



Railway

Smart solutions for the railway sector



«Fastening solutions for railway applications from A to Z. Bossard is your one-stop shop.»

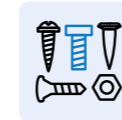
SMART SOLUTIONS FOR THE RAILWAY SECTOR

Better connected

We are the experts for all fastening technologies in railway applications.

The railway sector is characterized by a rising demand for reliability, speed and punctuality. To make trains faster and more economical, light-weight materials are used increasingly. In addition, short throughput times in production and lean maintenance of the trains should be ensured. We understand these trends as well as the resulting challenges, and provide fasteners that meet the highest safety and quality standards, helping our customers increase their efficiency and productivity.

Our engineers will be pleased to advise you in regards to alternative fastening solutions, innovative developments or specific material requisitions. If the best solution for your application does not yet exist, we will develop it with you in order to ensure that it meets your unique needs. On the following pages, we present a selection of our products and their main benefits for specific applications. Of course, many of the products can also be used in numerous other applications.



One-stop shop

- Fasteners for train construction
- Fasteners for mechanical purposes



Engineered parts

- In-house engineering know-how
- International network of specialized partner companies



Optimal delivery conditions

- We are on the spot with more than 70 subsidiaries worldwide
- Short response and delivery times
- E-Shop for all catalog products



Own testing laboratories

- ISO/IEC 17025-accredited test laboratories in 10 countries around the world.
- Comprehensive mechanical, optical, geometric and chemical test methods



Professional consulting

- Comprehensive engineering services
- Customer trainings for fastening solutions



Smart Factory Logistics

- B- and C-part management
- IoT ready
- Smart, lean and reliable

Applications

Supply units (p. 6)



Railcar body (p. 8)



Energy supply (p. 16)

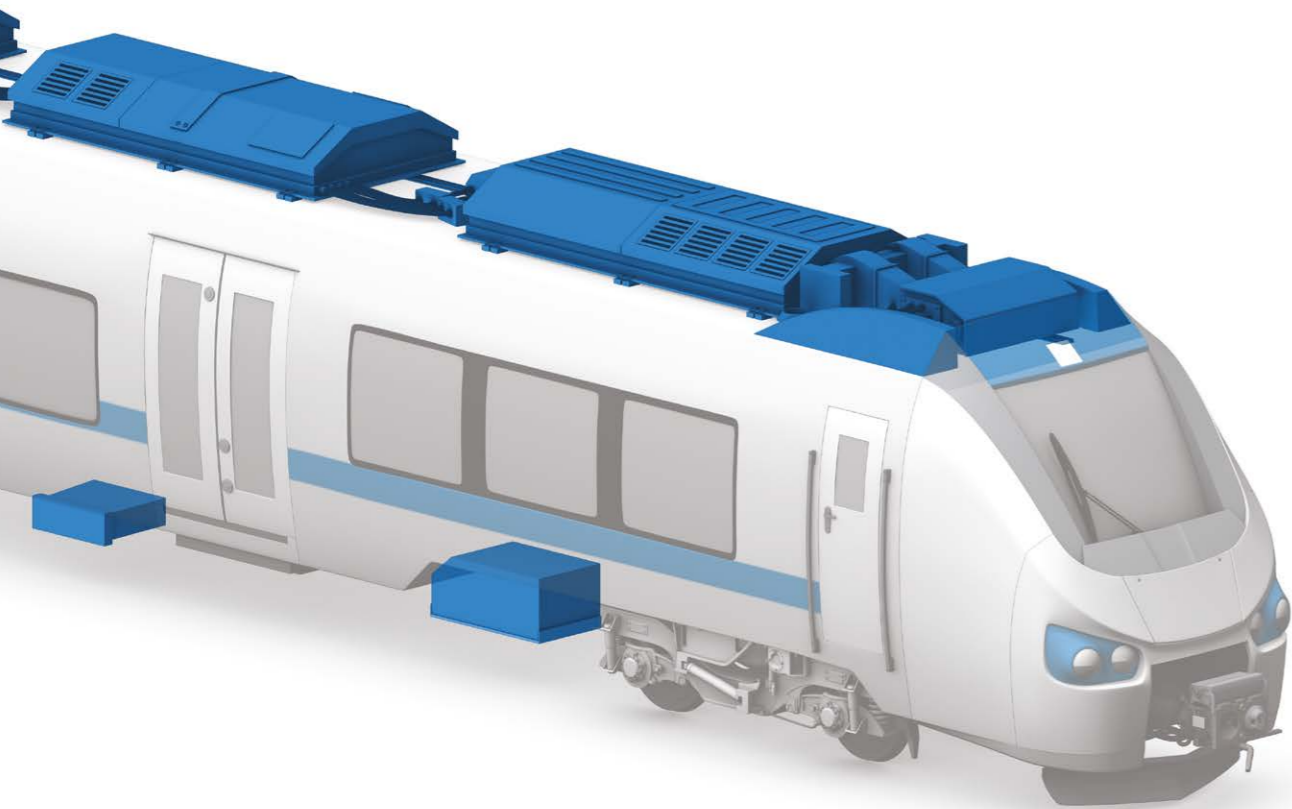


Bogie (p. 10)



Interior (p. 12)





SAFETY AND MAINTAINABILITY

Supply units

In this application, the comfort of the passengers as well as a fast accessibility for maintenance and inspection of the equipment are paramount.

