

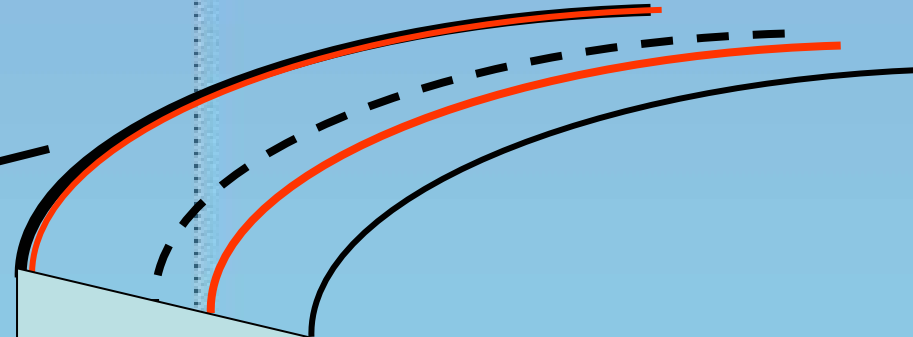
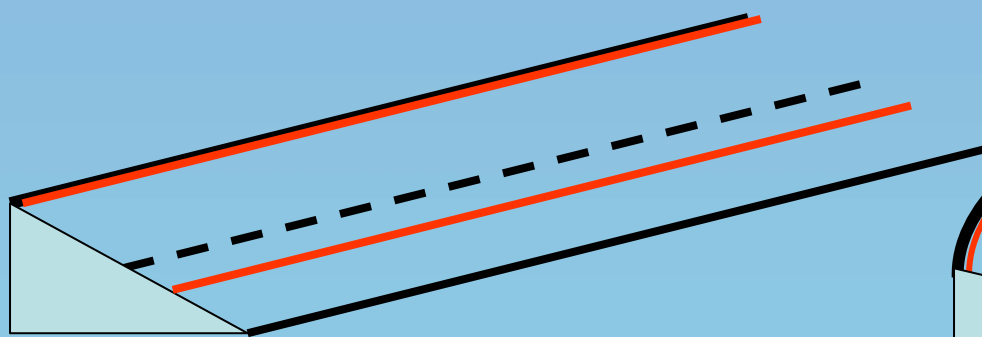
Precise spreading of liqued (brine) with GPS and nozzles

Jens Kr. Fonnesbech
jkfo@nordfynskommune.dk

Jesper Dam Buch
jdb@epoke.dk

Vision

- ***We can use less brine (salt) with GPS-controlled spreading if we place***
 - ***brine(salt) on the high level on the middle***
 - ***brine(salt) on the high level in curves.***
 - ***less brine(salt) on lane with heavy traffic***

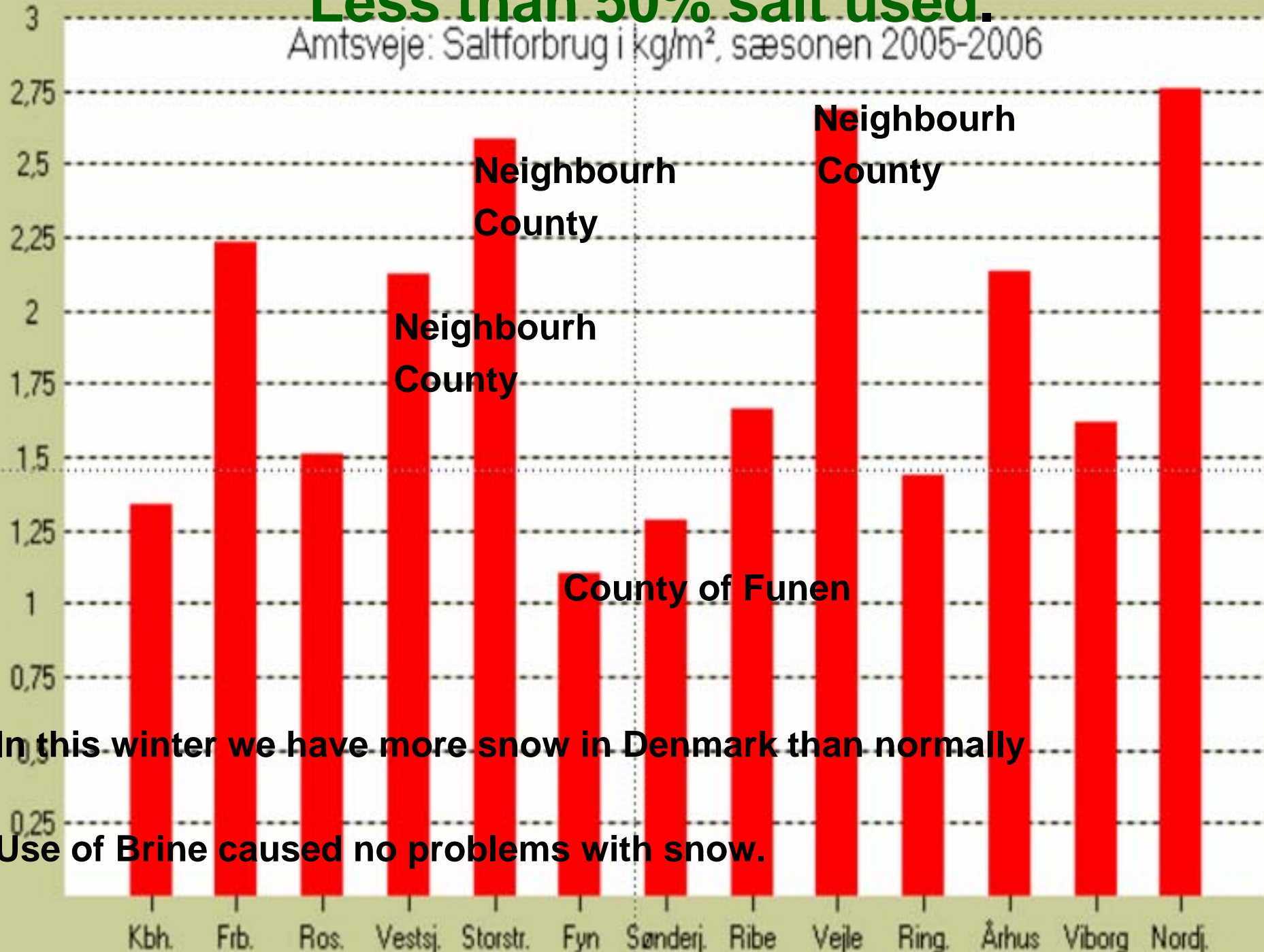


Necessary spreading

Necessary spreading

Less than 50% salt used.

