Automotive – Light Sources (head lights)

from

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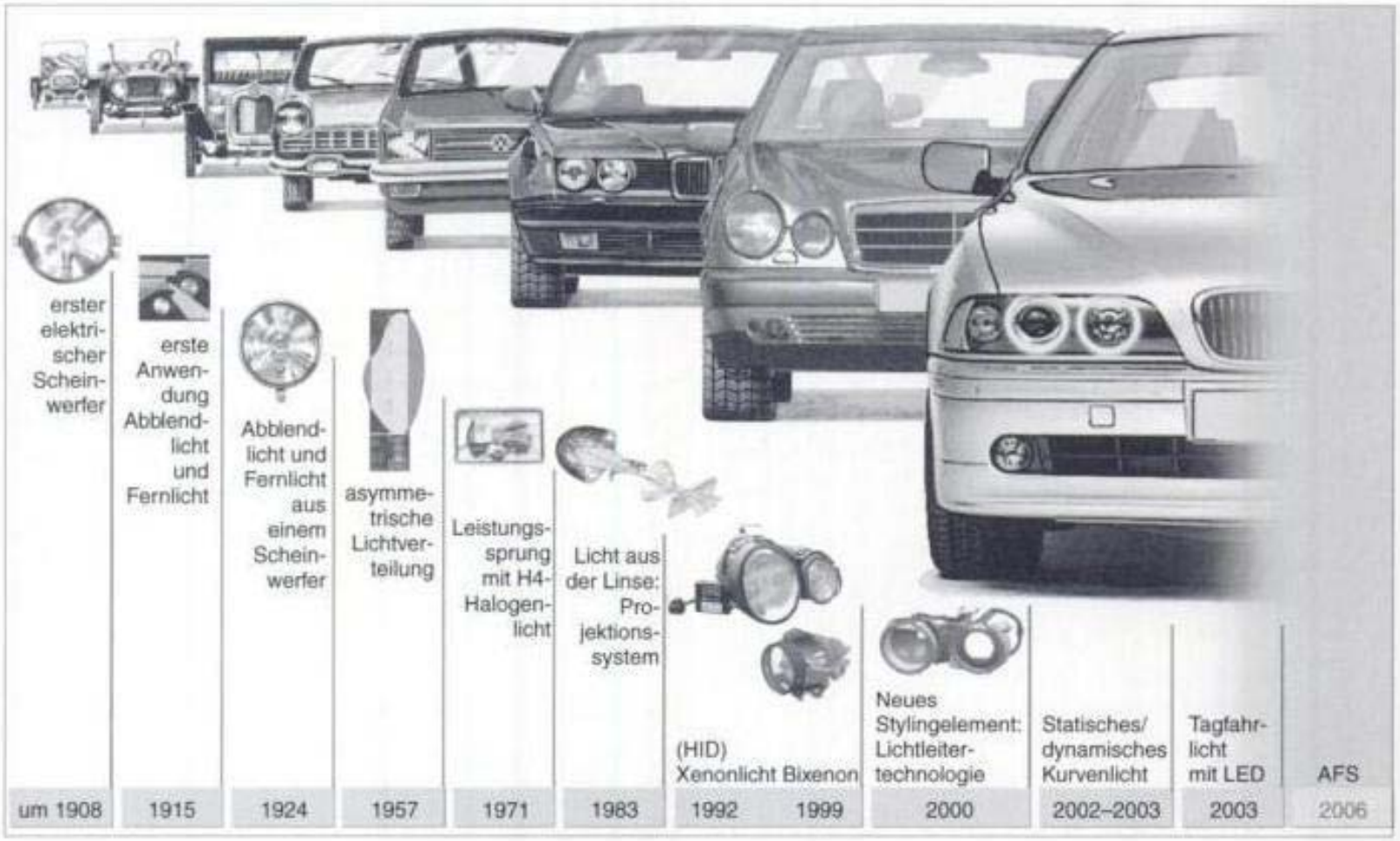
Contents

- History
- Head light types
- Head light systems
- Reflector technology
- Light sources
- AFS

History



Historic development in Automotive Head Lights; Source: [1]

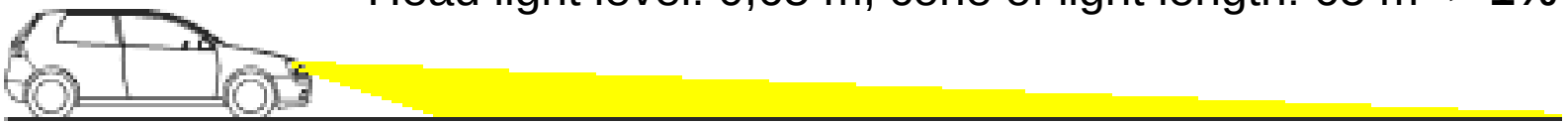
Head light types

- Dim light
- Main light
- Add on head light
- Adverse weather light
- Backup light
- Spot lights
- Search head lights

Head light types

- Dim light

Head light level: 0,65 m, cone of light length: 65 m -> **1%**



Head light types

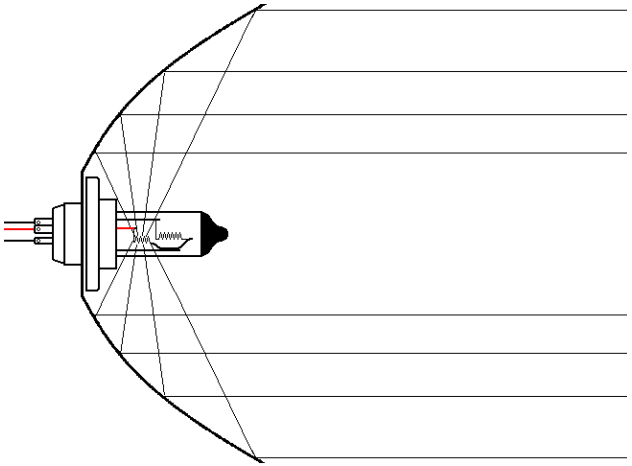
- Dim light
- Main light
- Add on head light
- Adverse weather light
- Backup light
- Spot lights
- Search head lights

Head light systems

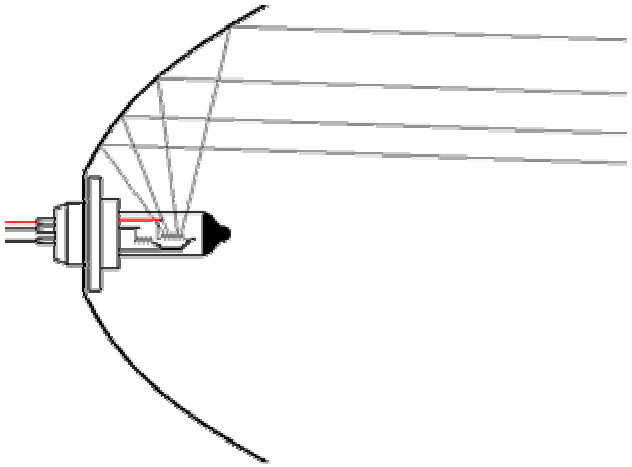
- Two head light system
- Four head light system
- Right-hand / Left-hand driving

