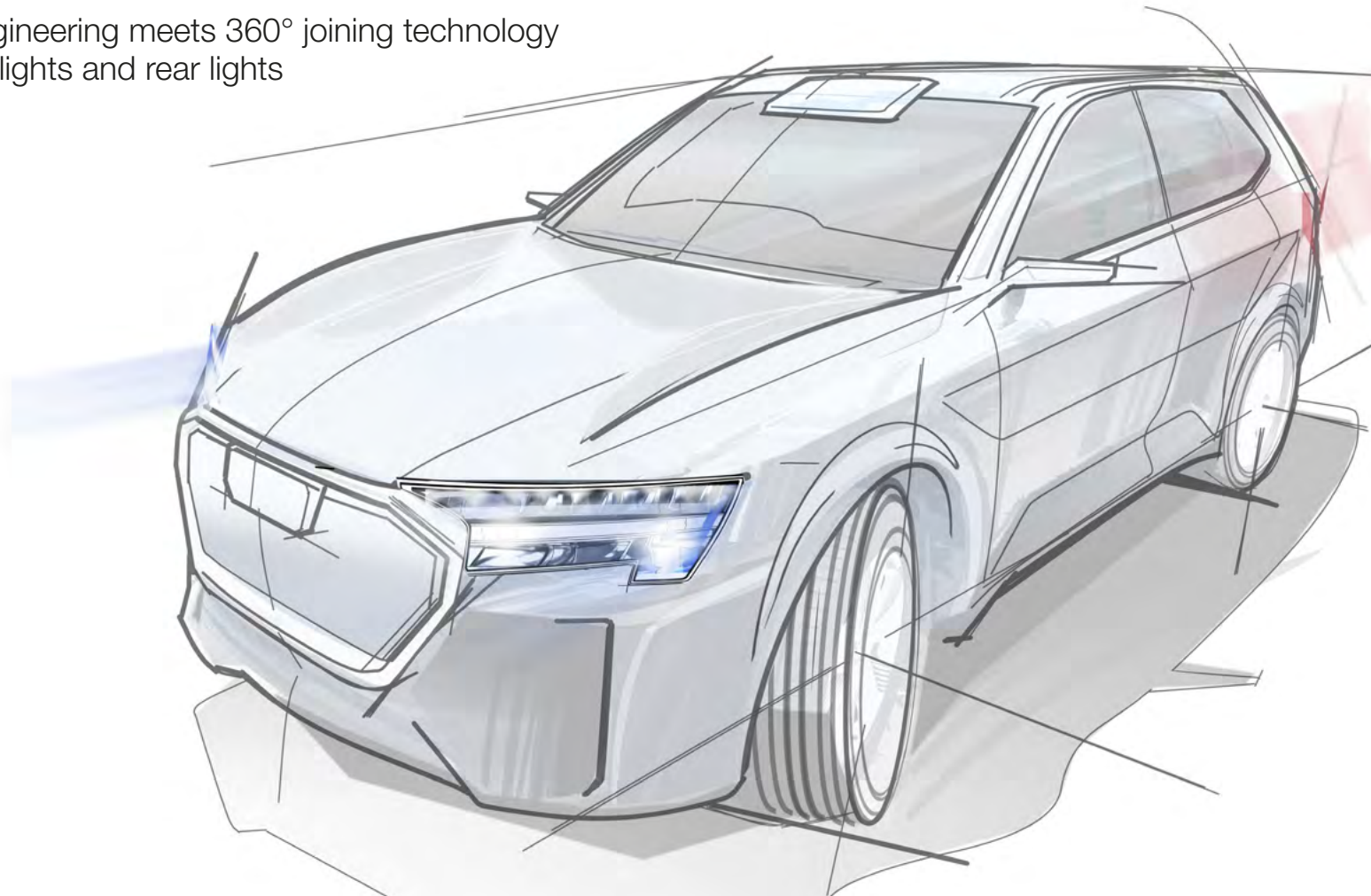


BÖLLHOFF

Automotive engineering meets 360° joining technology
Exterior – headlights and rear lights



Böllhoff, your joining technology expert in automotive engineering

Light is an essential safety component in cars — to be able to see better, but also to be seen by others. Along with the further development of the car, vehicle lighting has also been undergoing different stages of change. In today's vehicle generations, factors such as energy efficiency or freedom of design also play a decisive role besides brightness. The requirements for the joining technology are correspondingly high. New ideas are needed.

For decades, we have been a partner to the automotive industry offering special solutions to fasten lighting elements in vehicles.

**We are right where you need us –
by your side.**

Design

Progress

Efficiency

Table of contents

Your requirements – our 360° Joining Technology	4
360° Joining Technology	6
FLEXITOL® tolerance compensation systems	6
SNAPLOC® plug-in connection	7
Front lighting	8
Headlights	9
Automatic tolerance compensation – FLEXITOL®	10
Manual tolerance compensation – FLEXITOL®	10
FLEXITOL® in practice	11
Rear lighting	12
Rear lights	13
FLEXITOL® special version	14
FLEXITOL® special version in practice	15
Combined use of fasteners – FLEXITOL® and SNAPLOC®	16
FLEXITOL® and SNAPLOC® in practice	17
Rear-light strips	18
Combined use of fasteners – FLEXITOL® and SNAPLOC®	19
FLEXITOL® and SNAPLOC® in practice	20
360° Joining Technology – our services	21
InfoPoint	22