Amtsveje: Saltforbrug i kg/m², sæsonen 2005-2006



In this winter we have more snow in Denmark than normally

Use of Brine caused no problems with snow.

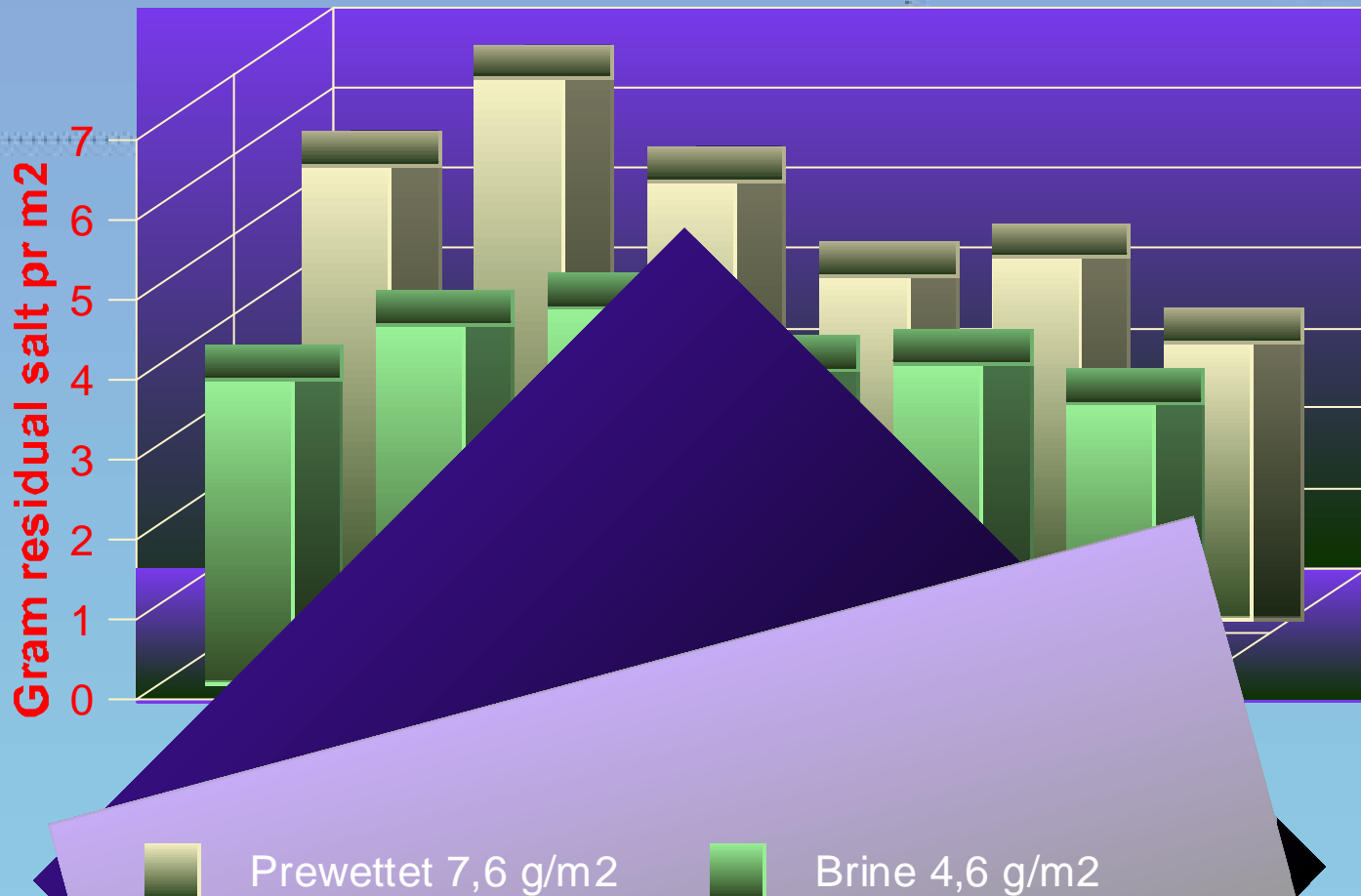
Accidents

- 2002 – 2005 The County of Funen use Brine on some routes and pre-wetted salt on other routes.
- 10 % less accident
cause icy roads, when using brine.