Head light systems

- Two head light system



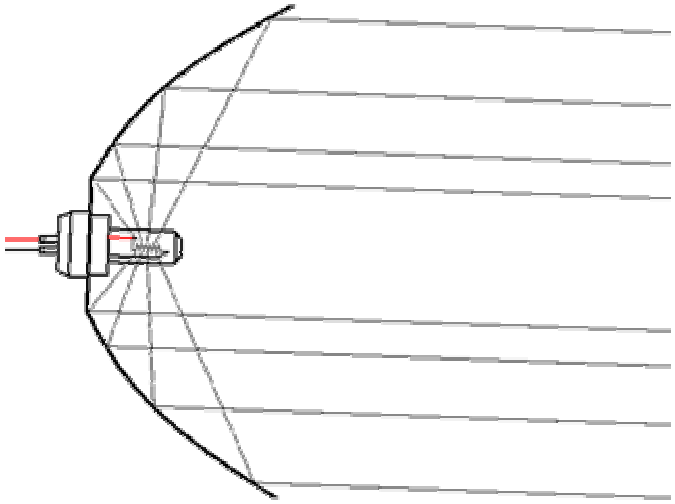
Main light [2]



Dim light [2]

Head light systems

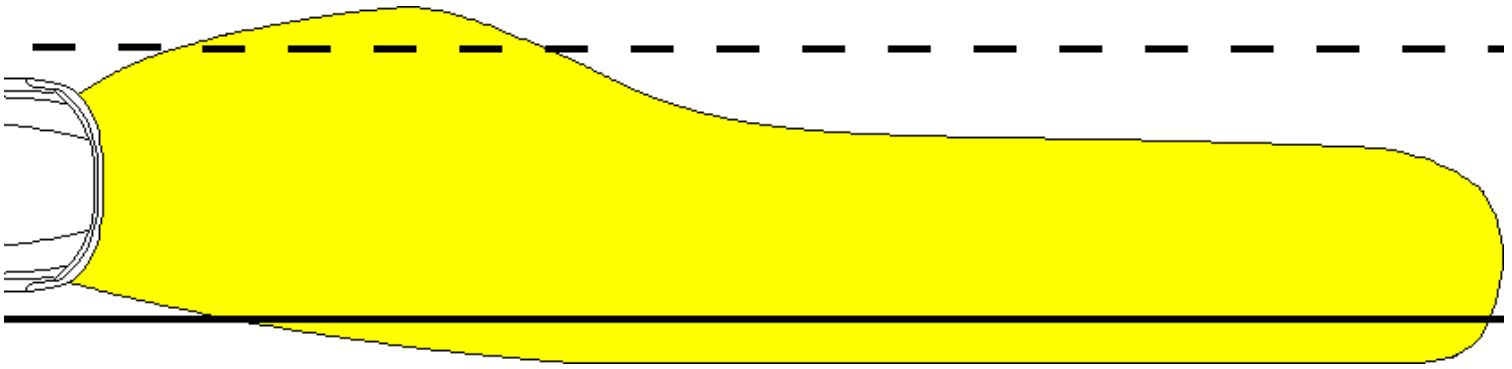
- Four head light system



Single head light [2]

Head light systems

- Right-hand / Left-hand driving



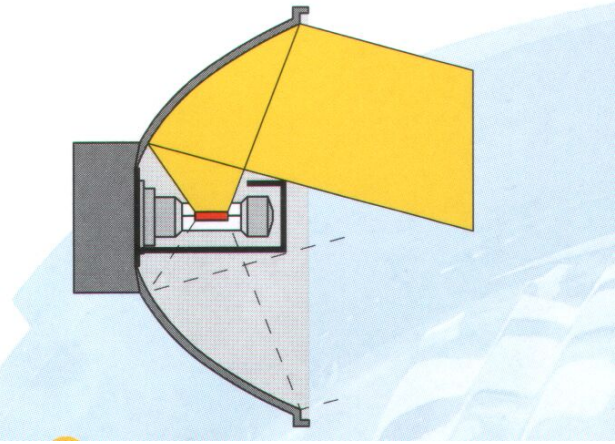
Light radiation characteristics at dim light [2]

Reflector technology

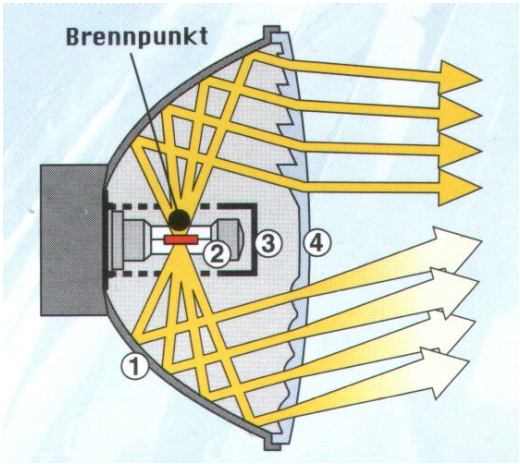
Praboloid – head light

- Reflector technology
- Conventional head light system
- since 1910

1. Reflector
2. Light source
3. Aperture stop
4. Diffusing panel



Lateral view [2]

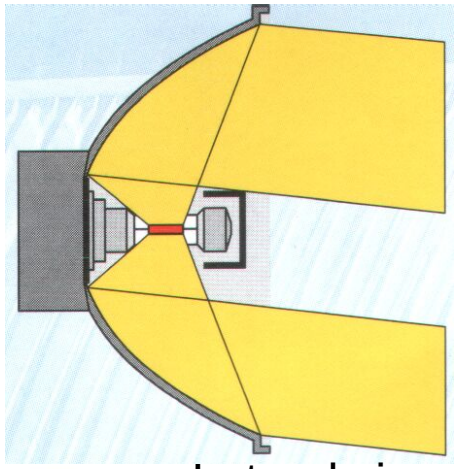


Top view [2]

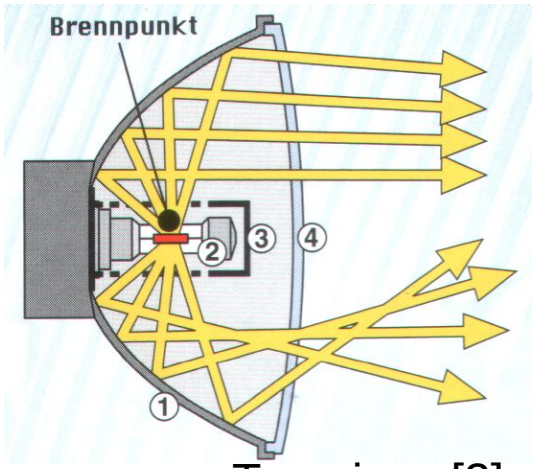
Reflector technology

Clearance surface reflector

- Reflector system
- Free Reflector surface
- many single surfaces, designed by a PC
- Light efficiency 45 %
- By scattering reflector
- Whole reflector is used
- 80 % increase compared with Praboloid



Lateral view [2]



