

THE DIESEL-ELECTRIC TRAIN IN THE NETHERLANDS

AUGUSTUS J. VEENENDAAL, JR | NETHERLANDS RAILWAYS – RETIRED (NETHERLANDS)

INTRODUCTION

During the 1920s Netherlands Railways, just formed out of two big and two smaller independent railway companies, with a strong influence from the side of the Government, faced the problem of losing traffic to the new mode of transportation, the motorbus, the truck and the automobile. For goods, the competition was not yet actually threatening, but for passenger traffic the motorbus was a really dangerous alternative to the steam train. Passenger traffic had always predominated in the country, and even shippers of bulk goods often preferred the slower but cheaper barge on the many rivers and canals. Distances in the Netherlands were generally short and even a smelly and badly sprung uncomfortable bus, but one that stopped in the center of the towns instead of at some railway station a mile or more from town, was seen as a good alternative to a slow steam train. Netherlands Railways had recognized that fact, and in 1923 had introduced the first railcars on rural lines. These cars were fairly big steel 8-wheelers, powered by two gasoline engines of 75 hp each on the end balconies, with manual gearboxes. The technology was mostly German, with engines from NAG and cars from Linke Hofmann, Wismar and other German manufacturers. They seated 65 people, and had a top speed of some 75 or 80 kilometers per hour, enough for the regional lines where they ran. They were ugly ducklings, however, with large and very prominent radiators in the fronts. Later examples were constructed by Dutch firms such as Werkspoor or Beijnes, but still with German engines and gearboxes. Experiments with the use of MAN diesel engines in a series of small four-wheel railcars in 1927 were not very successful, although the cars were retained for many years. Altogether by 1934 NS operated 17 bogie railcars, all with gasoline engines and manual gearboxes, and eight fourwheelers with diesel engines plus six with gasoline engines. For the rural lines with light traffic they were well suited and cheap to run, sometimes even in one-man style, with the motorman also selling tickets to passengers who boarded at an unstaffed halt.

ELECTRIC TRACTION IN THE NETHERLANDS

Of course, one way to get rid of the uneconomic steam traction was electrification. And indeed, in the Netherlands the first electric line had already been opened back in 1908 between Rotterdam and The Hague, and in 1924 the busiest line Amsterdam-Haarlem-Leiden-The Hague-Rotterdam had been electrified with 1500 volts direct current. The new electric traction had been a success, with cheaper working of the line, less staff per train, less maintenance of rolling stock and a great upsurge in traffic. On the debit side stood the enormous investment in substations, overhead catenary, new maintenance facilities with skilled personnel and new rolling stock. Other lines, feeding into this mainline, had been electrified in later years, but the great investment in capital had prohibited the extension of the electrification to other parts of the country. Yet, something had to be done to speed

up the traffic on lines originating in the western part of the country and extending all the way to the German border and up north and down south. Electrification of all these lines radiating from Utrecht was out of the question during the Depression of the 1930s, when the government simply had little money to invest in such a scheme. Moreover, there were many parties who found the railway itself an old-fashioned means of transportation, losing lots of money that had to be supplied by the taxpayer. In their eyes money could be spent better and more profitable on a system of new roads. Active lobbies of automobile clubs, road builders, oil and rubber companies never tired of advertising these opinions, and the Dutch press was generally strongly anti-railway. With large-scale electrification out of the question, something had to be done to make the railway more competitive, with a more modern image and with the means to attract more customers. The government also wanted to show that they took the modernisation of the railway system seriously and were prepared to advance the money needed, on condition that as much as possible of the work involved would be executed in the country. Too many people were out of work during these depression years and it was worth something to provide jobs.

THE DIESEL ENGINE

With these incentives the director of Netherlands Railways Willem Hupkes started to look around for a suitable replacement of the steam traction, but without complete electrification of the lines involved. The tried gasoline railcars were clearly unsuitable for the high speed long distance traffic that the railways had in mind, but in Germany a new development promised a solution. The diesel engine, already around for many years, had many advantages over the gasoline engine: cheaper to construct, less moving parts resulting in less maintenance, and diesel fuel was much cheaper than gasoline. Dutch firms such as Werkspoor had built diesel engines since the beginning of the century for permanent installations and power stations, and had also launched the first sea going ship with diesel propulsion in 1913. The problem was not that high power outputs were needed for a train, but the way the power of the engine would be transferred to the wheels. In a power station the diesel engine could run continuously more or less at the same speed, but in a train, with its constant stopping and accelerating, things were different. Mechanical gearboxes were impossible with the high power output needed, and hydraulic transmission was still in its infancy.

The development of the Fliegende Hamburger in Germany was followed closely by the Dutch engineers. Here was a high speed diesel train with electric transmission, and it proved to be a great success, both from a technical and from an economic point of view. The Fliegende Hamburger was a hit everywhere in Europe and America, and it was copied in several places. However, the Dutch railway engineers did not simply copy it, but they were clearly inspired by its success. One high-speed train was not what they were looking for, they wanted a larger number of trains, with more seating capacity and possibly a lower maximum speed. They came up with a proposal for a three-car train, with the same two Maybach V-12 diesel engines and electrical transmission. But the Dutch train was no straight copy, but one with many differences. The Fliegende Hamburger was a one of a kind train, intended for one particular daily service - Berlin-Hamburg and back -, the Dutch trains were intended to provide a fast hourly service from Amsterdam, The Hague and Rotterdam, by way of Utrecht to Arnhem, Eindhoven and Groningen in the north.