BRINE

Residual salt 2 hours after spreading (1999-2000)



Prewetted lost 20% (uneven spreading)

SOBO 20 (saltstick)

- *Don't use acetone!*
- *Only clear water with conductivity < 10 mikroSiemens/cm.*
- *The quantity of water in the measure room have to be 43 or 44 ml*
- *measure room must repeatedly be cleared with paper*



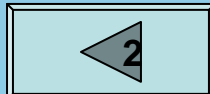
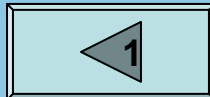
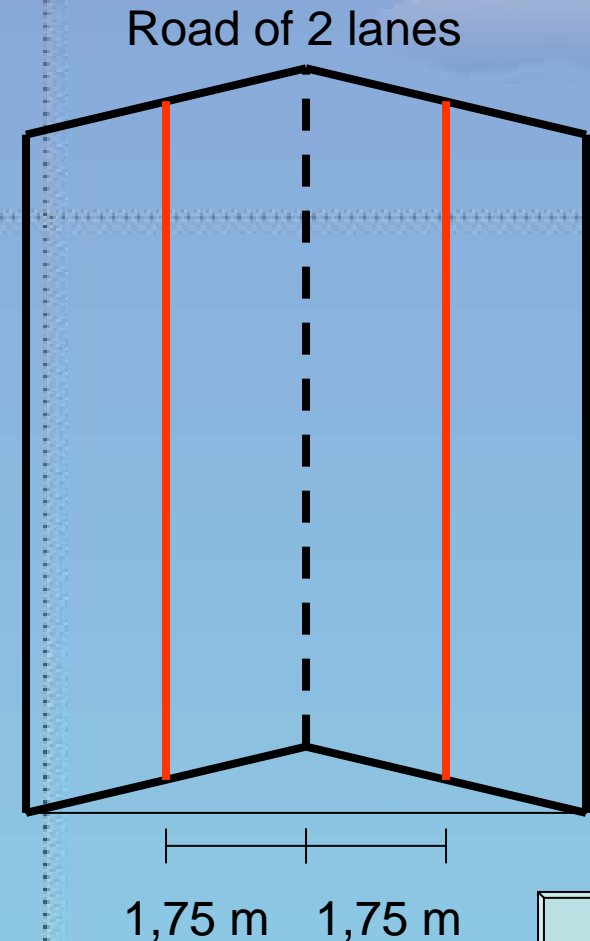
Spreading measurements 2004



Measurements, example

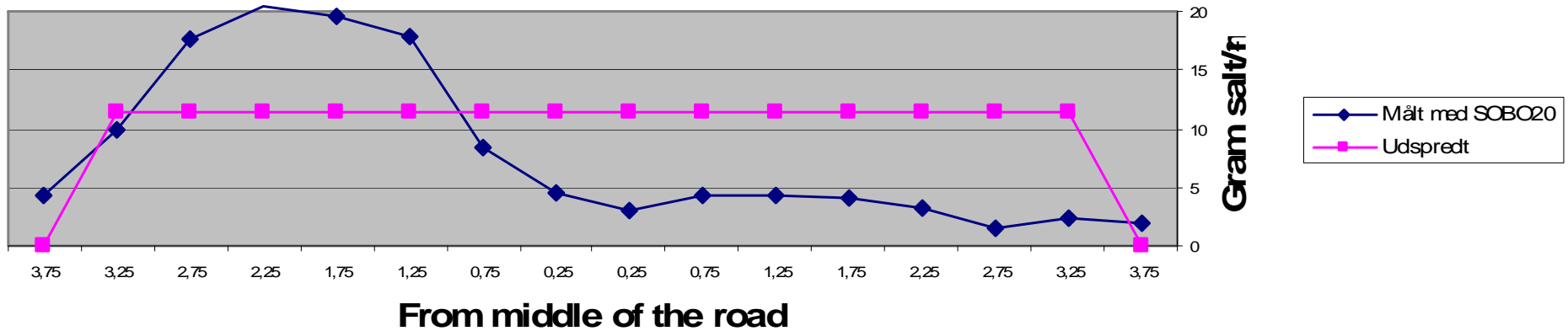
- Sobo 20 measurement 1,75 m.

	left	right
• Arne	22	5
• Helge	18	4
• Jeppe	19	5
• Allan	18	3
• Jens Kr.	21	3
• Middle value	19,6	4



Measurement example

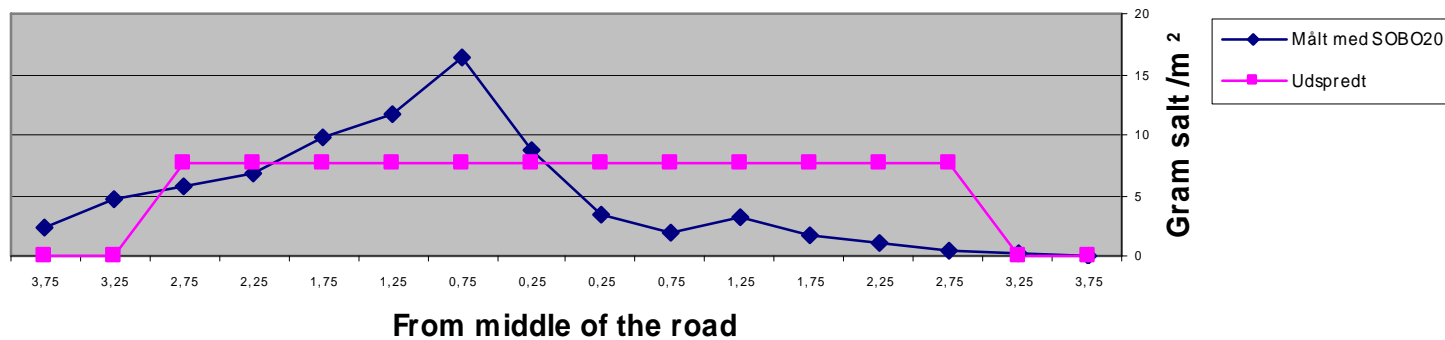
15 g/m² prewetted "7m" 60 km/t (Diagram 4)
Disc spreader year 2002 Asymmetrical



