IEP Trains Presented
PKP IC „Pendolino“ Starts
InnoTrans Megareport, Part 2
ABB Traction For EUROLIGHT
Three Czech Operators In Slovakia
The major requirement for this type of operation is to apply maximum tractive effort at axle load below 20 tons. The versatile platform includes current solutions for diesel-electric and multi-system applications.

**Strong Collaboration**

ABB in strong partnership with Vossloh developed a traction system platform tailored to customer needs. Close cooperation already in the early design phase ensures that all components of the system are designed with simple and clear interfaces. ABB’s traction system is engineered for optimum overall performance, high reliability and efficiency, and driven to minimise the down time and cost of ownership. Highest tractive effort at low weight is achieved by ABB’s advanced adhesion control.

The latest member of the EURO-LIGHT locomotive family, already homologated in Continental Europe, the UKLIGHT, has been tested in Velim, Czech Republic and in the UK. The locomotive made its debut at InnoTrans 2014 in Berlin and entered regular operation in the fourth quarter of 2014.

**Overview Of The ABB Traction System**

The ABB traction system for UK-LIGHT diesel-electric locomotive includes a synchronous generator, two BORDLINE® CC1500 DE traction converters and four traction motors. The two traction converters are directly fed by the synchronous generator. Each traction motor is supplied by its individual motor inverter. The single axle drives ensures highest adhesion performance and beneficial system redundancy.

For passenger operation, the traction package includes additionally a BORDLINE® M500 head end power for on-board auxiliary power supply of the passenger coaches.

**Traction Generator**

The 2.8 MVA brushless synchronous generator from ABB is directly coupled to the diesel engine and has a single bearing. It is forced air-cooled and weighs 5.3 tons only. The generator is self-excited with a redundant automatic voltage regulator UNI'TROL 1010 from ABB. The robust structure ensures very high reliability and durability with reduced and easy maintenance.

**UKLIGHT 68002 at Albuixech works on 10 December 2013. The Class 68 of Direct Rail Services has a Bo’Bo’ axle arrangement, a diesel-electric transmission with an installed power of 2,800 kW. Its max. starting tractive effort is 317 kN and a maximum speed 160 km/h.**

**BORDLINE® CC1500 DE Compact Converters**

The BORDLINE® CC1500 DE is a highly integrated IGBT traction converter housed in a very robust IP54 cabinet located in the machine room. The compact design includes environment-
tally friendly water cooled Power Electronic Building Blocks (PEBBs), DC-link capacitors, converter control, and switches.

The PEBBs are configured as rectifier, motor converters (2x), braking chopper, and auxiliary converter for the locomotive’s on-board supply. For passenger operation, an additional PEBB feeds the BORDLINE® M500 head end power supply from the DC link. The PEBBs are optimised for service aspects: lightweight (35 kg) and easy to handle by coolant quick couplings.

Each converter control is based on the powerful AC800 PEC platform, which is used in all ABB traction converters, as well as in a wide range of industrial applications. The converter control ensures best adhesion performance and power management, optimising the energy-efficiency and effectiveness of the entire traction chain. The converter control and power supply units are placed on a swing frame in front of the PEBBs providing excellent access to all key components.

For diagnostics, an Ethernet interface is available. In-depth data can be obtained using BORDLINE® - View, a diagnostic tool including an advanced self-diagnosis function, which gives advice and instruction for smooth service and repair.

**Traction Motors**

The traction motor has been designed to fulfil the requirements for freight and passenger operation. The ABB AMXL400 is an AC six-poles induction motor with an open force ventilated (OFV) cooling arrangement and a total weight of 1,850 kg. The new electrical design is optimised for high energy efficiency and high performance/weight ratio. The motor with its Class 200 vacuum pressure insulation and lubricated bearings designed for robustness and reliability is highly integrated into the vehicle structure, and

**UKLIGHT 68001 and prototype EUROLIGHT 284 001 with a 1,500 t coal train at VUZ’s test centre in Velim on 9 March 2014.**

**Vossloh’s Insight To Market Requirements And Outlook, And Collaboration With ABB**

What is the reason Vossloh developed the new EUROLIGHT locomotive platform?

We identified a market demand for versatile and reliable high power four-axle diesel electric locomotives for railways with restricted axle-loads bearing in mind that many European secondary lines are not electrified. The EUROLIGHT locomotive family is setting new standards in the European locomotive market with its axle-load of under 20 tons and designed for freight as well as passenger services.

What particular challenges did you face with the new locomotive platform design?

A vehicle platform intended for both freight and passenger operation requires a high-power traction system with maximum tractive effort at minimum weight. ABB’s traction system platform has the advantage that all components of the package are designed in close partnership with Vossloh and configured for optimum overall performance and efficiency. The traction chain is configurable for Bo’Bo’ as well as Co’Co’ locomotive.

Are there market trends or new developments that offer further collaborations with ABB?

We are delivering 22 new catenary-free trams for the São Paulo Metropolitan Urban Transport Company (STM/EMTU) equipped with ABB traction converters. The bi-directional trams are based on the Vossloh Tramlink platform, first vehicles have been already delivered to the customer. As well for South Yorkshire Passenger Transport Executive (SYPT), Vossloh is delivering seven tram-trains with ABB multi-system traction converters suitable for both 750 V DC and 25 kV 50 Hz AC supply. In addition, we see interesting opportunities to cooperate with ABB in further locomotive projects.

