



RAILWAY **SHOCK** ABSORBERS

ENGINEERING HERITAGE SINCE 1872

THE
FUTURE
OF RAIL



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INTRODUCTION

Kárászy's engineering heritage dates back to 1872 and has evolved through generations of technical knowledge, practical experience and continuous development. Derived from Kárászy Suspension, the KARSUS name carries this heritage into railway damping technology.

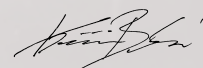
Today, KARSUS engineers and manufactures railway shock absorbers for a wide range of railway vehicles, including locomotives, multiple units, passenger coaches and other specialised rolling-stock applications. Application-specific product design, valve technology, calibration and testing are carried out in-house, keeping the key technical stages closely connected.

Each KARSUS shock absorber is created around the requirements of its specific application. Installation conditions, operating loads, required damping characteristics and technical specifications are evaluated together from the outset, allowing each configuration to be precisely matched to the vehicle and its operating environment.

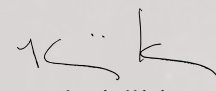
Our manufacturing capabilities extend from individual custom units to series production. Controlled processes, dedicated testing and no minimum order quantity provide the flexibility to support both unique technical requirements and larger production programmes.

Research, testing and continuous improvement are integral to our work. Long service life, maintainability and lifecycle performance are considered from the earliest stages, while maintenance and renewal services support continued operation throughout the product lifecycle.

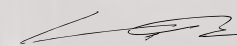
KARSUS railway shock absorber solutions are supplied to partners across Europe, Asia, Africa and the Americas, combining technical expertise, flexible manufacturing and application-specific engineering to meet the requirements of modern rail transport.



Balázs Kárászy



István Kárászy



Bálint Kárászy



HISTORY

TAILOR-MADE SAFETY.
ENGINEERED BY KÁRÁSZY.



1872

THE BEGINNING

István Kárászy, founder of the company, laid the foundations of the family business in the vehicle industry through the manufacture of horse-drawn carriages. The first official trade licence was issued by the Hungarian authorities in 1874.



1960

SHOCK ABSORBER EXPERTISE

The Kárászy brothers began refurbishing shock absorbers, establishing specialised technical expertise that would support the company's development in the decades to come.



2000

RAILWAY SERIES PRODUCTION

Kárászy expanded into railway applications with the development of service, renewal and recycling technologies for railway shock absorbers, establishing the technical foundation for a dedicated railway division and future cooperation with Hungarian State Railways (MÁV).



2008

RAILWAY SERIES PRODUCTION

Series production of railway shock absorbers was launched under the KÁRÁSZY brand, addressing a broad range of railway requirements.



2018

THE KARSUS BRAND

The KARSUS name was established following the development and testing of a comprehensive railway shock absorber portfolio comprising seven distinct product series.



2021

IRIS CERTIFICATION

Kárászy achieved ISO/TS 22163 (IRIS) certification, further strengthening its quality management standards for the railway industry.



2026

A NEW GENERATION OF RAILWAY SOLUTIONS

Building on expanded manufacturing capabilities and the new production facility completed in 2024, KARSUS enters a new phase with a broader railway shock absorber portfolio for diverse vehicle and bogie requirements, while continuing to strengthen its presence across international rail markets.

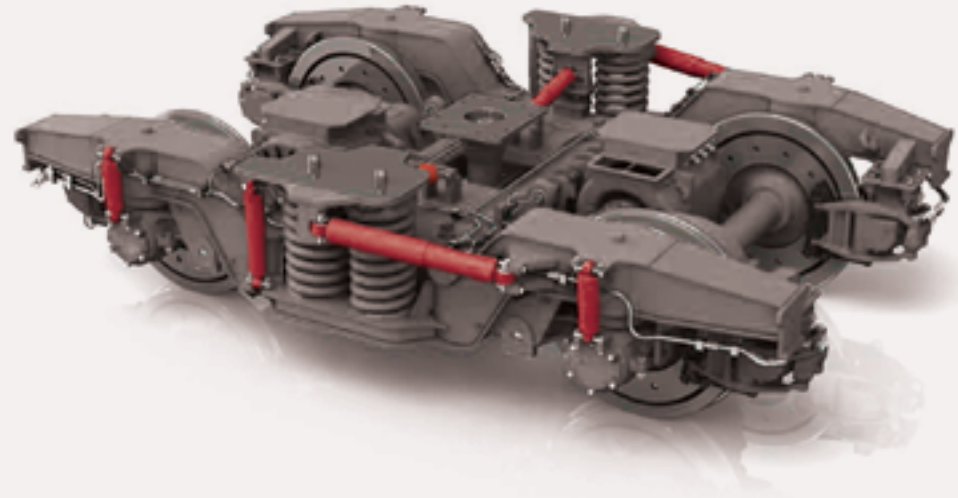
PRODUCT RANGE & ENGINEERING

KARSUS RAILWAY SHOCK ABSORBERS ARE DEVELOPED FOR A BROAD RANGE OF BOGIE APPLICATIONS:

