The Great Belt Link in 7 minutes

DSB

DSB's part in the Great Belt project

As future owners and users

In statute law No. 380 dated 10th June 1987, the government decided that a link should be built across the Great Belt. DSB will become the future owner and user of the railway part of the link.

DSB has supplied the technical and traffic specifications relating to the railway.

As consultants

In joint venture with the Danish Road Directorate, DSB has planned the project work on land. This consists of bridges as well as road and earth works for the railway and motorway. Involved, too, has been co-operation with various authorities concerning, e.g., the acquisition of land needed for the project. The work is budgetted at approx. 500 million DKK.

As main contractor

In their capacity of main contractor to Great Belt Link Ltd. DSB is responsible for the design and installation of all railway related systems. This contract amounts to approx. 1.4 billion DKK.

These tasks are being carried out by DSB in a special project organisation with the assistance of consulting engineers.

As owner-builders

Finally, on their own account, DSB are building 2 new stations at Nyborg and Korsør.

Published by:

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Rail traffic in Denmark after 1993

The completion of the Great Belt Link project will mean an entirely new and more attractive traffic structure for Denmark.

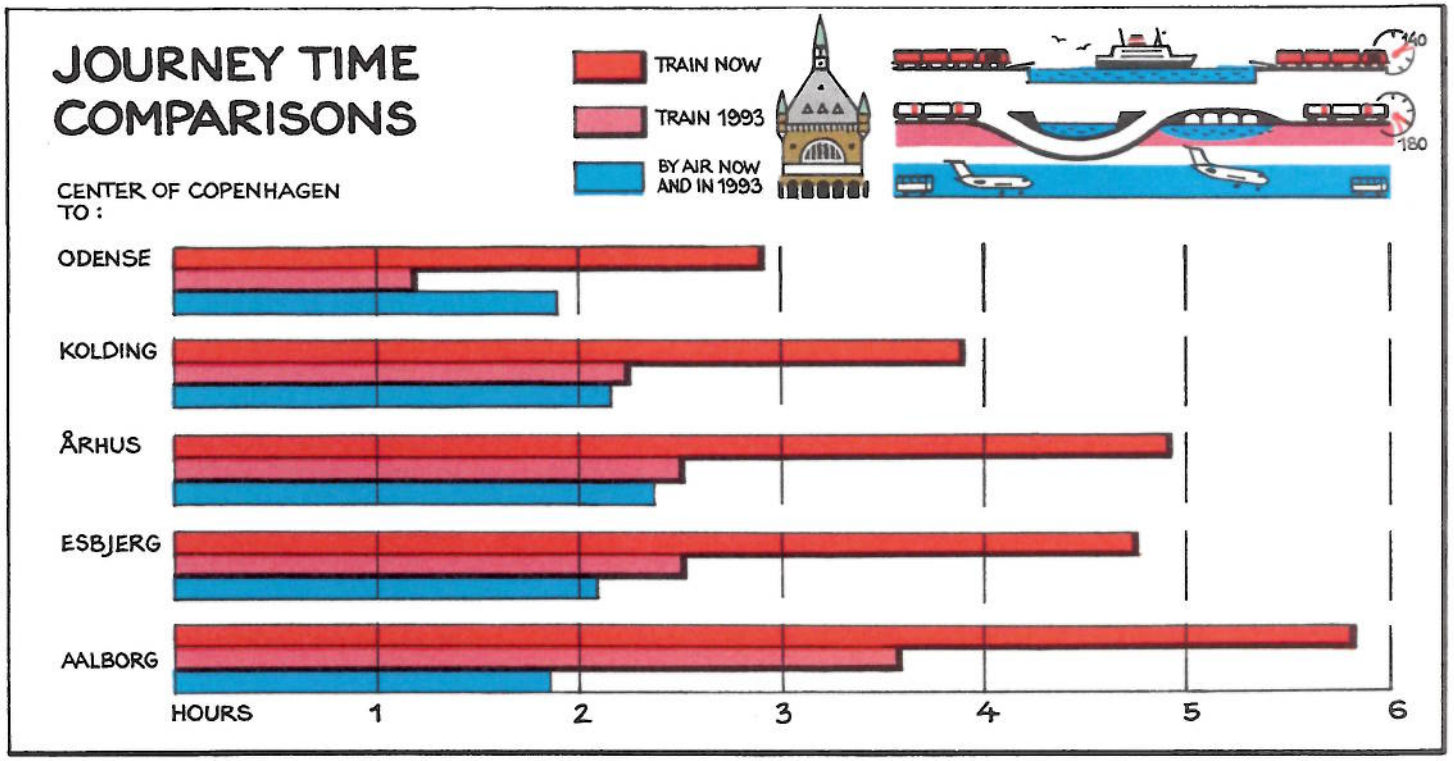
The number of passengers travelling by rail will be greatly increased and goods traffic will also escalate considerably after 1993.

As can be seen from the illustration the Danish State Railways, DSB, will be able to compete with domestic flights as regards the time spent travelling to a whole range of destinations. In addition, it will become much quicker to travel by rail to a number of towns than by car.

DSB therefore foresees that a great many motorists and passengers will choose the comfort of rail travel as an alternative.

The Great Belt Link combined with the new trains will be just as revolutionary for railway traffic as was the case when the original red »Lightning«-express trains were designed and the Little Belt bridge was built in the 1930's. The original red »Lightnings« were introduced in 1935, at the same time as the Little Belt bridge was opened.

In 1993 passenger and goods traffic by rail will take a tremendous upswing. The time taken to travel from Copenhagen to western Denmark will be reduced by between 1 and 1½hours. This, combined with the introduction of new trains and speed increases on selected stretches, will mean that the town of Odense can be reached in 1¼hours and Århus in 2½ hours from Copenhagen.



Looking further ahead, the Great Belt Link will eventually be part of the Trans-European high-speed network and Hamburg will only be 4 hours rail travel from Copenhagen.

Goods traffic by rail will also be considerably increased after 1993.

The Great Belt Link will mean time-saving for domestic goods traffic and transit goods carried by DanLink across the Sound between Denmark and Sweden and via the new »short-cut« rail by-pass around Fredericia between Snoghøj and Taulov on Jutland, the Danish peninsula.

This means that DSB will be able, after 1993, to offer their transit goods customers a much shorter transport time from Copenhagen via the Great Belt to Hamburg and other destinations than is possible today.

The New Link

2

The Great Belt Link consists of three major features:

The East Tunnels – two 8-kilometre long railway tunnels under the Great Belt eastern channel between Zealand and the island of Sprogø. They are parallel bores, 25 metres apart and connected every 250 metres by cross passages.

The West Bridge – a 6.6 km long combined road-rail bridge spanning the western channel between Funen and Sprogø. The bridge is built of large prefabricated concrete elements that are shipped from Funen on a giant crane to the construction site.

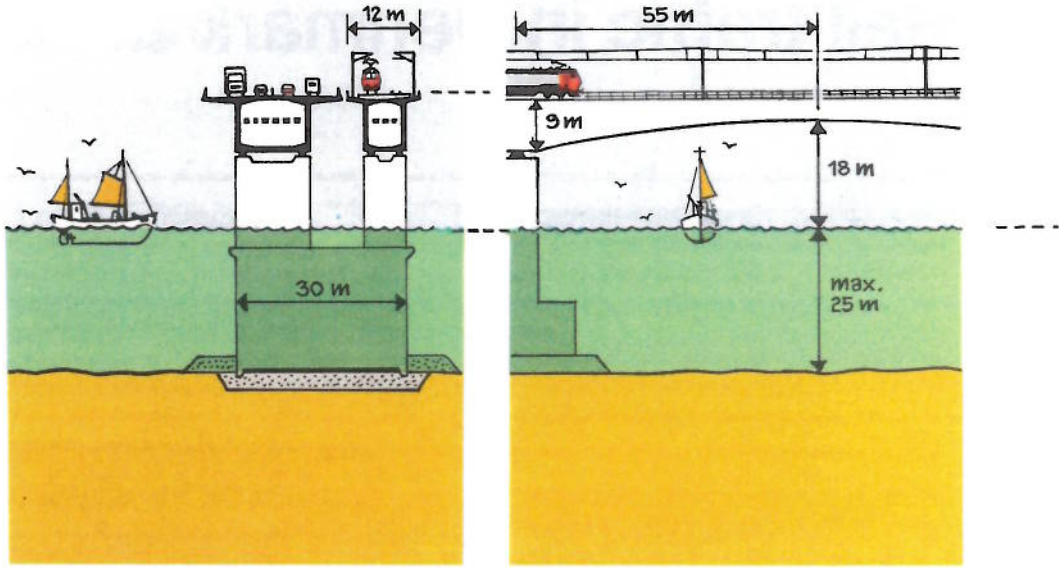
The East Bridge – a 6.8 km long suspension bridge for road traffic across the eastern channel. The main span is more than 1600 metres.

There are, in addition, a number of on-land installations at either side of the Great Belt and on the island of Sprogø. These constructions connect the existing road and rail networks to the bridge and tunnel constructions.

The total cost of the Great Belt Link project is DKK 17.85 billion in January 1988 prices.

The Great Belt Link project is financed by Danish and foreign loans. These are to be repaid by the users, i.e. motorists and DSB will have to pay for the use of the Link.

Great Belt Link Ltd is responsible for the project. This company is owned 100 % by the Danish state, is entrusted with ensuring favourable loan conditions, and is in overall charge of the planning and construction.

