Registered participants

First Name	Last Name	Company
Alexander	Cosic	Jaguar Land Rover
Markus	Hofmann	ams-OSRAM international GmbH
Rainer	Krautscheid	BMDV Bonn
Michael	Brachmann	ZKW Group GmbH
Magnus	Nordeke	Volvo Cars
Barend	Hauwetter	Deutscher Verkehrssicherheitsrat (DVR) e.V.
Philipp	Plathner	OSRAM GmbH
Werner	Halbritter	ams OSRAM
Aadit	Deshpande	MAN Truck & Bus SE
PETER	ONDREJKA	TESTEK, a.s.
Silke	Barton	Marelli Germany GmbH
Carmen	Hervas Lara	Koito Czech s.r.o
Seiji	Nemoto	Koito Czech s.r.o.
Ana-Isabel	Munoz	Valeo GmbH
Ulrich	SCHIEFER	Hochschule Aalen / Universitäts-Augenklinik Tübingen
Markus	Maier	Mercedes-Benz AG
Anil	Erkan	AUDI AG
Elisabeth	Kemmler	TU Darmstadt
Markus	Peier	TU Darmstadt
Marc	Fischer	Kraftfahrt-Bundesamt
Bart	Terburg	GTB
Stephan	Berlitz	AUDI AG
Davide	Puglisi	GTB
Martin	Hadrava	Ferrari S.p.A.
Gary	Knight	Jaguar Land Rover
Christian	Schwanengel	TechnoTeam
Paul-Henri	Matha	DVN
Wolfgang	Huhn	GTB
Rainer	Neumann	GTB
Francois	Bedu	Renault
Valere	Calais	Renault

Agenda

1:30pm to 3:30pm : Lectures from NGO, universities, lighting experts

- ADAC : Burkhard Boettcher
- DVR : Barend Hauwetter, *“Glare with a road Safety Perspective”*
- GTB : Davide Puglisi, Secretary of GRE-TF Glare
- TUD : Michael Hamm, *“Vehicle- and Street-geometry based glare contributors”*
- L-LAB : NIEDLING Mathias
- Q&A and round table

4pm to 6pm: Lectures from NGO, universities, lighting experts

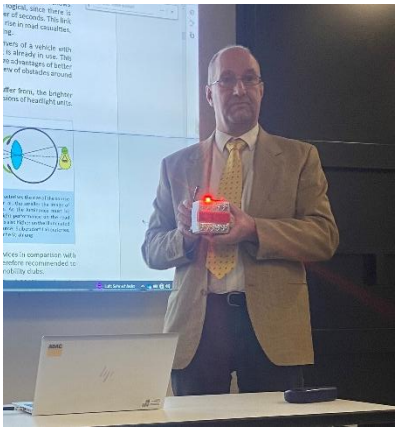
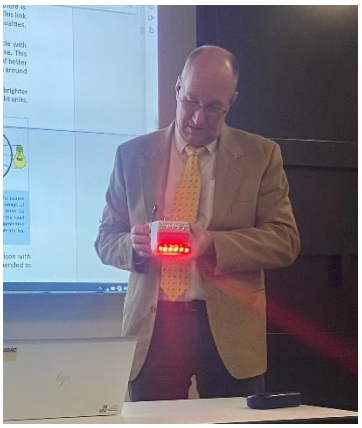
- GTB : Rainer Neuman, WG-SVP Chair
- VUB : Valéry Ann JACOBS
- Marelli : Ernst-Olaf Rosenhahn
- TUD : Markus Peier : *“Discomfort of bright DRL in the transition phase - results of a field test experiment and interpretation”*

- Tomas Targosinski *: "The impact of the current official regulatory system on glare in real road traffic".*
- Q&A and round table

ADAC : Burkhard Boettcher

Burkhard read the document presented in GRE. He mentioned additional topics :

- Color is a problem : in mesopic situation, eyes are more sensitive ti blue light
- Rear stop light : with a very small surface of 1cm2, stop lamp can fulfil Legal requirement UNECE R148. Demonstration during the event has shown that a 1cm2 bring more glare versus a 100 cm2.

- DRL has a minimum surface (25 cm2) but there is no luminance criteria according to ADAC (this is missing)
- ADB is not reacting at correct speed
- People with age < 35 years old are more glared (or complain more). Why ?
- ADAC symposium in March : Ophthalmologist will be part of the symposium

DVR : Barend Hauwetter, *“Glare with a road Safety Perspective”*

Cause of glare : Low sun, Luminance, Increasing luminosity (also for bicycles), Incorrectly adjusted headlights, Soiling on headlights and windscreen, High beam, but also low beam and auxiliary rear light, Increased sensitivity to glare with age.

