Feature

Development of Norwegian Railways 1854–2002

Roar Stenersen

Norway is well known for its fjords and spectacular scenery but its railways are little known by the outside world. It scenery is seldom ideal for railway construction and the very small population of just 1.4 million in 1850 with virtually no industry meant that there was no pressing need to construct a railway network, unlike in some other European countries.

Construction of the first railway (67.5 km) started in 1851 between Christiania (now Oslo) and Eidsvold; the standard-gauge line was financed and built by the British under the supervision of the great engineer Robert Stephenson (1803–59) and all the locomotives were built in his shops in Newcastle. The Norwegian Trunk Railway as it was called was opened on 1 September 1854. However, the Norwegian parliament was unhappy with foreign ownership and decided in 1857 that all future lines should be built and operated by the state.

To finance the various lines then under consideration, a local delegates would present a proposal for a railway to parliament based on surveys regarding potential traffic and promises from local citizens and towns to assist with financing. Usually, parliament would debate the proposal and vote for building the line as a state railway. People with stock in the initial proposal never saw any return on their investment but at least they got the got the railway!

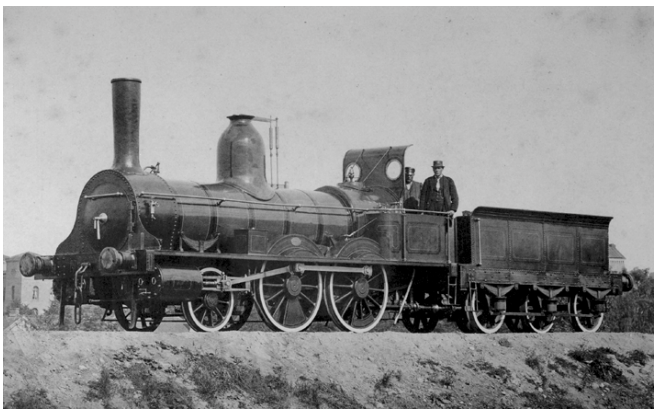
In 1858, the Norwegian engineer Carl Abraham Pihl (1825–97) was appointed Chief Engineer with responsibility for future railway construction, a post he held until the formation of Norwegian State Railways in 1883 when he became Director of existing and future construction. Pihl pioneered in construction of light railways in Norway and chose the 3'6" gauge for lines that did not connect with standard-gauge Swedish lines. His first 3'6" line opened in 1862 and was worked by three 0-4-2 tank engines built by Robert Stephenson in 1860.

Pihl had trained in Britain under Stephenson among others, and was a friend of prominent British dignitaries in railway circles like Sir Douglas Charles Fox (1810–74), the Duke of Sutherland (1828–92), John Fowler (1817–98) and C. F. Beyer (1813–76) who respected him highly as an engineer.

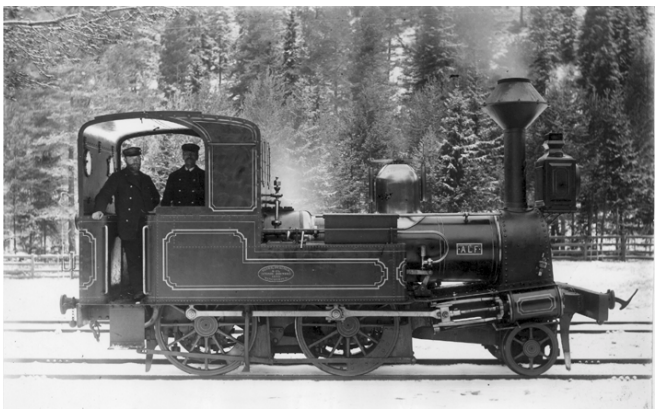
Narrow gauge lines were built in South Africa, New Zealand, Queensland in Australia and several Canadian provinces after Fox of London pointed out Pihl's successes in Norway.

At home, Pihl vigourously pushed his 3'6" narrow gauge and most lines built until the mid-1880s were 3'6" gauge. Pihl soon abandoned Robert Stephenson & Co. as locomotive suppliers and after a brief flirt with Avonside in the mid 1860s, he turned to Beyer Peacock. Beyer Peacock delivered the first two of its famous 2-4-0 tank engines to Norway in 1866. The same type was built for several later railways the best know of which is undoubtedly the unique fleet on the Isle of Man. Two of these locomotives are preserved. One at the Norwegian Railway Museum at Hamar and one in Stavanger Station, although this one is built under licence by Motala in Sweden. The first passenger carriages and freight wagons were imported from Britain but were built domestically from the late 1860s.