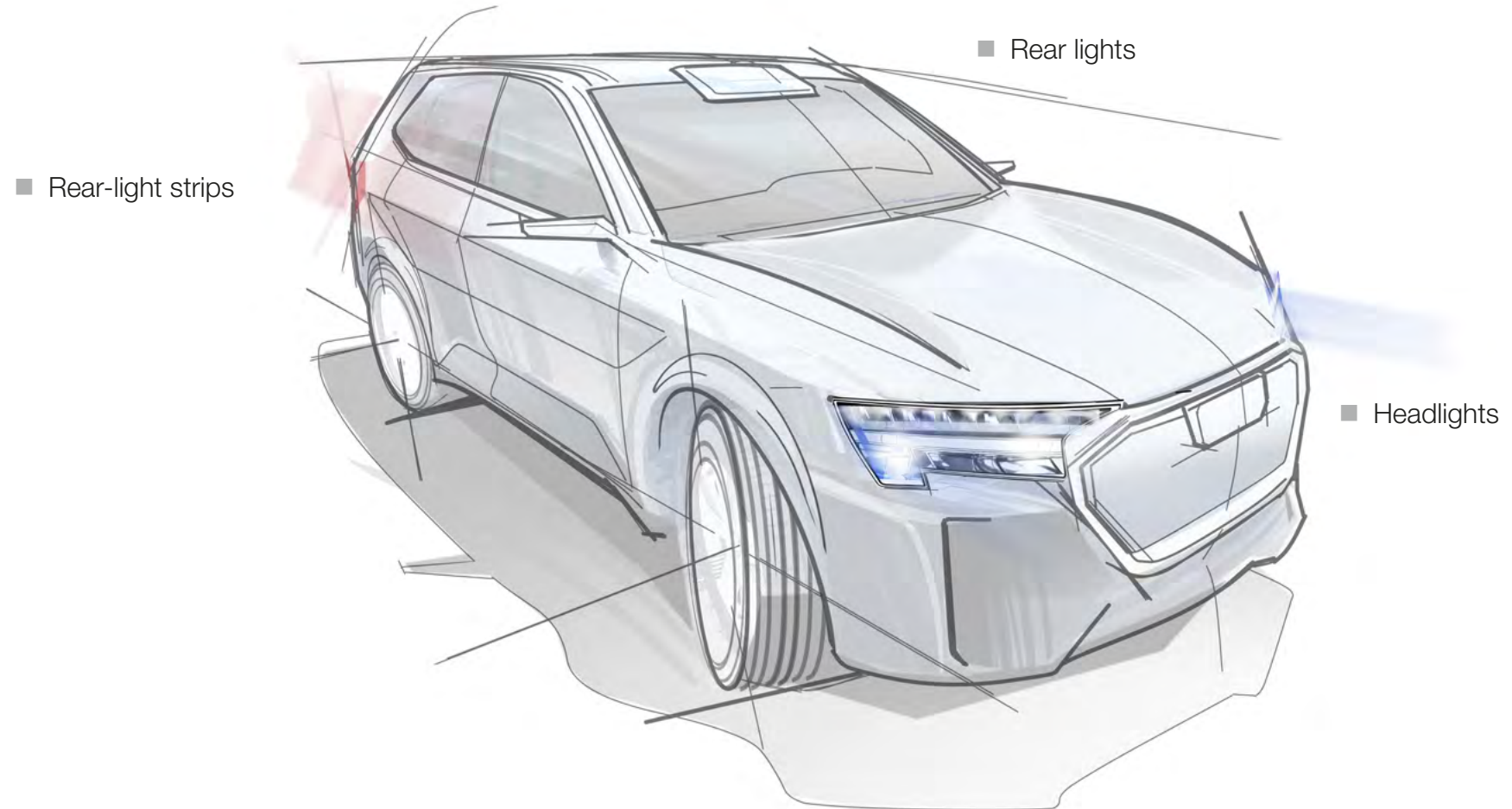
Our InfoPoint provides additional information in the form of further brochures and/or videos at the end of this brochure.

Adaptive and intelligent vehicle lighting will fundamentally change the driving experience in the future. Besides improving safety, the design plays a decisive role. The vehicle lighting increasingly merges with the exterior therefore creating ever higher requirements for the joining technology. All influences and parameters must be taken into consideration for the choice of the proper joining solution.

As a development partner, we work in particularly close cooperation with you. We accompany and support projects from the very first concept to the final realisation. Your tailor-made joining solutions evolve from a smart combination of idea and innovation management.



Discover our intelligent joining solutions which represent a selection of our options.



Before getting to the joining solutions in practice, we wish to introduce to you two product groups which are particularly relevant for the fastening of lights. Namely FLEXITOL® and SNAPLOC®.

FLEXITOL® is an economic engineering solution for continuous tolerance compensation.

Today, there are manual and automatic tolerance compensation systems. The employment of one or the other system depends on the requirements.

The technologies:

Automatic tolerance compensation

Upon automatic tolerance compensation, two components are aligned toward each other. During screwing, the spacing between the two components is automatically compensated. The tolerance compensation system fixes the originally aligned position. If the joint is loosened, the system resumes the initial position.

Manual tolerance compensation

The manual tolerance compensation system is screwed into the screw element to a defined measure. During screwing, the component tolerances can be compensated (zero tolerance at component delivery). Further alignment is possible during installation. The adjusted position is maintained when the joint is loosened.

Your advantages at a glance:

- High performance reliability
- Only one-sided accessibility required
- Easy integration into different applications
- High end product quality
- Fast and easy installation
- No deformation during installation



Fasteners and fastening systems for fast and easy assembly and disassembly.

The technology:

SNAPLOC® is a two-piece system consisting of a ball stud and a coupling. The joint is created through simply snapping on, while it is disassembled by just pulling off.

Function:

SNAPLOC® is based on the simple principle of a plug-in connection. The coupling is installed in the provided mounting geometry on the component to be mounted, thus creating a positive engagement. Inside the coupling, there is a ball socket which serves as a counterpart for the ball stud to snap into. The ball stud must be mounted on the mating component. The joint can be repeatedly disassembled and engaged.

