Agenda

- Introduction
- Key Company Highlights
- Rail Vehicle Systems (RVS)
- Commercial Vehicle Systems (CVS)
- R&D Focus
- Financials
- Sustainability
- Capital Markets Summary
- Appendix
The Knorr-Bremse leadership team

Frank Weber
CFO & Executive Board Spokesman
- 2020-present: Knorr-Bremse | CFO
- 2016-2020: Daimler AG | Head of Corporate Development
- 2019-2020: Mercedes-Benz AG | Head of Transformation
- 2013-2016: Daimler Trucks Asia | CFO
- 2011-2013: Mitsubishi Fuso Trucks & Bus Corporation | CFO
- Diploma in Bus. Administration

Professional Experience 25
Years with Knorr-Bremse 2

Dr. Claudia Mayfeld
Member of the Board, Integrity & Legal
- 2021-present: Knorr-Bremse | Head of Integrity & Legal
- 2013-2019: RWE Pensionsfond | Member of the Executive Board
- 2016-2020: Innogy SE | Senior Vice President Group Legal & Compliance, General Counsel
- 2013-2016: RWE AG | Senior Vice President Group Legal & Compliance, General Counsel
- PhD in Accounting Principles

Professional Experience 28
Years with Knorr-Bremse 1

Bernd Spies
Member of the Board, CVS
- 2022-present: Knorr-Bremse | Head of CVS
- 2014-2022: Knorr-Bremse | Member (2013-2015) and Chairman (since 2014) of the Management Board, CVS
- 2008-2013: Hella KGaA Hueck & Co | Member of the Management Board, Global Sales
- 2006-2008: Robert Bosch GmbH | Head of Commercial Vehicles product division, Starters and Alternators
- Diploma in Electrical Engineering

Professional Experience 28
Years with Knorr-Bremse 8

Dr. Jürgen Wilder
Member of the Board, RVS
- 2018-present: Knorr-Bremse | Head of RVS
- 2015-2017: DB Cargo AG | CEO
- 2013-2015: Siemens AG | CEO Mainline Transportation Global Business Unit
- 2011-2013: Siemens AG | Head of Strategy Infrastructure and Cities Sector
- PhD in Physics

Professional Experience 21
Years with Knorr-Bremse 4

Notes: RVS - Rail Vehicle Systems; CVS - Commercial Vehicle Systems
Knorr-Bremse – One of Germany’s most successful industrial companies

2021 Key financials

- Sales: €6.7bn (>9% CAGR\(^1\) since 1989)
- op. EBITDA: €1.2bn (margin 17.9%)
- op. EBIT: €0.9bn (margin 13.5%)
- R&D: €431m (~6.4% of sales)
- Aftermarket: ~36% of sales

Balanced portfolio\(^2\)...

- RVS: 49% Sales, 59% EBITDA (22% Margin)
- CVS: 51% Sales, 41% EBITDA (15% Margin)

... and diversified global footprint with high local content

- RVS – Rail Vehicle Systems; CVS – Commercial Vehicle Systems; 1) CAGR 1989–2019 based on German GAAP (HGB); 1989 – first year when consolidated accounts are available; 2) Excluding consolidation/other; 3) Including human resources leased staff; Source: Knorr-Bremse information

Notes: Sales, EBITDA, EBIT, and EBIT for 2020 based on annual report prepared in accordance with IFRS; other financial figures for 2020 prepared in accordance with German GAAP (HGB); Aftermarket share based on German GAAP (HGB) where BilRUG sales allocated proportionally between OE and aftermarket; RVS – Rail Vehicle Systems; CVS – Commercial Vehicle Systems; 1) CAGR 1989–2019 based on German GAAP (HGB); 1989 – first year when consolidated accounts are available; 2) Excluding consolidation/other; 3) Including human resources leased staff; Source: Knorr-Bremse information
Over 30 years of consistent strong growth

1985
Management buyout by Mr. Thiele

1985-1990
Successful strategy: Globalisation, focus on RVS and CVS, growth in connected systems

1991
Dawn of the ICE era with high-speed braking systems

1995-1996
Rise of ADB technology

1999
Joint Venture with Bosch in Electronics

2000
Bendix integrates Westinghouse Air Brake company

2002
100% acquisition of Bendix in the US

2006
4 Joint Ventures in Rail formed in China

2015/18
Joint Venture with DongFeng Motor goes into operation & expansion 2018

2015/16
7 acquisitions

2016
New state-of-the-art innovation and testing centre in Munich

2019
Strategic investment in RailVision & RailNova as well as acquisition of Snyder & Sentient

2020
Acquisition of RH. Sheppard Co., Inc. in the U.S

2021
Acquisition of EVAC

2022
Investment in Nexxiot

2022
Investment in Cojali

>9% sales CAGR
1985\(^1\)-2021

Notes: 1986-2016 based on financial statements prepared in accordance with German GAAP (HGB) and 2017-2019 based on financial statements prepared in accordance with IFRS. 1) 1989 – first year when consolidated accounts are available