In Germany, 2500 accident for sun glare. No data for headlamp glare.

Recommendation : luminance limitation, correct lamp adjustment ande clean headlamp

GTB : Davide Puglisi, Secretary of GRE-TF Glare

GRE-IWG VGL (Visibility Glare and Levelling) investigated the subject over the years (2015-2018). The activity then moved under GRE-IWG SLR (Simplification of Lighting Regulations) which concluded its work with the GRE approval of mandatory Auto levelling in April 2023, finally adopted by WP.29 in March 2024.

At GRE-90 (April 2024), GRE agreed to consider establishing a TF in order to address the results of the 2024 European consumer study on glare in road traffic highlighted by FIA (GRE-90-20 and GRE-90-40).

→ *According to the surveys conducted by 10 Europeans mobility clubs presented by FIA, the majority of drivers felt dazzled in road traffic, and three out of four of the respondents believed that glare prevention should be better regulated*.

At GRE-91 (October 2024), GRE decided to launch a new TF on “Glare Prevention” (TF-GP). Germany will Chair the TF and GTB will provide Secretariat.

Kick-off meeting on 23 January 2025 (online only)

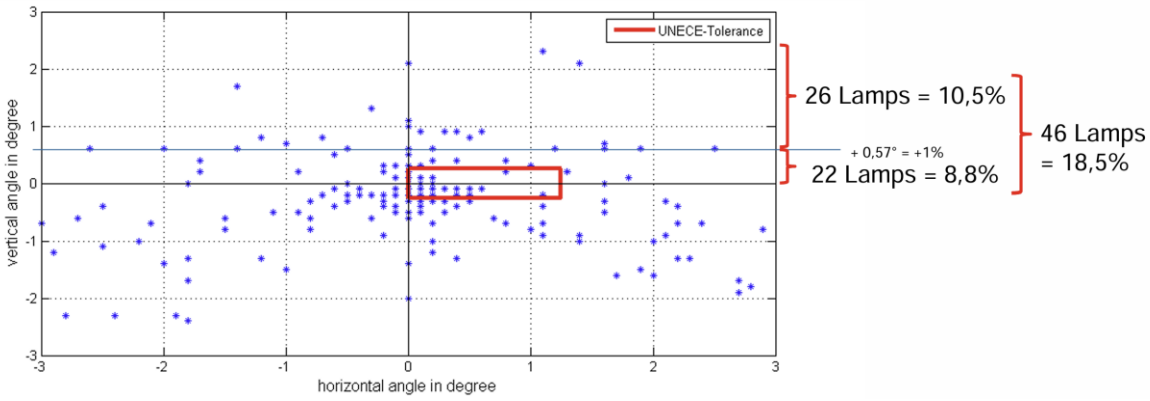
1. Big attendance: 41 participants, including 11 Contracting Parties.
2. First task of the TF is to revise and agree on a Terms of Reference.
3. During kick-off meeting reviewed and improved the Objectives of the TF:
    - Distinguish between avoidable and unavoidable glare occurrences as well as short-term and long-term solutions.
    - Priority was confirmed to be the glare caused by Road Illumination Devices and, in a second step, glare caused by Light Signalling Devices (including DRL).
    - Improve the understanding of different factors that influence glare, visibility and conspicuity, and their respective weighted importance.

First meeting on April 8, 2025 in Brussels, CLEPA HQ (hybrid session)

Second meeting in May, Bonn.

TUD : Michael Hamm, *“Vehicle- and Street-geometry based glare contributors”*

First study in 2016 on 124 cars. Only 24 measured cars were in UNECE Box. 18% up, 10% down. 10% above horizontal line

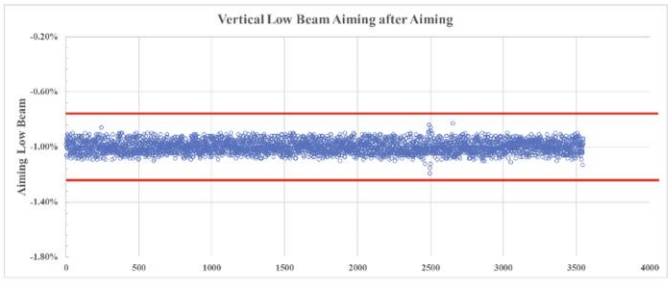


Reasons explained by Michael Hamm :