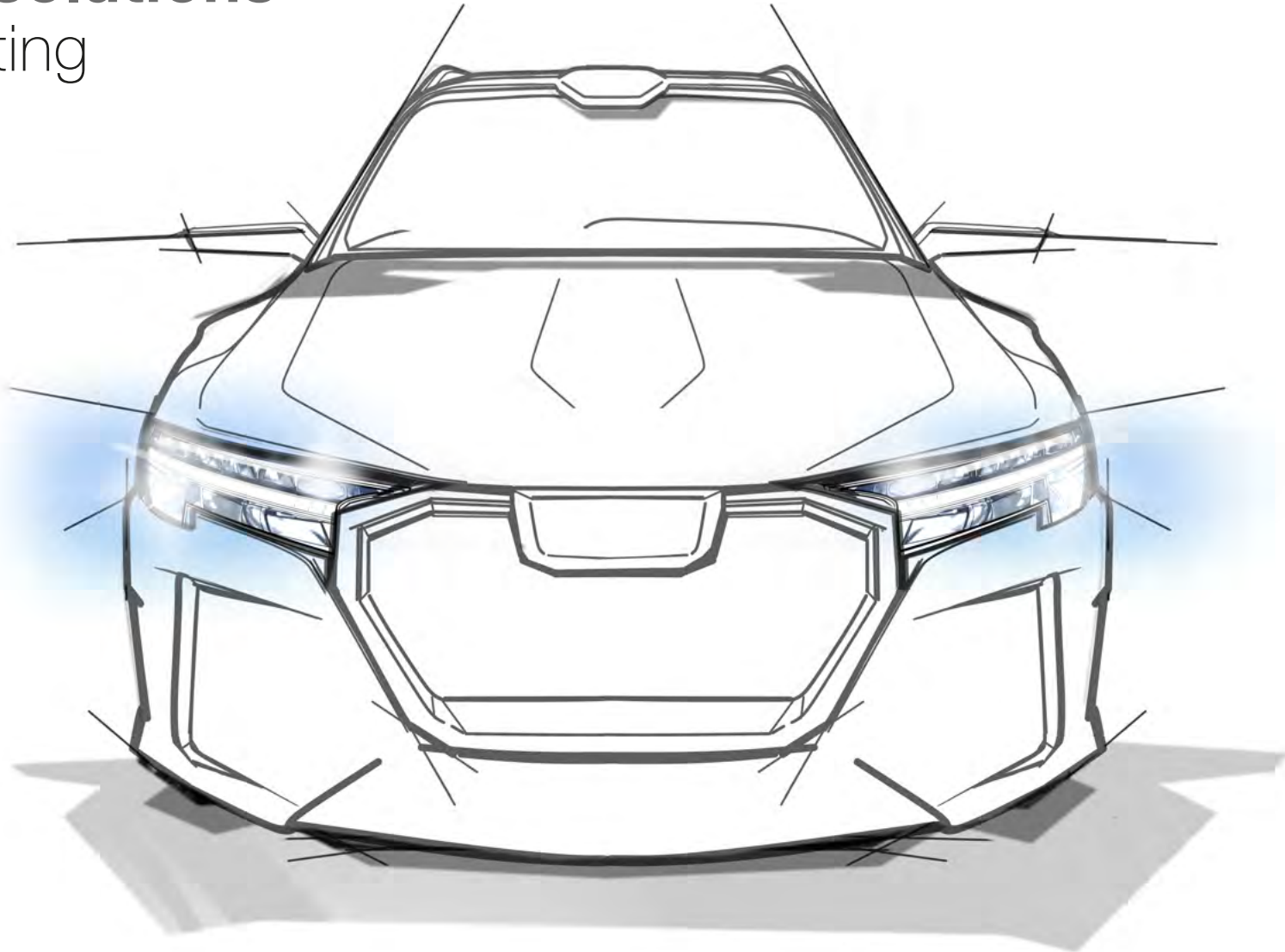
Your advantages at a glance:

- Fast and easy assembly/disassembly
- Tolerance compensation in the centre distances
- Variable fastening options
- Easy integration
- Vibration and noise decoupling

