A Visit To Stadler's València Works

In November 2015 it was announced that Vossloh España's factory in the Valenciano suburb of Albuixech was to be taken over by Stadler, becoming Stadler València (see R 5/15, p. 7). By inheritance Stadler Rail thus became one of the Europe's major builders of diesel-electric and electro-diesel locomotives, with markets for the EURO 4000 design and its derivatives established and evolving in Britain, Iberia, Scandinavia, France, Germany, Israel, Africa, south-east Asia and Latin America.

A Potted History

The history of the rail vehicle factory in València dates back to the foundation of Talleres Devis y Noguera in the Valenciano suburb of Marxcalenes by Miguel Devis and José Noguera in **1897**. The company began as a boiler and heavy engineering works, becoming Devis e Hijos, and subsequently Hijos de Miguel Devis in 1921, diversifying that year into steam locomotive and rolling stock repairs and construction.

Between 1926 and 1932 126 carriages, 1,360 wagons and 116 vans were built for the Compañía de los Caminos de Hierro del Norte de España, but only seven steam locomotives, for the Compañía Nacional de los Ferrocarriles del Oeste. A subsidiary factory was built at Alcázar de San Juan in 1941, and that year RENFE placed an order for 28 locomotives. Starting in 1945, working together with Sécheron, electric locomotives were also built. In **1947** Devis merged with the Barcelona concern Material para Ferrocarriles y Construcciones SA, becoming Material y Construcciones S. A. (MACOSA). The company built the first Spanish articulated tram, and also the first main line Spanish diesel locomotive.

In **1960** MACOSA started working together with General Motors, which granted it a licence for building diesel locomotives, these supplied not only to RENFE but also for export to Brazil, Iraq, Yugoslavia, Algeria and Switzerland. Between 1961 and 1996 no fewer than 996 diesel locomotives were built, of which 329 were exported.

In **1989** MACOSA, in financial difficulties, became part of the GEC-Alsthom group, which in 1997 built the new 200,000 m² works complex, the buildings, covering 47,000 m², including a bogie production hall, bodyshell painting and assembly halls for locomotives and passenger vehicles, together with testing and commissioning facilities. In 2005 Alstom sold Albuixech works to Vossloh, under which the plant developed several locomotive types (EURO 4000, EURO 3000 and EUROLIGHT) and LRV families (Tramlink and Citylink).

For testing Stadler València has a 3 km long, three-gauge (1,000 mm, 1,435 mm and 1,668 mm) track, with catenary that can be energised at 25 kV 50 Hz and 3 kV, 1.5 kV and 750 V DC.

Completing The Vossloh Legacy

On 1 January 2016 the 172 million EUR sale of Albuixech works to Stadler was completed. The Swiss manufacturer gained, in addition to a complete and evolving main line locomotive construction sector, the ability to build trains using steel, since it had hitherto focused on using lightweight aluminium for bodyshells. Stadler took on Vossloh España's order book, and over the **two years** since acquiring Albuixech realised:

- one EURO 4000, 1415, delivered to Israeli State railways in 2016,
- four EURO 4000s, 4039 to 4042 for Europorte (France) in 2016, ordered in December 2014,
- six EURO 4000s, E4043 to E4048, delivered to VFLI (France) in 2016 (see R 2/16, p. 20), ordered by Beacon Rail Leasing in December 2014,
- six EURO 4000s, E4049 to E4054, delivered to VFLI in 2017, equipped with on-board ETCS,
- six 1,668 mm gauge EURO 4000s, delivered to Alpha Trains in 2017, four (E5033 to E5036) for use by Medway (Portugal) and two (335.037 and 038) for Ibercargo,
- six UKLight Class 68s, 68 020 to 68 025, delivered in 2016, ordered by Direct Rail Services and financed by Beacon Rail Leasing,
- nine UKLight Class 68s, 68 026 to 68 034,
- ten Class 88 UKDUAL electro-diesels, 88 001 to 88 010, financed by Beacon Rail, ordered in September 2013 and delivered to DRS during 2017. The Class 88s are based on the design of the Class 68s, of which 34 were sold (see R 6/14, p. 44).

In addition to building locomotives, Albuixech works has also supplied bogies and monocoque **bodyshells** incorporating crash impact absorption structures to EMD/Progress Rail for forty 200 km/h Class F125 diesels ordered by Los Angeles suburban operator Metrolink, the first of these machines being completed at EMD's Muncie works in Indiana in early 2016 and presented in July that year. Bogie frames have also been produced at Albuixech for several other Stadler contracts in Europe, including trams, metros or FLIRT EMUs.

Photo: Metrolink

One of the Metrolink locomotives for which the bodyshells were built at Albuixech works.

Image: Stadler

A view of the Stadler's New Generation (NG) shunting locomotive. It is available in three versions: diesel-electric, dual-mode or electro-diesel, and hybrid (diesel/battery).

HVLE's first EURODUAL at the final assembly stage.

The bodyshell of HVLE's second EURODUAL recently emerged from the paint shop, having received a coating of primer.

