



Statens vegvesen

From	Document dato
Arne Jørgensen	21. oktober 2019

Meeting in road- and tunnel lighting grup

Time	25. November 12.00 – 17.00 and 26. November 9.00 – 12.00.
Place	Drammen
Meeting number	2019-2

Agenda

Case number	Case	Responsible
1	Measuring of road surface in Sweden	Petter
2	Cost of reprogramming the lighting in tunnel based on Visual performance	Arne
3	Calculation of road lighting	Kai
4	Maintenance factor measurements in Finland	Alexanteri
5	Rapport too NMF meeting <ul style="list-style-type: none">• 4.1 Road and tunnel lighting• 4.2 LED requirements• 5.6 Measuring of road surface in Sweden• 8. CEN work	Arne
6	Very Dirtyness	

1. Measuring of road surface in Sweden

Kai goes through the road reflectance measurements done in Sweden. He tells about how he had reinforced the box. A large part of the measurements couldn't be used due to over and under exposure due to wrong settings of the camera.

According to Berne the measurements was satisfactory, Kai would have liked it to be perfect. 98 locations out of 181 had measurements that could be usefull. It was not to criticise the measurements, the planning was good and many measurements was done. He was a bit unhappy that so many of the measurements had to be discarded.

The calibration of the box was still valid. They were happy with the overall results of the measurements and the values was higher than expected (like C2?)

We had a small discussion about the Norwegian measurements to be done in 2020, the budget is still not fixed, so Arne is waiting to get the budget confirmed. Arne had planed to have 6 different locations, there was around 35 different places to where they get the small stone aggregates for the asphalt. They will wait until January before the planning started.

2 Cost of reprogramming the lighting in tunnel based on Visual performance

Arne talked with Thorn and Phenix to the tunnels that provided the lighting and dimming system respectively. Arne talked with Thorn about a suggestion on what tunnel we could use, and a price for how much it would cost to do reprogramming. We don't know how much it would cost to reprogram the lighting in a tunnel.

3 Calculation of road lighting

Dennis presented the pre-project.

Aleksanteri suggested to use a Master students.

The primary thing we should examine, can we really reduced the lighting and still see the object. Secondly can the model be used in high speed situations.

Can we have an object that could easily run over that wont damage the car or breaks.

We have a camera that can be adjusted so the tunnel have different driving speeds.

Bagnskleiv tunnellen E16. 10.000 EU to re-program the tunnel.

<https://no.wikipedia.org/wiki/Bagnskleivtunnelen>

Aleksanteri, Arne and Petter presents tunnel lighting calculations done on the same tunnel according to different national recommendations. It will be a good idea to compare that to the new suggestion we have gotten in our tool. The results was very different. So there is still a job to do.

These calculations should be compared with the results from our tunnel tool.

Kai went through his presentation about lighting on roads where he had modified the tunnel tool to fit with road lighting, by only looking at the inner zone. Conclusion we should take traffic conditions into account in our tunnel tool. (More lighting with difficult conditions)

Arne will ask Per Ole if he still have his study about accidents in tunnels, normally they happen in the threshold zone or just outside the tunnel. Not inside the inner tunnel.

Petter suggested to add luminance that has a limited range in front of the car, working as car headlights. That would probably work as an extra glare source. Kai think it would not give any extra benefits.

We need to adjust the guide so it takes “looking time” into account and the traffic difficulty.

Kai don't think we have additional accidents even though we have the lowest lighting levels on motorways in Europe.

NORDFOU seemed very interested in a project about tunnel lighting.

Preparation for a NORDFOU application:

1. To locate the right tunnel
2. To find out how we can manipulate the regulation
3. How we can do the assessment of the tunnel visibility
4. Use this pre-pre project write the NORDFOU application.
 - a. Funding: 5000

Prepare this by a small initial project

Northern comparison project.

- a. Use the excel file to create a similar simulation as Norway, Sweden and Finland have done do this as a CIE88 calculation also. USE this as an ANNEX for the NORDFOU application.
 - a. Conclusion is that we ask for some money to Alexanteri to do the small report.
 - i. Funding: 3000 Euro
 - b. Some money for using the excel sheet and CIE88 to use in the comparison.
 - i. Funding: 1000

Surface (Lådan)

1. Kai would like to apply for a small amount to participate in surface measurements
 - a. Funding: 2000

4	Maintenance factor measurements in Finland
<p>The project started 2½ years ago, the aim of the work was to study the maintenance factor value of different LED luminaires. The maintenance factor (MF) should be calculated every second year. In September 2019 six luminaires were taken down and measured at Aalto university. Both in dirty and clean condition. The other luminaires will remain there there and be measured again in 2 and 4 years. They measure several different parameters, Power, Circuit power factor, luminous flux, efficacy, CCT and CRI. The luminaires runs at 100% all the time.</p> <p>Luminaire 1: The luminous flux decreased around 3.5% after 2 years, the power stayed close</p>	

to the same. There seemed to be something wrong with the CRI calculations
Luminaire 2: there was a huge difference in the luminous flux (LF), the distribution was also changed a lot. When it was cleaned there was also no difference between the reference measurement and the measurement done after two years. The problem is due to the lenses was unprotected so dirt could easily be attached to the lens.

Luminaire 3: LF decreased 4.5% after 2 years, and there was an issue with the CRI calculations again, if the luminaire was cleaned the difference was more like 2% decreased.

Luminaire 4: As with Luminaire 2 the LF decreased 12.5% and got improved a lot when the luminaire was cleaned.

The conclusion is partly that luminaires with flat glass contra LED lenses, gets less dirty. The conclusion is that they are going to use flat glass with lenses, the dirt has less of an effect.

We had a small discussion about the tilt used, in Denmark we chose 3 degrees to correct the visual impression in so it looks correct.

HPS lamps LF decreased over time and power increases. (almost with a factor of 2+).

6	Very Dirtyness – Pre study (Nedsmutningsmätare)
---	---

How do we measure the dirt in a tunnel, and how quickly does the tunnel get dirty?

It is a small instrument that RISE have made in order to do the examination.

The idea is that we will make an small instrument, and see if it works. If it works we will share this instrument so it can be used to see how the maintenance in tunnel changes over time. It will be finished this year. Mikael Lindgren have made a sketch of a prototype.

They will take an existing luminaire with an LED and a detector and measure the reflectance, where the hypothesis is that reflectance of the glass will change when the it becomes more dirty. They will sample the reflectance every minute.

A small 6 year project, with a lot logging.

CEN work: We have started on the revision of “EN162760 emergency lighting”