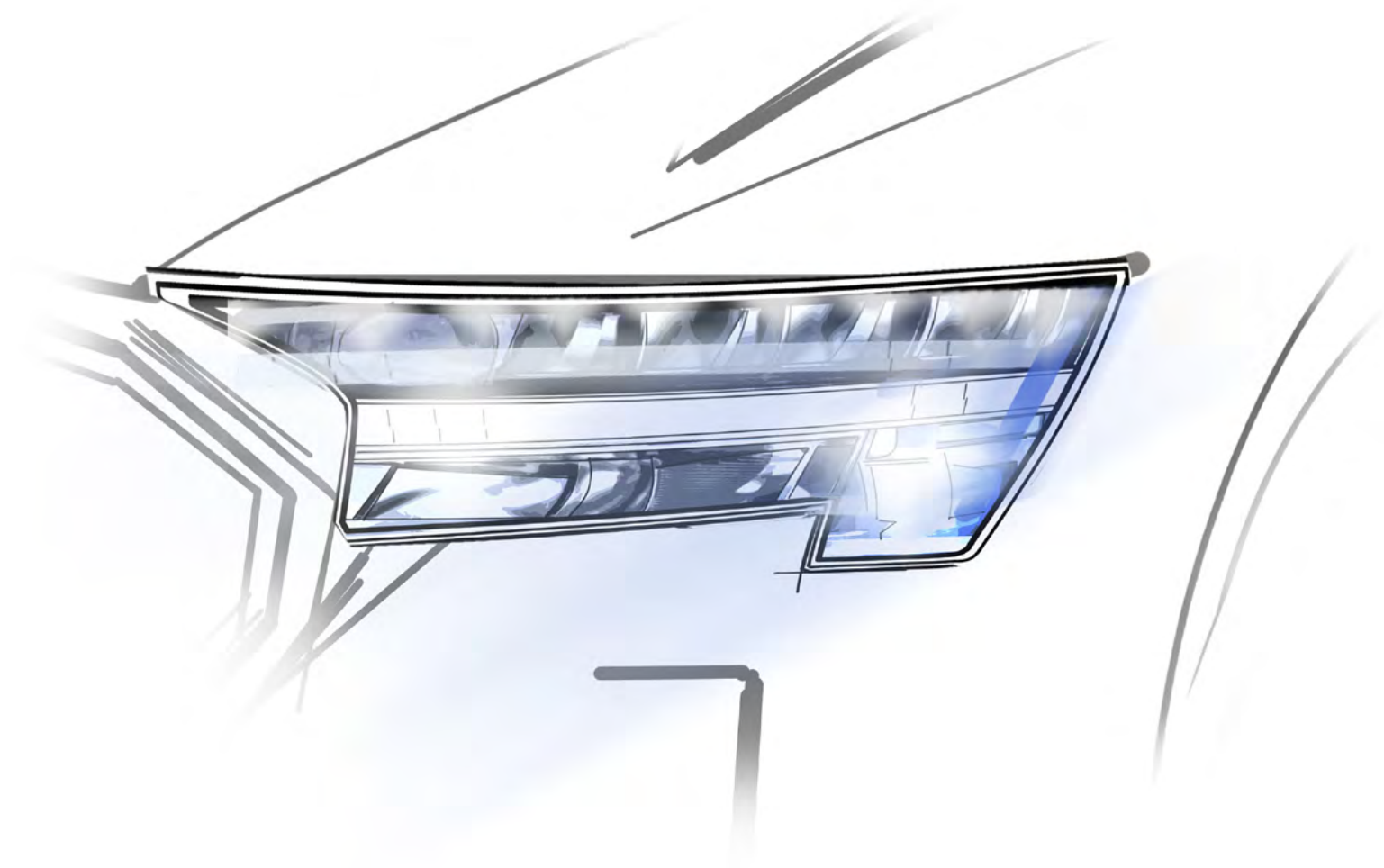


Joining solutions

Front lighting



Headlights





Our solution:

FLEXITOL® automatic tolerance compensation

The technology:

The FLEXITOL® Plastic consists of a plastic adjustment element and a plastic fastening element and is supplied as a pre-assembled assembly.

You can easily screw that assembly into the mounting hole in the plastic screw element or fasten it by means of a bayonet joint.

Your advantages:

- Fast and easy installation
- Stress-free screwing
- Automatic compensation of production tolerances
- Built-in fastening thread

Our solution:

FLEXITOL® K' in K' manual tolerance compensation



The technology:

For FLEXITOL® K' in K' the function of the K' in K' thread is of great importance. It taps its holding thread into the provided plastic bore hole. Due to a resistance effect, the element can only be screwed further in or out if a higher torque is applied.

Your advantages:

- Tolerance compensation in all axes
- Axial tolerance compensation also when fastened
- Precise gap widths through simple continuous adjustment at the K' in K' thread

Requirement: Precise adjustment of the gap widths

Because of manufacturing tolerances on the body, tolerance compensation fasteners must be used during the assembly of headlights to achieve uniform gap widths. FLEXITOL® K' in K' fasteners are used to adjust the headlight in x-, y- and z-direction to the correct gap width and to screw it on. This is mainly accomplished with the especially shaped K' in K' thread developed by Böllhoff. In the second step, spacings between headlight and body resulting from the adjustment process are automatically compensated with the FLEXITOL® Plastic when a conventional M 6 screw is screwed in.



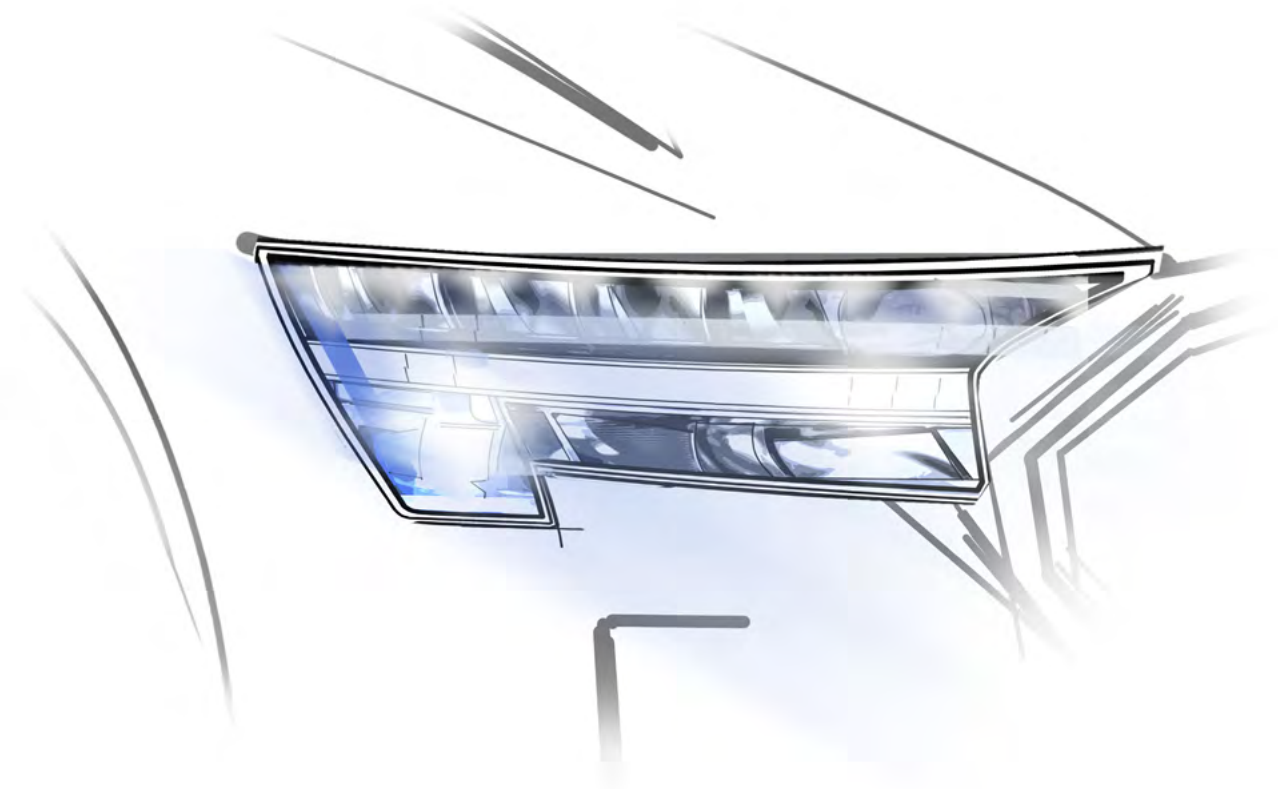
Our solutions:



FLEXITOL® Plastic

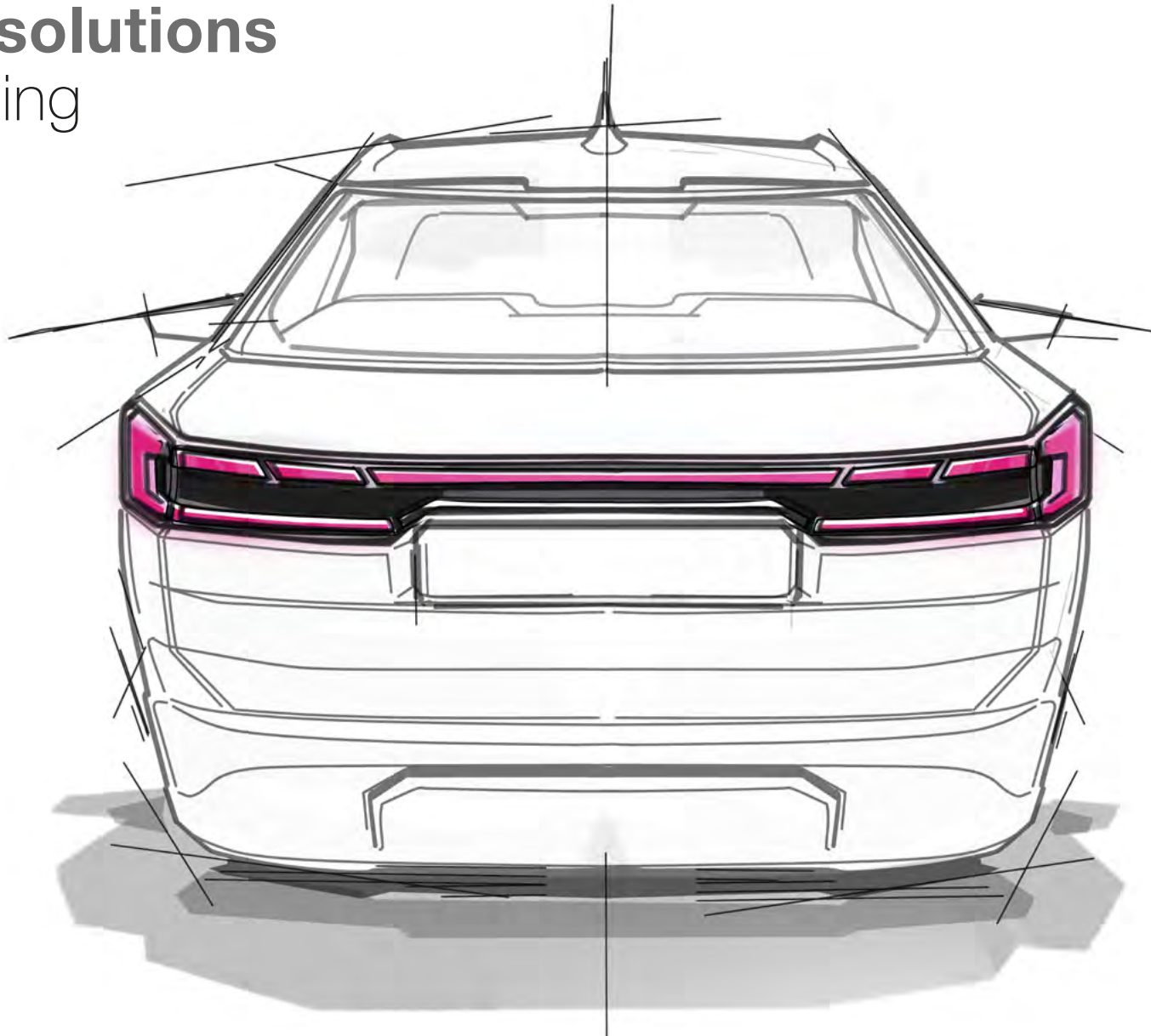


FLEXITOL® K' in K'