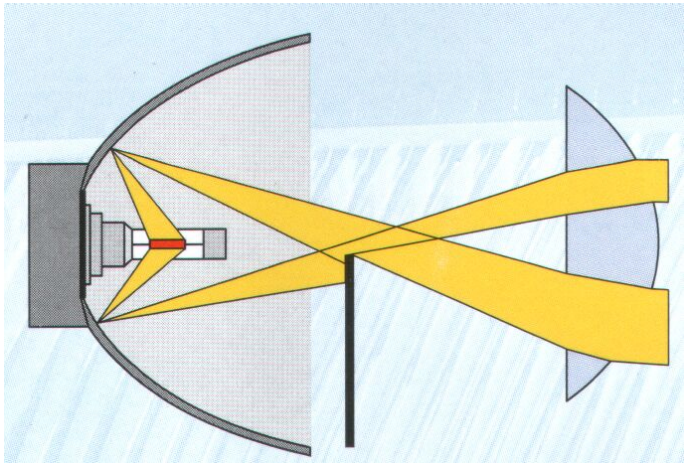
Top view [2]

Reflector technology

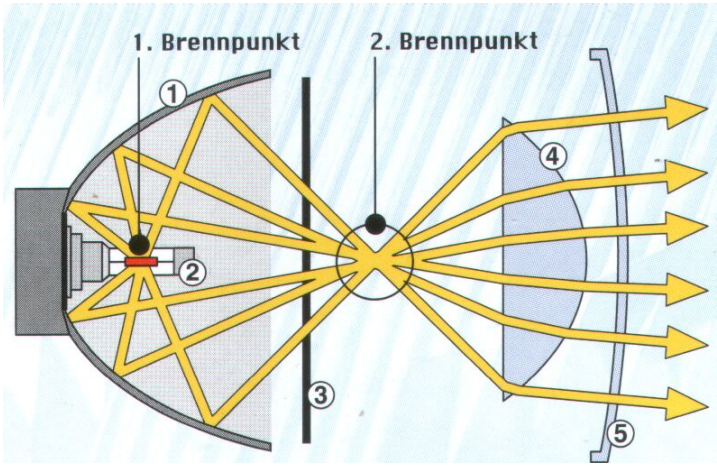
DE – head light

- Three axis Ellipsoid
- Small construction; high power
- Middle of the 80 markets
- Projection system
- Light efficiency 36 %
- Sharp bride-dark-border

1. Reflector
2. Light source
3. Aperture stop
4. lens
5. End panel



Lateral view [2]



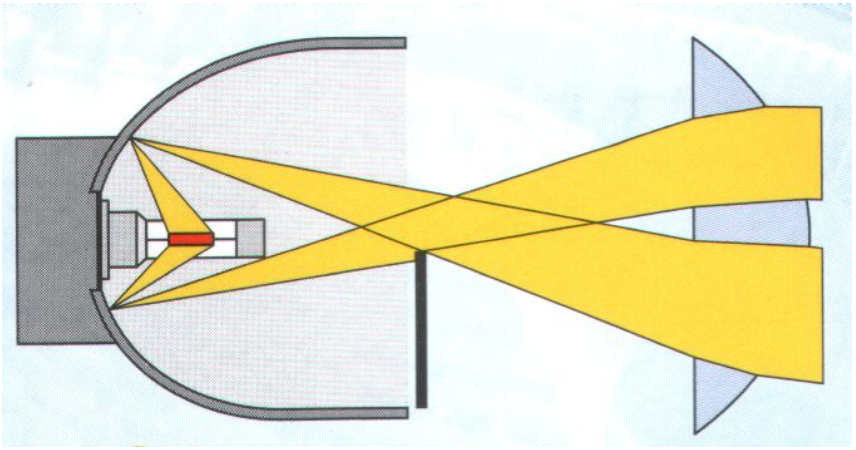
Top view [2]

Reflector technology

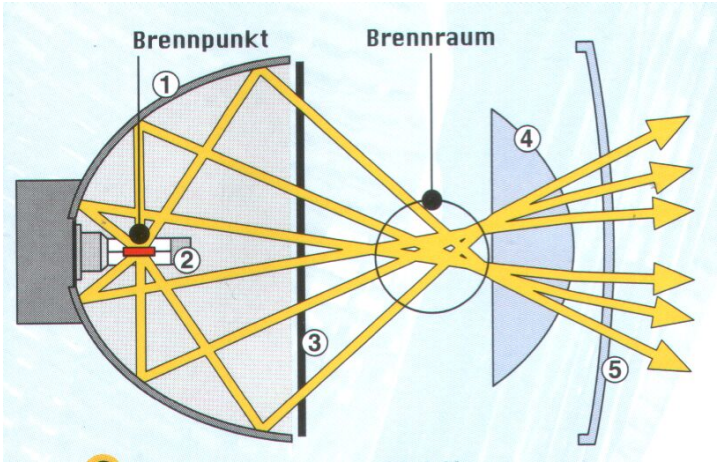
Super DE – head lights

- Projection system
- Three axis Ellipsoid
- Clearance surface Reflector
- Light efficiency 52 %
- since 1988