In 1879, Baldwin of Philadelphia entered the scene when that company delivered the first 4-6-0 tender engines to Norway. They were standard gauge machines built for working on two lines connecting Norway and Sweden. Between 1884 and 1900 Baldwin delivered several 2-6-0 and 4-4-0 tender engines for the narrow-gauge lines. The last shipment from Baldwin came in 1917 and 1919 in the shape of five different standard gauge types. As a rule Norwegian railways bought American-built locomotives only when they needed them in a hurry, or when European builders couldn't keep up with demand. Unfortunately, none of these Baldwin engines has survived to the present day.



Norwegian Trunk Railway Engine No.1 built by Robert Stephenson & Co. in 1851. This photograph dates from 1865 after minor modifications were made. (Norwegian Railway Museum)



Engine No. 21 *ALF* was built by Beyer Peacock in 1870 and is preserved by the Norwegian Railway Museum at Hamar. (Norwegian Railway Museum)

The decision to build narrow-gauge lines soon proved a mistake. Although unforeseen in the 1850s, a national railway network was taking shape with the result that many stations got mixed-gauge layouts, resulting in costly transhipment of freight transfers. Narrow gauge reached its peak in 1896 with 1055 km but was doomed as soon as the decision was taken to build the Bergen Line to standard gauge in 1898. The Bergen–Voss Line was regauged in 1904, the same year that the route-km of standard gauge overtook narrow gauge. All narrow-gauge lines were converted to standard gauge leaving only the Setesdal Line in the south after 1949. It was finally closed in 1962 but some 8 km have been preserved with four of the original locomotives.

Two standard gauge and nine narrow gauge private railways were built between 1892 and 1911 Two of the narrow gauge lines were 750 mm gauge, one was meter gauge, and the rest were 3'6". Part of the 750 mm Urskog–Høland Railway and the entire length of the meter-gauge Thamshavn Railway (the world's oldest high-voltage AC line) are preserved.

The standard gauge Rjukan Railway is famous for its role in the transport of the heavy water (deuterium-enriched water) during WWII and is currently being set up as a preserved line along with its two surviving railway ferries.

Norwegian State Railways (NSB) in 21st Century

The first major Norwegian line opened in the 20th century was the Bergen Line (1909). In terms of state expenditure, it is still unequaled to this date because it cost the equivalent of one year gross national income in its time.

Two Norwegian works were already building steam locomotives before the Bergen Line was finished—Thunes in Oslo and Hamar Iron Foundry. In the steam age these two domestic builders shared the Norwegian market between them. After 1927 when Hamar Iron Foundry failed, Thune went on building locomotives for the NSB and others until 1973.

The years from 1900 to 1938 saw the completion of many Norwegian main lines. The next main line after the Bergen Line was the Dovre Line (Dombås–Trondheim) opened in 1921 followed by the 100-km scenic branch to Åndalsnes in 1924, and the South Coast main line to Kristiansand in 1938. Several branch lines of lesser importance was also built in this period. The standard gauge main line from Kristiansand to Stavanger was finished during WWII and the narrow-gauge Røros Line was converted to standard gauge. The only major postwar construction was the completion of the Northern main line to Bodø in 1962, the same year that the last surviving narrow-gauge NSB Setesdal Line was closed.

Norway has almost no domestic coal reserves except at Spitzbergen where coal has been mined on an irregular basis since 1903. As a result, economic fuel consumption by railways has always been important. The first two-cylinder Von Borries compound locos were introduced in the early 1890s and the Class 19a 2-8-0 built between 1902 and 1910 for the Ofoten Railway in Narvik was the largest two cylinder compound ever to run in the country.

Superheating was introduced from 1908, and in 1910 SLM Wintherthur delivered three Class 26a 4-8-0 four-cylinder superheated simple locos to the Bergen Line, the first really modern Norwegian steam locomotives. They were soon followed by the Class 30a 4-6-0s in 1914 and Class 31 heavy 4-8-0s in 1915. All were four-cylinder simple locos, but new engines of all three classes were built as four cylinder compounds from 1919 to become the standard Norwegian steam locomotive. One example of each class is preserved today. The final development of the Norwegian steam loco was the impressive four-cylinder compound Class 49 of which only seven were built between 1935 and 1941. They were record breaking for their day with a rated output of 2600 hp at 60 km/h with an engine weight of 99 tonnes. One (No. 470) is preserved in the Norwegian Railway Museum at Hamar.

During WWII, 42 German Class 57s and 74 Class 52s entered service in Norway. The Class 57s had all been scrapped by 1955, but several of the Class 52s continued working until the end of Norwegian steam in 1970. Two of the Norwegian 52s still survive—one (No. 5865) at Bressingham in England, and one (No. 2770) in Stavanger. The latter was restored to working order in 1997.

