

Toshiba presents hybrid locomotive concepts

Toshiba Railway Europe GmbH which is headquartered in Kiel showcased two prototype hybrid locomotives at the Transport-Logistic-Fair in Munich at the beginning of June 2019. The technology installed in them is already used in Japan.

“Series Hybrid” is an electric single-axle traction chain with permanent magnet synchronous motors and lithium titanate oxide batteries, dubbed “Super Charge Ion Battery” (SCiB) by Toshiba, connected to the intermediate circuit. The primary energy can be derived from a diesel engine generator unit and/or from the catenary system. The traction battery is charged from the primary feeding system, from excess energy from the diesel traction unit or by means of a recuperative braking system; this allows limited shunting operation with the diesel engine switched off and in the absence of an overhead contact wire. It is expected that it will also be possible to install hydrogen fuel cells at a later time to replace the battery.

“Series Parallel Hybrid” on the other hand operates with a mechanical drive shaft train from the diesel engine to the axle drives. A generator or an electric motor is coupled to this via a mechanical distribution gearbox (planetary gearing). These are used with a 92 kWh battery for intermediate energy storage, as a back-up auxiliary drive or for battery-only operation. 90 80 1094 001 “HELMS”, a DB 294 built in 1972, was on show in Munich as an example of a diesel-hydraulic locomotive conversion of this kind. DB is planning to convert up to 275 locomotives of this class in Cottbus. HELMS stands for “Hybrid Electronic Mechanical Shunter”.

The prototype locomotive HDB 800 on display for the first time is representative of the “Series Hybrid” system for power feeding optionally from an AC catenary system (15 or 25 kV) or from two separate diesel generator sets each rated at 471 kW. According to the manufacturer the battery sets have a storage capacity of 2 x 62 kWh and a service life of ten years.

The locomotive on show was based on the SDE 1800, the prototype of a planned new generation of diesel-electric locomotives, that Toshiba took over from Schalker Eisenhütte Maschinenfabrik in the autumn of 2017 and converted at the former Northrail workshop in Kiel Süd. At the time of the transfer of the SDE 1800 from Gelsenkirchen to Kiel, Toshiba and Northrail were still denying the purchase [1].

According to Toshiba it is to deliver 50 locomotives of type HDB 800 each to DB Cargo and to Munich-based locomotive leasing provider Railpool, with delivery starting in 2021; the Railpool vehicles will also be leased to DB Cargo. The locomotives with a speed of up to 100 km/h for shunting and light mainline duties will be fitted with two MAN diesel engines and the lithium titanate traction batteries mentioned above, but will not be equipped for catenary operation. The permanent magnet synchronous motors have a total power rating at the wheel of 750 kW. Depending on the requirements, it is possible to either use the batteries on their own or to switch in one or both diesel engines. Hitachi is to provide the ETCS equipment.

Toshiba and DB Cargo have still not announced how production of the ordered fleet is to be shared between Kiel and Rostock. The German states of Schleswig-Holstein and Mecklenburg-Vorpommern spent a long time persuading the Japanese manufacturer to move there since it involves the creation of several hundred new jobs. (hpe/schr)

[1] Schalke SDE 1800 sold. Short report in Railway Update 1-2/2018, p. 4

Above and centre: The HDB 800 was on display in Munich in a “hybrid design” with one side painted in silver grey and bright blue with Railpool logo (photo: J. Lüthard), the other in DB Cargo traffic red with the manufacturer’s name displayed prominently (photo: H. Petrovitsch).

Below: 1094 001 “HELMS”, depicted here at the DB workshop in Cottbus in April 2019, is the former 294 789 (photo: F. Heilmann).



Vectron Dual Mode – a dual-power locomotive for goods traffic

The diesel scandal in the automobile sector and the rampant political surge to save the environment at the moment have caused what was already a weak level of demand for large diesel locomotives to shrink significantly. All the manufacturers are feeling the effects.

Siemens had presented a diesel option (Class 247) from the Vectron family at the 2010 Innotrans trade fair, but has only been able to sell about one loco per year since

then. Siemens Mobility is therefore planning to halt its production, but believes that it has discovered a gap in the market for a dual-power locomotive.

A relatively large proportion of the railway network in Europe is still not electrified. Goods services therefore need traction units that do not depend on overhead catenary, even if only one part of the route does not have overhead wires. Changing the locomotive during the journey is not an economically viable pro-