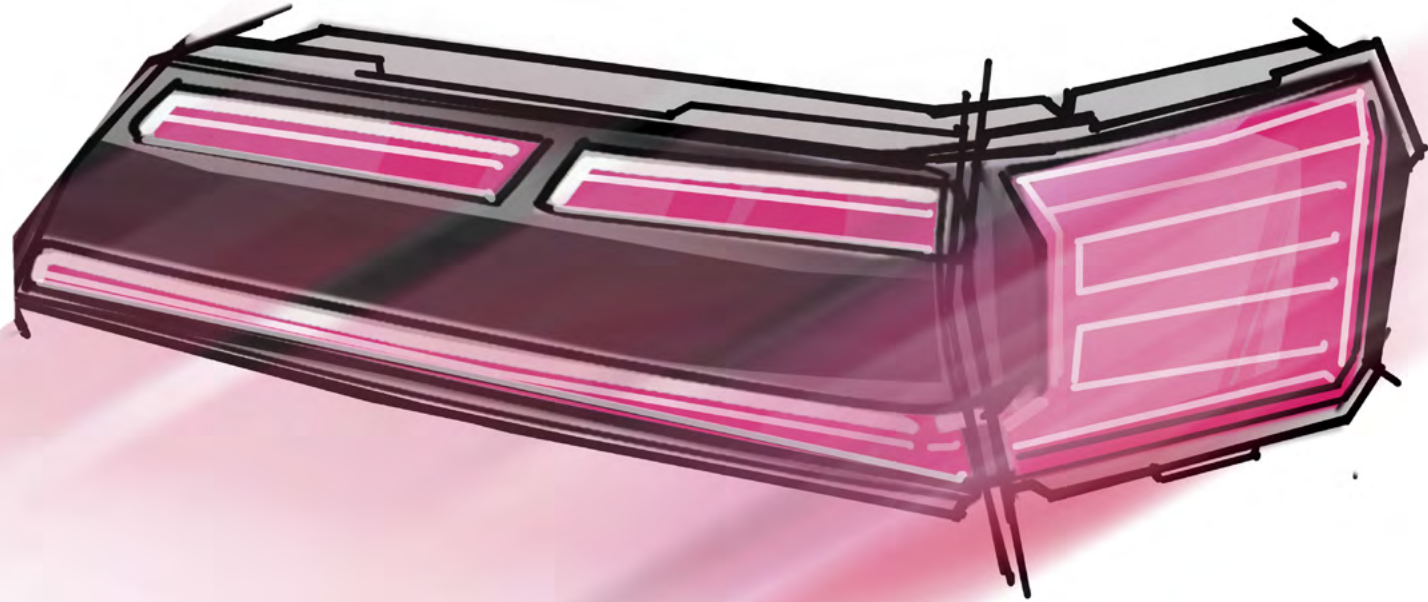


Joining solutions

Rear lighting



Rear lights





Our solution:

FLEXITOL® – manual tolerance compensation

The FLEXITOL® for rear light fastening is a manual tolerance compensation system especially developed by Böllhoff. You can use it to align the installed rear light to an ideal gap width and fasten it.

The technology:

During the installation, the rear light is screwed together with the FLEXITOL® spring assembly toward the body from the boot. After the installation, the rear light can be aligned to an ideal gap width by means of the FLEXITOL® adjustment elements. The spring compensates the alignment movements.

Your advantages:

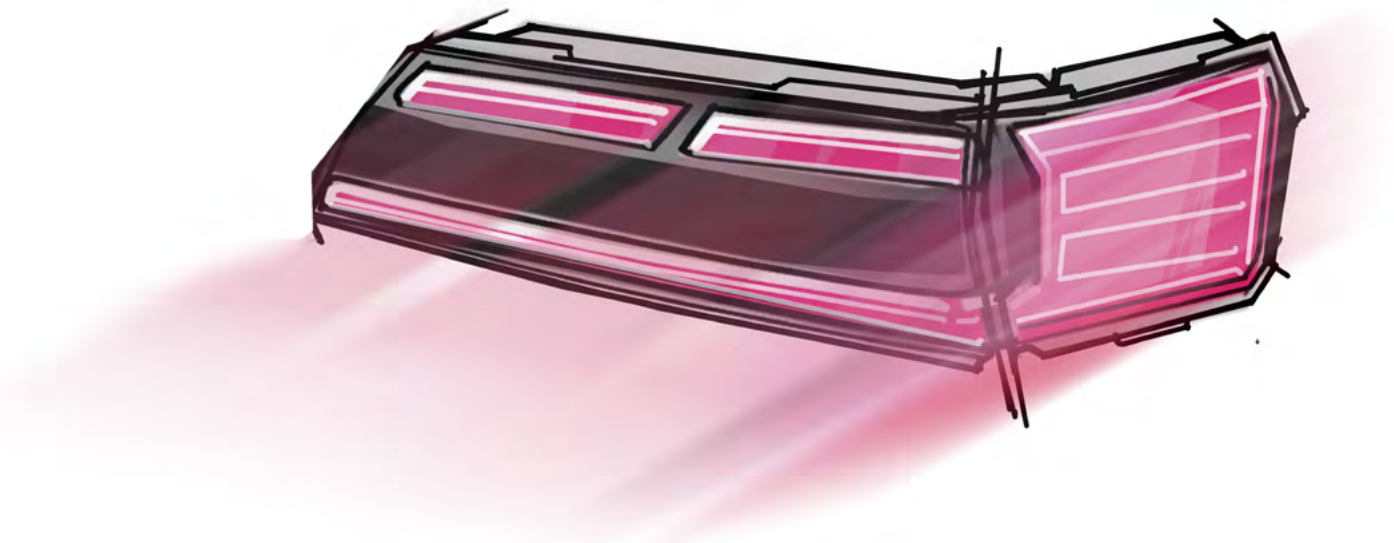
- Adjustable gap widths with adjacent components
- Position locking when the rear light is removed
- Variable connection options for an easy integration into the rear light

Requirement: Precise adjustment of the gap widths and fast assembly/disassembly



The spring assembly of the FLEXITOL® ensures that the rear light is permanently tightened to the body with a defined tensile force. Another point of contact of the rear light and the body is provided with two adjustable spacers which define the position of the rear light in the vehicle by means of a TORX drive and which are therefore substantial to an ideal gap width. During the installation, the rear light is screw fastened to the boot body by means of the spring assembly. Position adjustments of the rear light are compensated by the built-in spring element of the spring assembly. To be able to remove the rear light for servicing, the spring assembly can be screwed out. The originally aligned position is maintained and the light does not need to be re-aligned.

Our solution:
FLEXITOL® special version





The technology:

SNAPLOC® stud and angled coupling are used for the pre-assembly of the rear light. The rear light position is then adjusted with the FLEXITOL® K' in K' fastener so that the light gap width is uniform and even.

Our solution:

An efficient combination of our self-locking, self-tapping and adjustable FLEXITOL® K' in K' fasteners with tolerance compensation and our SNAPLOC® plug-in connections which allow a fast and reversible assembly of the components.

Your advantages:

- Reduced assembly times due to pre-assembly without tools
- Freedom of design because of the diversity of variants of all components
- Continuous adjustment without loosening the fastening screw

Requirement: Adjusting and compensation of different angular positions



Since the body panel is not positioned at a right angle with the mounting direction of the rear light, fasteners are used which can compensate this difference in angle. SNAPLOC® angled couplings can compensate different angular positions between rear light and vehicle body. The SNAPLOC® ball studs which are mounted in the rear light are snapped into the angled couplings for pre-assembly.