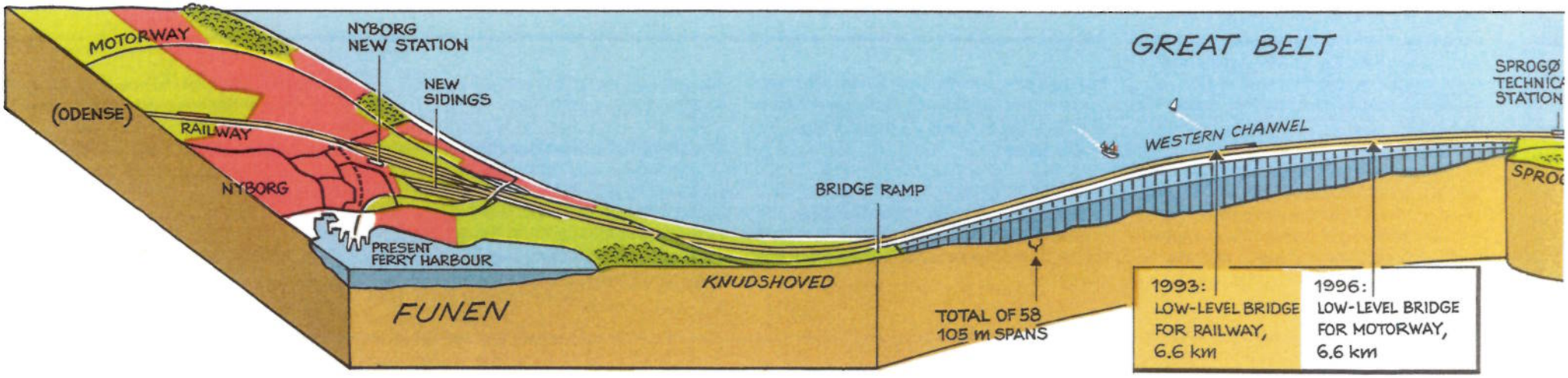


The actual planning and construction work is carried out with the aid of consulting engineers and contractors.

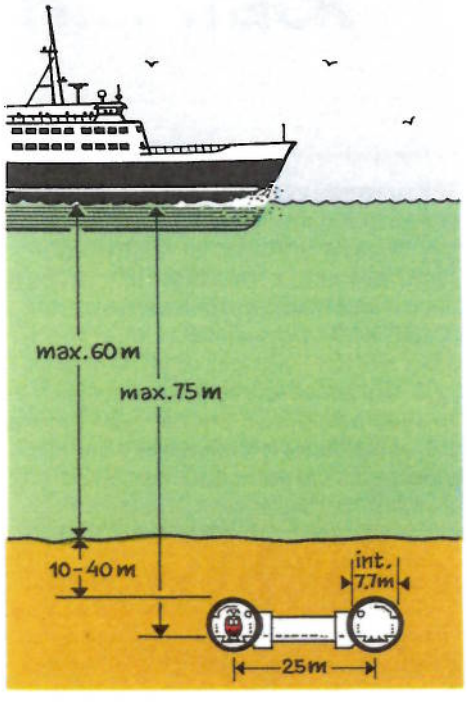
Costs in connection with the railway link amount to almost half of the total project cost. The technical planning and execution of the railway project is in the hands of DSB as main contractor to Great Belt Link Ltd.

The railway link will be operated by DSB, whereas the road link will be operated by Great Belt Link Ltd.

Legally, DSB must repay their project share (including interests) over a period of 30 years. Thereafter the railway link is the property of DSB.



Routing of the Rail Link



A new stretch of railway has to be built on Zealand between Slagelse and Korsør, starting at Svenstrup. This new stretch runs north of the present car ferry harbour berth at Halsskov and continues down into the bored railway tunnel.

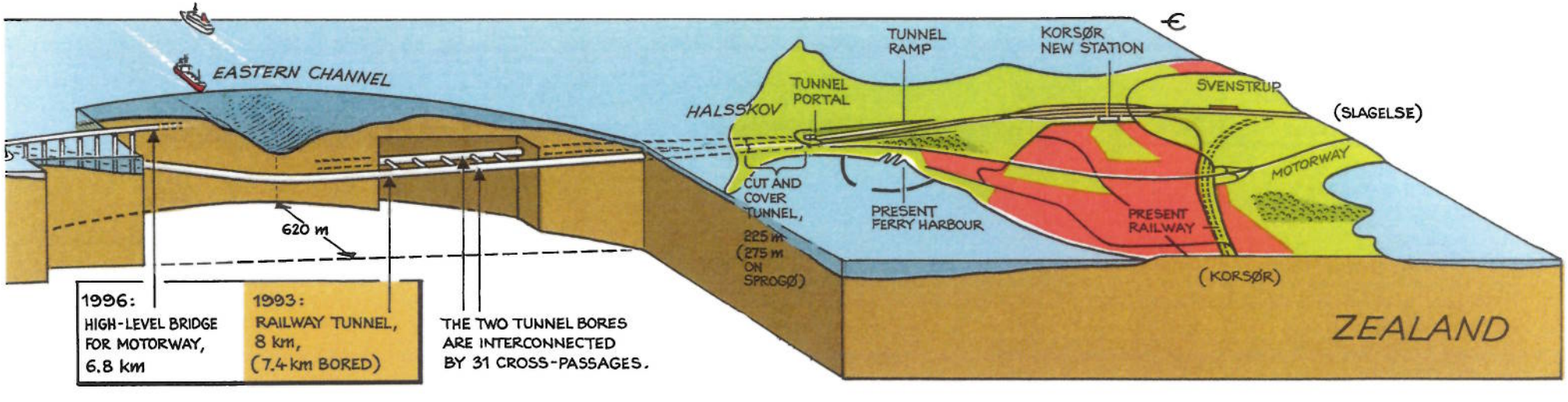
At its deepest point, the tunnel is 77 metres below sea level. This depth is necessary to ensure geologically stable conditions for the tunnel under the eastern channel. As a consequence, the steepest stretch of the tunnel will have a gradient of 1.5 o/o.

The new stretch of railway will continue up on to the tunnel ramp on Sprogø island and then via the combined road-rail bridge across the western channel. The average height of the West Bridge will be approx. 18 metres. The official length of the West Bridge is 6611 metres. This, however, is strictly applicable only at certain times of the year, since rails and bridges expand in summer and contract in winter. This can mean that the West Bridge could be too short or too long depending on temperature changes.

For this reason some special measures have had to be devised to allow for these expansions/contractions on the West Bridge. These constructions apply to the bridge itself and to the railway track on the bridge (see drawing mid page 5).

Some of the bridge spans have built-in gaps that can absorb any bridge movements. This necessitates the use of a special track construction with tapered rails. The tapers are made lengthwise on these rails and are thus not felt as the train passes.

The bridge's landfall is just north of present car-ferry berth at Knudshoved. From there the new railway track meets up with the existing rail network west of Nyborg.



Rail Electrification

4

In 1993 electric trains will be running from Copenhagen to Odense on Funen. The date for the extension of the electrification beyond Odense to the west has not yet been scheduled.

What is entailed here is that electrification i.e. catenary, substations etc, must also be included in the Great Belt Link. Electrical power in Denmark is divided into two networks – one for Zealand and one for Jutland and Funen. The two networks, however, are not synchronized and must thus not be connected together via DSB's catenary system. To avoid a direct join-up of the two networks, insulating neutral sections have therefore been installed in the catenary system on Sprogø.

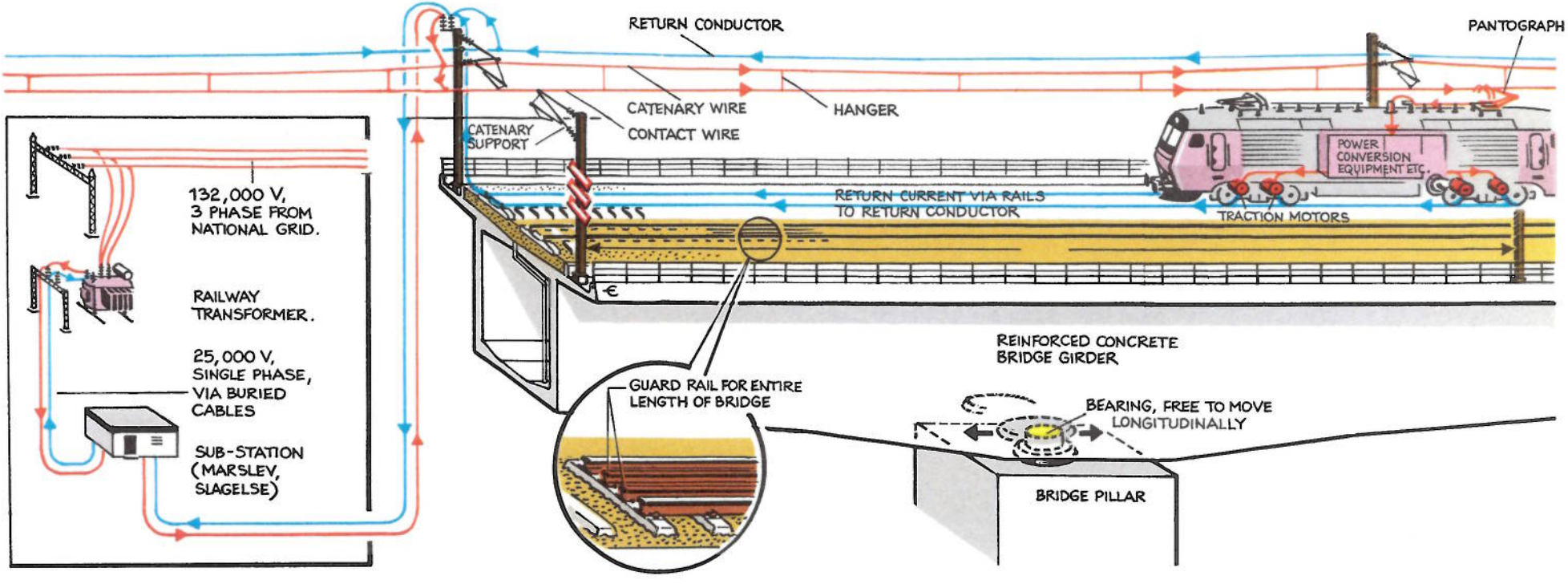
Power for the electric trains is supplied from the national grid via two substations. One of these has been built on Zealand near Slagelse and another is under construction on Funen near Marslev.

The catenary installation consists of the following elements:
- the overhead contact wire supplying current to the locomotive via the pantograph.
- the catenary wire itself supporting the contact wire by means of hangers.
- the return conductor which in conjunction with the return rail carries the return current

The catenary installation on the new stretch through the tunnel across Sprogø island and on the West Bridge will be slightly more »heavy duty« than on the other DSB stretches. This will ensure a satisfactory power supply on the long and steep gradients in the tunnel and on the bridge ramps.

DSB normally uses a catenary system with continuous contact wire and a catenary wire with a 60 metre maximum distance between masts. On the West Bridge there will be masts every 45 metres on account of the high winds.

In the Great Belt tunnel there is insufficient room for the normal catenary system and for this reason a completely new system needing less space has been designed and tested.