- Load & gas filling : 2% from 25kg to 425kg
- Driver : 0.1%
- Temperature : 0.2% (reversible and irreversible)
- Chassis : 0.1%
- Tyre pressure : 0.1%

- Hood slamming : 0.1%

Audi study in ISAL 2022on 3500 vehicles : tolerance 0.2% after lamp aiming in audi plant

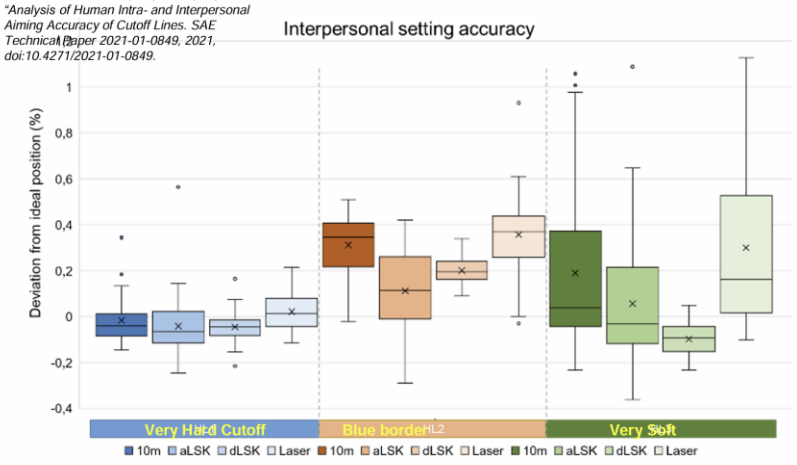


Source: The Aiming of Headlamps and Resulting Influences on Benchmarks and Road Users ISAL 2022, ISBN 978-3-8316-4953-2

Example of Aminig Station Source: Dürr

SAE paper in 2016 about aiming method in different cut off design (sharp, smooth): different results. What is the correct one?

Source: Hinterwaelder, C. ;Hamm, M., "Analysis of Human Intra- and Interpersonal Aiming Accuracy of Cutoff Lines. SAE Technical Paper 2021-01-0849, 2021, doi:10.4271/2021-01-0849.



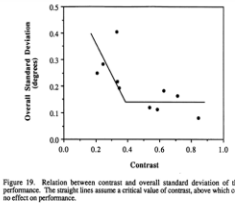
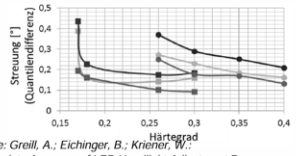


Figure 19. Relation between contrast and overall standard deviation of the aiming performance. The straight lines assume a critical value of contrast, above which contrast has no effect on performance.

Source: Sivak, M.; Flannagan, M.; et al.: Visual Aiming of European and U.S. Low Beam Headlamps Ann Arbor: UMTRI-91-24 Report, 1991.

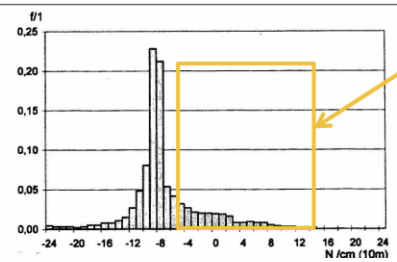


Source: Greill, A.; Eichinger, B.; Kriener, W.: Appropriate Accuracy of LED Headlight Adjustment Processes. In: VDI Optische Technologien in der Fahrzeugechnik, Karlsruhe: 2016.

In dynamic condition : study done on 8 cars with beam orientation recording (study from 1999, W Huhn). Result show a tolerance of beam aiming during driving +/-0.6%

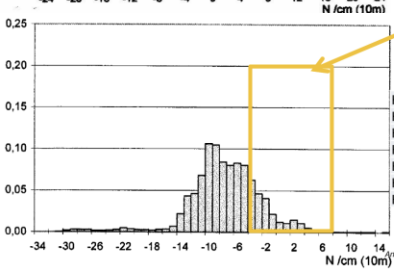
	Max Aim deviation b_{max} /°
Car #1	-0,76 / +1,4
Car #2	-1,29 / +1,37
Car #3	-1,34 / +1,42
Car #4	-1,56 / +1,24
Car #5	-1,81 / +1,49
Car #6	-1,70 / +1,40
Car #7	-1,18 / +1,06
	-1,38 / +1,34
2 Sigma	**~ ± 0,3°**

Statistics on 175km road in Germany
(city , country, motorway roads around Munich)
8 different cars from normal to stiff suspension
Analysis Method:
Laser Triangulation of car position relative to street