Building For The Future

With the primer movers for the EURO 4000 design no longer suitable for use in EU countries since they only meet Euro IIIA noxious exhaust emission standards, Stadler València found it necessary to develop a suitable Euro IIIB-powered successor. This is the **EURO 4001**, based on the design of the electro-diesel EURODUAL, but powered by a Caterpillar C175-16 Euro IIIB diesel engine rated at up to 2,800 kW giving it a top service speed of 160 km/h. The EURO 4001 concept was first presented at transport logistic 2017 in München, but so far there have been no orders placed.

Other Co'Co' derivatives from the original EURO 4000 design include the SALi (South American Light), intended for high altitude, low axle-load lines in Latin America (see previous article).

Another project is the **NG Shunter**. This four-axle design is targeted at the European markets, will be fitted with one or two Euro IIIB-compliant prime movers rated at up to 2,000 kW, and will also be available as an electro-diesel, also rated at up to 2,000 kW and as a diesel/battery hybrid, with just one diesel engine. It will have AC/AC transmission, be fully TSI-compliant, and will incorporate a high level of redundancy in its design, for reliable operation. However the first tender in which Stadler offered the NG Shunter was won by Alstom, which is to supply SBB Infrastruktur with 47 electro-diesel Prima H4 shunters (see R 6/15, p. 25).

One of the most recent contracts involving **EURODual** family locomotives is that placed by Havelländische Eisenbahn (HVLE) for ten machines (see R 2/17, p. 16). Batch production started in autumn 2017. These machines will be rated at 7,000 kW when operating off 25 kV 50 Hz and 15 kV 16.7 Hz AC, and 2,800 kW when using diesel power. By late January 2018 three were being built. The first was then at the start of the final assembly line, the bodyshell of the second was being painted, and the steel bodyshell of the third was being subjected to welding. One of these will be exhibited at InnoTrans 2018, while the two others will be subjected to testing on the Albuixech test track, prior to being sent to Germany in summer 2018.

Trams And Tram-Trains

So far we have focused exclusively on locomotives. Other recent activities at Albuixech have included the legacy contract from Vossloh Kiepe (now Kiepe Electric, of Düsseldorf) for 31 three-section Type GTW 2014 overhead **monorail „trains"** for the Wuppertaler Schwebebahn, operated by Wupper-

For accident repair treatment Stadler Albuixech also supports Renfe as shown on this example, 333.328.

Photo: Stadler

The EURODual prototype (see R 5/17, p. 11), having visited the Romanian test circuit at Făurei during early summer 2017, then went to the CEF2 test centre near Tronville-en-Barrois, to the west of Nancy. ***The upper photo shows the prototype, which carries the EVN 92 87 000 6001-7 F-STAVA (i. e. Stadler València) on 2 December 2017 on the CEF2 test track.*** The locomotive completed its stay there in mid-January 2018 and was then moved to Schaerbeek depot, in Brussels. From there it realised a series of test runs on the public network prior to authorisation being granted for use in Belgium.

One objective was to ensure on-board ETCS compatibility with wayside ETCS installations, while other tests, including EMC measurements, evaluated other requirements specific to operation on the Belgian network. This means test runs between Ath and Silly, and running on some lines equipped with ETCS, such as the Athus - Meuse line in southern Belgium. ***On 27 February 2018 the locomotive made some runs between Mechelen and Leuven. The lower photo shows it passing Wijgmaal station before returning to Schaarbeek.*** Also tested was transition management between France and Belgium. Testing in the latter country was scheduled for completion in mid-March 2018. Simultaneously Stadler is working on getting the EURODual authorised in France.

Photo: Bart van Tricht

Karlsruhe Citylink tram-trains and Wuppertal Schwebebahn cars on the assembly line.

On 29 January 2018 Karlsruhe tram-train 53 leaves Albuixech on a low-loader bound for Germany. A total of 75 of these tram-trains is on order.

taler Stadtwerke. The first was delivered on 14 November 2015 (see detailed description in R 6/15, pp. 68 - 69), and during 2016 was subjected to testing for acceptance by the technical supervisory authority.

The cars are being built at Albuixech, all the electrical equipment is being supplied by Kiepe Electric, and other principal subcontractors include Hammerer Aluminium Industries of Ranshofen (Austria), Traktionssysteme Austria of Wiener Neudorf, and ZF of Friedrichshafen. The individual cars are despatched from València to Wuppertal, where they are formed into three-car „trains". By the end of 2017 13 „trains" had been delivered.

During the Vossloh era at Albuixech various designs of tram and tram-train were developed, one of the early markets bering the FGV (Ferrocarrils de la Generalitat Valenciana) metre gauge networks in València and Alacant. Export orders also came. Verkehrsbetriebe Karlsruhe and Albtal-Verkehrs-Gesellschaft placed orders for 75 **Citylink** tram-trains, in all three batches, between 2011 and 2016. Then came orders for other networks in Germany (Chemnitz), England (Sheffield), Hungary (Szeged to Hódmezővásárhely) and Mexico (Puebla).