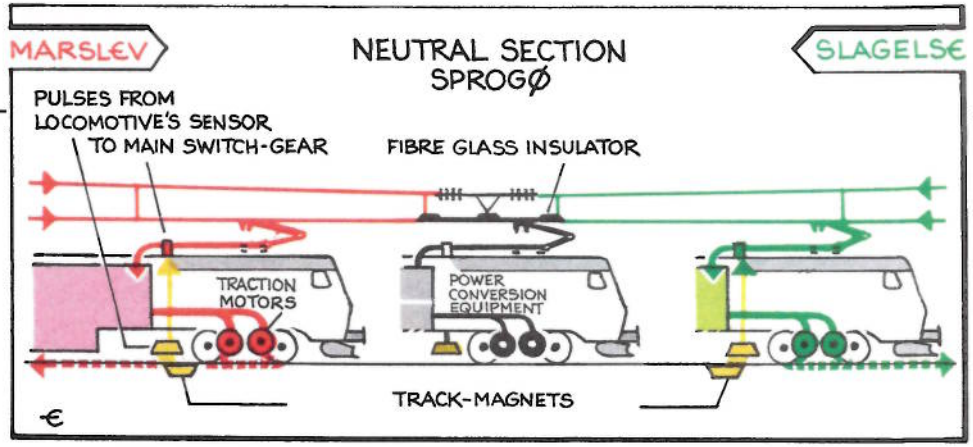


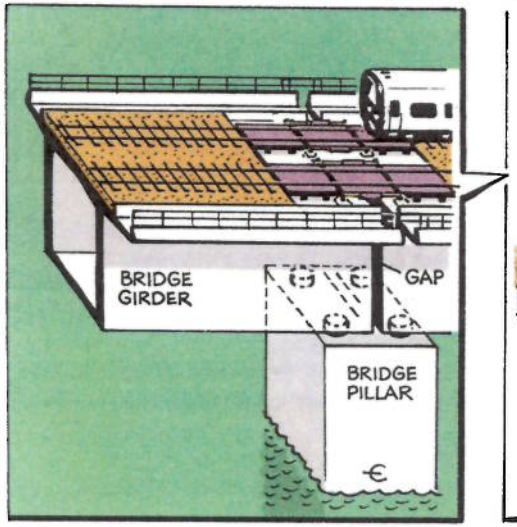
Rail Track

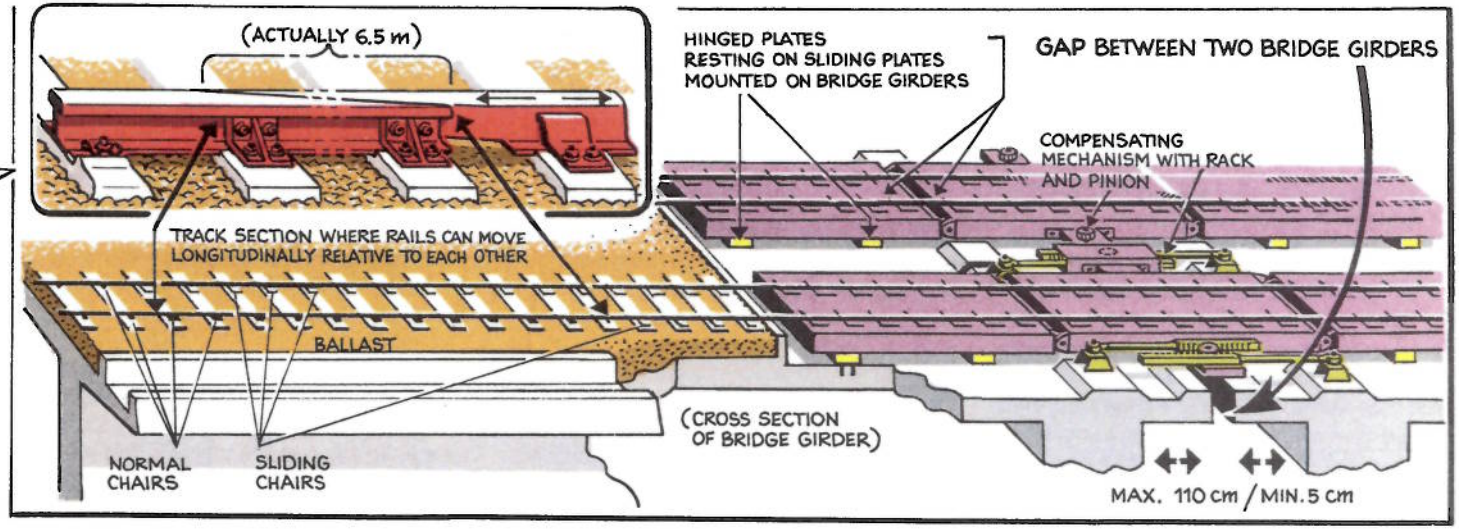
DSB's latest railway track system will be used, with concrete sleepers (monoblock sleepers) on coarse ballast. In addition the type of rails used will be DSB's strongest with a weight of 60 kg per metre. These will be fixed to the sleepers with a double elasticized fastening, the so called UIC 60 Dm type.

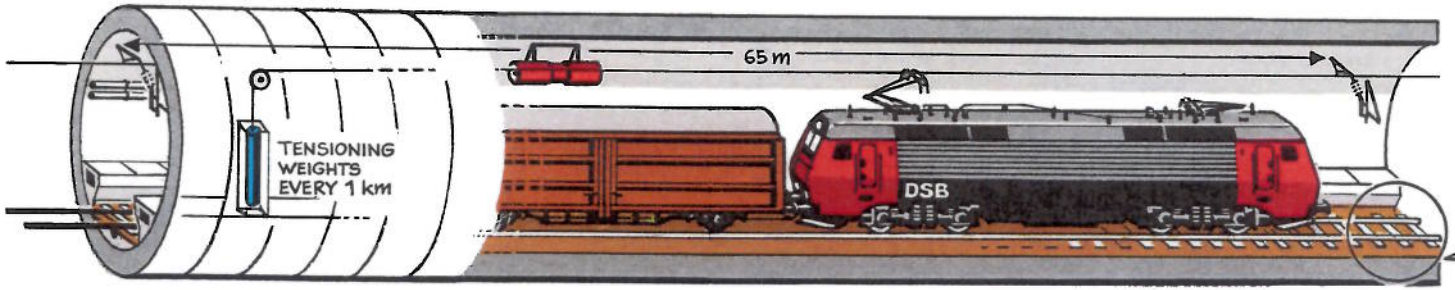
Dry weather conditions are an all-year-round state in the tunnel. It is therefore of paramount importance that the ballast between the concrete sleepers is quite clean. This aggregate must not contain dust or, as we call it in DSB, »snuff«. Small particles and dust get whirled up by the passing trains and settle on all the installations. This increases the risk of short-circuiting.

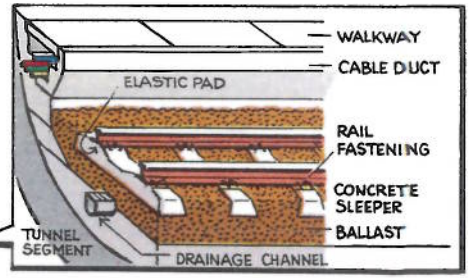
DSB is thus faced with the possibility of having to obviate the risk of dust settling on the installations by hosing down or other method of keeping the tunnel clean.











Safety Under All Conditions

6

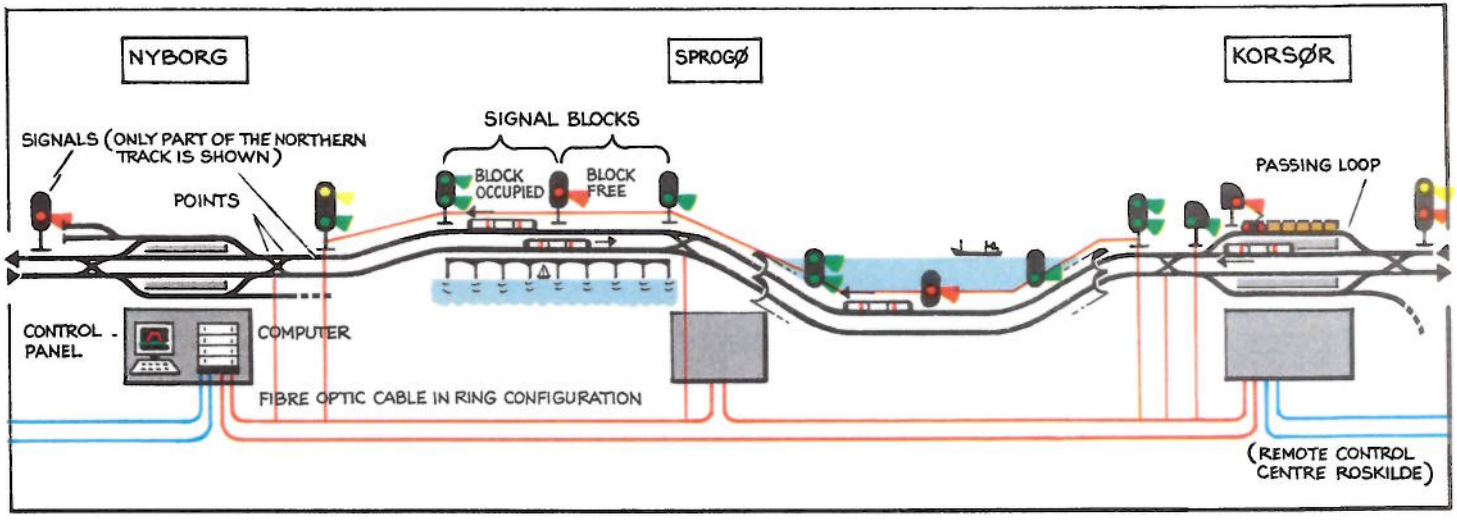
Signalling System

The signalling system monitors and regulates the railway traffic. The system ensures that the line is free and that signals and points are correctly set.

Signalling systems on the Great Belt Link are to be fully electronic. They consist of one or more central computers with screen terminal and keyboard. The systems are remotely controlled but can be operated locally.

The connection between the central computer and signals & points is based on the ring principle. This ensures that the system continues to function even if the connection is cut at any particular spot, e.g., due to a cable severage.

Fully electronic signalling systems will be located at the new stations at Korsør & Nyborg and on Sprogø island.
The Sprogø installation will allow for traffic diversion from left to right tracks and vice versa. This will be needed when, e.g., a particular track is being repaired. The signalling systems ensure a normal traffic flow at the stations. The railway



sections between stations, on the other hand, will be covered by an automatic block system, i.e. a signalling system for sections of track.