BOGIE APPLICATIONS

- Primary damping
- Secondary vertical damping
- Secondary horizontal damping
- Horizontal yaw damping

Each railway application presents its own technical constraints. Restricted installation space, demanding operating environments, high dynamic loads and horizontal mounting positions require different approaches to damper configuration and integration.



DESIGN & ENGINEERING

Different vehicle and bogie configurations require different damping characteristics, installation geometries and mounting solutions. **These parameters are considered together to define the appropriate damper configuration for each bogie application.**

A broad range of mounting components and interfaces supports integration across different vehicle specifications and installation conditions.

PRODUCT SERIES

K146
YAW CONTROL
20 KN AT 0.1 m/s
HORIZONTAL INSTALLATION
HIGH-SPEED APPLICATIONS

K147
PRIMARY & SECONDARY DAMPING
INCREASED OIL VOLUME
THERMAL STABILITY
HIGH-SPEED APPLICATIONS

K148
TRAM · METRO · LIGHT RAIL
COMPACT & LIGHTWEIGHT
LOW-FLOOR BOGIE INTEGRATION
SPACE-EFFICIENT DESIGN

WHY KARSUS?

- ◎ PRECISION ENGINEERING
- ◎ NO MINIMUM ORDER QUANTITY
- ◎ DESIGNED FOR LONG SERVICE LIFE
- ◎ TAILOR-MADE SAFETY



FROM A SINGLE UNIT TO SERIES PRODUCTION
KARSUS combines engineering flexibility with controlled manufacturing to support application-specific railway requirements at different production volumes.

YAW CONTROL FOR HIGH-SPEED RAIL

THE K146 SERIES

Developed for high-speed railway applications, the K146 series provides controlled lateral damping between the bogie and car body, contributing to vehicle stability under demanding operating conditions. Its robust architecture, high damping capacity and horizontal installation capability make it particularly well suited to yaw-control applications.

At higher speeds, the dynamic interaction between the wheelsets, bogie and track can generate lateral oscillations that affect vehicle stability. Installed between the bogie and car body, the K146 mitigates these movements through precisely defined damping characteristics, contributing to stable running behaviour and passenger comfort.

The valve-controlled architecture of the K146 provides a broad damping-force adjustment range and **controlled damping characteristics in both directions of movement**.

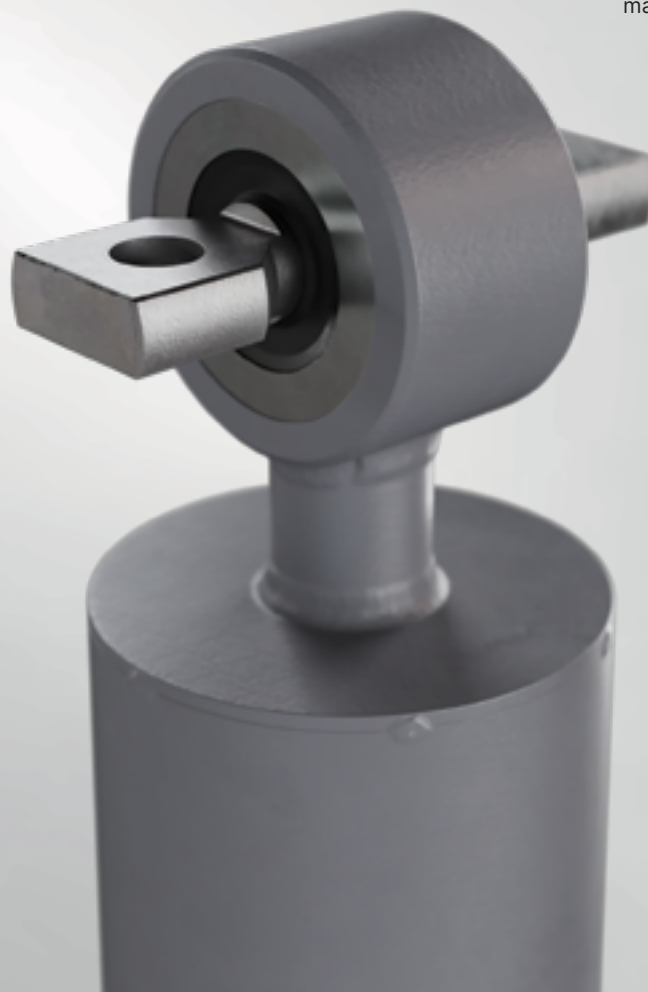
In addition to yaw-control applications, the series can be configured for inter-car damping and other railway installations requiring high damping forces.