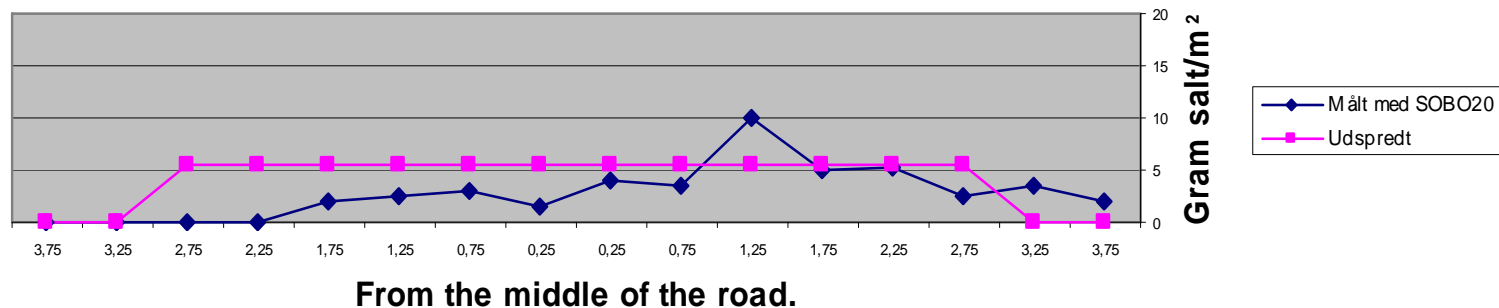
Disk spreading 6 m asymmetrical

Spreading discs have opposite rotation

10 g/m² prewetted salt "6 m" 60 km/t
 Disc spreader year 1996 (Asymmetrical)

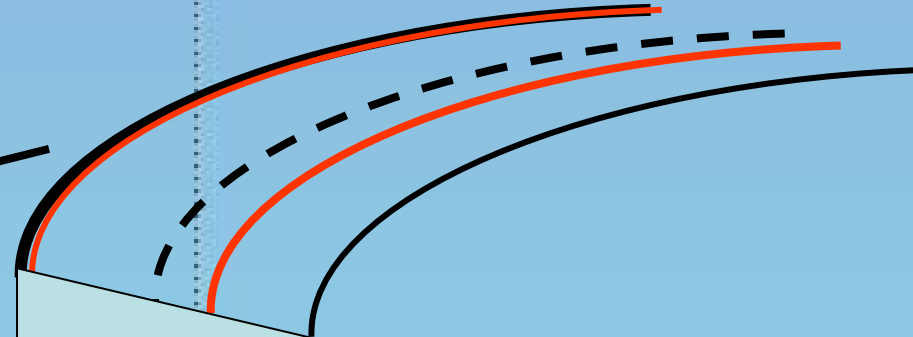
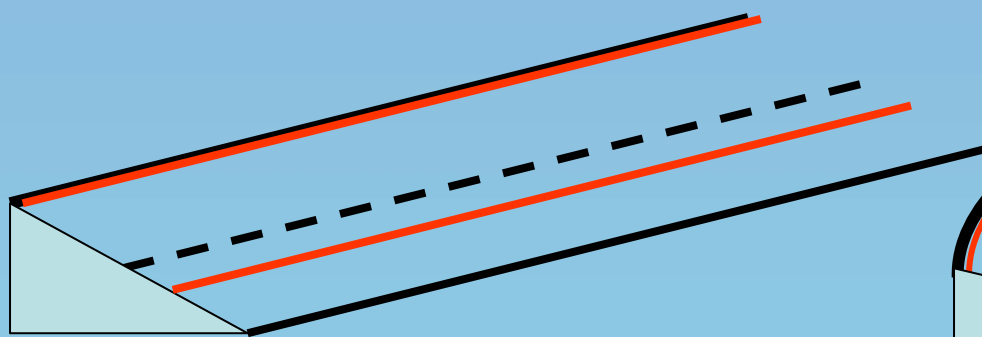


10 g/m² brine + 3 g/m² salt "6 m" 60 km/t
 Disc spreader year 2001 (Assymmetrical)



Vision

- ***We can use less brine (salt) with GPS-controlled spreading if we place***
 - ***brine(salt) on the high level on the middle***
 - ***brine(salt) on the high level in curves.***
 - ***less brine(salt) on lane with heavy traffic***



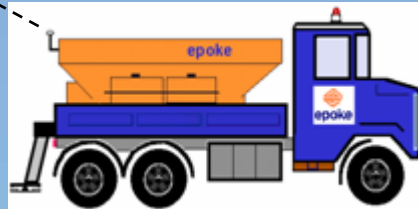
Necessary spreading

EpoSat

-



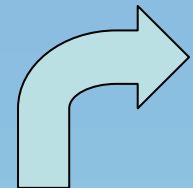
GPS-controlled spreading



Route navigation

-

Navigating the driver



?



Spreading turnout

A normal spreading route is typically between 40 – 70 km or 2 – 3 hours.

A spreading route in the country has approx. 150 – 250 changes of width and symmetry etc.

A spreading route in the city has up to 700 changes of width and symmetry etc.