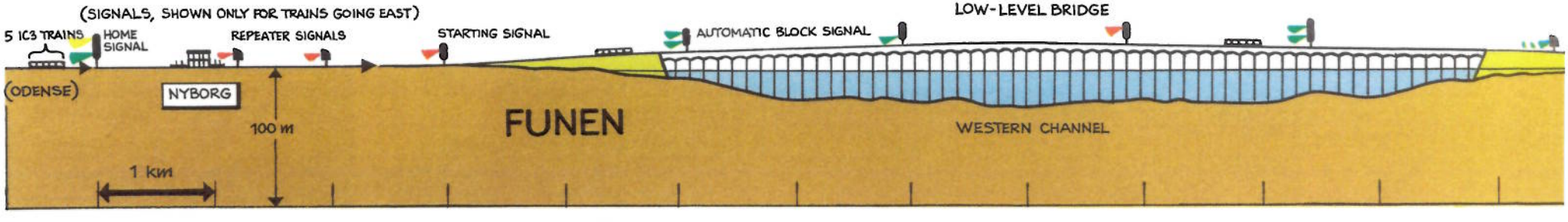
Block System

When a train leaves New Korsør station and runs into the tunnel, the block system is responsible for safety on the line. The same applies when the train has passed Sprogø island and runs on to the West Bridge en route for Nyborg.

The object of the block system is to enable more than one train – at suitable distances from one another – to run in the same direction in the tunnel or on the West Bridge simultaneously. There are 4 block sections in the tunnel and 3 on the West Bridge. Technically speaking, it is thus possible for trains to run at a few minutes interval.

The block system on the Great Belt Link provides for both right and left side running.

Trains will thus be able to run on the



»wrong« side in the tunnel or on the bridge with maximum safety and at full speed. This is a tremendous advantage, for instance, when maintenance work is being carried out or if a train has stopped and has to be passed.

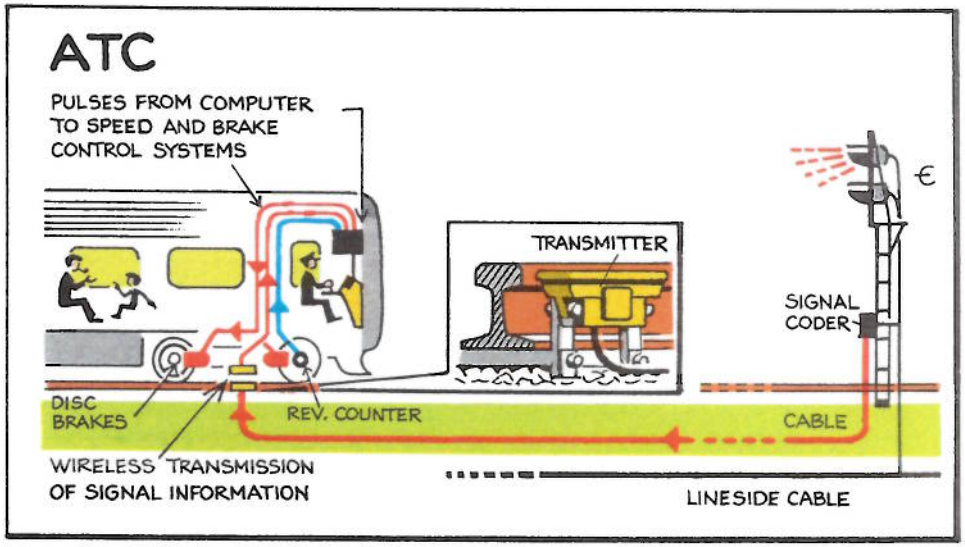
This system is fully tested and has been in use since 1988 on the 4 tracks between Høje Tåstrup and Roskilde near Copenhagen.

The signalling system installations and the block system are there to make rail travel across the Great Belt – as in the rest of Denmark – as safe as possible. To enhance the safety aspect under all conditions, a further safety measure will be incorporated: »Automatic Train Control«.

The automatic train control functions in such a way that information on the state of the signals, i.e. the aspects of the track-side signals, is transferred to the train via a system of transmitters. The train driver can thus read information on permissible speeds on an instrument in the driving cabin. This provides an extra measure of safety.

The information is transferred to the train via transmitters which are placed at the side of the track at approx. 2 kilometre intervals.

ATC also comprises a computer on the train. This keeps a check on whether the train driver exceeds the speed limit or overlooks a stop signal.

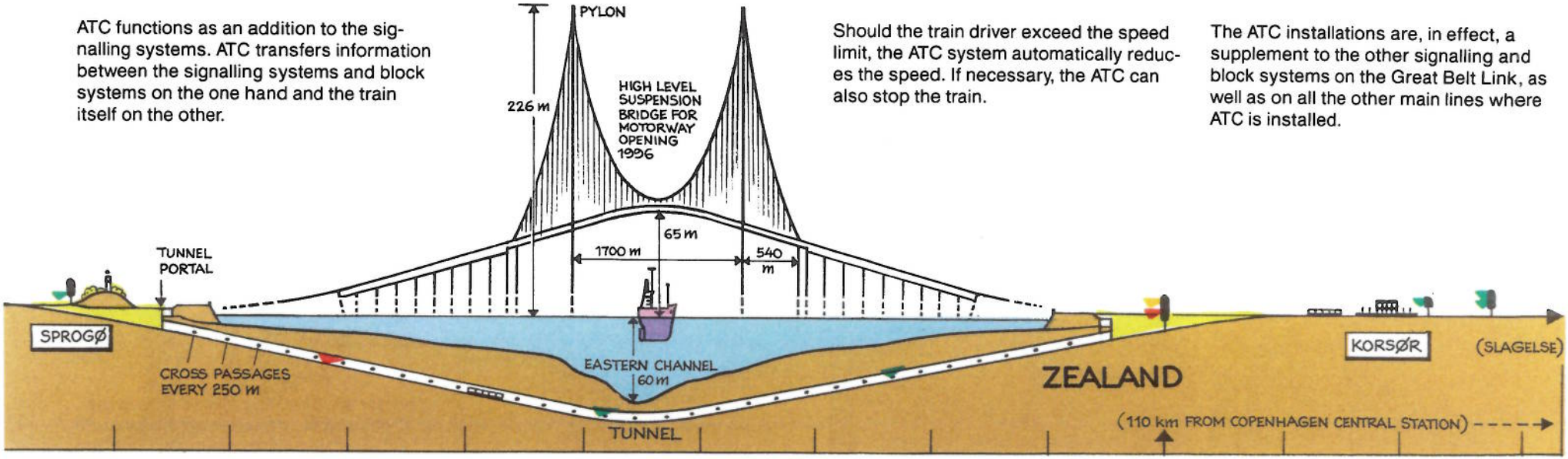


Automatic Train Control – ATC

ATC functions as an addition to the signalling systems. ATC transfers information between the signalling systems and block systems on the one hand and the train itself on the other.

Should the train driver exceed the speed limit, the ATC system automatically reduces the speed. If necessary, the ATC can also stop the train.

The ATC installations are, in effect, a supplement to the other signalling and block systems on the Great Belt Link, as well as on all the other main lines where ATC is installed.



Efficient Railway Operation

8

Radio

Trains running on all routes are constantly in touch by radio with the nearest remote control centre. From there information can be made available on any irregularities in train services.

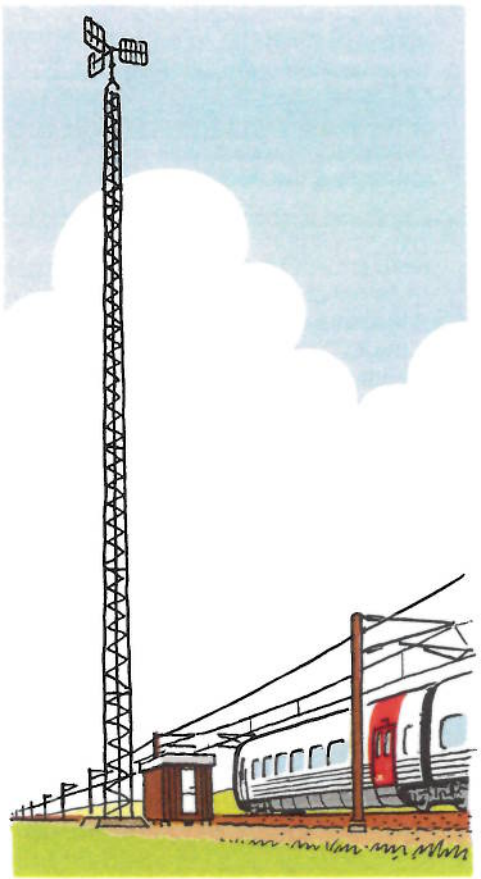
Radio communication is also in use at all stations in connection with shunting activities, brake-testing and much else.

DSB has more than 4.500 mobile radios in operation every day to facilitate rail traffic in Denmark.

Several different radio systems are being established for the Great Belt Link:

- main-line radio
- local station radio
- service radio, consisting of maintenance and emergency radio.

Main-line radio is for communication between the train driver and the regional remote control centre.



Via this main-line radio, the train driver and the rest of the train staff can inform the remote control centre of any irregularities of whatever nature.

Main-line radio comprises radio equipment installed in the driving cab. This transmits and receives signals in the tunnel under the Great Belt via a specially designed antenna system with radiating antenna cable and amplifiers.

The amplifying equipment and electrical installations are situated in the cross passages in the tunnel and in the tunnel portal buildings, from where the signals are transmitted to the relevant remote control centre. Radio coverage outside the tunnel is via 45-metre high radio masts situated on Zealand, Sprogø and Funen.

Local station radio is provided at each station for use, e.g., in connection with shunting activities.

Service radio is for use by rescue teams in case of accidents in the tunnel and for the use of railway personnel while repairing or maintaining the technical equipment or the track in the tunnel or on the bridge.

Service radio is installed in the tunnel and on the West Bridge. In the tunnel, the service radio comprises portable radios and base stations situated in the portal buildings.

Modern Traffic Control

There are probably very few passengers who, when travelling by rail across the Great Belt Link, will be aware of the very complex technical systems that ensure their safety en route – and that trains run on time under almost all conditions.

The heart of the modern traffic control system is the new traffic operations centre at Kalvebod Brygge in Copenhagen.