KEY FEATURES

- Robust construction for high damping-force applications
- Mounting components engineered for wide angular movement
- Broad damping-force adjustment range
- Controlled damping characteristics in both directions
- Horizontal installation capability
- Application-specific KARSUS valve design
- Serviceable construction with replaceable wear components
- No metal-to-metal contact between friction elements

ENGINEERED FOR LONG SERVICE LIFE

The K146 is engineered for reliable long-term operation under demanding dynamic loads. Replaceable wear components and a design that prevents direct metallic contact between friction elements support efficient maintenance, refurbishment and continued reliable operation throughout the product's service life.



TECHNICAL SPECIFICATIONS

- Maximum damping force at 0.1 m/s: 20 kN
- Dust protector tube diameter: Ø110 mm
- Shock absorber housing diameter: Ø100 mm

INTERCITY & HIGH-SPEED DAMPING



THE K147 SERIES

TECHNICAL SPECIFICATIONS

- Maximum damping force at 0.1 m/s: 10 kN
- Dust protector tube diameter: Ø90 mm
- Shock absorber housing diameter: Ø 80mm

PRIMARY AND SECONDARY VERTICAL / HORIZONTAL DAMPERS

Developed for intercity and high-speed railway applications, the K147 series provides controlled damping for primary and secondary suspension systems operating under sustained dynamic loads. Its valve-controlled architecture, broad damping-force adjustment range and increased oil volume support **consistent damping characteristics during prolonged operation**.

As operating speeds increase, track irregularities, changing vehicle loads and continuously varying dynamic forces place greater demands on suspension systems. The K147 is designed to maintain controlled damping behaviour under these conditions, contributing to **vehicle stability and effective suspension control over extended operating periods**.

The K147 series was developed in parallel with the K146 series. While the K146 was designed for yaw-control applications, the K147 was developed specifically to attenuate oscillations within primary and secondary suspension systems. Its valve architecture allows **independent damping adjustment in both directions**, supporting precise tuning for different suspension layouts and operating requirements.

KEY FEATURES

- Broad damping-force adjustment range
- Independent damping adjustment in both directions
- Designed for primary and secondary vertical / horizontal damping applications
- Application-specific KARSUS valve design
- Increased oil volume for improved thermal stability
- Dual dust protection
- No metal-to-metal contact between friction elements

ENGINEERED FOR CONSISTENT PERFORMANCE

The increased oil volume of the K147 helps reduce temperature rise during prolonged operation, supporting stable damping characteristics over extended duty cycles. Combined with dual dust protection and a design that avoids direct metallic contact between friction elements, the K147 supports reliable long-term performance in demanding intercity and high-speed railway applications.

URBAN RAIL SHOCK ABSORBER SOLUTIONS

THE K148 SERIES

Developed for tram, metro and light rail applications, the K148 series combines compact dimensions, low mass and adjustable damping characteristics in a design optimized for urban rail vehicles. Its space-efficient architecture makes it particularly well suited to low-floor bogies and other installations where available space is limited.

Urban rail vehicles operate under demanding conditions shaped by frequent acceleration and braking, varying passenger loads and restricted installation space. The K148 is designed to maintain **controlled damping behaviour under intensive urban operating conditions**.

Building on the proven valve architecture of the K147, the K148 uses a more compact configuration developed specifically for urban rail applications. Its valve architecture allows **independent damping adjustment in both directions**, supporting precise tuning for different vehicle layouts and operating requirements.

KEY FEATURES

- Broad damping-force adjustment range
- Independent adjustment in both damping directions
- Developed for tram, metro and light rail applications
- Compact and lightweight construction
- Optimized for low-floor bogie installations
- Application-specific KARSUS valve design
- No metal-to-metal contact between friction elements
- Serviceable construction with replaceable wear components

ENGINEERED FOR COMPACT PERFORMANCE

The compact architecture of the K148 supports integration into space-constrained bogie installations while maintaining reliable damping performance.