Hupkes and Bolleman Kijlstra, the engineers responsible for the new train, now designed a streamlined three-car articulated diesel-electric train with seating for 48 second class and 112 third class passengers, with two Maybach V-12 diesel engines of 410 hp each, the same as used in the *Fliegende Hamburger*, but not located directly over each bogie, but installed in a separate engine room in the middle car of the unit. Under a licence from Maybach, Werkspoor of Amsterdam and Utrecht constructed the diesel engines, and all electrical equipment was supplied by Dutch firms. The Dutch government guaranteed the necessary 7 million guilders, on the condition that the Dutch industry was to participate strongly in a time of large-scale unemployment. The German industry could promise earlier delivery and a much lower price, but the government remained firm and urged the railway company to place the order with the home industry. So, in March of 1933, with the financing secure, the railway company could place the orders for no less than 40 trains with the Dutch industry: Werkspoor was to build 25 sets, Beijnes of Haarlem 10, and Allan of Rotterdam 5 trains. All three firms had enough experience in the field of building railway equipment, but these trains were something completely new, of a design never tried before, and a great challenge for the engineers and workers involved.

THE DUTCH DIESEL-ELECTRICS

The three cars per train were each constructed as tubular, all-welded units, without the traditional separate frame, and the three firms had to develop a special revolving mould to ensure that the welders could reach every part of the car under construction. A lot of aluminium and other light alloys were used, and the complete three-car train weighed only just over one hundred tons. The streamlined nose was designed by NS, and tested in the wind tunnel of the Zeppelin factory in Friedrichshafen. Scharfenberg automatic couplers were installed, and it sufficed to drive two units slowly together to ensure that all connections, electrical and pneumatic, were made, without a shunter having to go down between the rails. In this way one man could operate a train of four units. Maximum speed was around 140 km per hour, but in service 120 sufficed. Schedules were shortened accordingly.

The sleek light gray and silver trains were an instant hit with the public, as the contrast with the old wooden-bodied passenger carriages was indeed very great. Even in third class one could sit on well upholstered and padded seats, instead of on hard wooden benches, with good electric lighting and ventilation by forced air, when necessary heated by the coolant of the diesel engines. With this train the somewhat ancient and dusty image of the railway was changed into a glittering modern and streamlined one. Traveling public, railway directors and workers, and the government in The Hague were enthusiastic. At long last there was positive news about the railway, despite all deficits and wage reductions of railway workers. The well known French-American industrial designer Raymond Loewy judged the Dutch train as one of the best efforts in streamlining: "Three cheers for this. In the writer's opinion it is the best looking Diesel-electric unit-train built so far. Its aerodynamics are nearly perfect; the front end treatment and the flush side windows are most attractive and efficient. Paint scheme good. This is an excellent example of what good taste and restraint can produce." So far Loewy, and others concurred. But the general euphoria was not to last very long.

DISAPPOINTMENT

After a few weeks the first problems surfaced. The bearings of the crank axles of the diesel engines began to run hot and showed an unacceptable amount of wear, causing annoying vibrations. The Maybach units were taken out of service, and engineers of Maybach, Werkspoor and the railway company did their best to get at the roots of the problem. They found that there were two possible causes. One was the somewhat irregular flow of diesel fuel from the fuel tanks underneath to the cylinders. New and more dependable fuel pumps proved to be a solution to this problem. The other was harder to solve. The Maybach engines were designed to run at one thousand revolutions per minute as a minimum. But in service the engines often ran below this figure when there was no great demand for power. Maybach went out of their way to help. For them it was the good name of their product that was at stake, and they even supplied new engines of a slightly different type as a stopgap until the originals had been repaired and adequately strengthened. So after a couple of months of very tense feelings for all concerned the original engines were reintroduced, with heavier bearings and other reinforcements. From then on the units performed faultlessly and they were only taken out of service in the 1960's by which time they were completely worn out.

Being wise after the event, it might have been better if the railway company had ordered just a few units of this unproven revolutionary train, to have time to test everything thoroughly and remove all teething troubles. But the company was under strong pressure from the government to modernise quickly and completely, and to provide jobs for hundreds of skilled workers in the Dutch industry. After all the necessary money came from the Hague and the directors in the railway headquarters in Utrecht could not do much but comply with the wishes of those who held the purse strings.

SUCCESS AT LAST

After all three-car units were back in service and performed without trouble, the railway ordered new five-car trains for long distance traffic. Eighteen of the new units were ordered, with three Maybach-Werkspoor diesel engines each, giving a total horsepower of almost 2000. The trains were also meant for international traffic and the fuel tanks were big enough for a return trip Amsterdam-Paris or Amsterdam-Berlin without refuelling. The outbreak of war in Europe meant the end of these dreams and most units never performed as hoped for because of lack of diesel fuel. In post-war years twelve complete trains were assembled from the remaining pieces and these served well into the 1960's.

CONCLUSION

The introduction of the diesel-electric trains in 1934 on a large scale in the Netherlands meant that the end of steam in the country was coming. In the future only electric and diesel-electric traction would be considered, and the steam engine was to be phased out. The introduction of the new trains was a bold venture indeed. Where other countries experimented with one or only a couple of the new-fangled trains, NS ordered no less than forty units to

revolutionize the whole timetable and give the railway, considered hopelessly old-fashioned by many, a new lease of life. That the introduction of so many trains in one move led to serious trouble in the first months after their introduction, was only to be expected. But all problems were overcome and Netherlands Railways for a time led the rest of the world in the use of diesel-electric traction on a large scale.