In the following step, the pre-assembled light is adjusted to an ideal gap between rear light and car body width by means of the FLEXITOL® K' in K' fastener with a hex drive. The K' in K' thread developed by Böllhoff is also used in this step. The adjustment can be made without loosening the screw.

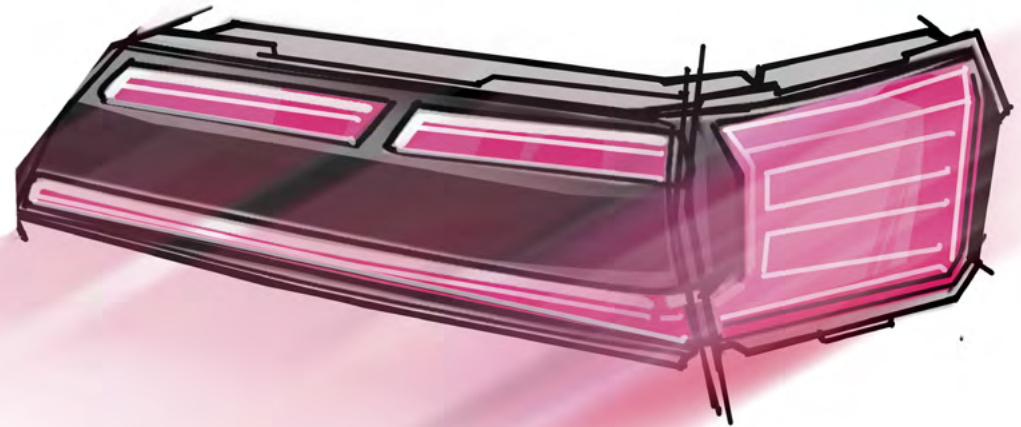
Our solution:



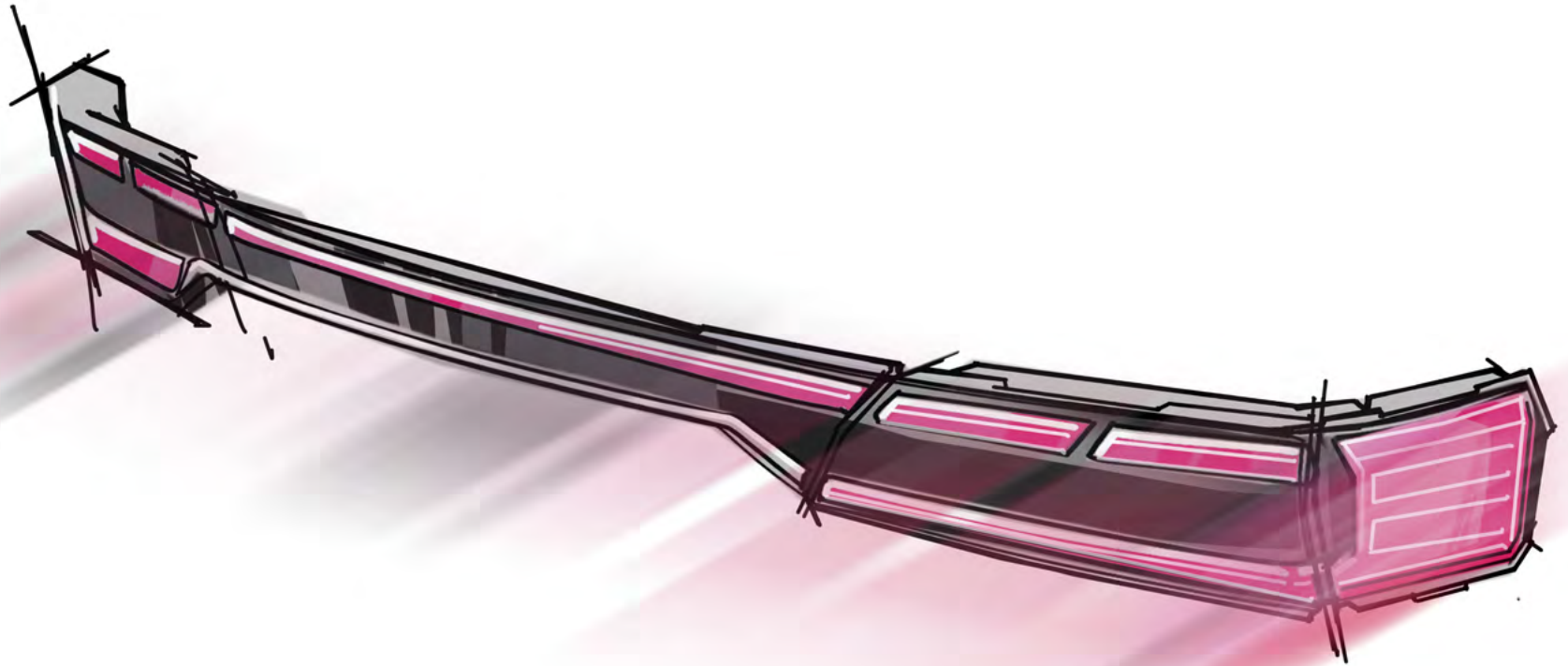
FLEXITOL® K' in K'



SNAPLOC® plug-in connection with angled coupling



Rear-light strips





SNAPLOC® ball stud



SNAPLOC® coupling



FLEXITOL® K' in K'



FLEXITOL® K' in K'

The technology:

The rear-light strip is pre-assembled using the SNAPLOC® coupling and stud. After the pre-assembly in the boot lid, the rear-light strip is accurately adjusted by means of two different fasteners of the FLEXITOL® K' in K' product family for manual tolerance compensation.

Our solution:

The elaborate combination of the SNAPLOC® quick joining technology and manual tolerance compensation with FLEXITOL® K' in K' allows an easy pre-assembly as well as precise positioning of the rear-light strip in the vehicle boot lid.