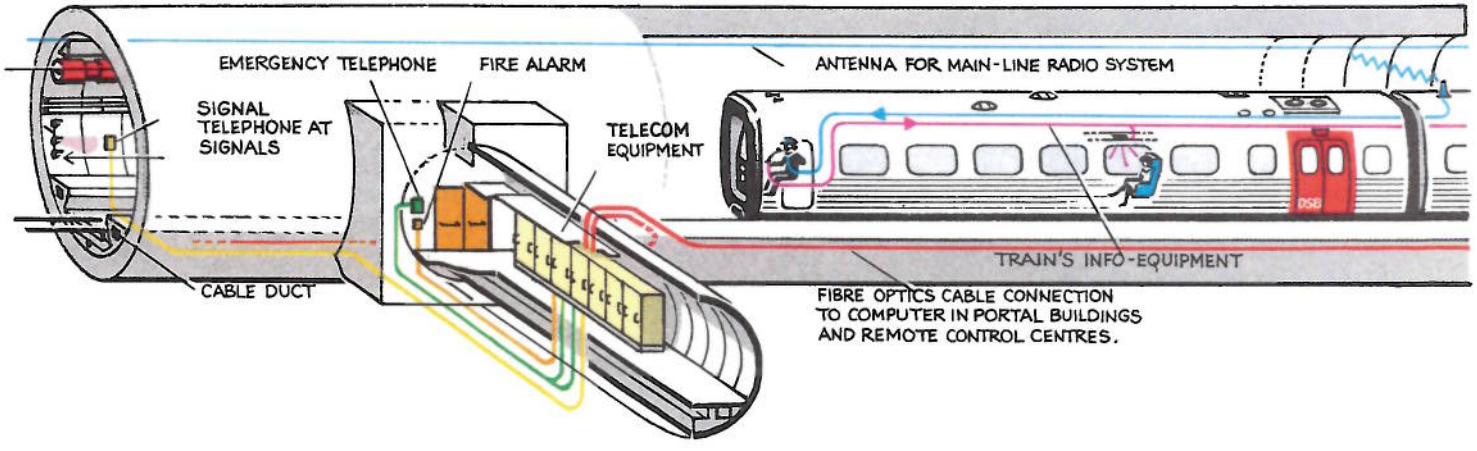
This operations centre comprises four systems:
- remote control of traction current supply system
- remote control of signalling system
- automatic train number system
- automatic staff and passenger information system.

The operations centre is at all times in touch with the regional operations centres and thus also in touch with rail traffic crossing the Great Belt.

What this means is that DSB has a constant overview of the traffic situation and thus can organize rail traffic in such a way that maximum safety and best possible schedules can be combined.

The remote control of traction current to the electric trains is normally carried out from the traffic operations centre.

This, in turn, means that maintenance and repair work on the traction current supply to the Great Belt Link can be carried out quickly and effectively.



Remote control of the signalling systems at the new Korsør station, Sprogø's technical station and the new Nyborg station, will primarily be the responsibility of the regional remote control centre in Roskilde or if need be the DSB traffic operations centre at Kalvebod Brygge in Copenhagen.

The automatic train number system comprises computers containing information on timetables and train movements on the remotely controlled sections of the line.

The automatic train number system ensures that the right train always arrive at the right platform and that they depart on the right track for the next station.

This system gives a complete overview of the current traffic situation. In addition, it gives DSB the means whereby it can advise its personnel and its customers of any schedule changes without delay.

This is carried out by means of the Electronic Staff and Passenger Information system.

In this way, it becomes possible to inform, without any delay, personnel and passengers of the traffic situation by means of the information screens installed at many stations including Korsør and Nyborg.

The information given includes departures and arrivals, extra trains and possible delays – and departure platforms and stations being called at etc.

In addition, the Electronic Staff and Passenger Information system transmits traffic information to the trains during the journey.

This permits passengers to receive messages concerning the traffic situation on their way across the Great Belt via the train's loudspeaker system. The information is sent from the remote control centre to the train personnel and passengers via the main line radio system.

Technical installations for the railway in the East Tunnel

Tunnel data

The rail link between Korsør and Sprogø island is via two bored tunnels with an external diameter of approx. 8.5 metres and a length of approx. 8 kilometres. The tunnel walls are 40 centimetres thick and made of prefabricated concrete segments.

The ends of the tunnels, however, are cut-and-cover constructions. The distance between the two parallel tunnel bores is approx. 25 metres, and there are connecting cross passages every 250 metres. These cross passages have a diameter of 4.5 metres and can be used in emergency situations and for technical equipment and installations.

The drilling is carried out by 4 tunnel boring machines working from either end in towards the middle.

Both diesel and electric trains will be able to operate in the tunnels. Maximum speed in the tunnel section has been set at 180 km. per hour. It is expected that about 140 passenger and 100 goods trains will run in the tunnel every 24 hours.

Ventilation

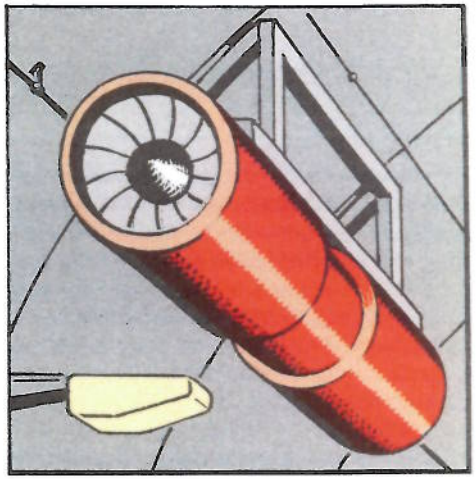
The normal tunnel ventilation is supplied by the movement of the trains pushing the air out in front, and thus sucking in air behind to fill the vacuum created. This piston-like effect means that the tunnel is normally self- ventilating.

In order to provide sufficient ventilation for passengers in the event that a train is stopped in the tunnel for some time, a supplementary ventilation system is, however, being installed.

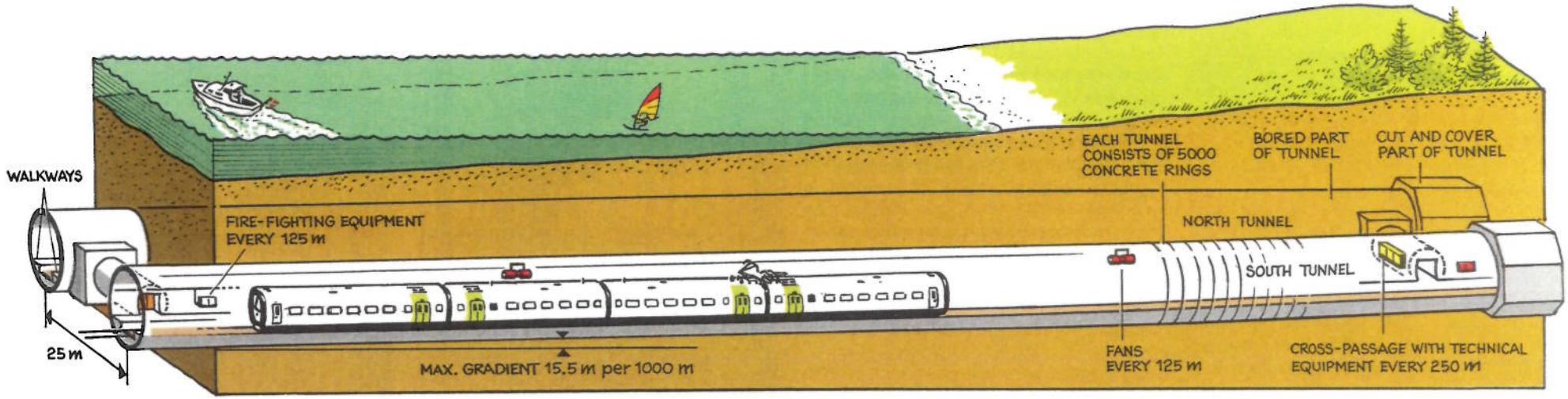
This ventilation system consists of a number of jet fans designed to cope with the worst imaginable situation: a train on fire in the middle of the tunnel. In such a situation, the system must be able to create an air flow of 4 to 5 metres per second.

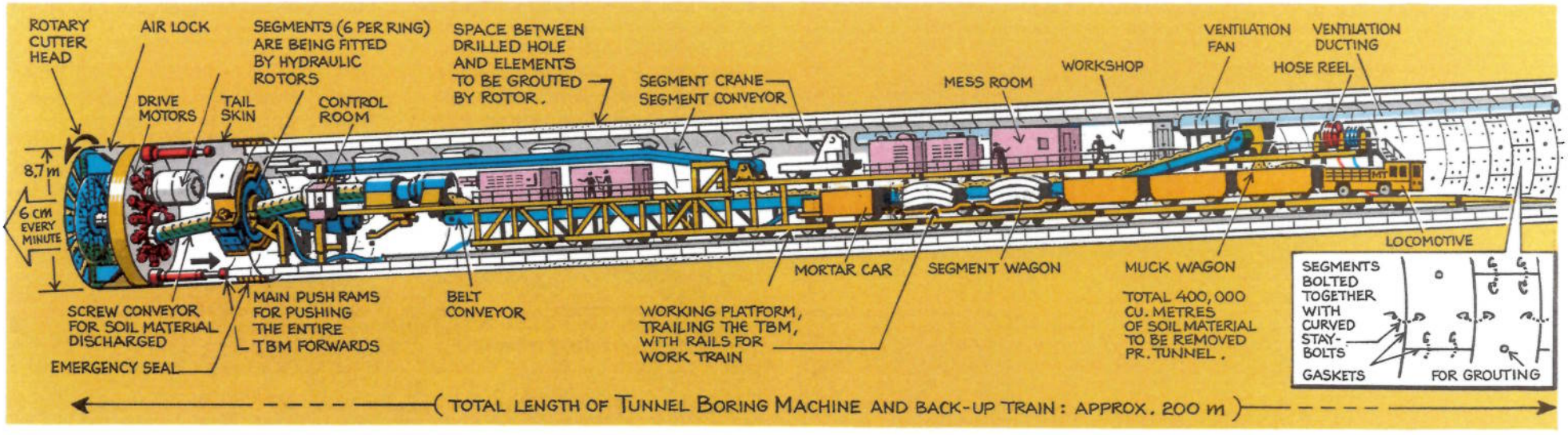
The system can blow air in either direction, thus allowing for a choice of the more favourable one for ventilation, so that heat and smoke from any fire can be confined to one direction and permit firemen and rescue teams to get to the scene of the fire.