1. Reflector
2. Light source
3. Aperture stop
4. Lens
5. End panel

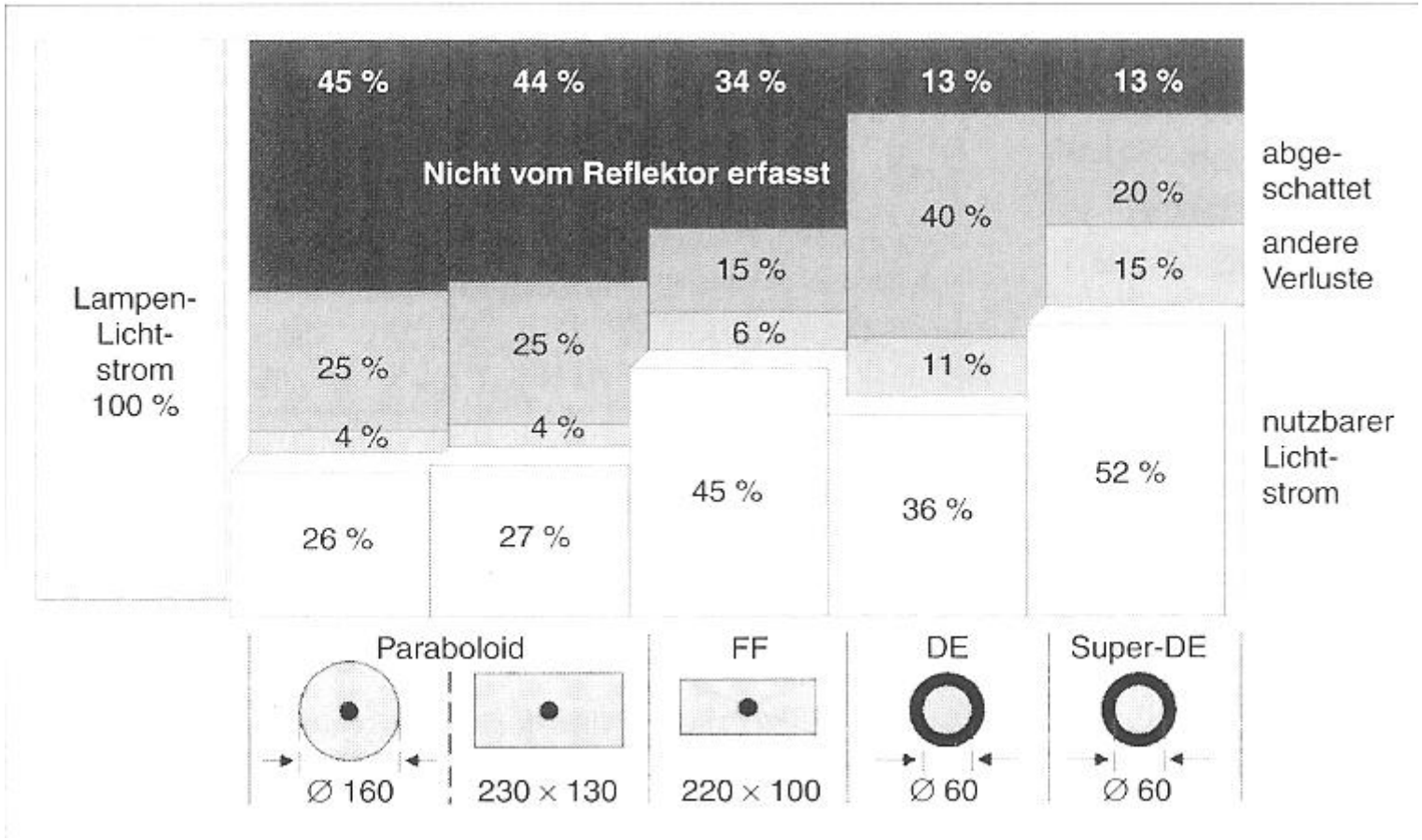


Lateral view [2]



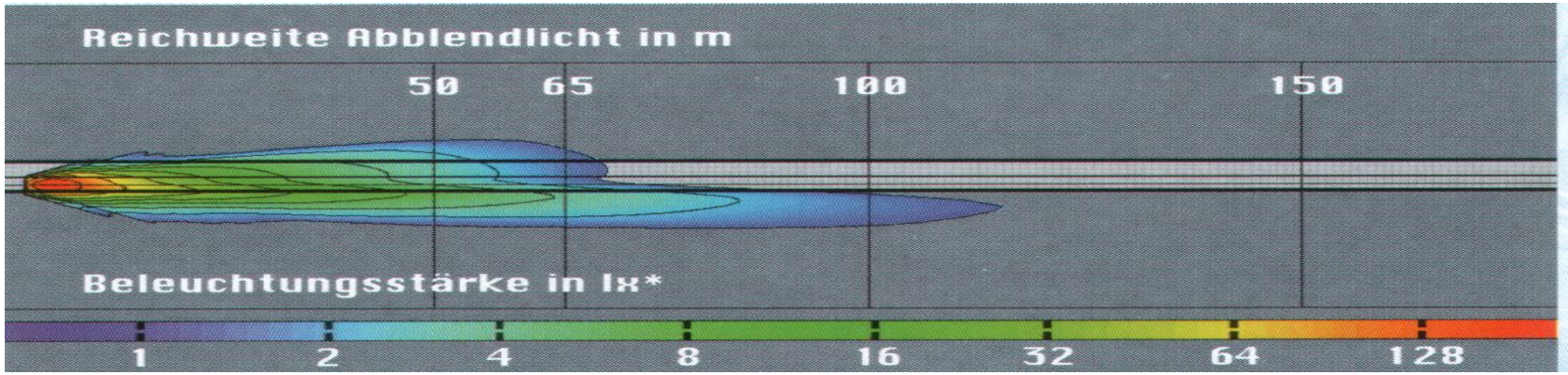
Top view [2]

Reflector technology

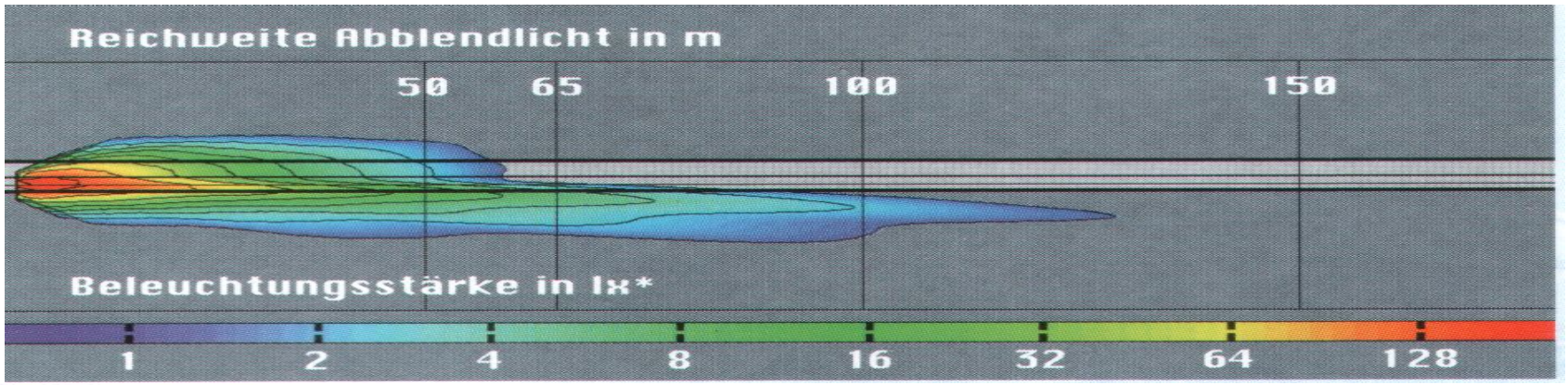


Luminous flux balance [1]

Reflector technology

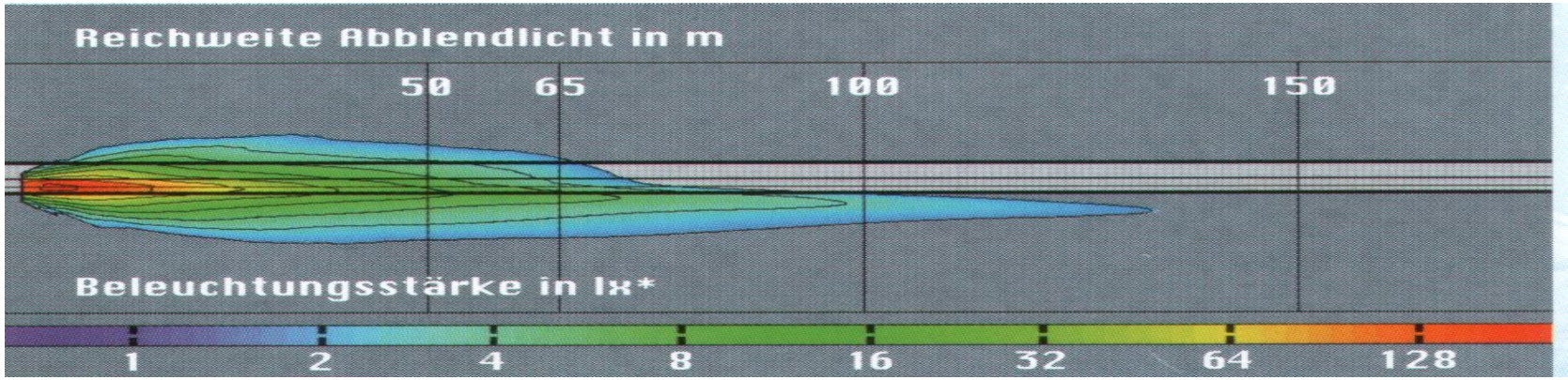


Paraboloid head light [2]