The connecting elements must above all be:

- Quickly replaceable
- Captive
- Reusable for assembly and disassembly
- Suitable for easy and safe mounting

SUPPLY UNITS

CABLE GLANDS

Cable glands for safe mobility

- For highest demands on fire behavior
- Versions certified for the railway industry in brass and plastic
- Product range streamlining thanks to high sealing and clamping areas



COMPRESSION LATCHES

Designed for quick and safe installations

- Industry proven latches reduce maintenance costs
- Made of corrosion resistant steel
- Vibration-resistant closing mechanism



HOSE CLAMPS

Heavy-duty clamps for the most demanding assemblies

- Can be mounted without removing the hose
- Beveled edges protect the hose from damage
- High-strength bolt with captive nut and spacer system

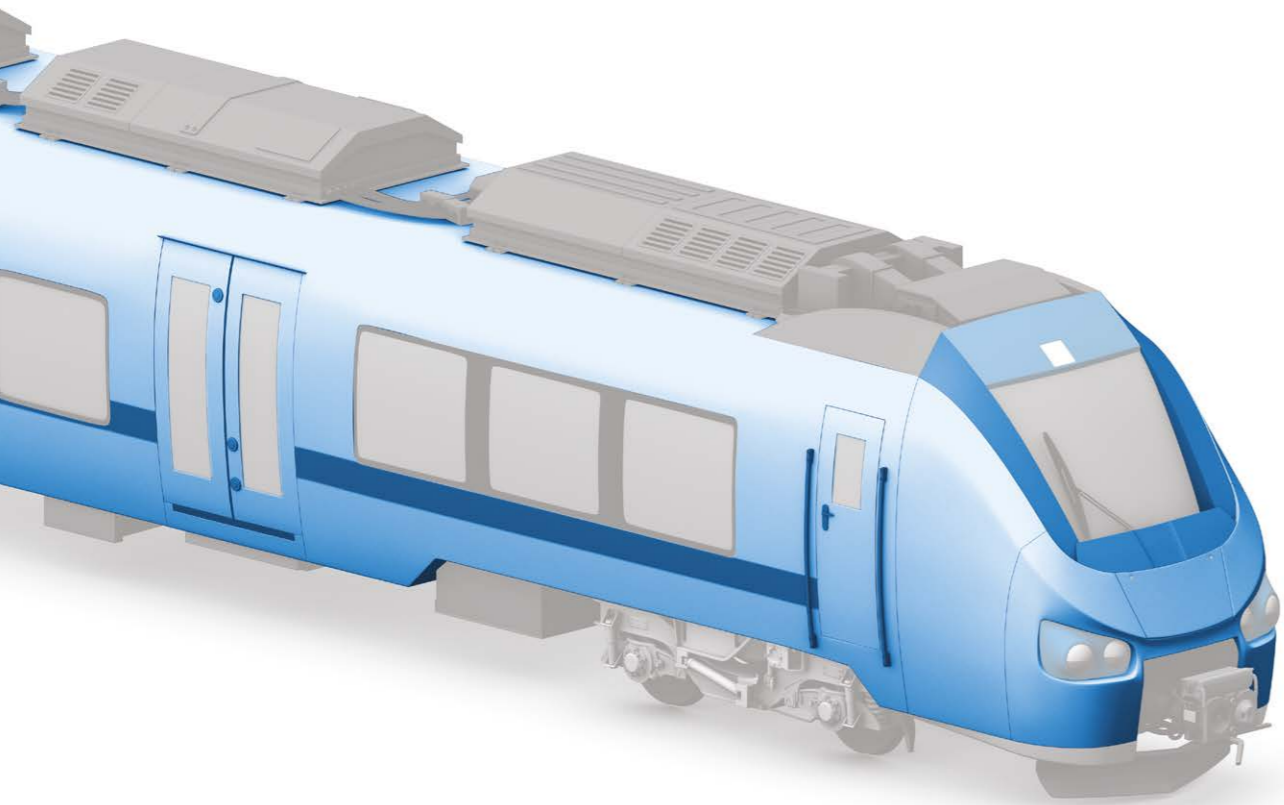


HIGH STRENGTH THREADED INSERTS

Prevent rotation due to torsion or vibration, even at the highest tightening torques

- Highly durable
- Repair of damaged threads
- Pre-assembled key locks eliminate rotation





QUICK AND EASY INSTALLATION

Railcar body

In this central application, structural stability and reliability are essential to guarantee passenger safety.