Glare potential

Pitch higher than -0,37°	28,2%
Pitch higher than -0,31°	24,7%
Pitch higher than -0,26°	20,9%
Pitch higher than -0,20°	17,9%
Pitch higher than -0,14°	15,9%
Pitch higher than -0,07°	13,9%
Pitch higher than 0,0°	11,9%



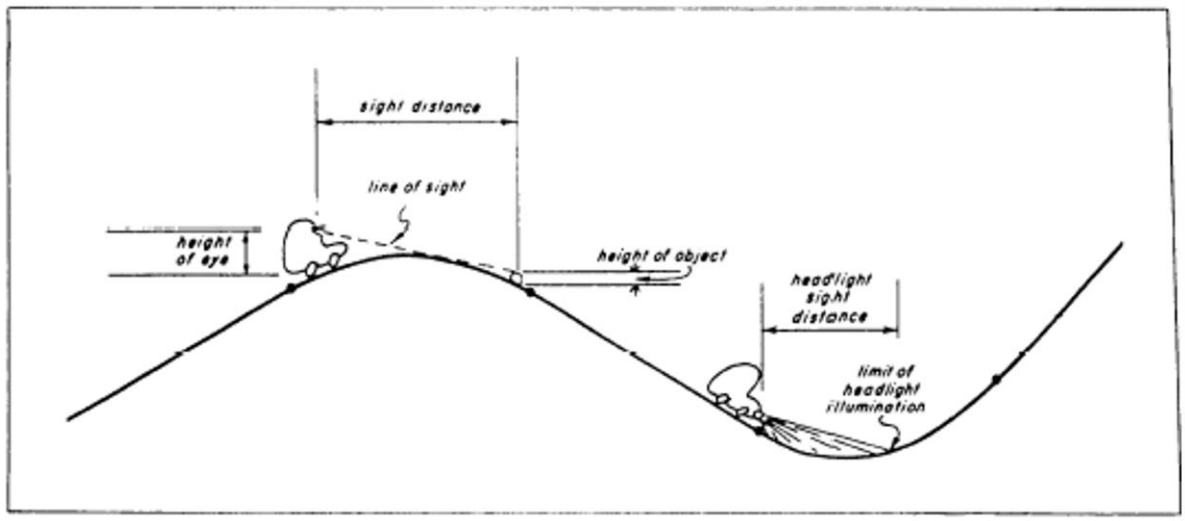
Glare potential

Higher than -0,6°	28,8%
Higher than -0,5°	21,3%
Higher than -0,4°	14,8%
Higher than -0,3°	10,3%
Higher than -0,2°	6,3%
Higher than -0,1°	4,3%
Higher than 0,0°	3,3%

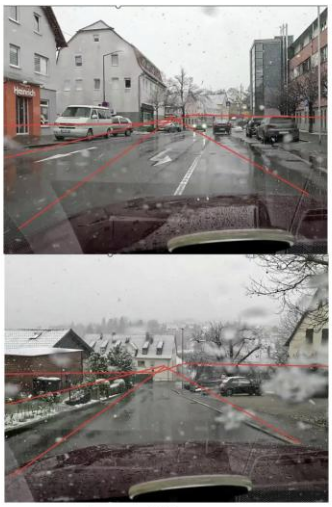
ref: PhD Publication:
Technical University Darmstadt, Germany: , 1999 / W. Huhn:
Anforderungen an eine adaptive Lichtverteilung für Kraftfahrzeugscheinwerfer im Rahmen der ECE Regelungen, 1999

Cut off above horizon 5% of the time in inner city, 3% on country road and 2.5% on motorway

Similar experiments in 1995 (Damsky) with between 3.8 and 5.2% of light above cut off