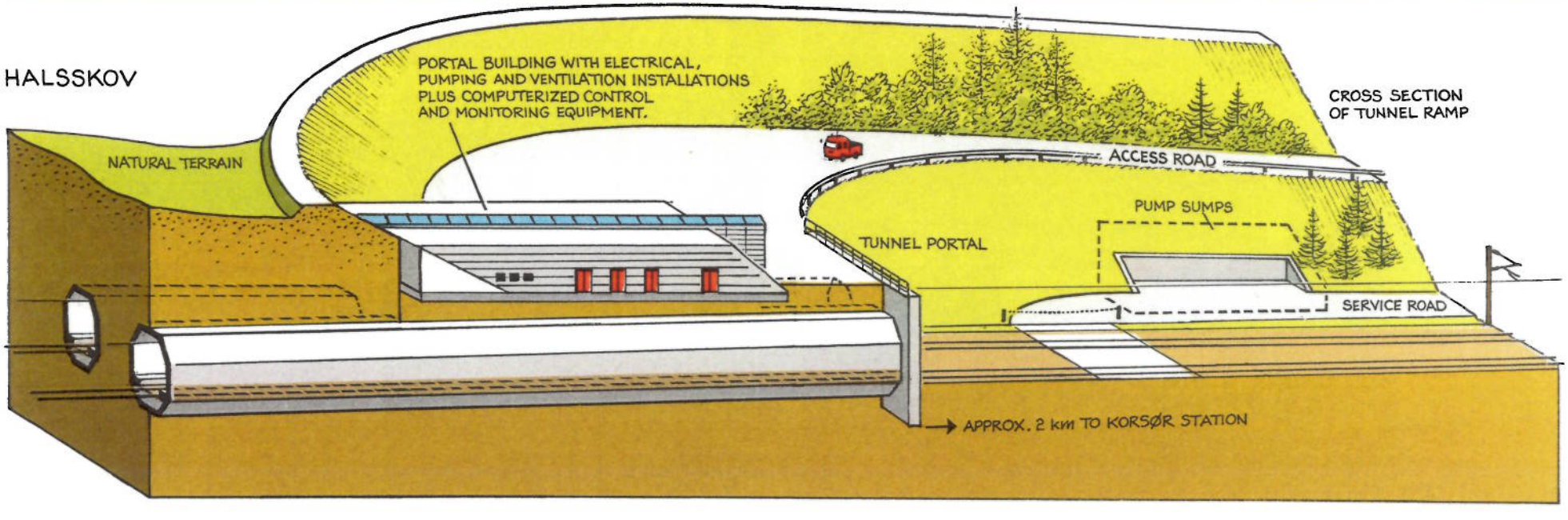
All technical installations on the railway are as far as possible based on the latest proven technology available to DSB and have been tested together with all other relevant railway systems. This is the best way to ensure that everything will function correctly from the start.



The greatest problem to be faced regarding the technical system in the tunnel is the extremely short time of a little more than one year in which to install them, inclusive of track-laying. For his reason, as much as possible will be pre-fabricated and tested prior to installation in the tunnel.




ROTARY CUTTER HEAD
AIR LOCK
SEGMENTS (6 PER RING) ARE BEING FITTED BY HYDRAULIC ROTORS
SPACE BETWEEN DRILLED HOLE AND ELEMENTS TO BE GROUTED BY ROTOR.
SEGMENT CRANE
SEGMENT CONVEYOR
MESS ROOM
WORKSHOP
VENTILATION FAN
VENTILATION DUCTING
HOSE REEL
DRIVE MOTORS
TAIL SKIN
CONTROL ROOM
8,7 m
6 cm EVERY MINUTE
LOCOMOTIVE
SEGMENTS BOLTED TOGETHER WITH CURVED STAY-BOLTS
GASKETS
FOR GROUTING
MORTAR CAR
SEGMENT WAGON
MUCK WAGON
TOTAL 400,000 CU. METRES OF SOIL MATERIAL TO BE REMOVED PR. TUNNEL.
SCREW CONVEYOR FOR SOIL MATERIAL DISCHARGED
EMERGENCY SEAL
MAIN PUSH RAMS FOR PUSHING THE ENTIRE TBM FORWARDS
BELT CONVEYOR
WORKING PLATFORM, TRAILING THE TBM, WITH RAILS FOR WORK TRAIN
TOTAL LENGTH OF TUNNEL BORING MACHINE AND BACK-UP TRAIN: APPROX. 200 m


HALSSKOV
PORTAL BUILDING WITH ELECTRICAL, PUMPING AND VENTILATION INSTALLATIONS PLUS COMPUTERIZED CONTROL AND MONITORING EQUIPMENT.
CROSS SECTION OF TUNNEL RAMP
NATURAL TERRAIN
ACCESS ROAD
PUMP SUMPS
TUNNEL PORTAL
SERVICE ROAD
APPROX. 2 km TO KORSØR STATION

Control and monitoring in the tunnel

Operation and maintenance

All systems and technical installations are controlled and monitored by computer. The two main computers are placed at either end of the tunnel, i.e. in the portal buildings on Sprogø island and on Zealand. These portal buildings are situated on the entry ramp gradients. The main computers are connected to a number of smaller data processors placed in the cross passages in the tunnel.

The control and monitoring system can be operated from the remote control centres in Copenhagen and Roskilde, and from the technical monitoring centre at Korsør's New Station.

The remote control centres receive only informations and alarms that are of importance to rail traffic. Other information on operation and maintenance goes directly to the technical monitoring centre.

The control and monitoring system keeps check on the functioning of technical equipment during normal railway operation, during maintenance work and in cases of alarms, accidents etc.

The system constantly registers:
- the presence of certain types of gas
- temperature
- air condition
- fire
- water levels in pump sumps

The system continually monitors:
- tunnel and bridge constructions
- communication installations
- electrical power installations
- lighting systems
- fans
- pumps
- emergency doors

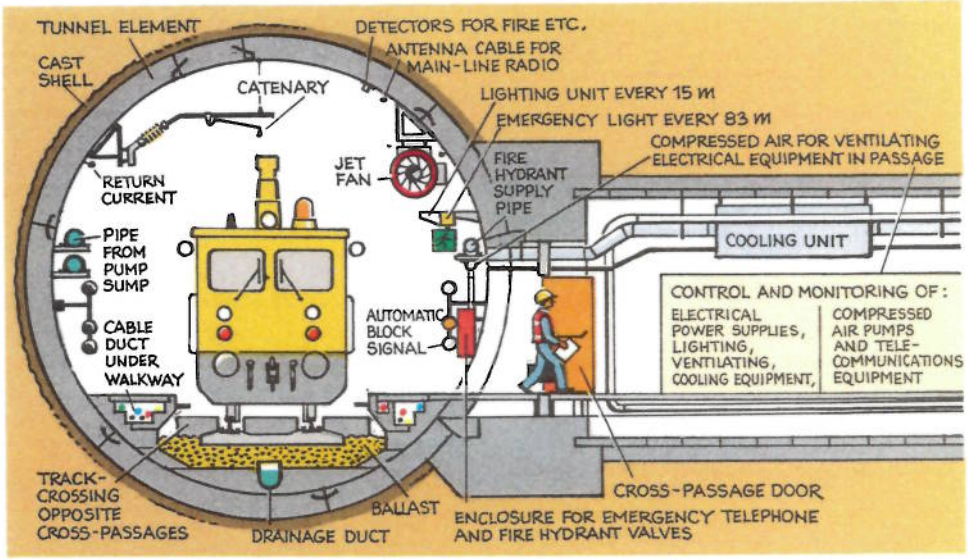
On the basis of all the above information, the computers automatically control:
- pumping installations
- ventilation systems
- cooling systems
- compressed air equipment
- lighting systems

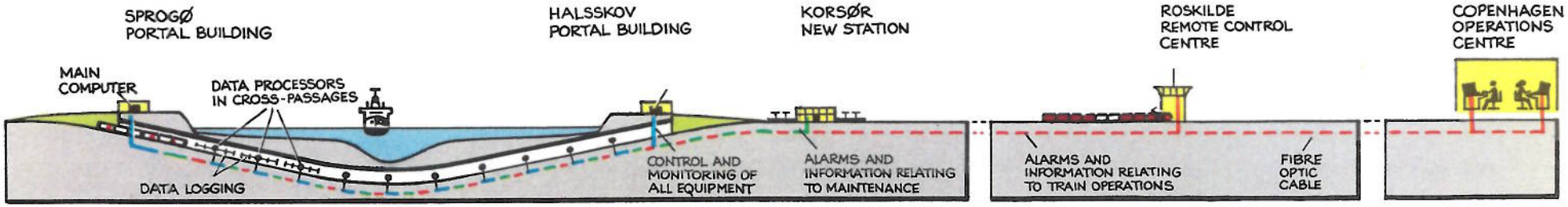
Control and monitoring continues night and day from the computers in the tunnel portal buildings.

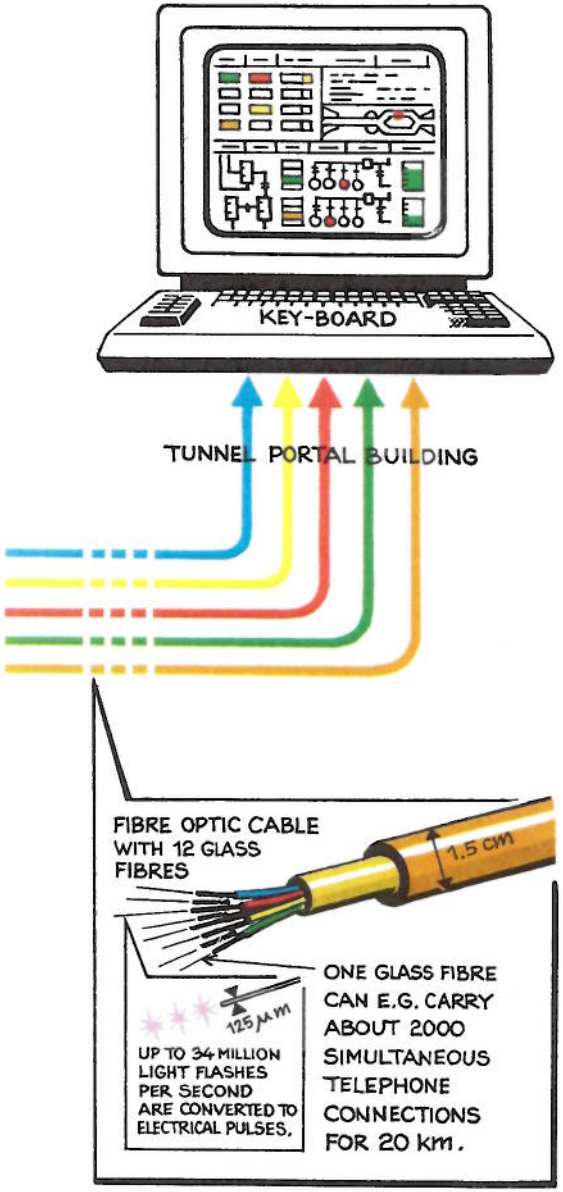
Should a serious accident occur, New Korsør station and the tunnel portal buildings computer rooms would be manned and from these points relevant information can be obtained via the screen terminals so that it is possible to operate the systems in the tunnel. Firemen and rescue teams will be available in case of accident situations.