We therefore recommend fasteners that fulfil the following prerequisites:

- Easy to assemble and disassemble
- Made of high-strength materials
- High corrosion resistance
- Compliance with high safety standards

RAILCAR BODY

SLOTTED SELF LOCKING NUTS

Locking function for various applications in the train

- Very high temperature and corrosion resistance
- Retaining clamp load even under high temperature changes
- Vibration resistance under high dynamic stress
- Reusable



LOCK BOLTS

Permanent and vibration resistant mechanical fastening

- Fast and automatic installation process without retorque
- Visual installation indicator on collar ensures correct installation



GROUNDING STUDS

Bolts to discharge leakage current

- Permanent grounding connection on steel plate
- Easy and process reliable installation due to battery powered installation tool
- Above-average clamping range of stud

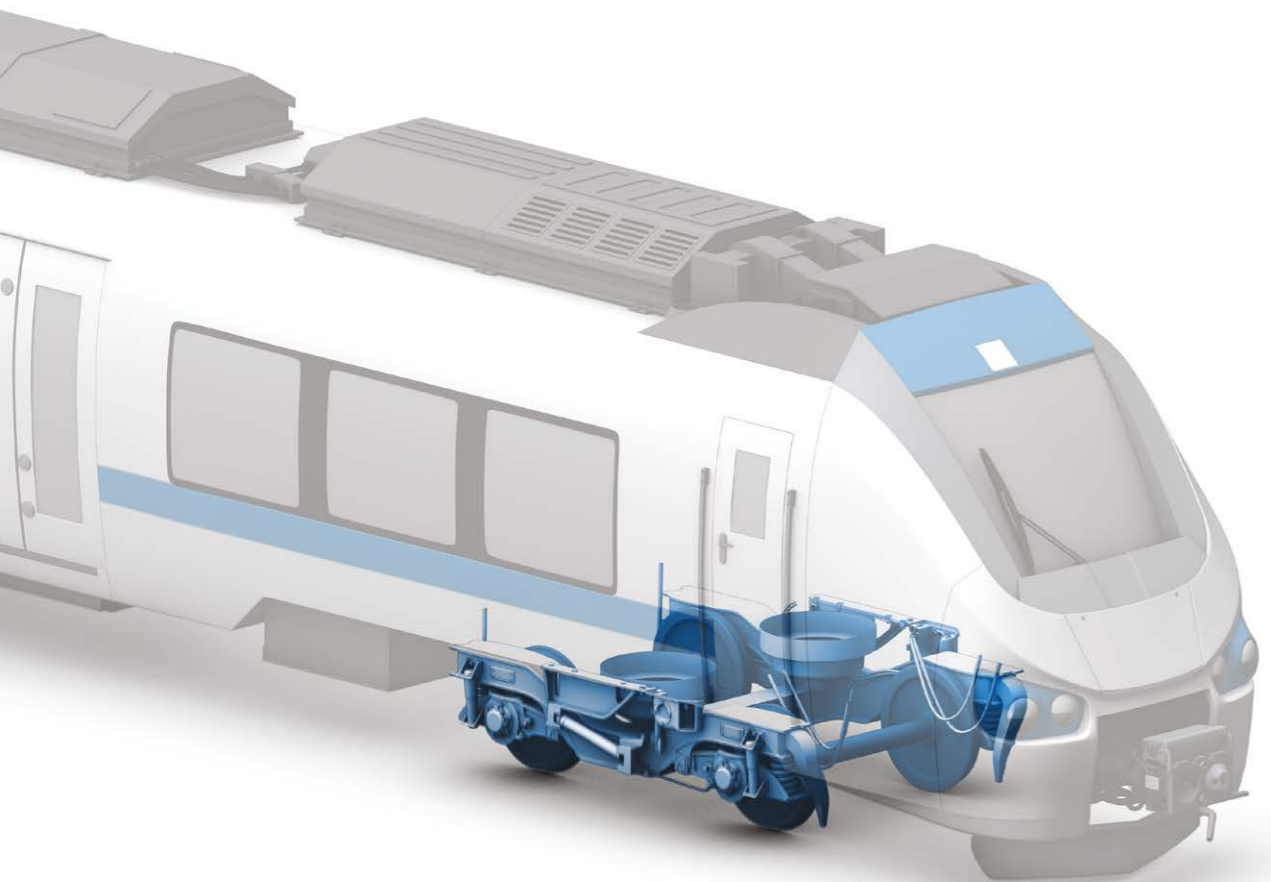


TENSIONER NUTS

Precise and economical mounting of large bolts and studs

- Simple and safe tightening of large size bolts through any hand tools
- Enormous clamping force available
- No thread galling
- Tightens stud/bolt in pure tension





STABILITY AND DURABILITY

Bogie

The bogie plays a vital role in the train. The main requirements on the bogie are operating reliability, maintainability and traveling comfort through suspension and damping.