Country Roads



Inner City

Bridges

Dynamic levelling could solve this issue

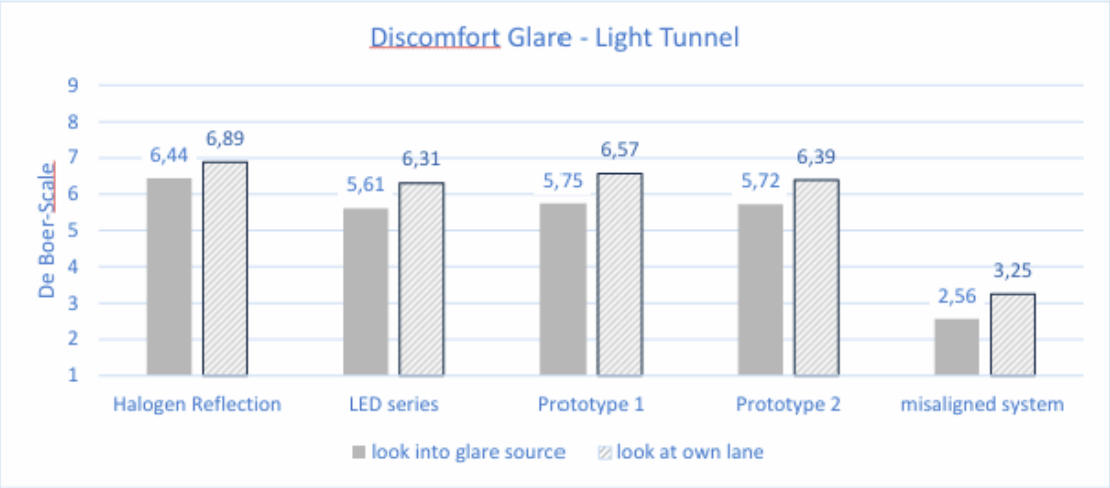
And last, More and more SUV on the road. From 14% in 2011 to 49% in 2022 (total of sold vehicle), with lamp mounting height 843mm (SUV) versus 690mm (sedan) that bring more glare. Higher lamp position, higher risk of glare for driver who seat in a sedan

L-LAB : NIEDLING Mathias

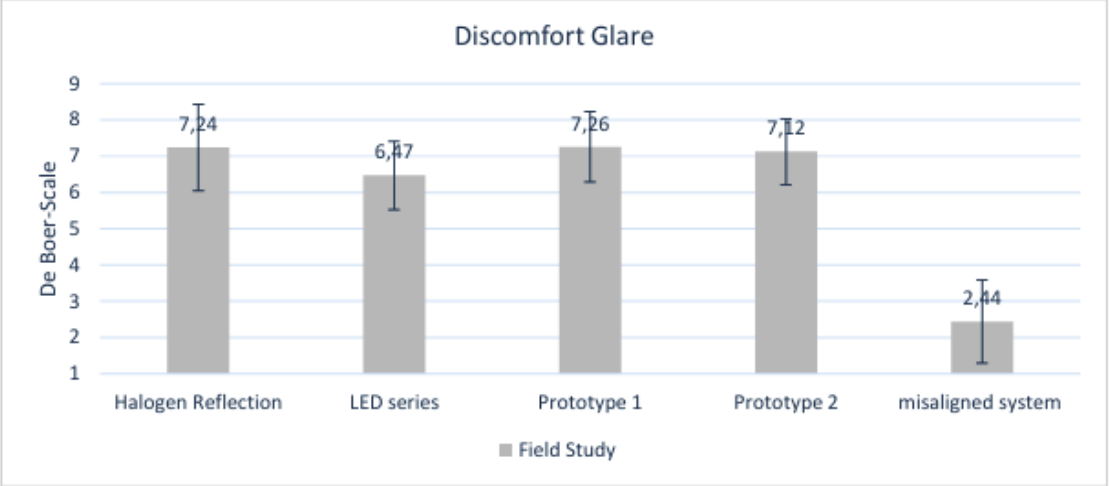
Direct relation between luminance and glare (DeBoer rating).

The More lux we have, the more luminance we have, the more glare we are

However, in the study done by LLAB, no difference between (Halogen / LED slim / LED not slim) low beam when correct aiming. For static and synamiuc testing, they compared the galre from different lamp correctly aimed, and a misaligned lamp (halogen)



In dynamic condition, when lamp is misaligned, glare even for halogen lamp. Issue is aiming and not lamp size.



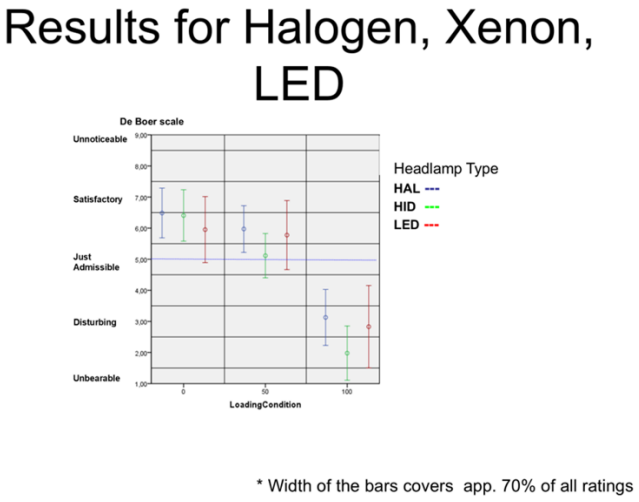
Q&A session :