Reduced installation volume and mass make the series particularly suitable for modern urban railway vehicles where packaging efficiency is a key design requirement.

TECHNICAL SPECIFICATIONS

- Maximum damping force at 0.1 m/s: 6 kN up to 10 kN
- Dust protector tube diameter: Ø80 mm
- Shock absorber housing diameter: Ø70 mm

TRAM · METRO · LIGHT RAIL
COMPACT & LIGHTWEIGHT
LOW-FLOOR BOGIE INTEGRATION
SPACE-EFFICIENT DESIGN

TECHNICAL DESCRIPTION

PRODUCT IDENTIFICATION SYSTEM

KARSUS shock absorbers are identified according to a standardized marking system, providing clear product identification and traceability throughout their service life. The alphanumeric product code identifies the main configuration parameters of each shock absorber, including product series, application type, stroke, damping-force designation and mounting type.

SERIES	APPLICATION TYPE	STROKE [mm]	DAMPING FORCE AT REBOUND [$\times 100$ N]	DAMPING FORCE AT BUMP [$\times 100$ N]	MOUNTING TYPE
K147	V	161	20	20	D
K146 K147 K148	V-Vertical H-Horizontal Y-Yaw	Size-dependent parameter	Velocity-dependent parameter	Velocity-dependent parameter	A- Eye / Eye B- Pin / Pin C- Pin / Eye or Eye / PIN D- Special

LABEL ON DUST PROTECTOR TUBE
Series number



ENGRAVING ON THE HOUSING

KARSUS

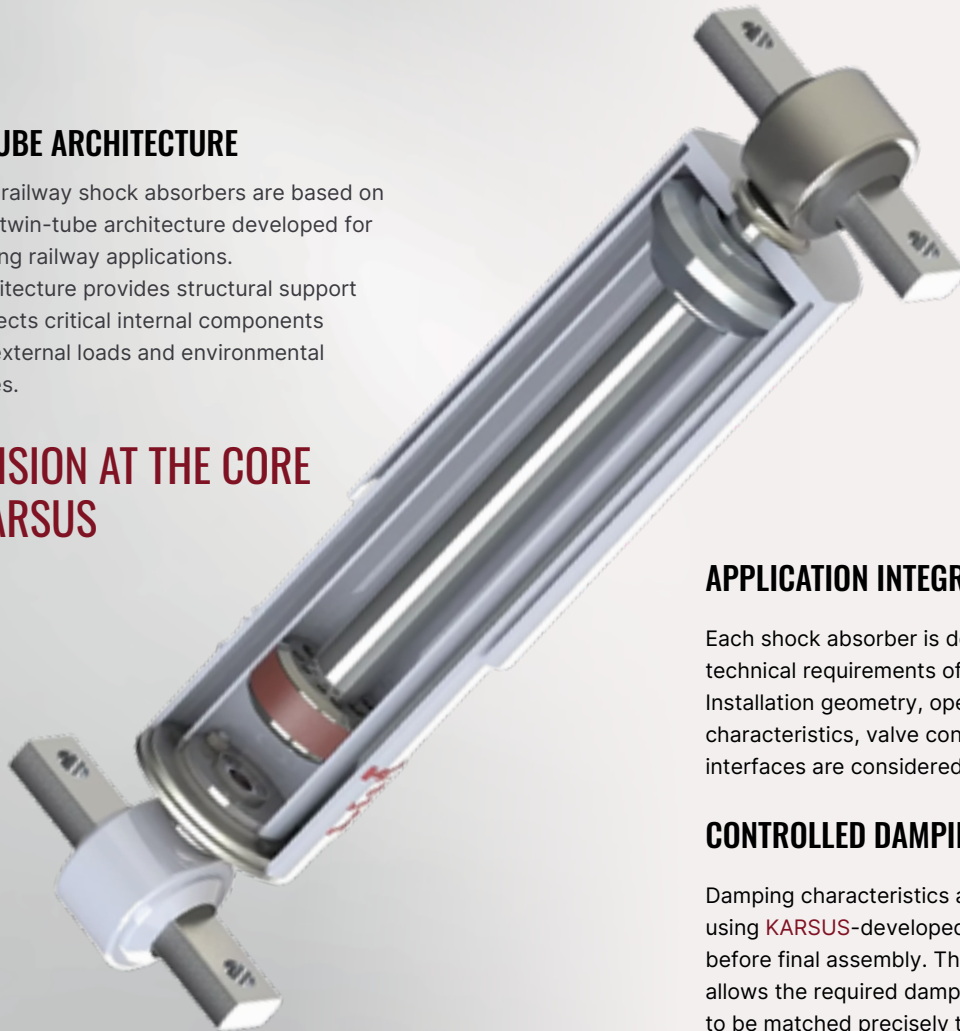
MADE IN HUNGARY

CONSTRUCTION & ENGINEERING

TWIN-TUBE ARCHITECTURE

KARSUS railway shock absorbers are based on a robust twin-tube architecture developed for demanding railway applications. The architecture provides structural support and protects critical internal components against external loads and environmental influences.

