

Newsletter 2014 - 3

2014-04-24

Magnetic-train Scandinavia

News

Welcome to the only inter-Nordic newsletter about magnetic-trains.

Sweden

The Swedish government agency Trafikverket declared earlier this month that they have studied the possibility to make the track in "Ostlänken" (Stockholm-Linköping) raised up over the landscape instead of cutting into the landscape. This method will lessen environmental impact and result in construction speed advantages.

With a maglev inspired raised track, it will have some but not all, of the advantages of a regular maglev option. Trafikverket is still not commenting on maglev technology.

Denmark

On 2014-04-24, the Danish Parliament's Transport Committee, received this magnet train group for an audience in which a new series of OH's ([link](#)) were shown, and a number of development opportunities presented. are going to be shown, and a number of development opportunities will be presented.

International

The Nordic "8 Million City" group has organized their 2014 final seminar. We have initiated a dialogue with the group on possibly cooperating with them on certain development and future issues.

Ole Rasmussen (DK) from this magnetic train group attended the seminar.

Transrapid Test Track

Series – *Magnetic trains around the globe*
In early 1980 it was obvious that Transrapid needed a full scale test track. The first part was finished in 1984. In 1985 the track was complemented with a southern

circular track section, and in 1987 a northern high speed circular track, so the train could run continuously.



Above: Transrapid TR09 on Transrapid test track

The first train tested on the track was the Transrapid TR06, it topped out just over 400km/h. A lot of data was collected from TR06 and in 1989 a radical new train, the TR07 with improved aerodynamics, suspension and lifting mechanism. The mass was also lowered considerably. A new cheaper track segment was also developed, significantly decreasing the cost of track construction. A handful of segments was installed for durability testing.

After 15 years of testing in 1999 the TR07 was updated in a TR08 pre-production, ready for regular service. A new concrete hybrid track section was also developed to decrease track installation cost more. This system is almost identical to the one later installed in Shanghai.

In 2007 after years of experience in regular service a TR09 was developed with a high number of improvements over the TR08. With everything from increasing comfort, to reducing maintenance costs. The old thyristor was also replaced by modern transistors reducing energy consumption.

Copenhagen to Aarhus

Part 3: Denmark

Series – *Scandinavian parts*
Continuing from the newsletter in March in the series on Scandinavian routes.

This is not a professional investigation, only a few different

options on how a route would look.

Calculations are made with the same program as the official investigation.

Total distance: 180-190km

Estimated cost: 50-65 billion kr

Stations: 5

Population city: 1,7 M central

Total population: aprox. 2.5 M metro

Direct travel documents: ~550k/month

Further connecting: ~680k/month

Km cost directly: 120-165öre/km

+ Connecting Göteborg: 95-133öre/km

+ Connection Oslo: 90-125öre/km

(estimated using the same model The model is not optimized for this route and the results will therefore deviate somewhat from the expected real world results).

In our model we have calculated with a direct land route from Aarhus to KBH. The model may underestimate the increase in passenger volume because it connects over Kattegat.

See map overleaf

Track can use a new south exit from Copenhagen with extensive tunnel-work, or a north exit following the same route as Göteborg to Copenhagen line, reducing cost, but also reducing capacity.

Following a somewhat straight line across Sjælland there is a possibility of a stop near Roskilde and Kalundborg reducing the strain on existing commuter service.

Over Kattegat to Samsø a tunnel is needed to allow for large ships to pass unhindered. Using Samsø as a staging platform the tunnel can exit, and the route continue using a medium sized bridge allowing small and medium sized ships to pass.

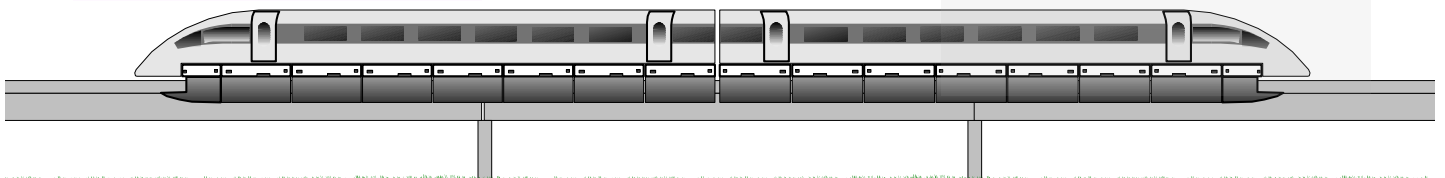
At Samsø a new city can be built within mere minutes from both central Aarhus and Copenhagen.

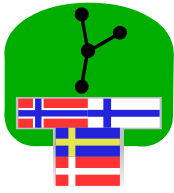
Over to Aarhus a direct bridging low cost Transrapid track can be built.

After reaching Aarhus a station can be built just south of the city to reduce costs and building time, or near the city center using a tunnel for central access.