- Discussion about luminance criteria : seems to be a criteria for signaling functions (when high light intensity in HV) versus lighting (no lighting above horizontal in nominal condition
- Aiming is an issue : why not proposing a legal aiming at -1.2% for lamps above 750mm to solve SUV issue ?
- LED bulbs (not at all certified versus UNECE R37 or R128 LED) : do we have some studies ? how to ban them ? (ADAC feedback is that it is difficult to ban them)
- Average years vehicle is increasing. Garage problem will be bigger in future for lamp aiming
- Close loop is the solution (camera to detect the beam aiming), but something complex and expensive.

GTB : Rainer Neuman, WG-SVP Chair, How to control and reduce Glare by improving Safety and Visual Performance

Eureka study 88-92 : comparison between light source luminance halogen / xenon

Kletwitz study 2012 : comparison between lamp misaiming halogen led xenon : when lamp misaiming, glare was similar between halogen, led and xenon



Solutions : Automatic headlamp re-aiming system, Automatic and effective headlamp cleaning system, Automatic controlled best fit light distribution, Enforcement and education

VUB : Valéry Ann JACOBS

Explanation about how human eyes is working. And the difference between far filed and near field.

VUB is qorking especially for interior

Question is : when do you reach the distance of far field ?

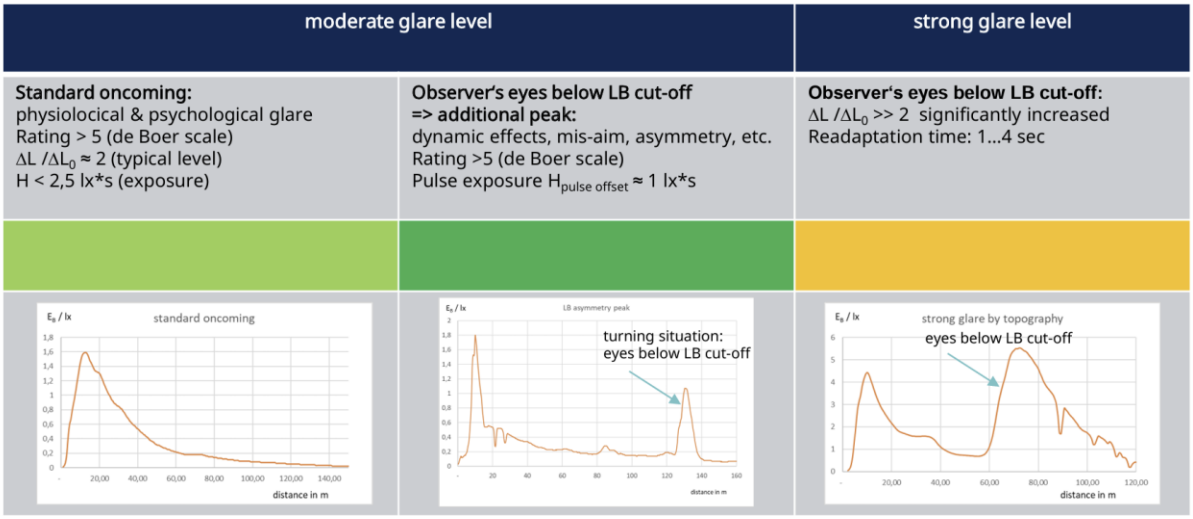
De Boer scale does not work for interior. UGR is used (physiological model)

VUB is interested in working with automotive glare.

Marelli : Ernst-Olaf Rosenhahn, Nighttime Traffic Glare Analysis by Measurements and new Statistical Evaluations

Study done between November 2024 and January 2025

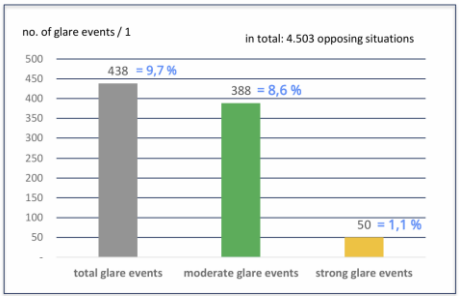
Marelli defined 3 type of glare : moderate and strong