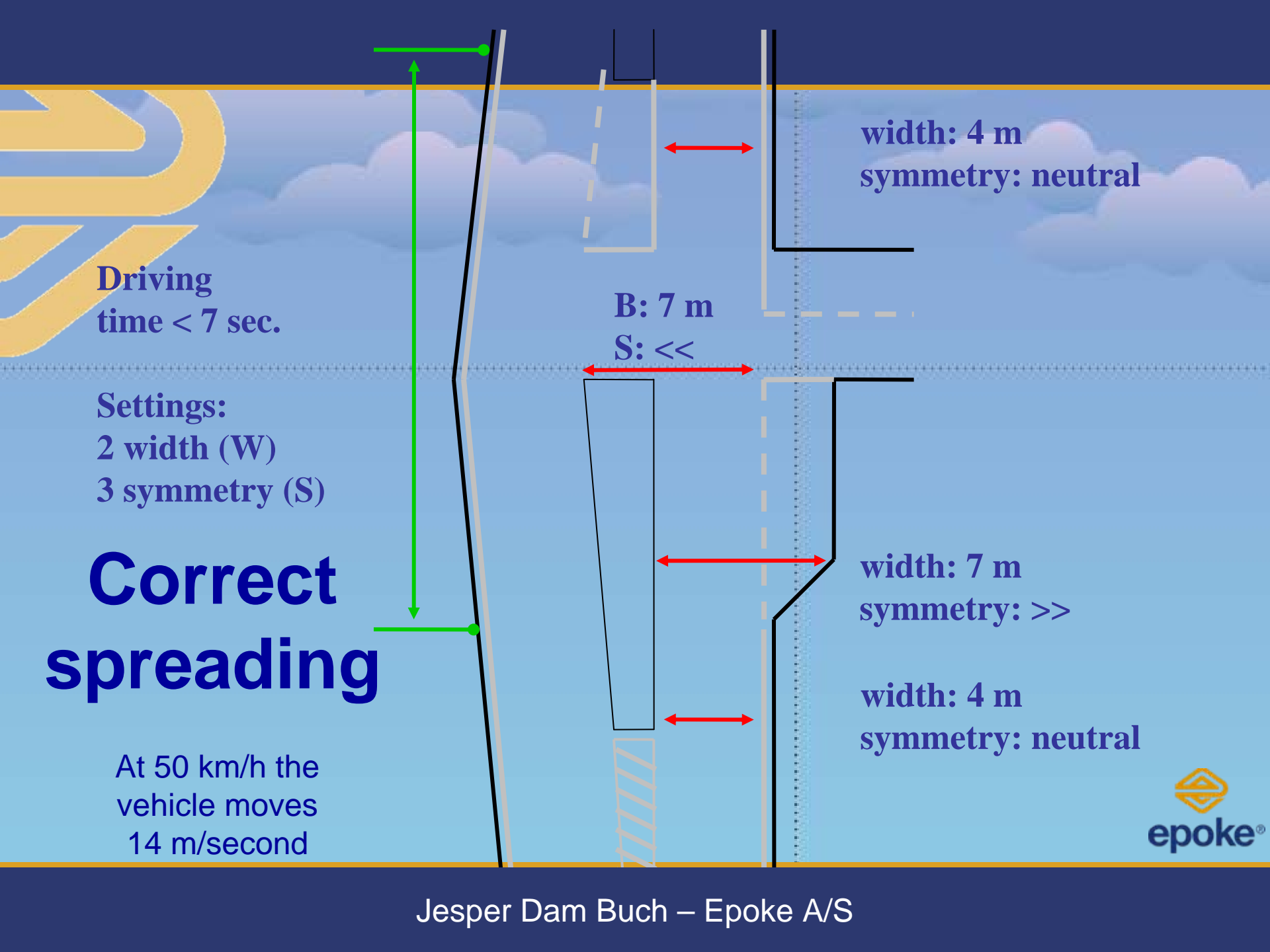
A normal winter typically has 50 – 150 turnouts.

75 turnouts – country = 18750 changes

75 turnouts - city = 52500 changes

Who is capable of doing that?





Driving
time < 7 sec.

Settings:
2 width (W)
3 symmetry (S)

Correct spreading

At 50 km/h the
vehicle moves
14 m/second

width: 4 m
symmetry: neutral

B: 7 m
S: <<

width: 7 m
symmetry: >>

width: 4 m
symmetry: neutral

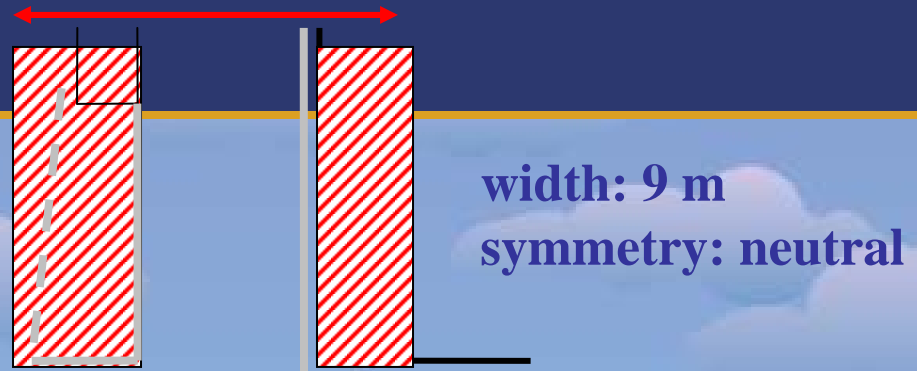


Driving
time < 7 sec.

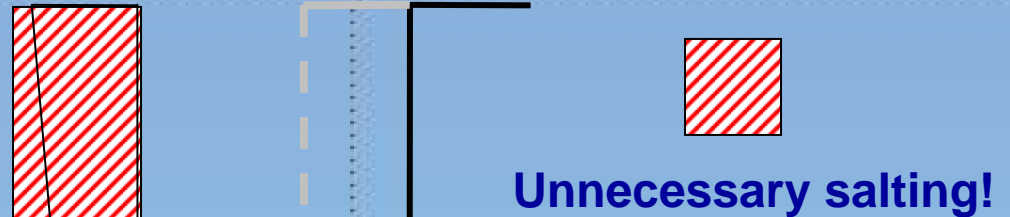
Settings:
1 width (W)
0 symmetry (S)

Spreading w/o EpoSat

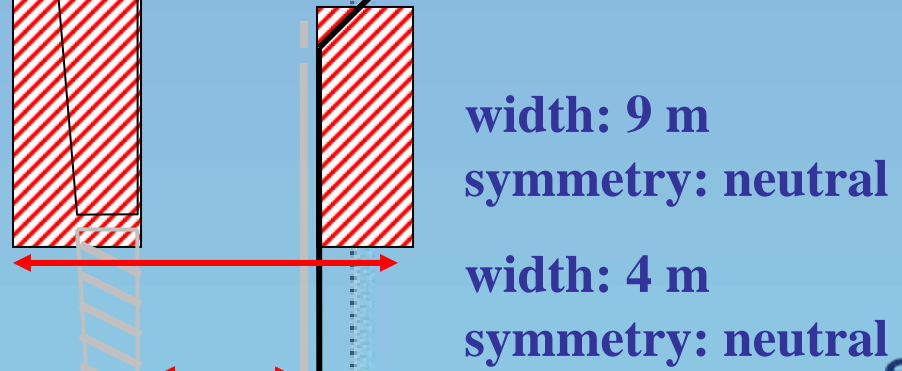
At 50 km/h the
vehicle moves
14 m/second



width: 9 m
symmetry: neutral



Unnecessary salting!



width: 9 m
symmetry: neutral

width: 4 m
symmetry: neutral



Driving
time < 7 sec.