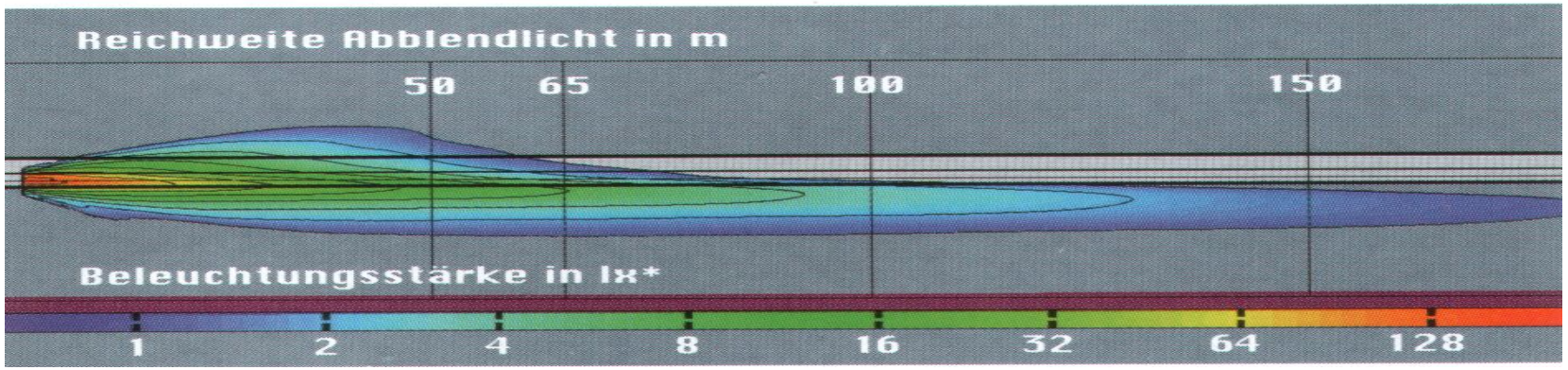


Clearance surface reflector - head light [2]

Reflector technology



DE head light [2]



Super DE head light [2]

Light sources

	Lampe	Lichtfunktion	Bauform	el. Leistung, Lichtstrom
	H1	Fernlicht Nebellicht	Axialwendel	55 W, 800 lm
	H3	Fernlicht Nebellicht	Transversalwendel	55 W, 1.450 lm
	H4	Abblendlicht + Fernlicht	2 x Axialwendel	60 W/55 W 1.650 lm/1.000 lm
	H7	Alle Scheinwerfer-Lichtfunktionen	Axialwendel	50 W, 1.500 lm
	H8	Nebellicht (u. U. Abblendlicht)	Axialwendel	35 W, 800 lm
	H9	Fernlicht	Axialwendel	65 W, 2.100 lm
	H11	Alle Scheinwerfer-Lichtfunktionen	Axialwendel	50 W, 1.350 lm
	HB3	Fernlicht	Axialwendel	60 W, 1.860 lm
	HB4	Abblendlicht Nebellicht	Axialwendel	51 W, 1.095 lm
	NDF H13	Abblendlicht Fernlicht	2 x Axialwendel	75 W/68 W 1.700 lm/1.100 lm

List commercial Halogen lamps [3]

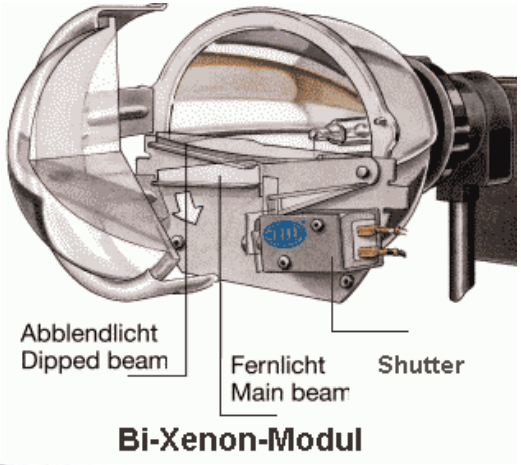
Light sources

	Specific life Tc (DIN 60810) [h]	Realistic life Tc [h]
H1	400	960
H3	400	990
H4	700	1050
H7	550	630
H7 LL = long life	930	1000

Duration of different Halogen Lamps [1]