Fasteners must above all be:

- Vibration-proof
- Corrosion resistant
- Resistant to extreme temperature changes
- Able to maintain clamp force of assembly

BOGIE

LOCK WASHERS

Securing through friction and mechanical locking

- Ribbed for higher vibration resistance
- No surface damage while tightening
- No loosening and minimal loss of pretension force
- Suitable for sensitive/coated surfaces



WEDGE LOCKING WASHERS

Self-locking through tension

- Quick and easy installation and dismantling
- High retention of the clamp load
- High vibration and corrosion resistance
- Maximum safety against loosening



HEX HEAD LOCKING SCREWS

Multifunctional screws with serrated flange

- Multifunctional, serrated washer integrated in flange
- Will not become loose or unscrew
- No risk of forgetting safety washers or using wrong orientation

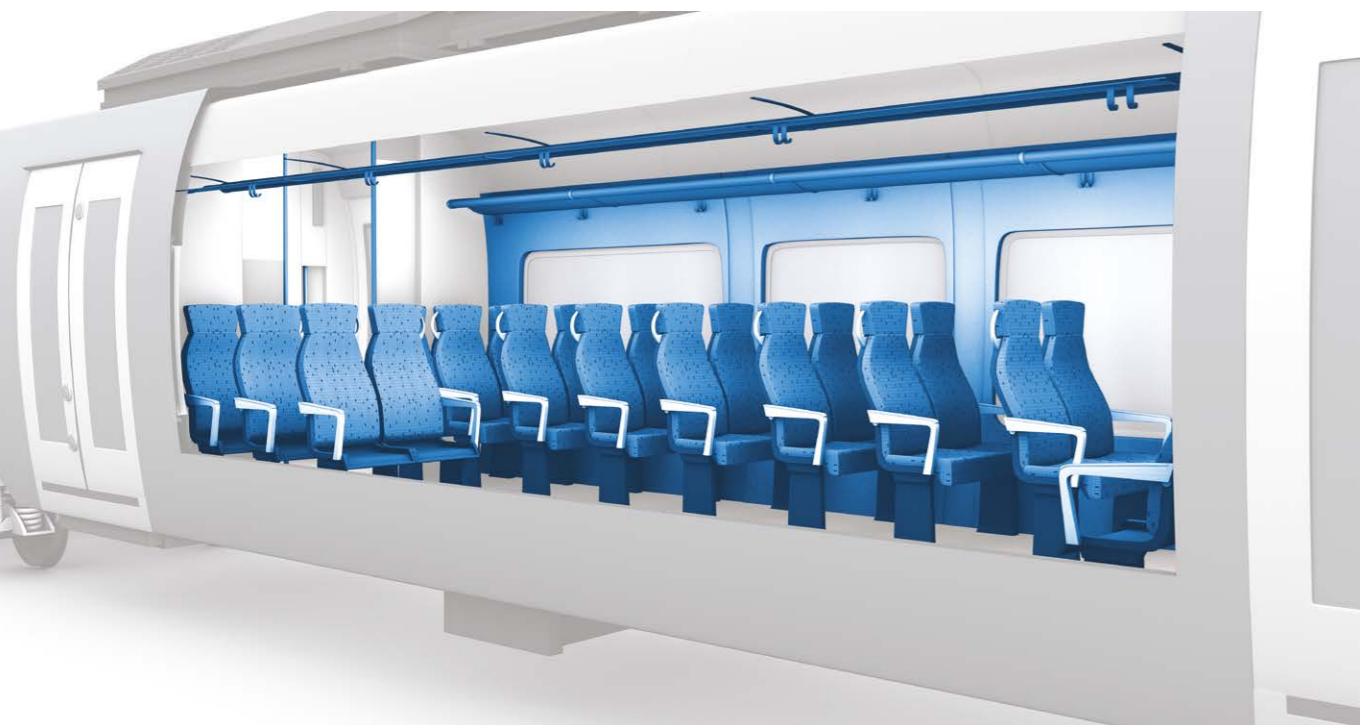


TENSION CONTROL BOLTS

Cost-efficient installation of high strength pre-loaded bolts

- Unique anti-corrosion protection that readily accepts paint
- Maintains consistent tension even under high vibration
- Safe tightening process due to high level of clamp load





FUNCTIONALITY AND DESIGN

Interior

Inside the train, the emphasis is on travel comfort and safety for the passenger. Luggage racks, grab poles, seats and folding tables must withstand daily stress.

We offer fasteners which:

- Can be used in various materials
- Meet high design and functionality requirements
- Are available in different color variations
- Meet the requirements for light construction

INTERIOR

HINGES

Long-lasting hinges for easy positioning of folding tables

- Constant resistance throughout the entire range of motion
- Hold mounted components securely at any desired angle
- Hinges are available in a wide variety of sizes, materials and torque ranges



FASTENERS FOR COMPOSITE MATERIALS

Reliable mounting in soft and composite materials

- Intelligent fasteners with high torque and tear out strength in soft materials
- Can be surface-mounted with adhesive or completely embedded
- Invisible integration into the application material