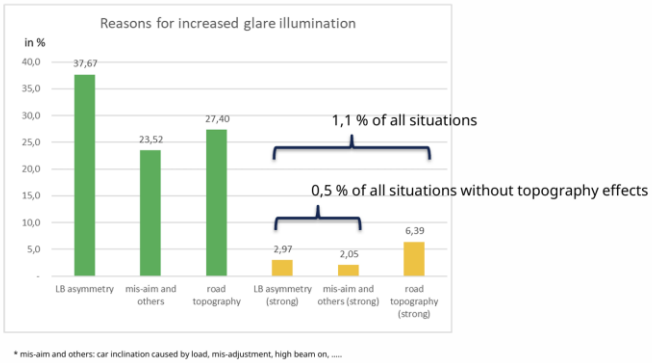


a 1 lux glre during less than 0.6 second is considered as acceptable for example

A 5 lux glare during 1.5 second is considered as strong glare

Marelli gathered a lot of datas with 4.503 opposing situations. 10% were judge as glare and only 1% strong glare.





About the strong glares (1%), 50% come from road topography, 20% misaimed and 30% low beam asymmetry. For these 3 different topologies, solutions are different and may be possible to be developed.

TUD : Markus Peier : *"Discomfort of bright DRL in the transition phase - results of a field test experiment and interpretation"*

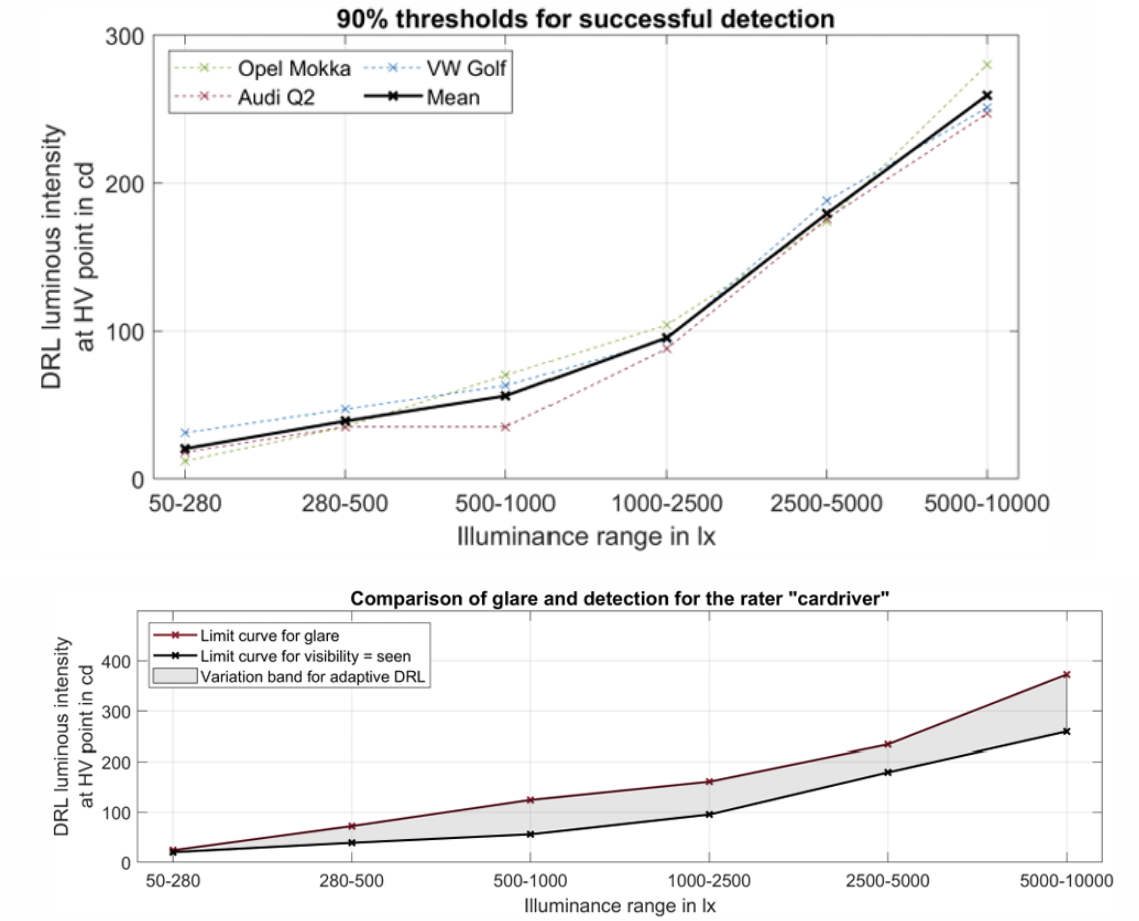
Study in partnership with Valeo

Focus of the study is about adaptive DRL, in sunset and dusk. Test was done with Golf, audi Q2 and Opel Mokka with adaptive DRL (dimmable lamp). Question was : did you see the car or not ?