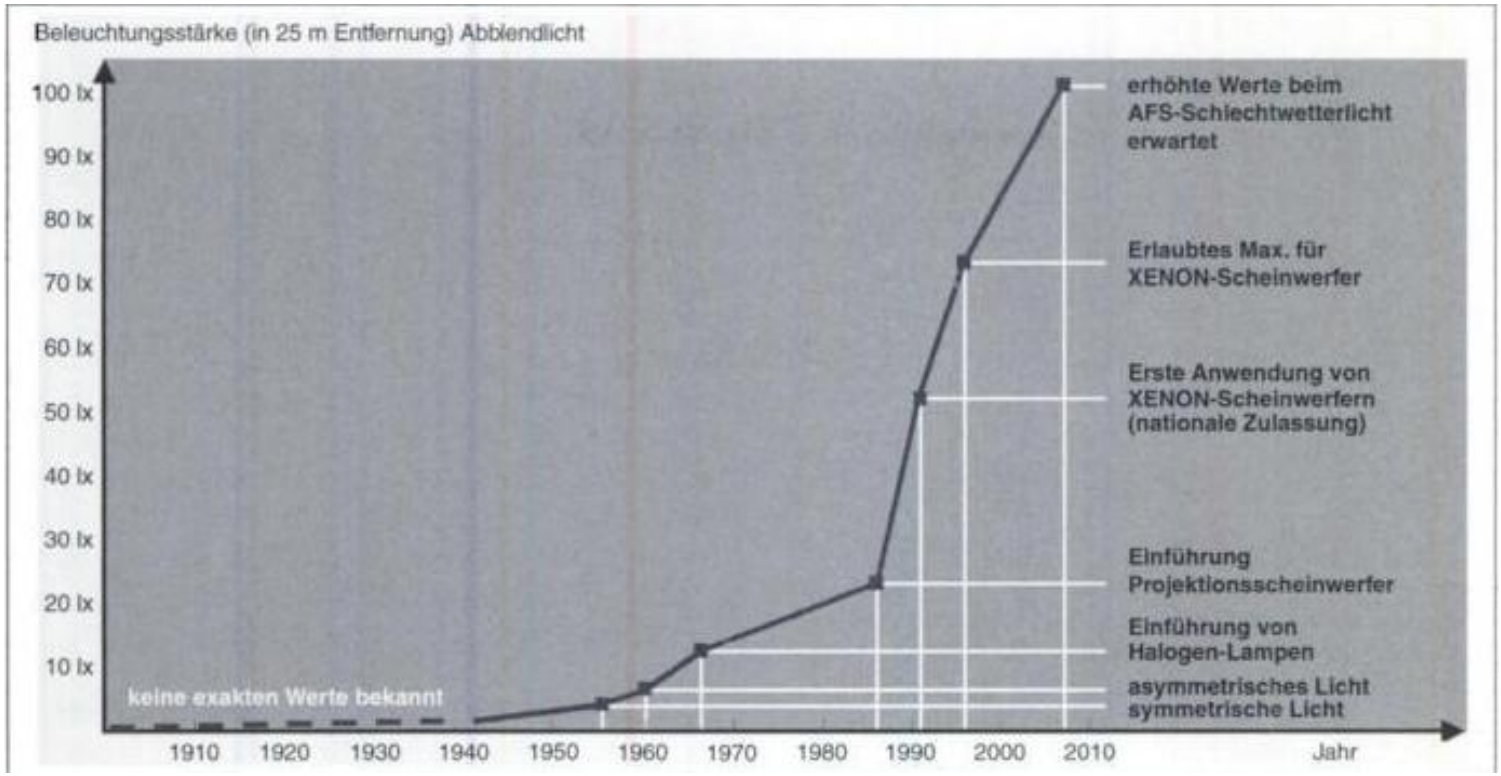
Light sources

Xenonlamps [3]



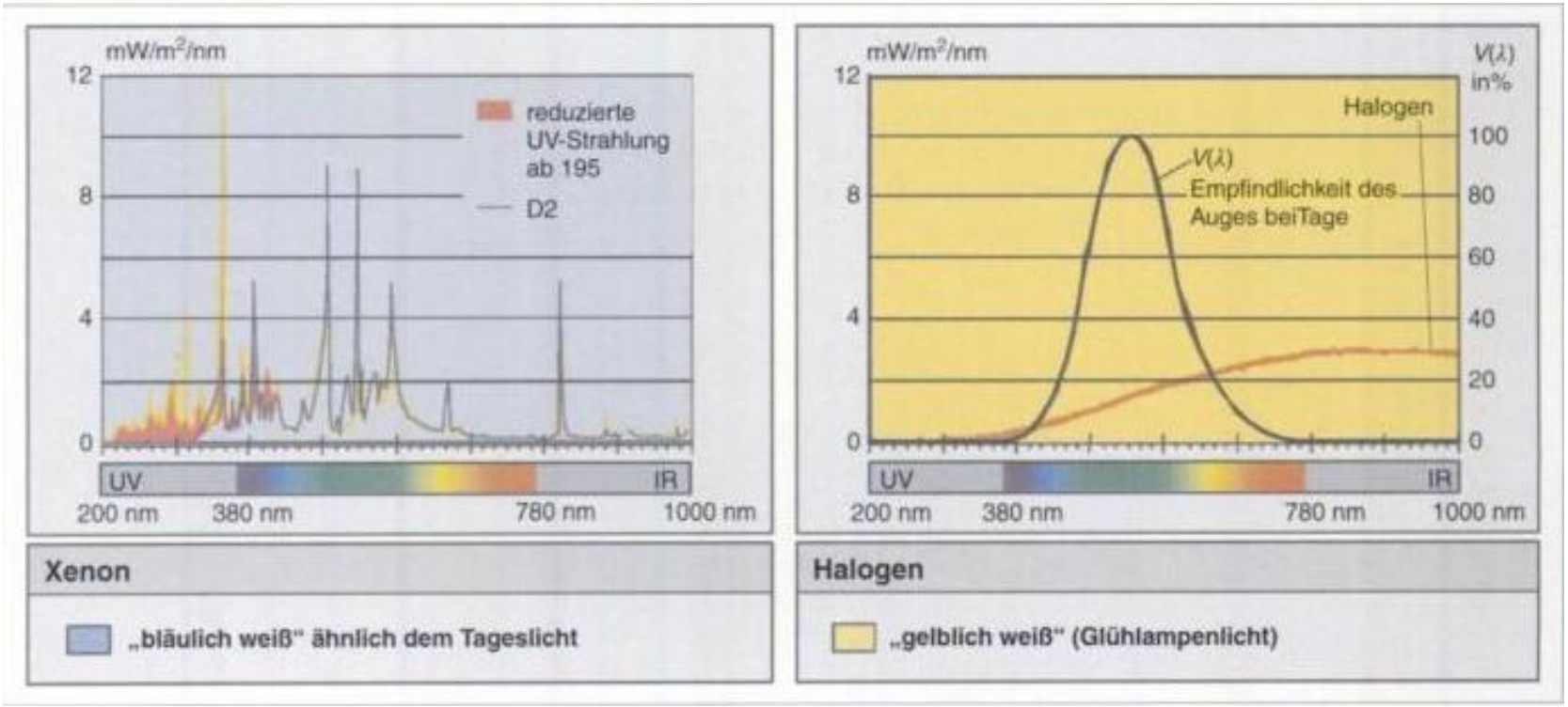
- **D2S use in Projection systems**
- **D2R use in Reflection systems**
- **D1S use in Projection systems**
- **D1R use in Reflection systems**