In August 2017 FGV placed a 43.3 million EUR order for six electro-diesel metre gauge Citylink tram-trains for Tram de Alacant's Line 9, between Benidorm and Dénia. The first of these is scheduled for delivery in 2019. This order, the latest, brings the number of tram-trains built at Albuixech up to 125. Of the power systems for tram-trains that can be provided by Albuixech works these are possible: pure electric (one or two voltages), diesel-electric or electro-diesel combinations.

Within Spain, Portugal and France Stadler València is also involved in the rail vehicle **maintenance** business. ERION Mantenimiento Ferroviario was founded in January 2007 by Vossloh España and Renfe Operadora, its shareholders nowadays being Stadler València (51 %) and Renfe Operadora (49 %). At present ERION has a contract for the full maintenance of 74 diesel locomotives in Spain and Portugal and 34 in France. In addition to maintenance, accident repairs are also undertaken.

Peider Trippi

Photos, unless otherwise cited, taken by author on 29 January 2018

Alstom's New Electric Road System

On 17 November 2017, on the occasion of the visit of the French President Emmanuel Macron to Sweden, Alstom presented its Electric Road System (ERS) project at the Volvo Group headquarters in Göterborg. The project was initiated in late 2011 by Energimyndigheten, the Swedish Energy Agency, and is being developed jointly by Alstom and the Volvo Group, no information having been released on the investment involved.

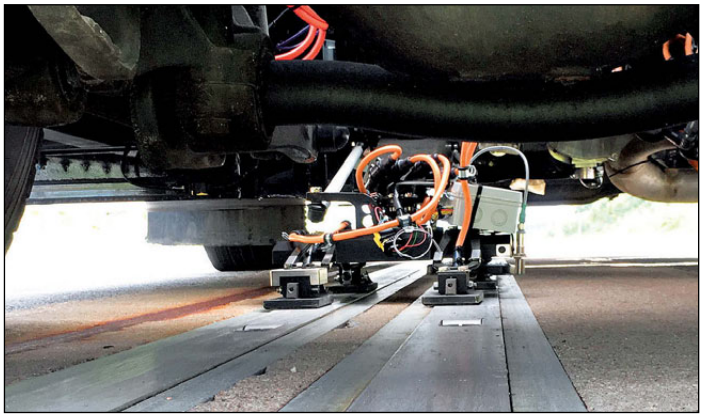
Essentially, the ERS is an extension of Alstom's **APS** (Alimentation par le Sol) ground-level electrification system, first used extensively on the Bordeaux tramway network, built between 2000 and 2003. The ERS was developed at Alstom's Vitrolles and Saint-Ouen factories, which supplied the complete electrification system, including current feeding and return rails built into the surface of the road. In Sweden the concept was implemented on the Volvo test road at Hällered, near Borås (halfway between Göteborg and Jönköping), to power a Volvo Group electric lorry.

The main technical **changes**, compared with a tramway APS system result from the fact that road vehicles are not guided (do not run on rails), vary in length and are shorter than trams. The tramway APS was thus modified as follows:

- parallel to the feeding rail, there is a second conductive bar to manage the current return to the power supply sub-station.
- since the road vehicle is not guided, the retractable current collector shoes installed underneath the chassis must be equipped with a lateral positioning system to ensure that they are always well positioned over the rails.
- since it is possible to have very short vehicles on the road, like cars, vans and tractors, it is necessary for the length of energised rail to be longer than such vehicles. One of the features of the tramway APS is that the feeding rail is energised over a length which is always shorter than the vehicles. This ensures that pedestrians and animals do not run the risk of electrocution. To safeguard against the latter occurring on an ERS it was necessary to modify the system so that no feeding could occur to stationary vehicles or to those moving at a slow speed, and that feeding would be stopped should there be an obstacle (such as a pedestrian or animal) in the vicinity of the feeding rail.

Since the current feeding and return rails are positioned at a lower level than the road surface, ERS will not be damaged by the actions of **snowploughs**. However the use of salt on EPS-equipped roads to melt ice is not advisable, since it will prompt current leakage onto the road surface, and thus cause the system to cease functioning. Alstom instead recommends the use of non-conductive de-icing liquids, such as green glycol, which is used for aircraft.

As regards the **cost** of implementation of ERS, the project is still at an early stage, and Alstom can only provide information regarding the infrastructure, not the vehicles. However it is estimated that large scale deployment would be economically competitive, and cost around 1 million km per km of road. Europe (particularly Sweden, Germany, Britain and France) and the USA are considered to be front-runners for the implementation of electric roads. Alstom reckons that the cost of acquiring equipment for ERS and system maintenance works out comparable with that of the Siemens system for road vehicles equipped with roof pantographs.



APS is now installed on seven tramway networks, including Bordeaux, Rio de Janeiro and Dubai, and has been used by trams covedring over 30 million km in service. Complementary to APS is **SRS** (Static Recharge System), which is designed for use by stationary trams and electric buses with on-board energy storage systems, originally a dynamic feeding solution for trams, service proven in seven networks worldwide including, and totalling more than 30 million kilometres run.

Alstom, Jaromír Pernička

Photos: Alstom