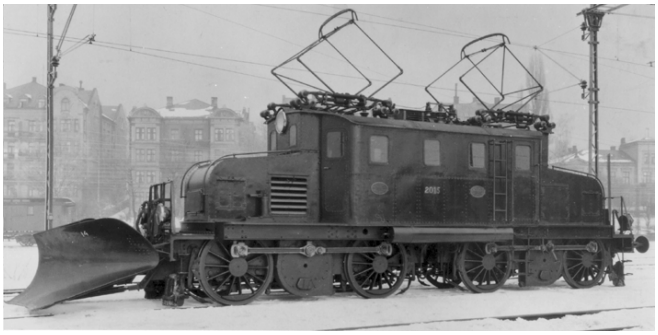
In Norway—as in many countries—the last steam workings were light and simple engines fiund on rural branch lines. The Class 21 2-6-0 lingered on until the autumn of 1970. Two went to England; No. 376 is on the Kent & East Sussex and No. 377 is at Bressingham. There are three others in Norway but none are currently in working order.

Electrification and Conversion to Diesel

As mentioned, Norway has very limited coal reserves, but abundance of waterfalls made electrification using hydroelectric power the obvious way forward. The first private railway to be electrified was the meter-gauge Thamshavn Railway in 1908, followed by the Rjukan Railway in 1911. The first part of NSB to be electrified was the Oslo–Drammen Line in 1922. It was originally powered by 22 Class El1 and two Class El2 electric locomotives with some of the latter working until 1973. Two of the El1's are preserved.

The Ofoten Line was built for hauling iron ore from Sweden to Narvik in 1902. This heavy-duty railway was electrified in 1923. Two other lines from Oslo were electrified before WWII and two new classes of electric locomotives were introduced. One

The NSB Class 49 four-cylinder compound was a true super-power locomotive. This example (No. 470) is preserved in static condition at the Norwegian Railway Museum. (Krupp, Norwegian Railway Museum Collection)



Class El1 2015 with butterfly snowplow when brand new in 1922. (Norwegian Railway Museum)

example of each of these classes (classes El5 and El8) are preserved in working order. Full-scale electrification commenced after WWII and the last major project was the Dovre Line completed in 1970.

In 2002 the Norwegian national network is 4021 km of which 2456 km is electrified. The class of locomotives replacing steam on the non-electrified lines was the legendary Co-Co diesel electric Class Di3 from General Motors. These were licence built by the NOHAB company of Sweden to many European countries, and 35 of them was delivered to Norway between 1954 and 1969. The Siemens Class Di6 that should have replaced them in 1997 failed, and was returned to the builder.

Two unrebuilt examples of the Class Di3 are preserved in Norway—No. 602 from 1954 and No. 616 from 1958.

The Norwegian Railway Museum at Hamar has a large collected of preserved rolling stock and there are six preserved railways with three more trying to get running. The Norwegian Railway Club handles main line steam and historic electric operations, while another group in Narvik runs special steam excursions on the Ofoten Line to Kiruna. Diesel preservation nationwide is taken care of by the GM-Group which is a fully licensed main line operator.

Norwegian Railways Today

As in most western countries, NSB experienced a steady decline from the early 1960s with branch line closures and falling traffic. A huge modernization backlog made the Norwegian railway system a paradise for railway fans. Wooden carriages were still in service until the mid 1980s, locomotives had an average age of about 40 years and there were single-track main lines everywhere. Single track is still the norm except for about 125 km around Oslo, but equipment modernization has caught up. Construction in recent years include a new high-speed 66-km long railway between Oslo, Oslo Airport Gardermoen and Eidsvoll, opened on 27 September 1998 (see *JRTR* 19, pp. 26–27). This line runs parallel to the first Norwegian Railway of 1854. Just out of Oslo this line enters a 14-km long tunnel named Romeriksporten, and problems with water-draining in this bore caused a one year delay in opening it. For the Airport Express service the new Class 71 EMU's was built by ABB of Norway. These three-coach sets has one powered bogie under each coach. Sixteen sets of this type was built, which later has been followed by two externally similar types of EMU's for medium- and long-distance runs, both of theese types (classes 73 and 73b) are four-coach sets equipped with tilting gear. Maximum speed for all these classes was 210 km/h, but problems with cracking axles caused the speed to be reduced to 160 km/h. This speed limit will remain until new running gear is installed on all three types.

In 2000 18 new diesel DMUs was delivered by Bombardier. They are a beefed-up version of their two-car *Talent* design, but have tilting gear. These sets are now used on long distance runs, and have been received with mixed emotions by the travelling public. Railway rolling stock is no longer made domestically.

The future for Norwegian railways seems to be privatisation and deregulation. Already the freight division of the NSB has been reshaped under the name CargoNet, and passenger service will go private this summer. New railway construction is underway from Oslo and westwards to help out the heavily congested Oslo—Drammen Line. This new double track railway will be a relief line bypassing the suburban areas, and therefore will be built almost completely underground. ■

Roar Stenersen

Mr Stenersen is Curator of Engineering at the Norwegian Railway Museum. He started to work for railway preservation at the age of 14 in 1969. He worked for various construction companies, and was Chairman of Urskog–Høland Railway 1985–1993.