Light sources

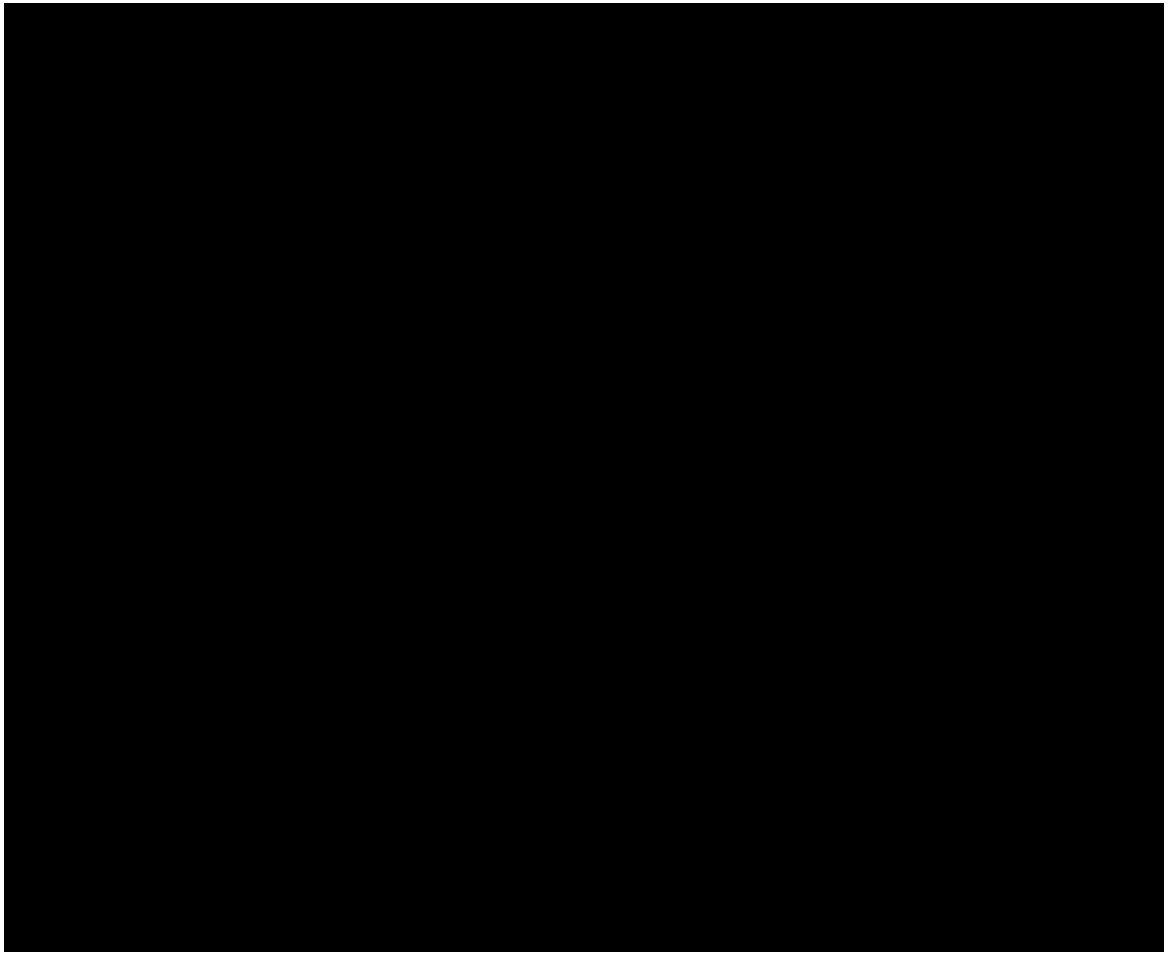


Increase of the illumination [1]

Light sources



Left: Xenon-Lamp spectum; right: Halogen lamp specrum [1]

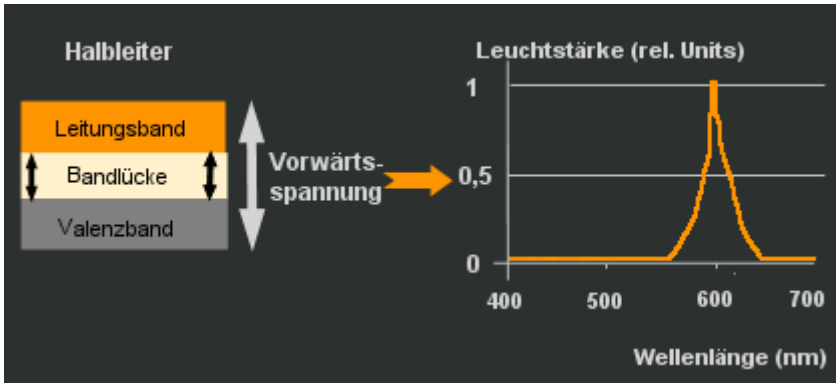


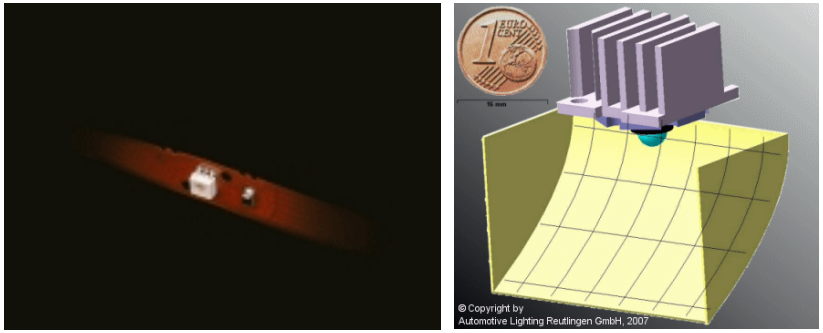
Xenon vs. Halogen [3]

Light sources

LED head lights

- First realization in Audi R8
- vantages:
  - Light color is more like day light
  - Extrem large life
  - Significantly lower consumption
  - Energie saving
  - Lower operating temperature





LED Module [4]

Full LED head light

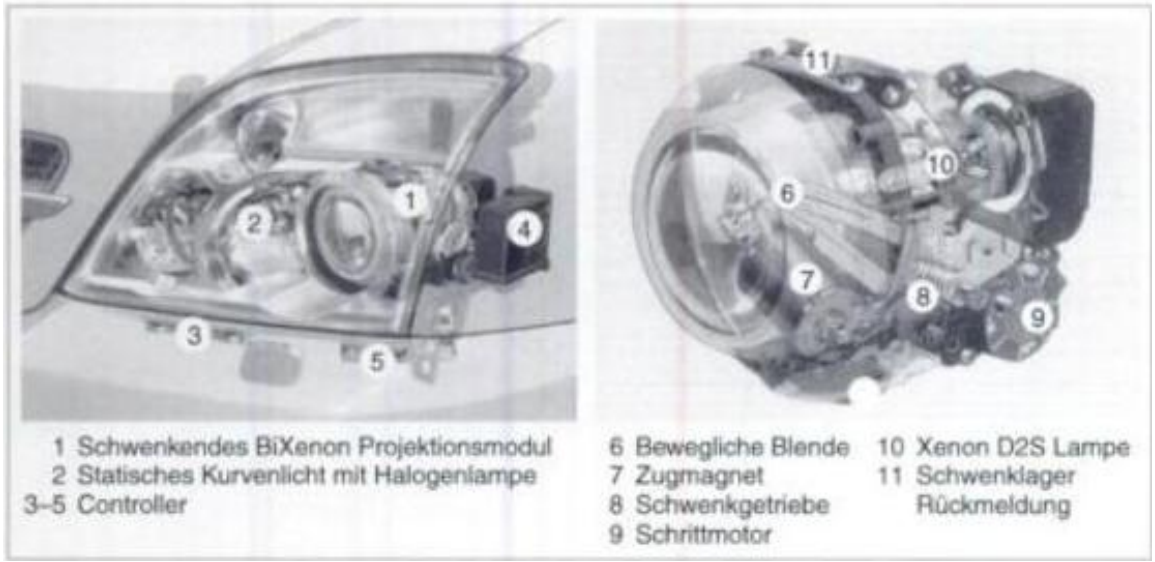
Front of the Audi R8 [5]

Daytime runnig lights

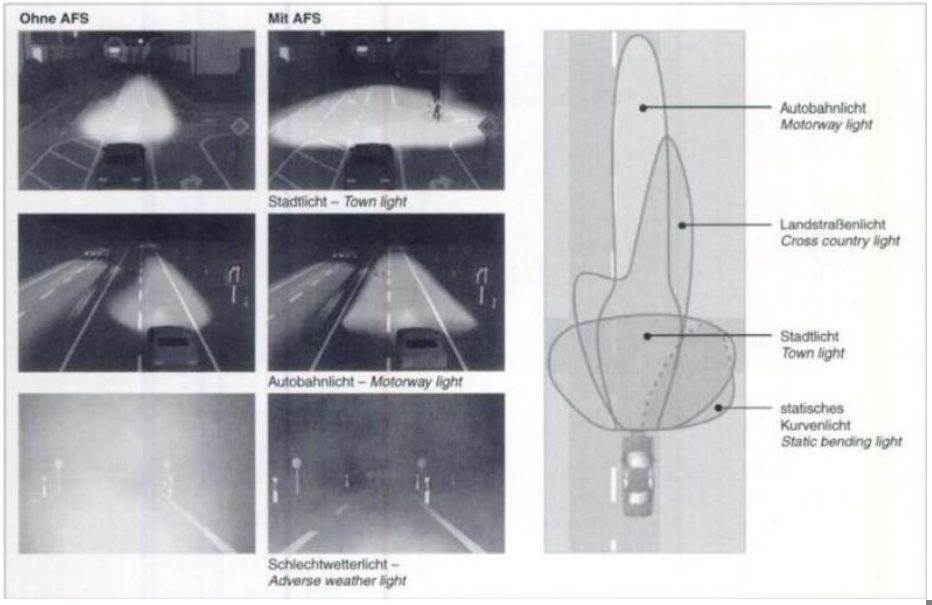
- Often realized by dim lights
  - relativly high fuel consumption
  - 100 W Light power equates approx. 0,12 l / 100 km
- LED Systems