Control and monitoring plays a very important role in connection with maintenance and repair work.

Data from all installations is collected by the control and monitoring system which registers operating times, operational faults etc. In this way it shows when and where maintenance of the technical equipment should be carried out.







Communication via fibre optics

New Korsør station, Sprogø and New Nyborg station are network centres for all communication across the Great Belt:

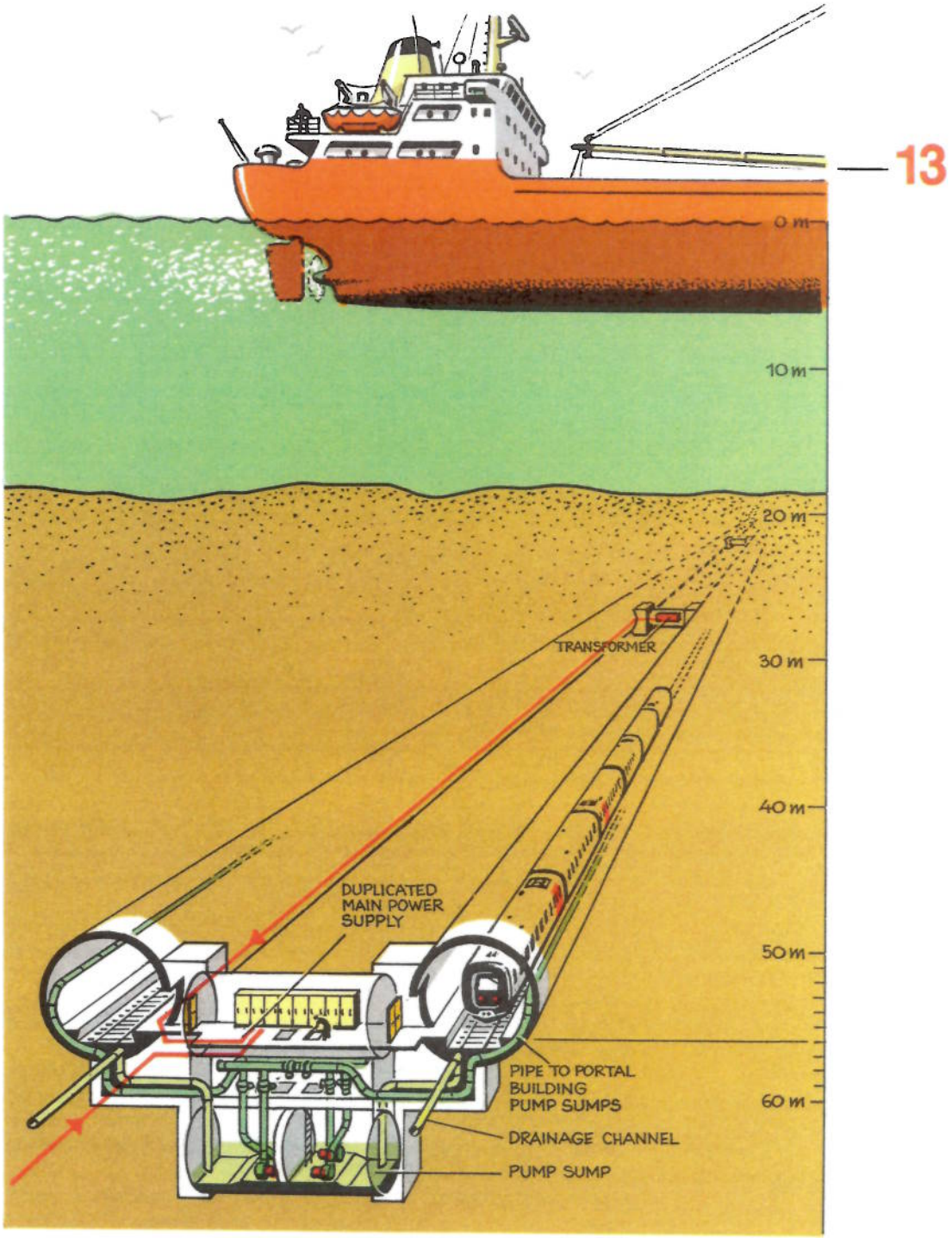
The communication lines provide:
- links between the new digital telephone exchanges at the stations
- links to the remote control centres in Roskilde and Copenhagen
- links between computer installations on the Great Belt Link, on Zealand and on Funen.
- links between the main computers and the technical systems in the tunnel.

The communication lines consist of fibre optic cables. Each light transmitting fibre is no thicker than the thin nylon line used by anglers. However, millions of light impulses per second can be sent through this fibre.

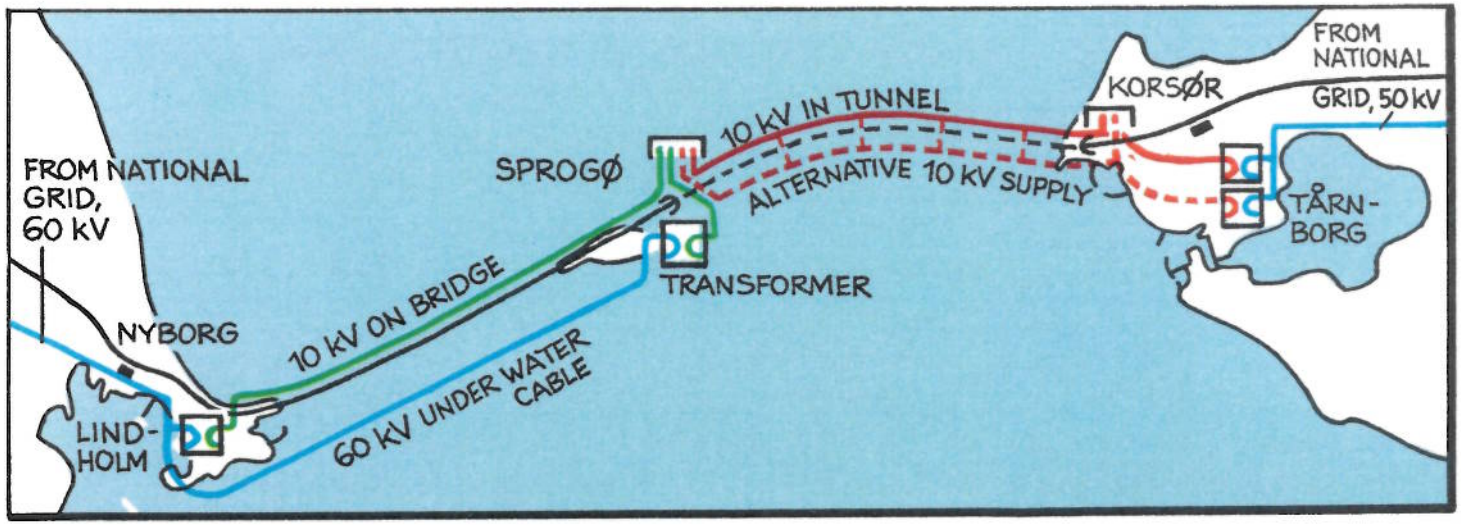
There are many advantages to these fibre optic cables. Their capacity is huge and they are not affected by the electro-magnetic fields from the enormous electric current needed to drive the trains.

It is only necessary to install one cable with 12 fibres to cope with DSB's entire communication needs via the Great Belt Link.

Finally, the tunnel is equipped with a system of emergency telephones. 64 of these are to be installed between Korsør and Nyborg.



Electrical power and lighting



Power

There are to be many electrical installations involved in the Great Belt project. They cover both daily operations and the many safety measures.

The tunnel's power supply is designed on the ring principle. This minimizes the risk of disruption.

The tunnel is supplied with power both from Zealand and from Funen. Normally the power supply comes from Zealand, but connection can be made to transformers on Funen, should current from Zealand fail.

Power supplies from Zealand and Funen are completely independent of each other. Each can thus act as a reserve supply for the other.

Additionally an emergency supply system has been established. This is able to function for some few hours and would only be used in the event that there were power failures from Zealand and Funen simultaneously, a contingency that has so far never arisen.

Only really vital installations are connected to the emergency power supply.

These are: Signalling systems, radio equipment, control and monitoring systems and emergency lighting on escape routes.

The Great Belt Link power supply system consists of the following:

- permanent power supply
- low voltage panels
- lighting system
- signs for escape routes
- emergency supply system

The normal power supply comes via high-voltage cables from the sub-station at Tårnborg on Zealand to the tunnel portal building at Halsskov.

The reserve power supply comes via an under water cable between Nyborg and Sprogø. During the construction period this is used to provide power for the building site on Sprogø and for the two large tunnel boring machines working from the Sprogø end. When the project is completed, this reserve power supply will become a permanent supply.

Lighting

There is no need for lighting in the tunnel during daily running of trains. There is, however, a need for lighting when work has to be done in the tunnel – maintenance and repair work, for instance – or while a train is stopped in the tunnel unexpectedly.

Working lighting and escape route lighting is provided by the same system that illuminates the track and walkway areas.

Escape route signs are powered by a separate emergency supply source. These signs show the shortest route for

escape in the event of an accident in the tunnel.

New stations and installations on land

The link across the Great Belt carries rail passengers across a strait where transport years ago used to be by small rowing boats hauled across the ice-packed sea during severe winters.