PRECISION AT THE CORE OF KARSUS

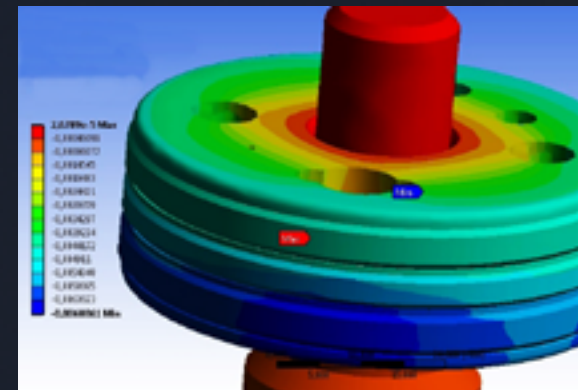
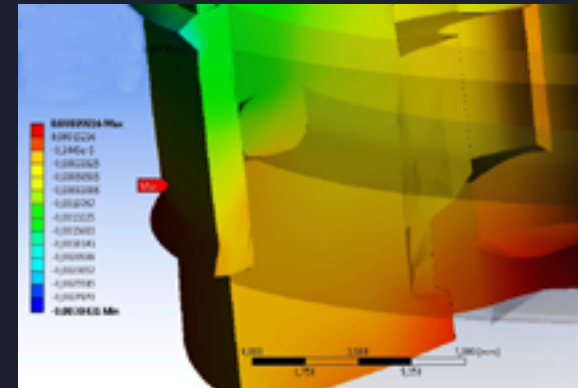
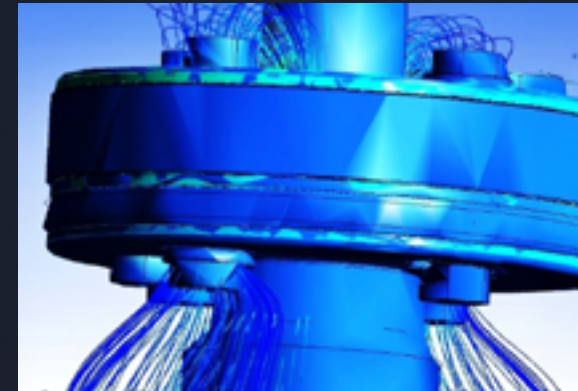


APPLICATION INTEGRATION

Each shock absorber is developed around the technical requirements of its intended application. Installation geometry, operating loads, damping characteristics, valve configuration and mounting interfaces are considered as an integrated system.

CONTROLLED DAMPING CHARACTERISTICS

Damping characteristics are individually adjusted using KARSUS-developed calibration equipment before final assembly. This controlled process allows the required damping parameters to be matched precisely to the defined technical specification.





QUALITY ASSURANCE

DEFINED FROM THE START

Every KARSUS project begins with an approved technical specification. Installation conditions, operating loads and required damping characteristics establish the baseline for production and validation

CONTROLLED THROUGH PRODUCTION

Materials, components, assembly and manufacturing processes are managed through defined quality procedures. These standards apply consistently across all production volumes.

PERFORMANCE, MEASURED

Every KARSUS shock absorber undergoes dynamic testing. Damping characteristics are measured and verified against the approved technical specification using dedicated in-house testing equipment.

VERIFIED BEFORE RELEASE

Production data and test results are reviewed prior to delivery. Only shock absorbers meeting the approved criteria are released for service.

CERTIFICATIONS & COMPLIANCE

RESEARCH & DEVELOPMENT

ENGINEERING FOR THE FUTURE OF RAIL

Every KARSUS development starts with the vehicle and the required suspension behaviour. These objectives are translated into measurable damping targets and defined design parameters.

FROM CONCEPT TO VALIDATED PERFORMANCE

Concepts are refined through analysis, prototyping, calibration and controlled testing. Measured performance data guides the process and verifies the required damping characteristics before production.