Results shows that 90% of the people are able to detect the car with DRL flux below the current legal requirement (400 cd).

When ambient light is 10.000 lux, 300 cd seems to be ok. So minimum threshold could be reduce to 300 cd instead of 400 cd

When ambient light 50 lux, 50 cd seems to be ok. Longer usage of DRL, below 1,000 lux with a dimmed DRL could also reduce power consumption, including good visibility and less glare



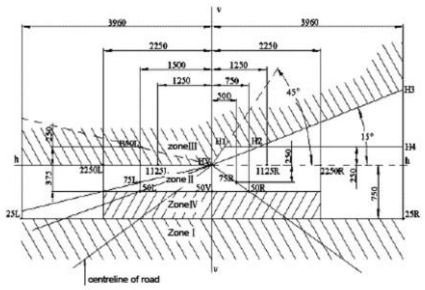
Tomas Targosinski *: "The impact of the current official regulatory system on glare in real road traffic".*

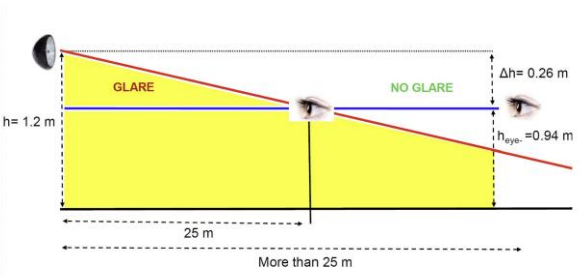
Thomas mentioned that if PTI is ok, driver thinks that it is ok. He considers also that driver installs retrofit lamp to increase performance and see better.

Type approval UNECE is not enough but OEM consider it is enough. Not enough for safety and glare is not enough regulated.

Regulation is based on vertical screen method from 1958 for flat horizontal road. Cut off requirement are ambiguous and unrepeatable

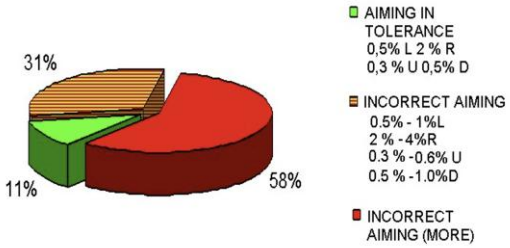
Actual aiming is too high (especially SUV) and automatic system does not work properly.





A lot of lamps are aimed to high

AIMING IN VEHICLES ON THE ROAD



Thomas proposal 3 items as action plan :

Ad 1. (ACTUAL AIM TOO HIGH)

- TOO LARGE LEVELING TOLERANCES IN THE REGULATIONS (No. 48),

- PERMISSION TO USE MANUAL LEVELING DEVICE,

- NO DETAILED REQUIREMENTS FOR PERFORMANCE OF AUTOMATIC LEVELING

- IMPRECISE REQUIREMENTS REGARDING THE CUT-OFF LINE BOTH DURING TYPE APPROVAL TESTS AND DURING SERVICE/PTI ADJUSTMENTS.

AD 2. (HIGH ILLUMINATION IN THE GLARE ZONE)

- DIRTY AND TARNISHED LENS (ESPECIALLY PLASTIC) AND REFLECTORS,

- DIFFERENCES BETWEEN MASS-PRODUCTION BULBS AND ETALON BULBS,

- INSTALLING UNAUTHORIZED BULB REPLACEMENTS, INCLUDING LED RETROFITS.

LOCALLY PERMITTED LED RETROFITS WERE TESTED WITH BRAND NEW HEADLAMPS. BUT ARE USUALLY INSTALLED IN OLD TARNISHED LAMPS. THEY HAVE A GREATER LUMINOUS FLUX TRANSMITTED THROUGH THE LENS, WHICH INCREASES THE INTENSITY OF ILLUMINATION IN THE GLARE ZONE FOR USED HEADLAMPS

AD 3. (ADB RELATED)

- INSUFFICIENTLY PRECISE ABD REQUIREMENTS IN TYPE-APPROVAL REGULATIONS (APPLICABLE TO ALL REQUIREMENTS)

- IMPERFECTION IN ONCOMING AND PRECEEDING VEHICLE RECOGNITION SYSTEMS AND LIGHTING CONTROL SYSTEMS

- NO POSSIBILITY OF ADB TESTING BY PTI AND IN INDEPENDENT SERVICES