FASTENER FOR SANDWICH PANELS AND HONEYCOMB STRUCTURES

MultiMaterial Welding LiteWWeight® Double Pin

- Robust and versatile fixation
- Can be equipped with a clearance hole, a threaded hole, or a metallic insert
- Quick installation via ultrasound: <0.7 seconds
- Full integration in substrate



INTERIOR

FASTENER FOR POLYMERS AND COMPOSITE MATERIALS

MultiMaterial Welding InWVerse® Fastener

- Uses ultrasonic energy for strong connections in thermoplastic sheets
- Suitable for low wall-thicknesses without pre-holes or through-holes
- Fast processing time: 0.5 seconds
- Seamless installation with reliable form-locking connection



FASTENER FOR EFFICIENT AND RELIABLE CONNECTION IN FIBROUS COMPONENTS

MultiMaterial Welding LiteWWeight® Lotus

- High strength and deep integration in fibrous matrix
- Quick installation via ultrasound: ~1 second
- Invisible from the opposite side, even in thin materials
- Joins thin sheet metal to fibrous material without pre-drilled holes



THREADED INSERTS

Lightweight inserts with high pull-out strength

- Provide strong thread in thin materials
- Lightweight yet stable and durable
- Clean and chip-free female thread



FASTENERS FOR C-RAILS

For stable yet flexible mounting

- Can easily be shifted after mounting
- Cage nuts with tolerance compensation due to floating fit in cage
- T-bolts according to railway specifications (quality class and marking)
- Reusable



INTERIOR

HIGH STRENGTH BLIND RIVETS

Strong solution for structural assembly

- Perfect for high-tensile applications
- One fastener replaces up to four rivets
- One side access
- Big diameter rivet
- Durable and reliable fixation



CABLE TIE PLATES

Space-saving organization of wire bundles

- Used to secure closely spaced wire bundles
- Low profile design keeps bundle close to mounting surfaces



PAN HEAD SCREWS WITH FLANGE

Multifunctional screws with integrated washer in flange

- Can also be used in soft materials
- Available in different colors
- Optimal bearing area to cover large and elongated holes



NOTCHED SCREWS

Special screws to prevent manipulation

- Full range of dimension
- Protection from manipulation / vandalism through passenger
- Special tool necessary to screw in and out





SAFETY AND RELIABILITY

Energy supply

Fasteners in this application must meet the highest safety requirements. In addition to the safety of the connection itself, fire protection is a key requirement.

Thus, the main requirements on the fasteners are:

- Corrosion resistance
- Vibration resistance
- Fire protection

ENERGY SUPPLY

BARB CABLE TIES

Cable ties especially for railway applications

- Geometry guarantees maximum strength and safety, even in extreme applications
- Steel locking barb ensures stable and durable bonding
- Can be used wherever personal and asset protection have priority



WRAP SLEEVINGS

Facilitated bundling of pre-assembled cables

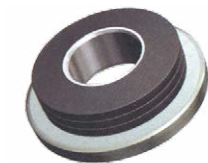
- Slotted, self-closing design allows easy draw-in of pre-assembled cables
- Suitable for subsequent installation
- Flame retardant / self extinguishing halogen-free material



RESILIENT CONICAL WASHERS

Optimal tension in the screws and bolted assembly

- No loosening due to crushing, material expansion, wear or vibration
- Compensate for thermal expansion in electric applications
- Available with a combined flat washer for time savings in assembly



COATINGS

Lubrication for higher process security and efficiency

- Exact and clearly defined lubrication
- Cannot be forgotten
- Technically resilient
- Safe and clean

Additional benefits of our coatings: decorative color, anti-friction, temperature and corrosion resistance





«Optimize your supply chain and your B- and C-part management with Bossard's innovative logistics solutions.»

SMART PROCESSES FOR HIGHER PRODUCTIVITY

Bossard Smart Factory Logistics

With innovative systems and solutions, we bring the Internet of Things to your factory and facilitate machine-to-machine communication. Focus on your core competence while we make your B- and C-parts management leaner and more transparent.

Systems

From the fully automated and flexible SmartBin to the informative SmartLabel with real-time information and to traditional Kanban systems: Your requirements determine our system.

- SmartBin Cloud
- SmartBin
- SmartLabel Cloud
- SmartLocker
- SmartCard
- Conventional Systems

Solutions

Focus on your core competence, knowing that your steady supply is guaranteed. Smart Factory Logistics Solutions are the key to smooth and seamless supply chain performance.

- Demand Management
- On-time Delivery
- Expert Support
- ARIMS
- Customizable Options

ARIMS

Supply chain collaborative platform: With an easy to use interface, intuitive features and highly intelligent analytics, ARIMS is the operation dashboard of Smart Factory Logistics. Engineered with the latest software technologies, it enables M2M Communication. It is time-tested and a proven technology.

- Integration of all suppliers
- Coordination of material flow
- Streamline supplier base
- ARIMS Analytics
- Coordination of information flow
- Single point of contact



ASSEMBLY TECHNOLOGY EXPERT

“Bossard Assembly Technology Expert helps our customers slash their time to market and cut costs by as much as 40 % or more.”