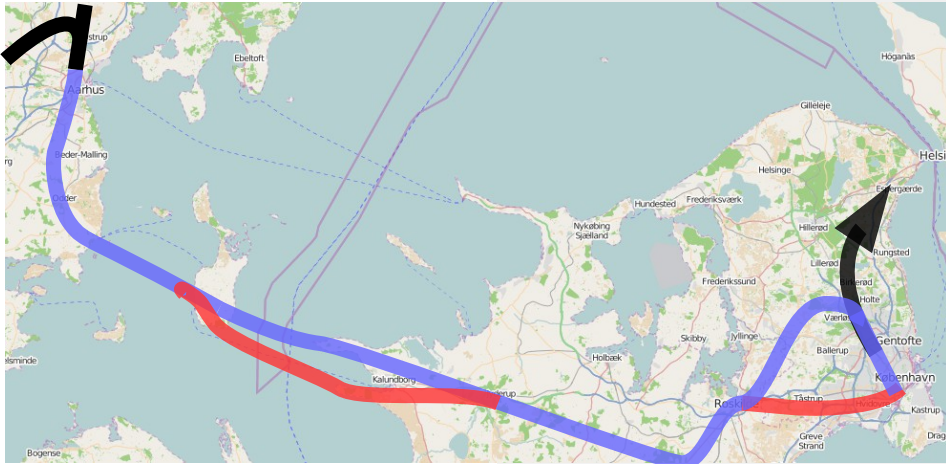
Future expansions can be built right through Aarhus and then split into two single track lines to connect to both Aalborg and Esbjerg at a reasonable cost.

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Göteborg (5 stops): 56 minutes
 Oslo (8 stops): 102 minutes
 Oslo (1 stop gbg): 75 minutes
 Stockholm (13 stops): 132minutes
 Stockholm (nonstop): 90 minutes



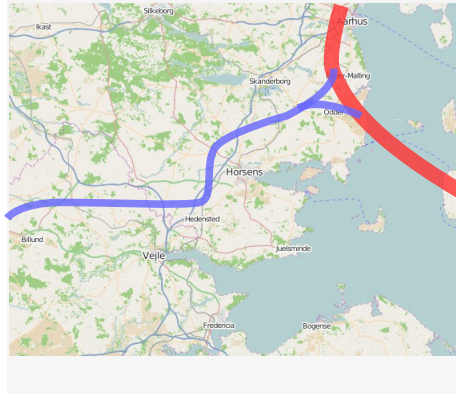
Continue from page 1. Copenhagen to Aarhus



Samsø in year 2040? This could be true for Samsø, with Aarhus C only 7 minutes away and Kbh 25 minutes, it becomes very attractive to live on the island.

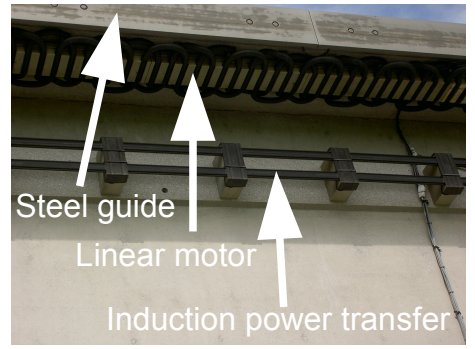
Traveling time from Copenhagen:
 Roskilde: 7 minutes
 Ringsted (1 stop): 13 minutes
 Kalundborg (2 stops): 21 minutes
 Samsø (3 stops): 29 minutes
 Aarhus (non stop): 25 minutes
 Aarhus (4 stops): 42 minutes
 Randers (1 stop): 33 minutes
 Aalborg (2 stops): 47 minutes
 Hedensted NV (1 stop): 35 min.
 Billund (2 stops): 45 minutes
 Esbjerg (3 stops): 57 minutes
 Landvetter (4 stops): 50 minutes

Over: Copenhagen to Aarhus via Samsø
 Below: Aarhus to Hedensted and Billund Airport continuing to Esbjerg



Technology Explained

How does the Transrapid TR09 work
 Transrapid trains are similar to Linimo trains in having lifting magnets under both sides of the T-shaped track. But while Linimo uses a passive magnetic field Transrapid is lifting in a moving electromagnetic field. That is Transrapid uses the same magnetic field for both propulsion and lifting. The induction power transfer is a system unique to TR09 reducing maintenance cost for both vehicle and track to a fraction of other systems. Transferring power to the train cordless, similar to a electric toothbrush.



The picture shows one of the two symmetrical sides of a TR09 Transrapid track. The component viable, Steel guide, Linear motor and Induction power transfer is the only component needed on the TR09 track.

The guide-way is made almost exclusively of concrete, the only exposed steel is the steel guide, reducing both up front cost and maintenance
 The linear motor is made of rubber and aluminum and is completely shielded from the sun by the track. All transformers and power-supply equipment is situated in secure areas every 50km with only small relays situated every 4 km next to the track.

The Transrapid TR09 is arguably the most modern magnetic-levitation transport-system available on the market today, and there is still room for improvement of the system

Modular system

A great advantage with the Transrapid transport system is that its totally modular, making it possible to upgrade part by part.



A TR09 train on old TR08 track

<https://www.facebook.com/MagnettagGotaland>
<http://ing.dk/debat/magnettog-i-norden-159595>

Contact Danmark: Ole Rasmussen
 Contact Sverige: Mattias Svederberg