(AFS) Adaptive Frontlighting System

- Headlamp control
- Dynamic bend lighting
- Connectable static bend light
- Connectable static bendinglight

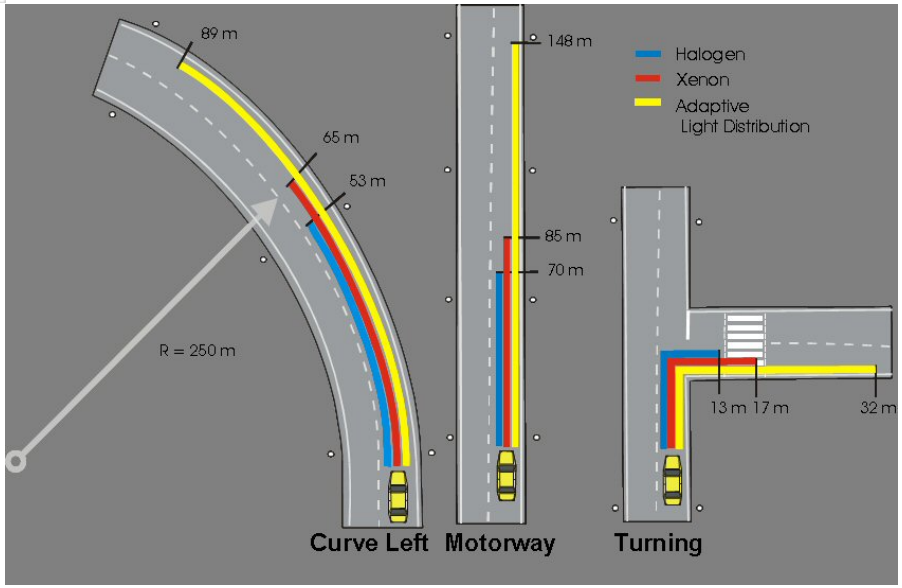


AFS Module with Bi Xenon head lights [4]

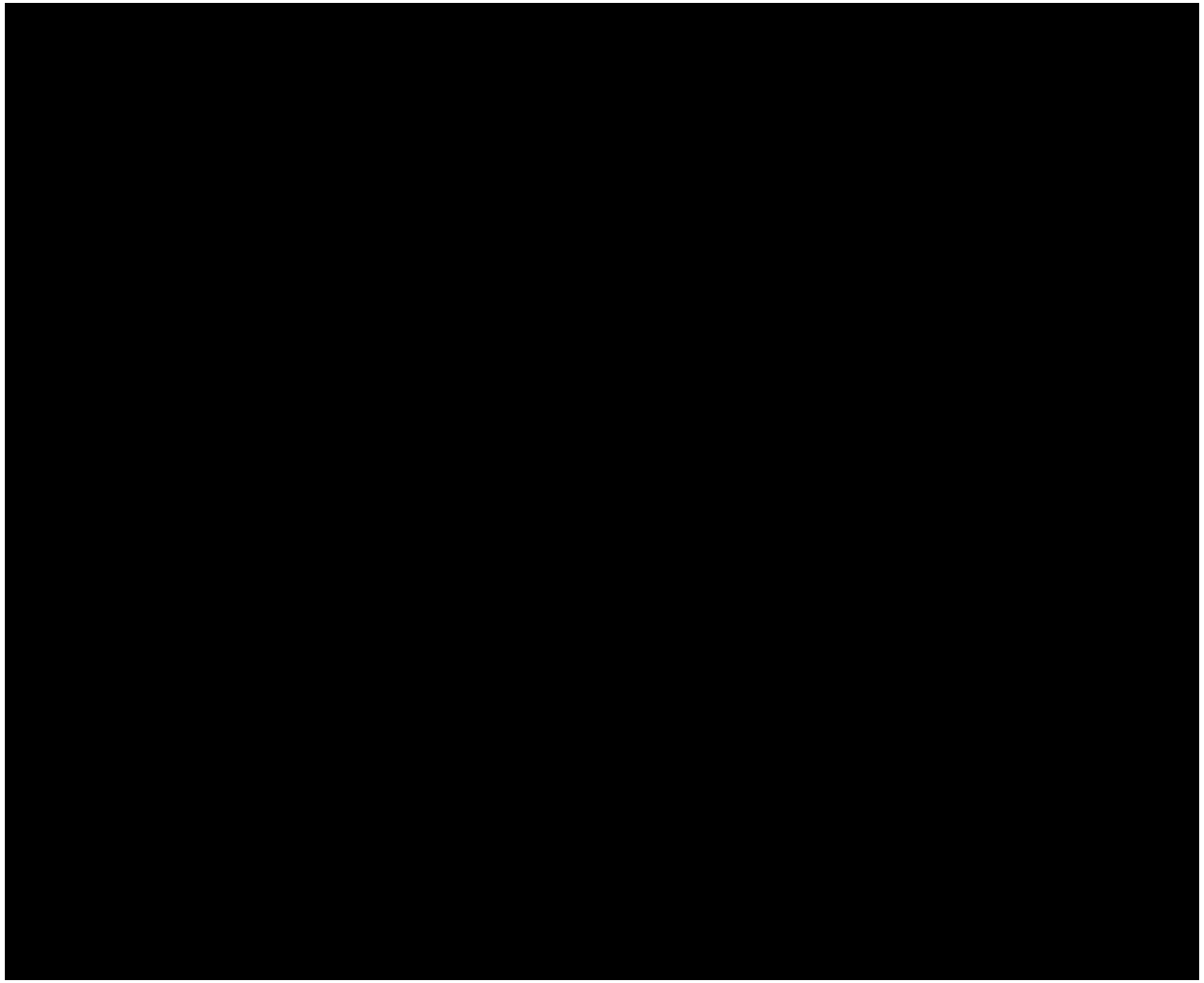


- Town Light
- Motorway Light
- Adverse weather light

AFS head lamp control [1]



AFS head lamp control [4]



Video Varilis [3]

References

1) Handbuch Kraftfahrzeugtechnik; Braess / Seifert; Vieweg Verlag; 2. / 4. Auflage; 2001 / 2005
2) http://www.kfztech.de/
3) http://www.hella.com/produktion/HellaDE/WebSite/Channels/Home/Home.jsp
4) http://www.al-lighting.de/
5) http://www.audi.de/

Thank you for your attention