While companies constantly look for smarter ways to accelerate time to market for new products, production engineers and product designers are full of continuous innovation, process optimization and efficiency – factors that are key to gaining a competitive edge in the manufacturing business.

ASSEMBLY TECHNOLOGY EXPERT SERVICE MODEL

Six Expert Services

Assembly Technology Expert works with six differentiated services. Each part contributes to improving your productivity step by step.



Expert Walk

We take an in-depth look at your production facility. We examine all workstations and assembly lines. Our engineering experts study fasteners and tools you are using and determine how to proceed leaner and smarter.



Expert Assortment Analysis

To reduce your total cost of ownership, we streamline your bill of materials by identifying opportunities for fastener rationalization. We work with proven analytical processes, application audits and state-of-the-art methodologies and techniques.



Expert Education

We empower you to become an expert in the full range of assembly technologies. In our seminars and e-learning, you learn about the essentials and secrets of fastening, from novice level to mastery.



Expert Teardown

We disassemble your product and examine every inch of it. Focusing on the fasteners, their design, their functionality and their assembly procedure, we identify the best fastening solution and the cost-saving potential for you.



Expert Design

Having the right fastener at the right time at the right place is crucial for your success. We provide you with technical solutions and access to big data to find the most practical part for you.

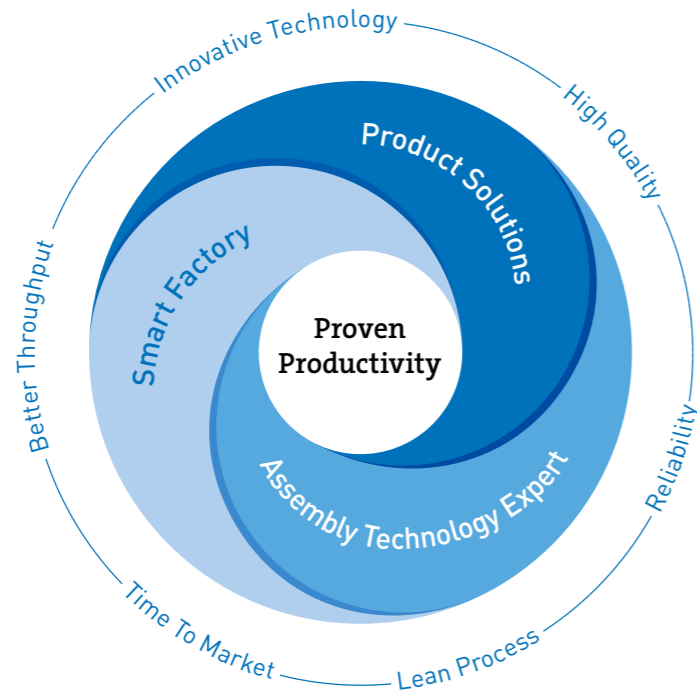


Expert Test Services

Bossard's test laboratories in Europe, America and Asia have cutting-edge measuring and testing equipment at their disposal. They guarantee that your manufacturing reliably meets quality requirements and that your production procedures are flawless.

PROVEN PRODUCTIVITY AND SUSTAINABILITY – A PROMISE TO OUR CUSTOMERS

The strategy for success



From years of cooperation with our customers we know what achieves proven and sustainable impact. We have identified what it takes to strengthen the competitiveness of our customers. Therefore we support our customers in three strategic core areas.

Firstly, when finding optimal **Product Solutions**, that is in the evaluation and use of the best fastening part for the particular function intended in our customers' products.

Second, our **Assembly Technology Expert** services deliver the smartest solutions for all possible fastening challenges. Our services cover from the moment our customers developing a new product, to

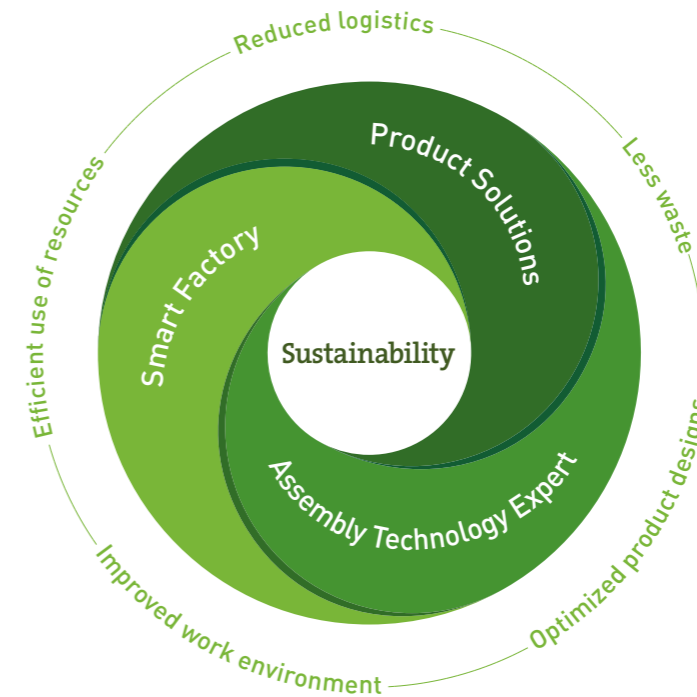
assembly process optimization as well as fastening technology education for our customers' employees.

