= GMB Class 71 =

GMB Class 71 is an electric multiple unit used by Flytoget for the Airport Express Trains on the Gardermoen Line of Norway . Sixteen three @-@ car train sets were built by Adtranz Strømmen between 1997 and 1998 . The units are capable of 210 km / h (130 mph) , connecting Oslo Central Station and other stations in Metropolitan Oslo to the Oslo Airport , Gardermoen , along Norway 's only high @-@ speed railway .

In a three @-@ car configuration , the units weigh 158 tonnes (156 long tons ; 174 short tons) and are 82 @.@ 3 metres (270 ft 0 in) long , with a power output of 2 @,@ 645 kW (3 @,@ 547 hp) . The units are similar to the NSB Class 73 , and are related to the Swedish X2 units . By 2009 , all units were expanded with a fourth car .

= = Specifications = =

The unit is based on the Swedish X2 designed by Kalmar Verkstad in the 1980s , and delivered from 1990 to the Swedish State Railways for use in their X 2000 high @-@ speed intercity trains . Although the technology involved is similar , like spot @-@ welded stainless steel car bodies , the Class 71 differs in several ways . First , the unit does not have a separate locomotive unit , but has the motors spread throughout the train , with one powered and one unpowered bogie in each car . The car bodies are totally different in layout , including the doors between bogies instead of at the end of the cars . In addition , the trains are pressure tight to increase comfort for passengers while passing through tunnels . They also have hydraulic couplers at the ends , which are hidden behind covers when not used . The Class 71 is also shorter , with only three cars , and does not have any tilting technology installed . The exterior design , especially the nose , is quite different . Norges Statsbaner later took order of 22 units of the Class 73 , that is almost identical , but has four cars and tilting technology . Class 73 's pantograph is pivoted in order to keep it centred under the catenary when the body tilts .

Each train has a 2 @,@ 645 kW (3 @,@ 550 hp) power output ; this is an unusually high power to weight ratio for trains with that maximum speed . The units use the standard Norwegian voltage of 15 kV 16 2 ? 3 Hz AC . Up to four units can be run in multiple , creating 12 @-@ car (or 16 @-@ car after the upgrade) trains . However , the trains normally only operate as single or double units , limiting the length to eight cars . End cars are 27 @.@ 9 m (92 ft) and weigh 52 t (51 long tons ; 57 short tons) , while center cars are 26 @.@ 32 m (86 @.@ 4 ft) and weigh 54 t (53 long tons ; 60 short tons) . The pantograph is located on the center car . Each unit has 168 seats , that are built modally so that the seating can be reconfigured . The sixteen units cost NOK 1 @.@ 4 billion .

During construction , the weight had increased from 149 to 170 tonnes ; to reduce this to 158 tonnes , the original idea of step @-@ free access was discontinued . Instead , a wheelchair lift was installed , but it proved not to work . The area around the doors are step @-@ free from the platform , but within the trains steps must be taken to reach the seating area . The Norwegian Federation of Organisations of Disabled People have criticized Flytoget for ordering identical additional cars that will not ease access for the disabled .

The Class 71 is capable of speeds up to 210 km / h (130 mph) , compared to 200 km / h (120 mph) in the original . This speed was chosen to make it possible to get from Oslo Central Station to Oslo Airport , Gardermoen in less than 20 minutes . The signalling system ATC @-@ 2 is built for 200 km / h , and could not be adopted for much more than that . The three car units (resp. four car units) can only be separated at a railway workshop , and are never used in anything but their native car configuration .

= = History = =

When the Parliament of Norway decided to build Oslo Airport , Gardermoen , on 8 October 1992 , they also decided to build a high @-@ speed airport rail link from Oslo Central Station to the airport . This railway , the Gardermoen Line , was to be built and operated by a subsidiary of Norwegian

State Railways , NSB Gardermobanen . To operate the railway they needed sixteen electric multiple units .

In addition to tests in Sweden , the X2 was tried out on the Randsfjord Line on 12 March 1993 . The order for the units was placed on 23 February 1995 , after NSB had received bids from ABB (that later merged with Daimler 's train division to become ADtranz) , AEG , Fiat Ferroviaria , Talbot , Linke @-@ Hofmann @-@ Busch , Siemens and Görlitz . During 1996 , an X2 train was rented to test out performance on the Norwegian railway system , and for a short period put into service on the Sørland Line . The first Class 71 unit was delivered on 19 September 1997 , and the last on 30 January 1998 . The last unit , no . 71 @.@ 16 , was delivered with tilting mechanism to be used to test performance on the Norwegian railways , due to the similarities between Class 71 and Class 73 . It could be seen during the winter on the challenging Bergen Line and Dovre Line . After a few years the tilting mechanism was removed .

In 2007 , Flytoget announced that they had ordered a fourth car for each of the units . This increased the capacity of each unit by 40 % to 244 seats , and allows the company to manage the annual 10 % growth in passengers . The delivery of the fourth cars started in 2008 and were built by Bombardier Transportation , who has bought ADtranz , with the rebuilding scheduled to be completed during 2009 . The rebuilding created several challenges for Bombardier , since most of the components used in the class were no longer available . Significant components such as the car body and rectifiers had to be built by Bombardier based on abandoned production lines , and many of the original manufacturers for the interior have become defunct .

From 2010 , the Norwegian Rail School operates a simulator center for training motormen . It consists of six mock @-@ ups of the Class 71 driver 's cab , and is used both by the school and to train existing Airport Express Train drivers in exceptional circumstances . The simulators were built by Sydac and cost NOK 35 million .

= = Incidents = =

The sister trains in service with NSB were prone to technical failures , since they have to operate on hundred @-@ year @-@ old infrastructure on cross @-@ mountain services . The Class 71 has more lenient operating conditions thanks to better infrastructure , and therefore has not been prone to as much malfunction . The only incident to ground all the Class 71 trains occurred on 17 June 2000 , after a Class 73 @-@ train operated by NSB derailed at Nelaug Station owing to stress on the axles . The Oslo Airport Express Trains were back in service the next day , while the 73 @-@ series had to wait another month before returning to service . On 24 January 2004 , a Class 71 unit had to be taken out of service due to smoke from a stressed bearing , causing the replacement of the bearings on all units within days .

Several deaths have taken place on the route , but only one due to an accident . In 1999 , an employee of the Norwegian National Rail Administration was killed after impact with a train ; the authorities stated that the cause was due to the train operating at 160 kilometres per hour (99 mph) , instead of the temporarily reduced limit of 80 kilometres per hour (50 mph) . The company was fined for not informing the driver of the speed limit reduction . Several other deaths on the line have been classified as suicides , and so are not part of the accident statistics ; they do however cause delays on all services for hours after the incidents take place .

In 2000 and 2001 , Flytoget experienced three derailments with empty trains at Gardermoen ; one caused by the engineer falling asleep and two by the train passing a red light . No more such accidents occurred after Automatic Train Control was installed in 2001 .