Settings:
0 width (W)
0 symmetry (S)

Spreading w/o EpoSat

At 50 km/h the
vehicle moves
14 m/second

width: 4 m
symmetry: neutral

No salting!

width: 4 m
symmetry: neutral

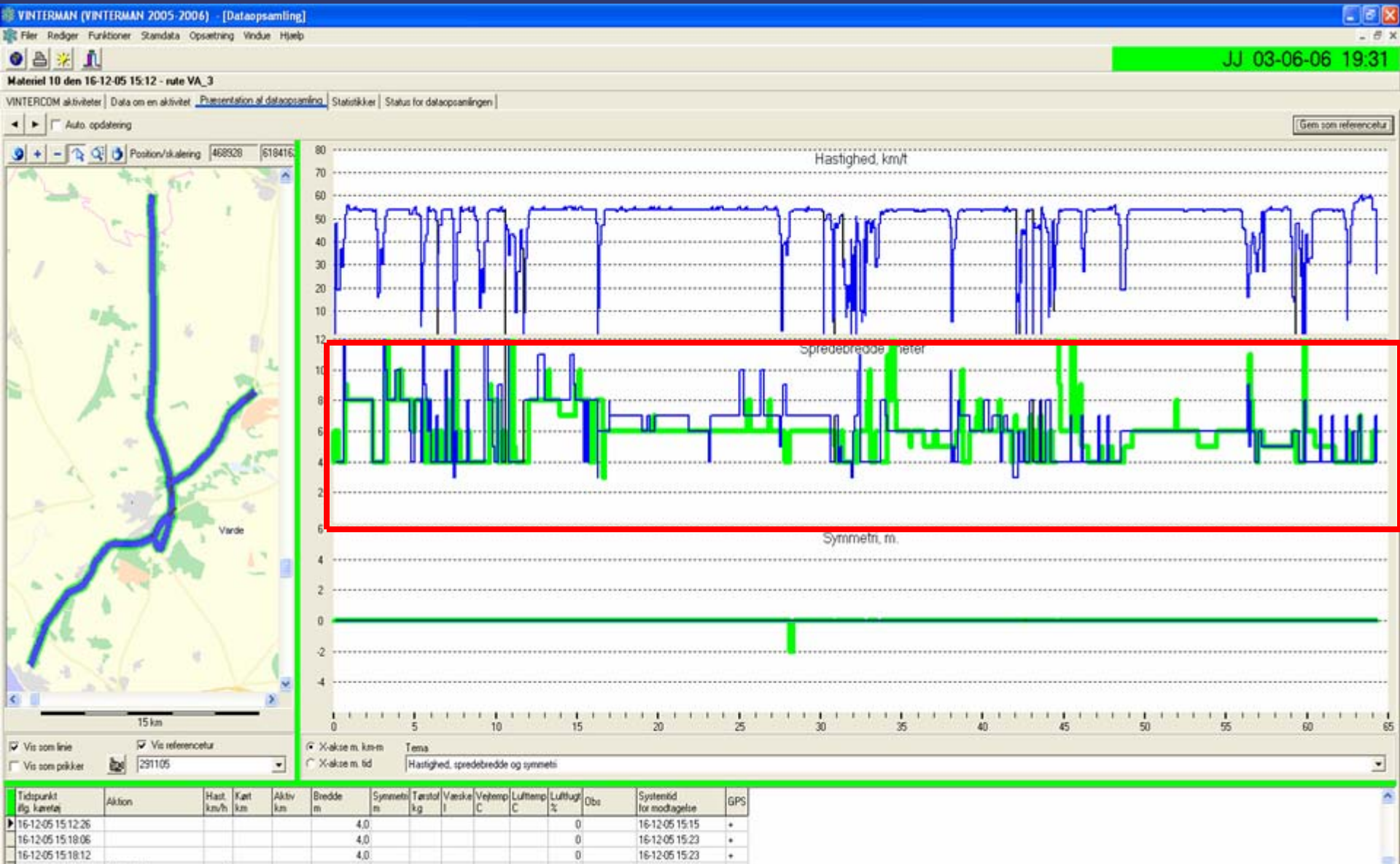


29-11-2005 kl. 18:15

+

16-12-2005 kl. 15:12

Without GPS-controlled spreading

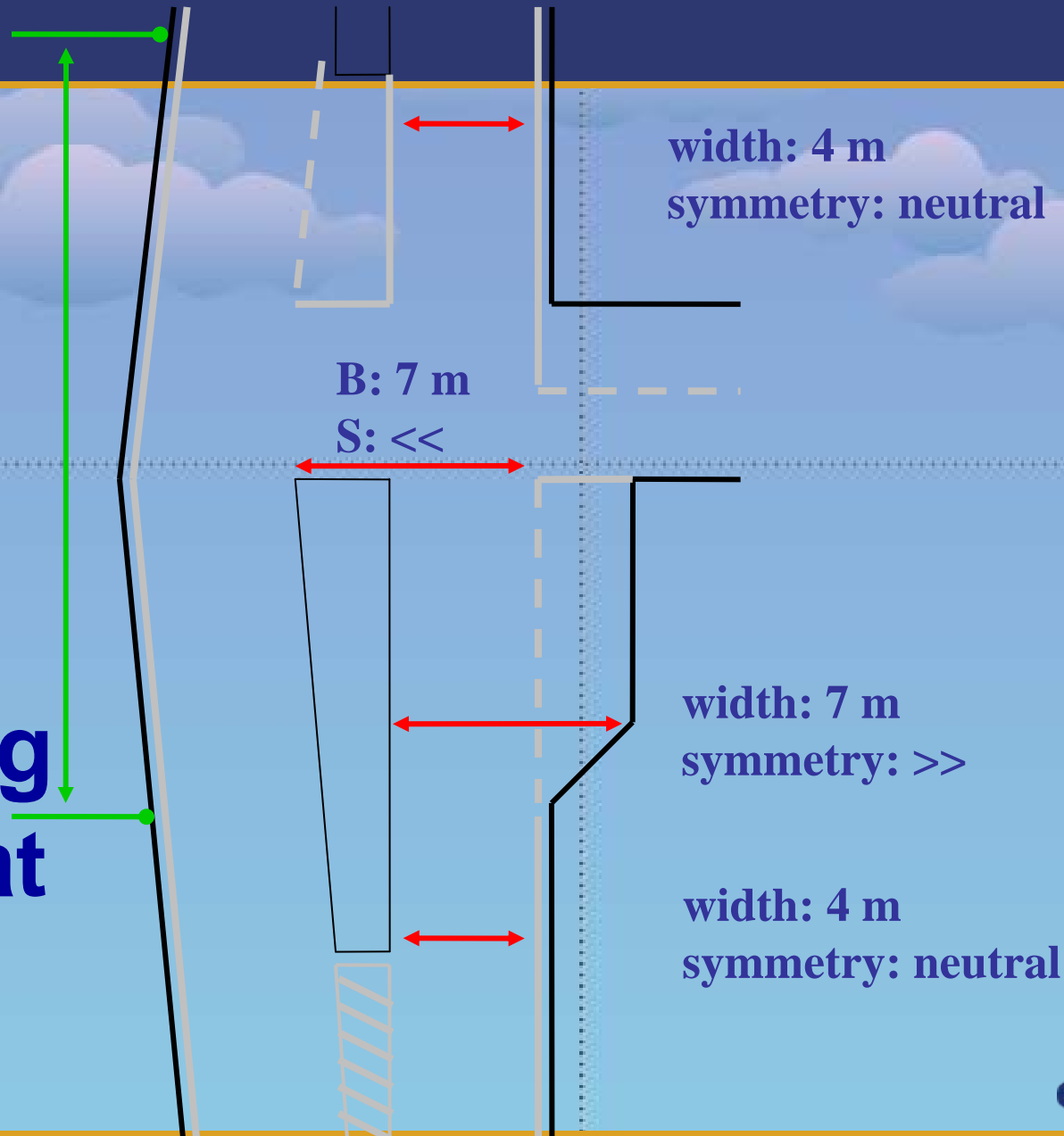


Driving
time < 7 sec.

Settings:
2 width (W)
3 symmetry (S)