And thirdly, optimising our clients' productions in a smart and lean way with **Smart Factory**, our methodology, with intelligent logistics systems and tailor-made solutions.

Understood as a promise to our customers, "Proven Productivity" contains two elements: Firstly, that it demonstrably works. And secondly, that it sustainably and measurably improves the productivity and competitiveness of our customers.

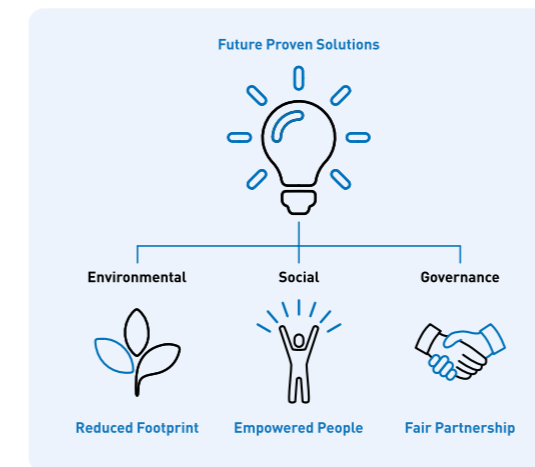
And this for us is a philosophy which motivates us every day to always be one step ahead.

"Together, we bring **Proven Productivity** and **Sustainability** to every assembly operation in the world!"



At Bossard, we are committed to Corporate Sustainability, and we follow the Environmental, Social and Governance ("ESG") principles in our daily business. We see ESG as a strategic, intrinsically motivated priority. While maintaining profitability, our business model accentuates environmental and social needs. We ensure that these principles are lived within Bossard and are shared by our leaders, suppliers, customers, business partners, and other stakeholders.

We have defined the following four focus areas:



- With **future proven solutions**, we want to create solutions that help our customers, our supply chain and ourselves to operate more sustainably, efficiently and fairly.
- In this respect, **reducing our footprint** is very important to us. We want to reduce our emissions, improve our waste management and packaging and use fewer resources with digitalization.
- Of course, we also **empower our employees** by creating a modern work structure, paying attention to diversity and inclusion as well as wellbeing and safety.
- In our focus area **Fair Partnership**, we support community engagement and the integrity of all our stakeholders.