**Photo: Quintus Vosman**

**A Type BORDLINE® CC1500 DE Compact Converter.**

**A Type BORDLINE® M500 Head End Power converter.**
includes sensors for temperature and speed measurement.

**Head End Power**

The BORDLINE® M500 head end power is delivering a maximum 500 kW auxiliary power supply for on-board consumers (heating, air conditioning). Therefore, by using the BORDLINE® M500 the freight locomotives can be easily upgraded for passenger operation. The unit, directly fed by one of the BORDLINE® CC1500 DE includes a galvanic separation and converts the three-phase AC input to two DC 900 V outputs. The platform design allows an easy adaptation to other output voltage levels such as 1,800 or 3,000 V. The BORDLINE® M500 is designed for underframe mounting in a robust IP65 housing.

**Service Concept**

ABB offers an established service concept to operators to ensure the reliability, availability and maintainability of the traction system. Besides training and remote support, ABB offers on-site support within 48 hours if needed. The consignment stock near the operator and on-site pooling with incorporated repair logistics ensures a higher availability and short downtime. The maintainability will be simplified due to high degree of modularity of spare parts, extensive diagnostic tools and active obsolescence management.

**Market Outlook And Further Applications**

In addition to the diesel-electric applications, the EUROLIGHT locomotive family was extended with multi-system solutions. ABB is supplying the traction packages for 50 locomotives (3 kW DC/diesel-electric) for Passenger Rail Agency of South Africa and for 10 locomotives (AC/diesel-electric) for Direct Rail Services, UK. Due to ABB’s flexible and modular traction platform, further single and multi-system applications for freight or passenger service can be realised.

Gmeinder Lokomotiven exhibited a Type D60 C diesel shunter, 903.04, belonging to LogServ, which initially ordered two of these machines in July 2012, then took up an option for two more in May 2013. The, “900” in the designation stands for the power rating in horsepower, “3” indicates that this is a three-axle locomotive, and “04” is the LogServ fleet number, this shunter being the latest member of the batch. 903.01 and 02 were delivered in November and December 2013, entered service in December 2013 and January 2014, and were followed by 903.03 in July 2014. 903.04 was handed over to LogServ at InnoTrans 2014 and hauled to Linz after the end of the fair. More are on the way, follow the signing of a contract in June 2014 for two, to be delivered in 2015, the agreement incorporating an option clause for a further two, to be delivered in 2016. If this option is taken up. In fact, LogServ envisages that it could acquire as many as 14 of these shunters.

The D60 C, built at Mosbach works, has evolved from a locomotive of a similar design built for the BP refinery in Lingen (Germany) in 2010. It is 1,435 mm gauge, with a C axle arrangement and a top service speed of 40 km/h. It is 10,780 mm long over buffers, 3,080 mm wide, 4,255 mm high above rail top, and has an axle-load of 22 t, tare weight being 66 t. It has been designed to fit within the UIC 50S-1 loading gauge, and can negotiate a minimum curve radius of 60 m. The prime mover is a 690 kW MTU Series 12V 1600 R50 diesel, linked to Voith L3rdzeU2 hydrodynamic gearbox.

Gmeinder also presented details of its proposals for a Type DE75 BB four-axle shunter, a 1,435 mm gauge hybrid machine which is intended to be a direct competitor of Alstom’s H3 Hybrid shunter. The centre cab design enables:

1. alternatively, two diesel gensets, one under each bonnet, may be installed, or one diesel genset and one set of electric traction equipment including a pantograph may be fitted,
2. the fourth option is a set of conventional electric traction equipment with pantograph, together with a Li-Ion battery.
3. if the latter option were ordered by a client, it would be the very first electric locomotive in Gmeinder’s production range.

The DE75 BB will have a Bo’Bo’ axle arrangement and will be built to conform with the UIC 50S-1 loading gauge. It is envisaged to be 13,000 mm long over buffers, 3,080 mm wide, and 4,260 mm high over rail top. The top service speed will be 80 km/h, though 100 km/h will be permitted if the shunter is being hauled. Tare weight will be 80 t ±3 %, giving an axle-load of around 20 t. All versions will have a power rating at wheel rim of 600 kW and a starting tractive effort of 260 kW. The C13 diesel engine(s) supplied by Caterpillar will have a power rating of 354 kW and comply with EU stage IIIb exhaust gas emissions limits, without the need for urea injection. The battery is designed to deliver up to 350 kW. When no power is needed for traction, the battery is charged from the diesel genset or through regenerative braking, the latter effected at up to 350 kW. While the locomotive is not in use, the battery can be charged from a 3 x 400 V AC external power supply.

The design of the DE75 BB is now complete, and the outcome of negotiations with prospective clients are now awaited before construction of the locomotive starts. For evaluation purposes, in 2015 the hybrid drive line will be installed in a Type DE500 C diesel-electric shunter, which Gmeinder bought in non-working condition and which the company is to modernise.
Field-proven, customized traction solutions?

Certainly.

ABB supplies best-in-class traction system technology for Stadler Rail’s double-decker multiple unit trains in Switzerland, Germany, Austria and Luxemburg. For the Russian railway operator Aeroexpress, the well proven and successful ABB traction converter platform for double-decker trains has been extended to 3kV DC power supply application and the harsh climatic conditions of Russia. The compact and powerful roof-mounted traction converter with integrated line filter, braking resistor, auxiliary converters and cooling system offers more comfort for passengers and easy maintenance access. ABB helps optimizing rail operators’ daily operation and improving their competitiveness. www.abb.com/railway