The route chosen for the new railway means that the stations at Nyborg and Korsør have to be moved northwards to new buildings.

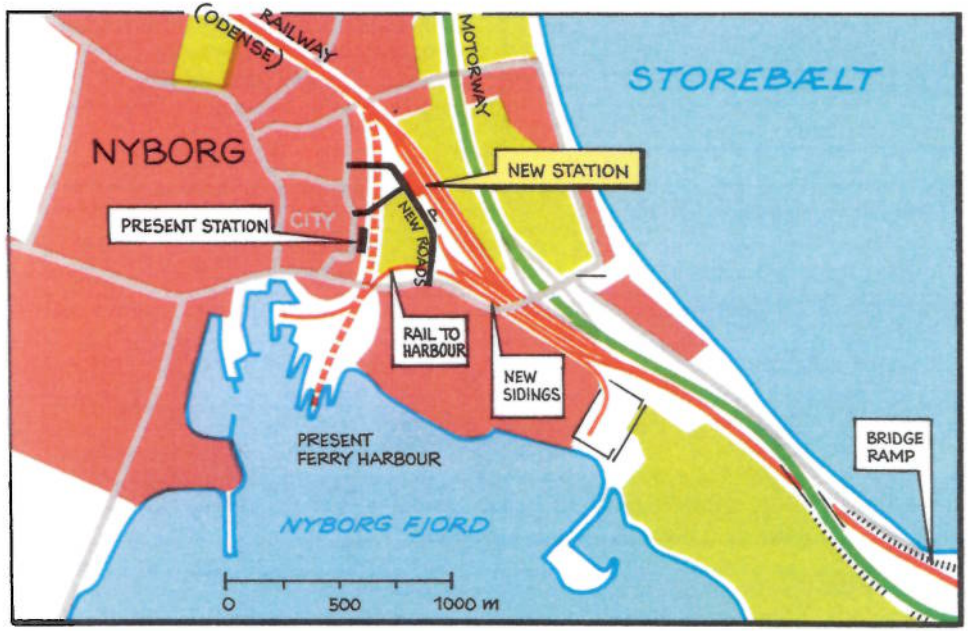
These new stations will be built by DSB and will be planned in accordance with DSB's principles as to how railway stations nowadays should be. For instance, they will be an integral part of the modern centres that are built up around the stations.

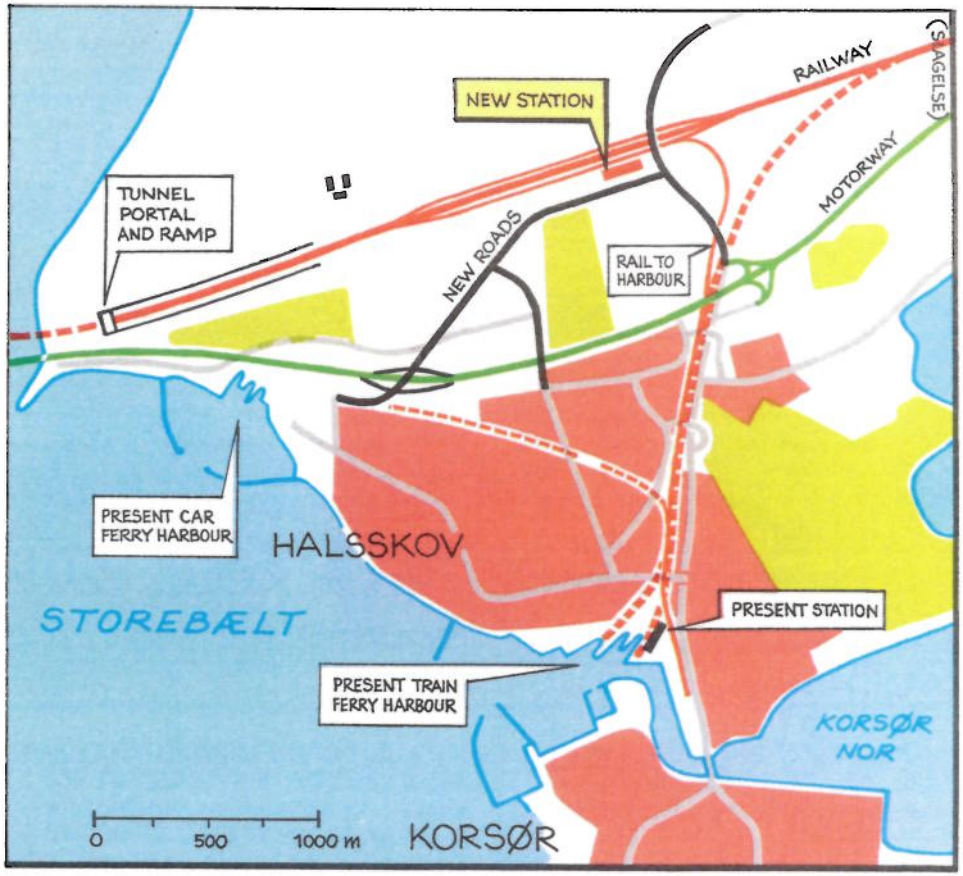
There will be plenty of passenger facilities: entrance hall with waiting room, ticket office, well-stocked kiosk, payphones and TV screens showing traffic information for passengers.

The track areas will be much less cluttered than is the case at Nyborg or Korsør today.

When traffic is moved on to the new routings, the old station buildings will be redundant. What will subsequently happen to them and the surrounding areas has not yet been decided.

The Great Belt project incorporates, however, a most unusual type of railway building: a station on an island with only two inhabitants.



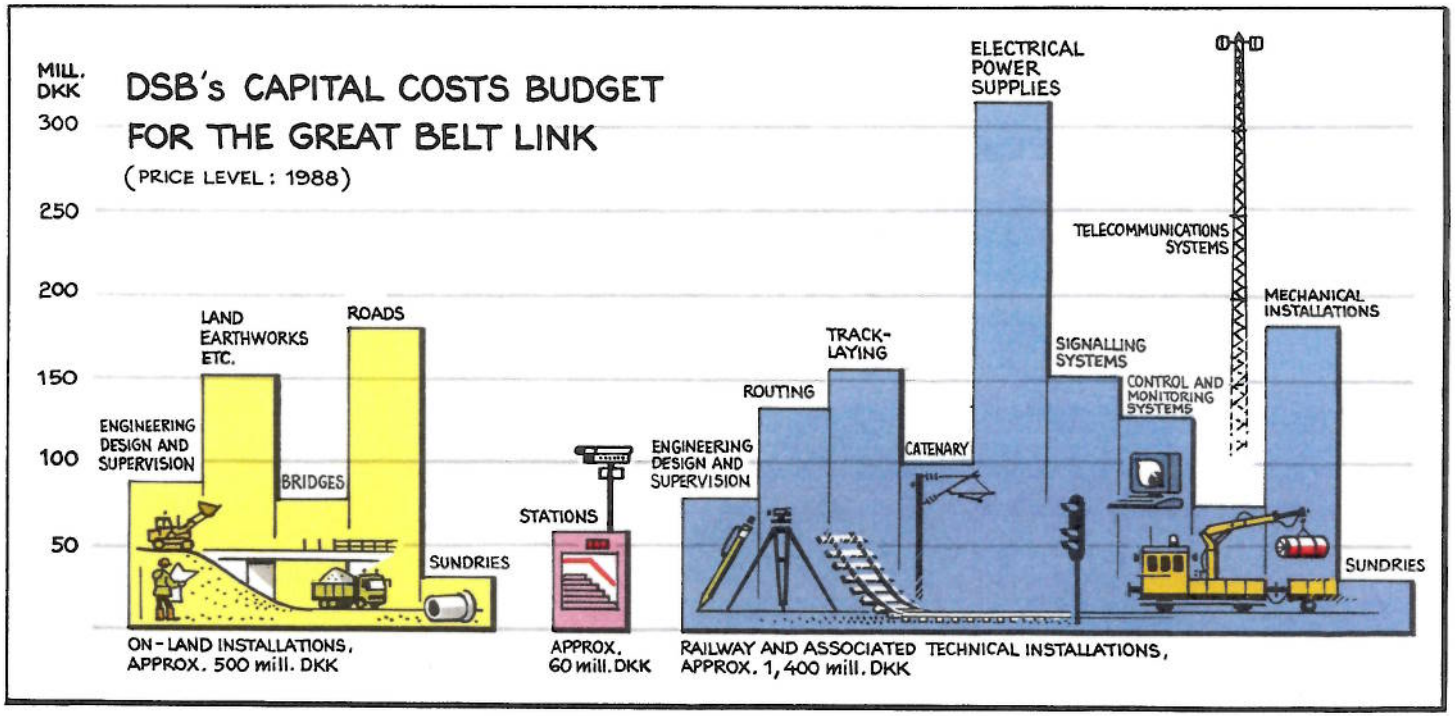


The station on Sprogø is, of course, only a technical phenomenon, of significance to the daily traffic solely in a safety context, and trains will not be stopping there.

After having been known as an idyllic spot – where they used to send women who had »got themselves into trouble« – Sprogø is again in focus as an important part of the Great Belt Link.

Much is being done to preserve the island of Sprogø as intact as possible. It has to be admitted, however, that its northern and north-easterly sides will show signs of the technical installations.

Budget and timing



* The West Bridge has to be ready for the railway technical installations by 1st November 1992

* The railway installations must be ready for test running by 1st June 1993 - The railway link will be opened 15th September 1993

* Road link will be opened 15th September 1996

All the railway technical installation have to be completed in less than a year and six months. This means a very tight working programme carried out under very difficult conditions.

The very thorough preparatory work carried out by DSB, however, has made it a practical proposition to build what can perhaps be described – in view of the installation problems to be faced – as a »ship-in-a-bottle« across the Great Belt.

The Great Belt project will be completed in two phases. The railway link will be in phase one – the road link in phase two.

The government has decided that the opening of the motorway link will take place 3 years after the inauguration of the rail link. It is thus up to DSB to take full advantage of this 3-year start.

The boring of the tunnel and work on the West Bridge started in 1990.

Great Belt Link Ltd will hand over the tunnel and railway bridge to DSB as building »shells«, after which it is DSB's responsibility in the role of main contractor to furnish the empty shells with all the necessary technical and other installations.

The carrying out of the installation work has to be based on the following time schedule:

* The shell of the east tunnels have to be ready for the railway technical installations by 1st March 1992