Spreading w. EpoSat

At 50 km/h the
vehicle moves
14 m/second

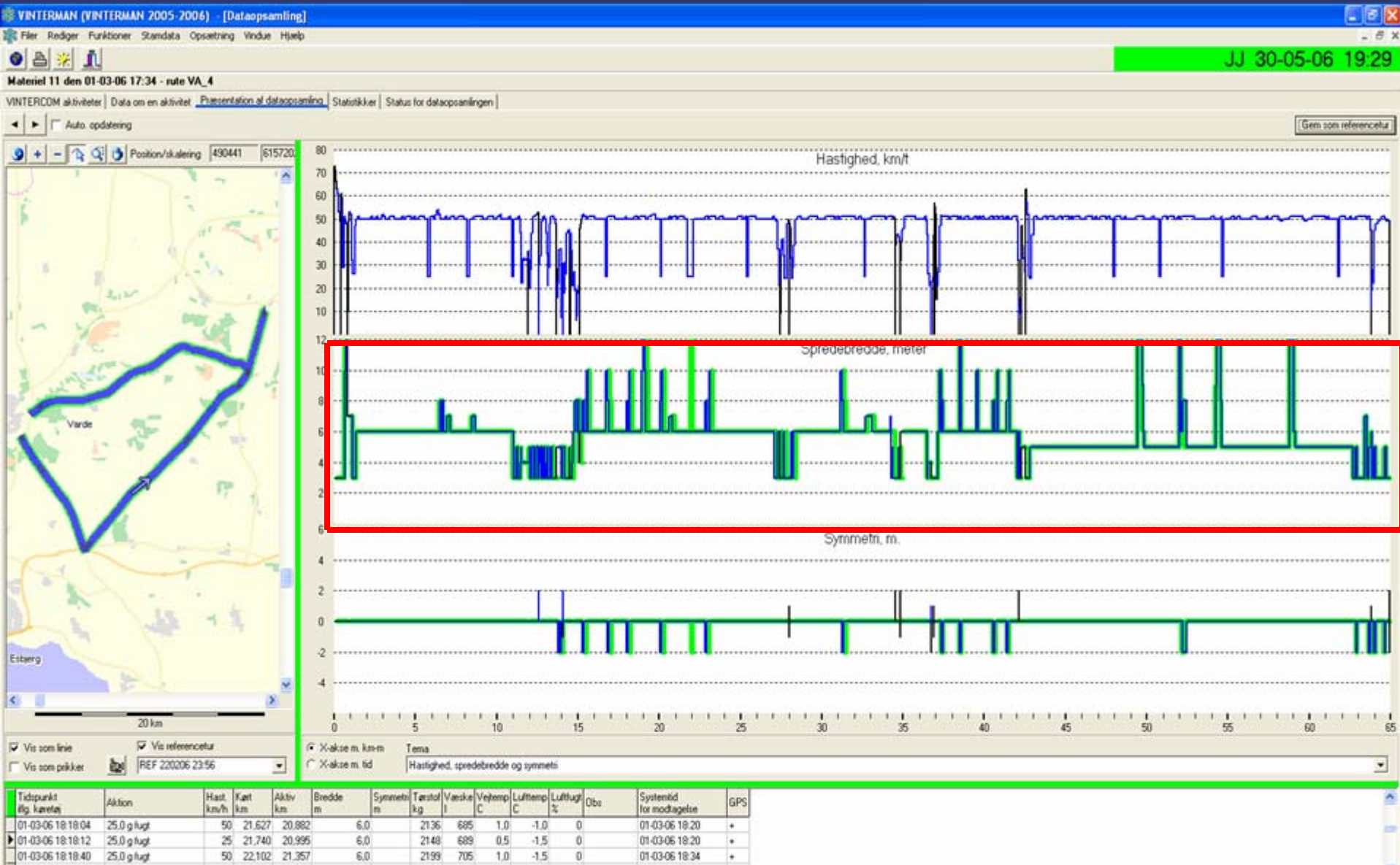


22-02-2006 kl. 23:56

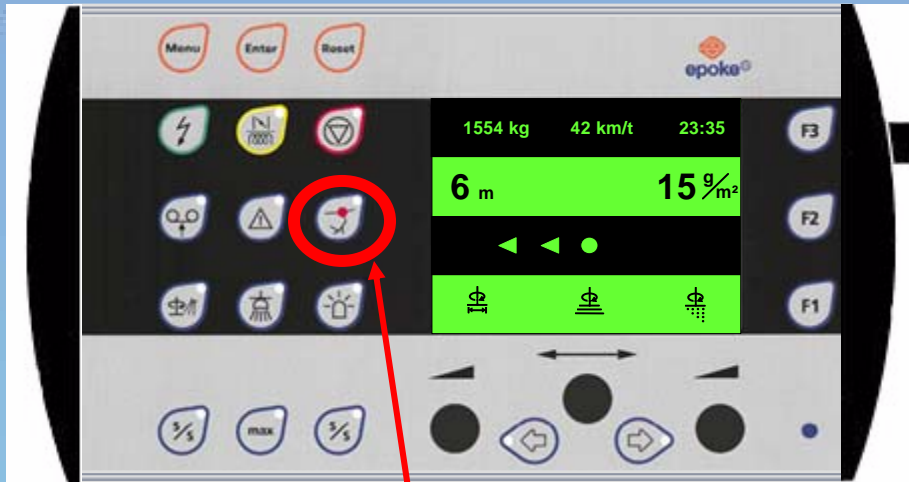
+

01-03-2006 kl. 17:34

With GPS-controlled spreading



Control



One button-push to start



right...



Advantages

EpoSat

- Increased traffic safety
- Improved work environment for the drivers
- Always optimum and uniform winter road maintenance
- Reduction of:
salt consumption costs
environmental damage

Route navigation

- Prevents the driver from taking the wrong road
- Drivers, who don't know the route, may quickly take over.