Your advantages:

- Increased freedom of lighting design due to individual fastening concepts
- Compensation of thermal expansion
- Precise adjustment of the rear-light strip in the boot lid
- Easy installation of heavy light components

Requirement: Fast assembly and compensation of thermal expansion

In most vehicles, the rear-light strip runs over the entire boot lid and results in special requirements for the fastening concept because of its size. Influencing factors such as thermal expansion, manufacturing tolerances and the installation play an important role in this. First, the pre-assembly of the rear-light strip by means of the in-moulded SNAPLOC® ball studs and the SNAPLOC® couplings installed in the boot lid is performed. Then, the rear-light strip is aligned in the boot lid with zero clearance as well as flush with the outer two rear lights using two different FLEXITOL® K' in K' fasteners. Conventional M 6 threaded nuts are used for screwing from the boot lid. Thermal expansion in the rear-light strip from environmental influences are compensated by the SNAPLOC® fasteners as well as the FLEXITOL® K' in K' fastener which is movable on the y-axis.



SNAPLOC® ball stud



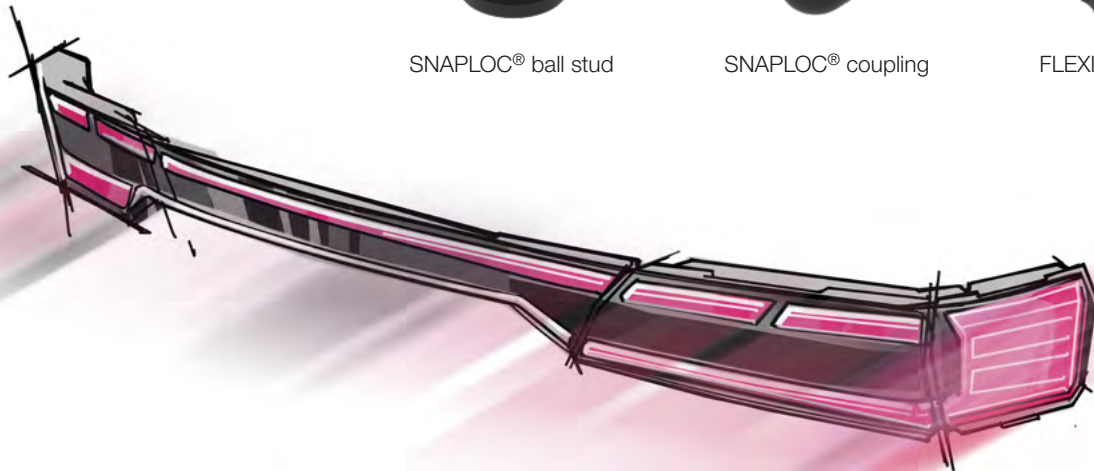
SNAPLOC® coupling



FLEXITOL® K' in K'



FLEXITOL® K' in K'





Your partner to succeed in joining – and what that means for you:

Innovation and development partner

- Modern methods, organisational forms and processes
- Trend analyses
- Research cooperations
- Open innovation
- In-house research and development
- Application engineering and consulting
- Customer-specific development parts
- Manufacture of samples and prototypes
- Value analyses

Procurement and assembly partner

- Engineering competence thanks to in-house production
- Twelve modern production facilities worldwide
- Production methods:
 - Injection moulding
 - Turning
 - Cold working
 - Wire winding
 - Mechanical and plant engineering
- Acceleration of your assembly processes
- Wide range of manual and automated assembly solutions

Logistics and quality partner

- Supply chain solutions
- Quality management according to IATF 16949
- Quality management according to EN 9100
- Distinctive quality and environmental awareness
- Accreditation of the in-house laboratory
 - according to DIN EN ISO/IEC 17025
 - certification according to DIN EN ISO 14001
- Regular audits through customers

Distributor and service partner

- Efficient consulting, assistance and service
- Local expert specialists
- Proximity to customers thanks to global presence
- After-sales service
- Expert seminars, training and workshops
- Online seminars
- Customer in-house fairs

Catalogues

Product catalogues



SNAPLOC®

Vibration and noise decoupling plug-in connections
Catalogue No 4350

<https://www.boellhoff.com/en/pdf/snaploc>



FLEXITOL®

Systems for stepless tolerance compensation
Catalogue No 0590

<https://www.boellhoff.com/en/pdf/flexitol>



Product Guide

360° Joining Technology
Catalogue No 1190

<https://www.boellhoff.com/en/pdf/product-guide>

Industry-specific catalogues – automotive



Automotive engineering meets 360° joining technology

Exterior – headlights and rear lights
Catalogue No 0943

<https://www.boellhoff.com/en/pdf/lighting-solutions>



360° Fastening technology for e-mobility

Catalogue No 8026

<https://www.boellhoff.com/en/pdf/e-mobility>

Videos**Fastener and application videos****FLEXITOL® Plastic**

Plastic tolerance compensation systems

<https://www.boellhoff.com/video/flexitol-plastic>

**FLEXITOL® K' in K'**

Tolerance compensation systems with K' in K' thread

<https://www.boellhoff.com/video/flexitol-k-in-k>

**FLEXITOL® for rear lights**

Tolerance compensation systems for rear lights

<https://www.boellhoff.com/video/flexitol-rear-light-fastening>

**SNAPLOC®**

Vibration- and noise-decoupling plug-in connections

<https://www.boellhoff.com/video/snaploc>

Industry-specific videos – automotive**Automotive engineering meets 360° joining technology**

Exterior – headlights and rear lights

<https://www.boellhoff.com/videos/lighting-solutions>

**Automotive industry meets 360° joining technology**

<https://www.boellhoff.com/video/automotive>

**E-mobility meets 360° joining technology**

<https://www.boellhoff.com/video/e-mobility>

BÖLLHOFF

Böllhoff Group

Innovative partner for joining technology with assembly and logistics solutions.

Find your local partner at www.boellhoff.com or contact us at info@boellhoff.com.

Passion for successful joining.

Subject to technical change.
Reprinting, even in extract form, only permitted with express consent.
Observe protective note according to ISO 16016.