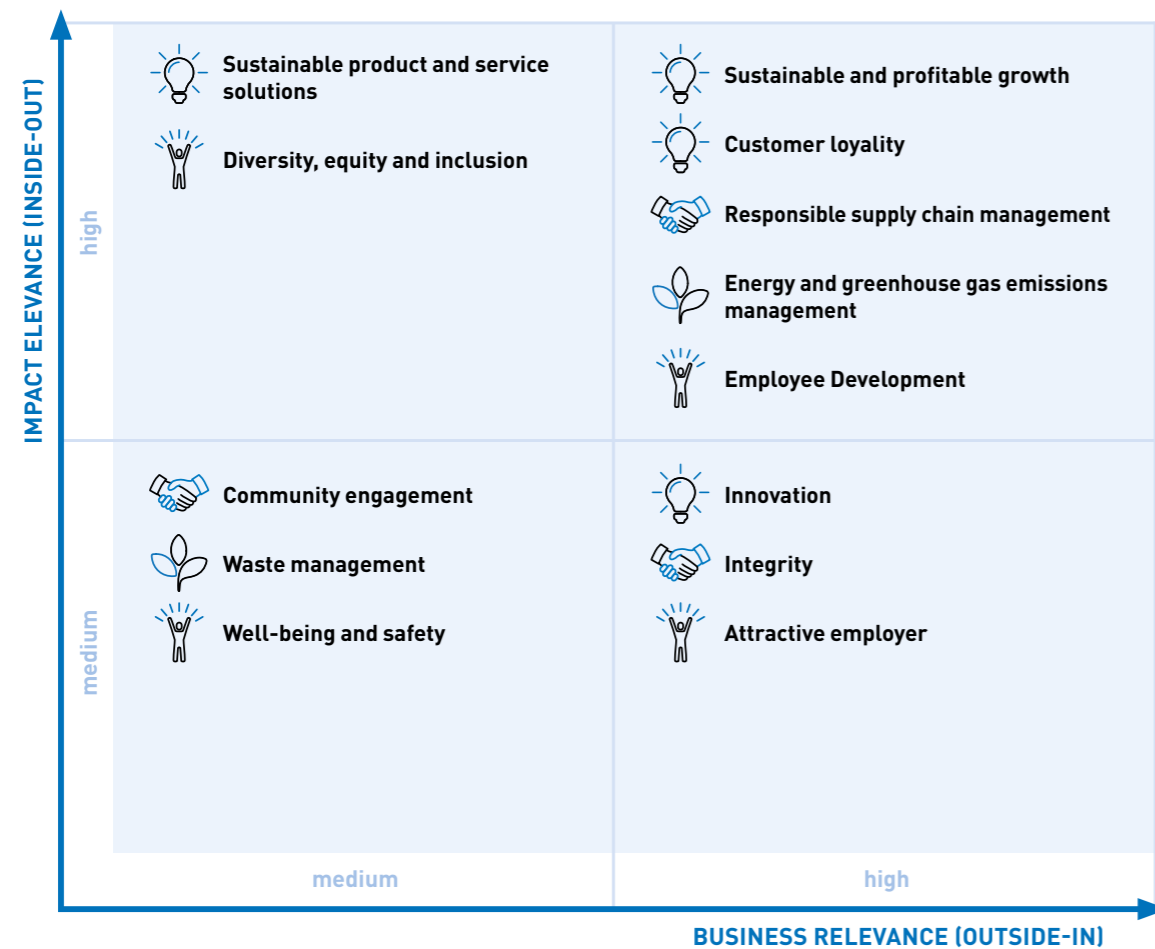
SUSTAINABILITY AT BOSSARD

Strategic foundations of sustainability

Bossard's products and services simplify and optimize processes across all fastening solutions. By targeting savings in materials, energy and production capacities, they are increasingly helping customers achieve their sustainability goals. Bossard also endeavors to be known and valued as a sustainable supplier through strategic sustainability efforts and transparent communication. Bossard's overarching sustainability ambitions are based on the United Nations Sustainable Development Goals (SDGs) and are in line with the ten principles of sustainable corporate leadership laid out in the United Nations Global Compact.

→ Watch the full report: [bossard-sustainability-2023.pdf](https://www.bossard.com/~/media/2023/04/Bossard-Sustainability-2023.pdf)

Materiality matrix



- Future Proven Solutions
- Reduced Footprint
- Empowered People
- Fair Partnership

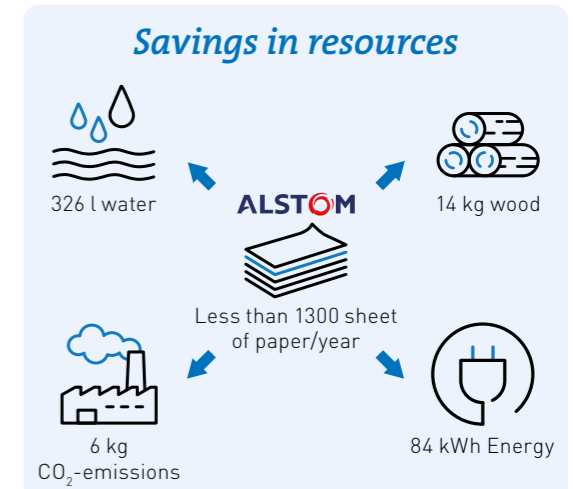
RAILWAY SUCESS STORIES SMART FACTORY LOGISTICS

A strong partner with ALSTOM

ALSTOM is a global leader in sustainable and green mobility solutions and is making a positive impact on the environment and resource efficiency in India. Smart Factory Logistic from Bossard ensures a smooth and seamless supply chain and thus does its part to conserve valuable resources.

- Automatic need recognition
- Reduced paper consumption
- Inventory transparency
- reduced transport routes

➔ After SFL implementation, ALSTOM saved approximately 1300 sheets of paper per year.



Source: <https://www.papiernetz.de/informationen/nachhaltigkeitsrechner/>

Reducing Carbon Emissions at POLMOR

With POLMOR India, a steel manufacturer for the railway and machine industry, Bossard Railway was consolidating the supply chain process with Smart Bin Solution. Smart Factory Logistics reduce the carbon footprint significantly and ensure that social responsibility and governmental topics are implemented in the supply chain.

As the Smart Factory value proposition analyses customer processes specifically and makes them overall more efficient and competitive, it eliminated 40% of invoicing paperwork by saving 28% of the paper used for purchase order handling. Further we could optimize the space by 20% for our

customer. The demand generation and the transparency of stock reduced manpower needs during Covid by saving manual stock count by 2 hours daily. Implementing digital transparency in the SFL process reduced person dependant tasks and stress significantly. At POLMOR this saved manual manpower up to 3 hours daily.

Further SFL real time data enables Bossard's collaboration with suppliers and customers across various departments and helps decision finding in up- or down streaming the supply chain process. Overall it reduces the carbon footprint and ensures that a green industry also has green supply chain.



MD Subba Rao
Polmor Steel Private Limited

“With SFL, we were able to consolidate the supply chain process and reduce the number of transactions. Bossard's SmartBin solution optimizes our orders, which means we need 20% less storage space. Overall, we have seen a productivity increase of over 40% in internal logistics and order management. In short, thanks to Bossard's SFL services, we remain competitive in the truest sense of the word!”

www.bossard.com