- Improved spreading
- Optimum flexibility when coordinating trucks, drivers and routes.



Advantages

EpoSat – Route navigation

Handsfree spreading

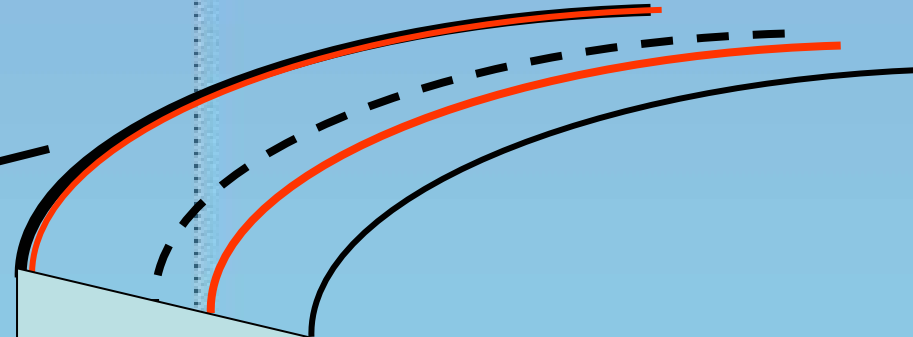
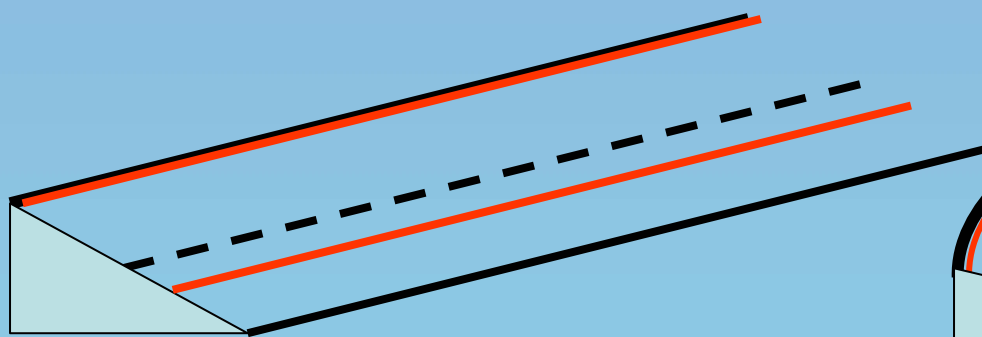
-

The system helps inexperienced drivers to become very experienced



Vision

- *We can use less brine (salt) with GPS-controlled spreading if we place*
 - *brine(salt) on the high level on the middle*
 - *brine(salt) on the high level in curves.*
 - *less brine(salt) on lane with heavy traffic*



Necessary spreading

Necessary spreading