

## RailCare's Swap-Body Generator Power Supply System

The Switzerland-based operator RailCare, a subsidiary of the **Coop** retail chain giant, which has an annual turnover of some 24.2 billion EUR, is mainly active in providing logistics services for the latter concern. At the end of 2016 it had a fleet of 730 swapbodies, and had on hire 84 Class Sggmrss 104-foot articulated six-axle container wagons, each of which can carry four swapbodies. These range in length between 7.45 and 7.82 m. The whole wagon fleet is equipped with Containermover 3000 frame adaptors. These enable easy horizontal reloading between an HGV and a rail wagon, were designed by Innovatrain as an evolution of the Mobiler system, and were introduced in 2011 (see R 6/11, pp. 66-67; R 4/13, p. 37).

Coop's logistics activities essentially involve the transport of food. Many food items are perishable, so require transporting **under controlled temperatures**. This usually means carrying the produce in insulated containers or swapbodies, together with which it is necessary to have diesel gensets, to provide electricity for the cooling equipment.

RailCare recently finished the development of its own means of keeping swapbody interiors at the required temperature, by using kinetic energy. This is known as the **rCE-Powerpack** (RailCare E-Powerpack). Development was realised over a short space of time - only 11 months. A key component in the development was the existing Containermover adaptor, since this is used as the mounting base for the rCE-Powerpack equipment. It does not form a permanent part of the wagon, and this simplified authorisation procedures.

The accompanying photos help to describe the system. Electricity generated is distributed, through a converter, to all four swapbodies loaded on the wagon. Lithium-iron-phosphate **batteries** are mounted on the adaptor frames. One frame can accommodate up to eight batteries, and is enough for the whole load carried on the entire articulated container wagon. The rCE-Powerpacks have standard 400 V AC connections, with a 50 A current, this making a total of 20 kW available (5 kW for each of the four swapbodies on one wagon). Each battery provides 52 V

and 7 kWh. This means that between 28 and 56 kWh can be provided for between four and eight batteries installed on one frame.

The whole rCE-Powerpack **configuration**, including six batteries, on one wagon, weighs a total of 1,460 kg. When the train reaches a speed of 40 km/h or above, electricity is generated. At lower speeds, and when the wagon is stationary, a set of six batteries is able to continue providing sufficient power for temperature control of one fully-loaded 7.45 m or 7.82 m long swapbody for around two hours, which in practice is sufficient.

The entire system is composed of standard parts, and RailCare possesses copyrights for the system, which the company is currently having patented. However rCE-Powerpack is to be marketed commercially and made available to any interested party. In theory, its use without the ContainerMover frame is possible, however in such a case, the advantage of avoiding more complex authorisation procedure would be lost.

As regards the **cost**, this depends on the number of batteries used. The installation costs of an rCE-Powerpack on one wagon start at about 60,000 EUR, and eight years of depreciation are reckoned with for the batteries, with 16 years for the entire system. RailCare estimates that the current use of rCE-Powerpacks saves up to 475,000 litres of fuel annually, which means around 700,000 EUR. However it is not really possible to figure out the exact data on the basis of just one installed Powerpack, since the savings depend on the kind of service it is used on. The plan is to reduce the depreciation for the entire system to eight years thus resulting in the doubling of the annual depreciation) and still to be able to balance all investment costs with fuel savings.

Another possible way of accessing electricity to power the temperature control systems in swapbodies is to make use of the **catenary**, on electrified railways. This means the electricity has to be fed from the locomotive's pantograph to the rest of the train. But this method was evaluated as more complex than the rCE-Powerpack system.

The increased amount of tractive effort required for powering a set of hydraulic generators is acceptable, both



The upper photo shows a typical example of RailCare's transport system. This is an articulated platform wagon fitted with a ContainerMover 3000 frame adaptor. On the left a swapbody is being loaded. The frame adaptor has been fitted with six square panels housing six batteries and there are two empty spaces, which could be filled with two more batteries.

The lower left-hand photo shows part of the central bogie: here the hydraulic pump has been mounted on the axlebox housing. The rotating movement of the axlebox bearing pressurises the oil, which then passes through the pipe to the hydraulic motor and electric generator. These are suspended beneath the ContainerMover frame adaptor and are visible clearly in the lower right-hand photo. In the foreground can be seen the oil cooler, and a control unit is also part of the assembly.

The electrical wiring is installed in the frame adaptors and wagon, providing power to adjacent swapbodies and also to the batteries. Therefore each frame has some sort of socket, so that the swapbodies on it can be plugged into the power distribution system.



from the view of increased operating costs and the amount of tractive effort remaining for haulage purposes. Railcare's own trains are usually quite short, as they need to be fast enough to be able to get a infrastructure capacity in-between fast passenger trains.

As regards **testing** of the rCE-Powerpack, two wagons were fitted with the system in 2016. Testing demonstrated its efficacy and prompted a decision to install it on 25 more wagons during 2017. All the remaining members of the fleet will be equipped during 2018. By early 2017 Railcare had acquired 130 swapbodies without diesel gensets, their cooling systems being fed purely electrically. It is planned to continue this strategy in the future.

During the test operation period, the wagons fitted with rCE-Powerpacks

were used not only on domestic distribution services in Switzerland, but also on services to and from North Sea ports and northern Italy. Here in addition to food, the payloads consisted of chemicals and pharmaceuticals.

The amount of **freight** being moved by railCare is steadily increasing, and this prompted the operator to place an order with Siemens in September 2016 for seven Vectron AC Last Miles. These are scheduled for delivery between November 2017 and June 2018 (see R 6/16, p. 38). Since these are direct purchases they will enable RailCare to return all five locomotives which it has on hire.

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Photos: RailCare

### RailCare's current service and connecting hub network.

