avenio is based on the single-articulated vehicles which have proven themselves in passenger service in Almada (Portugal) since 2005 and in Budapest (Hungary) since 2006. This vehicle concept reflects the particular importance that Siemens engineers placed on comfort for both passengers and driver as well as on a low level of wear on wheels and tracks. With this in mind, the Avenio's bogies were designed to rotate by up to 4.5 degrees. This ensures greater ease of movement in curves than bogies which are rigidly connected to the carbody. Moreover, the design engineers succeeded in reducing driving and braking noise – a major benefit not only for passengers but also for passers-by and residents. Technical highlights in this connection include above all low-noise electric braking, rubber-sprung wheel tires and ancillary units that are de-rated or switched off when the vehicle is stationary. The fully sprung traction drive also reduces noise emission and vibration. Due to its good energy efficiency and environmental compatibility, the Avenio is definitely part of the Siemens green portfolio.

Technical data of the triple-articulated Avenio for The Hague

Number of wheels (total / driven)	16 / 12
Tractive power	6 x 120 kW
Track gauge	1435 mm
Line voltage	600 V
Passenger capacity (seated / standing)	70 / 168 (at 4/m <sup>2</sup> )
Starting acceleration	1.2 m/s <sup>2</sup>
Maximum speed	80 km/h
Wheelbase	1800 mm
Wheel diameter	600 mm
Weight empty	49.4 metric tons

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