SUPPORTING THE NEXT GENERATION

KARSUS provides students from local (Budapest University of Technology and Economics -BME) and international universities with hands-on industry experience within our development and manufacturing environment. This connects academic knowledge with practical engineering and supports the next generation of railway engineers.



DEVELOPMENT FOCUS

- VALVE TECHNOLOGY
- DAMPING CHARACTERISTICS
- VEHICLE INTEGRATION
- ENGINEERING ANALYSIS
- PROTOTYPING
- TESTING & CALIBRATION

SUSTAINABLE ENGINEERING

LIFECYCLE MANAGEMENT BY DESIGN

KARSUS shock absorbers are engineered for long-term serviceability. Replaceable wear components, defined maintenance procedures and the ability to restore damping characteristics to specification support efficient lifecycle management and extend operational life.

Maintenance and renewal measures support continued operation throughout the product lifecycle. Each unit is assessed according to its technical condition and application requirements, allowing the appropriate scope of service work to be defined.

Following component replacement where required, recalibration and technical verification, the shock absorber can be returned to service with its specified damping characteristics restored.

**LONGER SERVICE LIFE.
FEWER COMPLETE REPLACEMENTS.
LOWER LIFECYCLE COSTS.
MORE VALUE RETAINED IN EVERY UNIT.**



MANUFACTURING CAPABILITIES

CONTRACT & PRIVATE-LABEL PRODUCTION

KARSUS develops and manufactures application-specific and private-label shock absorbers, with product configuration, documentation and branding aligned to the agreed specification.



FROM ONE UNIT TO SERIES PRODUCTION

KARSUS supports individual units, prototypes, small batches and series production, with no minimum order quantity.



KARSUS
TAILOR-MADE SAFETY.
WORLDWIDE.

GLOBAL PRESENCE

ENGINEERED IN HUNGARY.
TRUSTED ACROSS RAIL MARKETS **WORLDWIDE.**

KARSUS railway shock absorbers are supplied to railway operators, vehicle manufacturers and industrial partners across international rail markets.

SELECTED REFERENCES

- HUNGARIAN STATE RAILWAYS (MÁV)
- GANZ HOLDING · BKV · STADLER
- GYSEV · LINSINGER · SOFTRONIC
- DIESEL LOKO DISTRIBUTION · BOZANKAYA
- MAGYAR VAGON · SMH RAIL · UNISOURCE
- ETSP CZ · CONSTANTIN GRUP
- TRANSFEROVIAR GRUP

DIFFERENT MARKETS. DIFFERENT VEHICLES. ONE ENGINEERING STANDARD.



KÁRÁSZY HERITAGE

**MORE THAN 150 YEARS
OF ENGINEERING CONTINUITY**

Since 1872, Kárász has built its engineering knowledge through generations of practical work, manufacturing and technical development. Today, this experience continues through István Kárászi, Balázs Kárászi and Bálint Kárászi, carrying long-standing technical knowledge forward within a modern engineering and manufacturing environment.





LEADERSHIP STATEMENT

ENGINEERING IS A RESPONSIBILITY
WE CARRY FORWARD

“

Rail transport continues to evolve, bringing new requirements for vehicle dynamics, lifecycle performance and technical integration.

At KARSUS, we develop railway shock absorbers around the specific requirements of each application. Keeping development, manufacturing, testing and quality closely connected allows us to maintain direct control over the technical process while responding to new vehicle concepts, operating conditions and project requirements.

Continuous development is part of how we move the company forward. We build on proven technical **expertise** while advancing the methods, technologies and capabilities behind our products.

Our direction is clear: retain what has proven its value, advance what can be improved, and develop damping solutions for the next generation of rail vehicles.

Balázs Kárászi
CEO



**WE STAND BEHIND EVERY PRODUCT
THAT CARRIES OUR NAME.**

**A NAME IS ONLY AS STRONG
AS WHAT STANDS BEHIND IT.**

A KARSUS product represents more than a technical specification. It is the result of engineering judgement, disciplined execution and clear accountability at every stage.

YOUR APPLICATION. **OUR FOCUS.**

EVERY RAILWAY PROJECT STARTS WITH A SPECIFIC REQUIREMENT.
DEFINE THE REQUIREMENT. WE ENGINEER THE SOLUTION AROUND IT.



DISCUSS YOUR PROJECT WITH KARSUS

[KARSUS.COM](https://www.karsus.com)



TAILOR-MADE SAFETY FOR THE FUTURE OF RAIL

ENGINEERING HERITAGE SINCE 1872

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