Sales (€bn)  Important corporate events  Product innovation  M&A / Strategic partnerships


Fact Book 5
Corporate values

Entrepreneurship
- Knorr-Bremse regards challenges as opportunities for generating long-term, profitable growth

Passion
- We are passionate about what we do

Reliability
- Safety is the basis for everything we do – and we do not compromise on this

Responsibility
- As a globally operating company Knorr-Bremse incorporates a workforce with a wide range of cultures and strengths

Technological Excellence
- Knorr-Bremse stands for technological expertise and competence in all company divisions
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Global market leader in rail and truck

1) In 2020
2) 1989-2019

Market leadership

A global market leader
~50% market share\(^1\) in RVS brakes
~23% market share\(^1\) in CVS brakes

Market outperformance

Track record of above industry growth: 10% historic revenue CAGR\(^2\)

Innovation edge

Shaping industry trends by focusing on safety and mission critical applications

High safety requirements

Key supplier with global core technology know-how and capabilities
Clearly ahead in global homologation processes

Sustainability is part of our DNA

Our technologies are the foundation for sustainable and safe transportation

Profitability

Ø EBIT margin of ~14%
Focus on attractive rail and truck end markets

Resilience

36% aftermarket share\(^1\)
Well-balanced portfolio
Cost-efficient operations

1) In 2020  2) 1989-2019
Global #1 – Leading supplier of safety-critical rail and commercial vehicle systems

RVS offering (2021: 49% of sales, 59% of EBITDA)
- Brake systems
- Entrance systems
- HVAC\(^1\)
- Train Control Management Systems
- LRV\(^2\) traction systems

CVS offering (2021: 51% of sales, 41% of EBITDA)
- Fuel efficiency
  - Engine components
  - Transmission
- Brake systems, steering & vehicle dynamics
  - Brake control
  - Brake systems
  - Automated driving
  - Steering systems

Our customers

Example car builders

- Daimler
- PACCAR
- Siemens
- Alstom
- CAF
- Kawasaki
- Hitachi

Example operators

- DB
- Indian Railways
- BOMBARDIER
- TRATON
- DAIMLER
- PACCAR
- SCania
- ISUZU
- ISUZU
- M survivor
- FAW
- SAAB

Notes: 2020 financials based on IFRS excluding consolidation/other; 1) HVAC – Heating, ventilation and air conditioning; 2) LRV – Light rail vehicle; 3) Joint Venture between Bosch, Knorr-Bremse and ZF providing a range of workshop services relating to the repair and maintenance of commercial vehicles across all brands; 4) OEM – Original Equipment Manufacturer
Global #1 – … protected by high barriers to entry

Barriers to entry for RVS and CVS markets

Regulation / homologation

Low volumes, high number of variants with high level of customisation

High initial capital requirements, highly protected IP landscape and economies of scale

Highest quality and safety requirements

Long life-cycle with resulting customer loyalty, long gestation period for aftermarket

Same industry leaders since creation of the industry over 100 years ago

Market specifics

RVS

Only supplier world-wide certified for all global and local standards and norms (GOST, UIC, AAR, ARA)

Vast array of product variants to homologate (e.g. >100k active brake articles by Knorr-Bremse)

Homologation time typically 4-8 years for recent Knorr-Bremse products

CVS

One of only two suppliers able to offer harmonised products globally

Continuously increasing safety and emission standards requirements

Highest quality and safety requirements

Long life-cycle with resulting customer loyalty, long gestation period for aftermarket

Same industry leaders since creation of the industry over 100 years ago
KB has maintained and expanded its market leading positions

**Market positions key product groups**

1. **Brake systems**
2. **Entrance systems**
3. **HVAC systems**

**Global brakes market shares**

- **Example global market leader for brakes**
  - Brake systems: ~50%
  - Entrance systems: ~15%
  - HVAC systems:

**Market positions key product groups**

1. **Brake systems & vehicle dynamics**
2. **Energy supply & distribution**
3. **Fuel efficiency**

**Global brakes market shares**

- **Example global market leader for brake systems & vehicle dynamics**
  - Brake systems & vehicle dynamics: ~23%
  - Energy supply & distribution: ~15%
  - Fuel efficiency:

---

1. 2020 estimates for OE and aftersales without labor; Wabtec includes Faiveley; For competitor, an estimate was used; Market shares rounded to the nearest multiple of 5%
2. Heating Ventilation Air Conditioning
3. For 2020 global addressable Truck, Bus and Trailer OE market, excl. aftermarket
4. Air disc brake, valves / pedal unit, actuators, foundation drum brake, steering, brake control (ABS, EBS, ESP), ADAS, ELC, others
5. Compressors, air treatment
6. Vibration dampers, engine air control, transmission – gear and clutch actuation/ control; Source: internal market research
Resilience – Strong business model

Strong resilience of growth and profitability

Different economic cycles
- ~50/50 split RVS and CVS (by sales)
- Different market drivers
  - short vs. long cycle
  - private vs. public investment

High aftermarket share
- ~36% total sales\(^1\)
  - 46% of RVS sales\(^1\)
  - 27% of CVS sales\(^1\)
- Large installed base

Diversified customer base
- Partner to all major local and global players

Global footprint and local content
- High level of local content in manufacturing, purchasing and R&D
- Presence in 30+ countries with 100+ sites
- ~80% of employees outside Germany
- ~15% of employees in China, catering to local market

Notes: 1) Based on IFRS in 2020
Resilience – Attractive aftermarket business with comprehensive service offering drives profitability and contains high future potential

Aftermarket is the growth and resilience backbone

Key features

- **Annuity-like**
  - Regulated maintenance intervals
  - Leverages high installed base
  - 20-30 years long relationships

- **Close to the customer**
  - RVS
    - 36 service centres
  - CVS
    - >1,600 certified service partners
    - >700 Alltrucks workshops

- **Strong customer retention (homologation)**
  - High switching costs
  - Focus on safety and quality
  - IP protection

- **Innovative business model**
  - New connectivity-based business models
  - Preventive
  - Predictive

Notes: 1) Total CVS aftermarket sales and independent aftermarket sales EMEA (excl. South Africa & Skach) as proxy for the global split; 2) Does not include service locations at customers’ premises
### Synergistic business – Technology and scale benefits between Rail and Commercial Vehicles

**Interdependence of RVS and CVS**
- Same core technologies
- Shared components and materials
- Co-located R&D centers
- Shared overhead functions

**Future technology development**
- Shared research centres
- ADAS\(^1\) / HAD\(^2\) technology transfer
- Condition monitoring, condition-based and predictive maintenance
- Electrification and connectivity
- Electromechanical brake systems

**Differences of RVS and CVS**
- Serial business (CVS) vs. project business (RVS)
- Different customer group

<table>
<thead>
<tr>
<th>RVS</th>
<th>CVS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric compressors</td>
<td>Friction materials</td>
</tr>
<tr>
<td>Air disc brakes (ADB)</td>
<td></td>
</tr>
<tr>
<td>Driver assistance</td>
<td>Trailer control valve</td>
</tr>
<tr>
<td>Electronic air supply</td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1) ADAS – Advanced driver assistance system; 2) HAD – Highly automated driving
Innovation is the basis of KB’s technology leadership and long-term success

**True Scale:**
- ~3,800 R&D employees
- Thereof 740 software engineers
- 5 global R&D centers (3 co-located)

**Agile R&D methods** implemented

**Extensive partnership** network & collaboration with tech players

**In-house incubator** eCUBATOR eMOBILITY INITIATIVE

**Pioneering innovations (examples)**

**RVS**
- Digital automatic coupler for freight (DAC)
- Reproducible braking distance
- LIFEDrive sliding doors

**CVS**
- Electric power steering
- Electronic parking brake
- eCompressor

**Long-term R&D ratio:** 6 – 7 %
We confirm our successful strategy

1. Systematically develop base portfolio

2. Focus on attractive segments for future outperformance in rail and truck

3. Drive innovation & digitalization

4. Clear M&A strategy

5. Operational excellence

6. ESG and sustainability

7. Strong financial performance
Knorr-Bremse is ideally positioned to shape the trends of the future

Industry trends: addressing industry trends with superior technological solutions

- Transport Capacity
- Availability
- Eco Friendliness
- Life Cycle Management

- Traffic Safety
- Emission Reduction & E-Mobility
- Automated Driving
- Connectivity
Knorr-Bremse will continue to grow its core business further and will also develop new levers of growth.
Knorr-Bremse continues to systematically develop its portfolio of mission critical products and digital solutions

- **Mechanical products**
  - Air disc brake

- **Mechatronic products**
  - Smart & digital products
  - Electronically controlled pneumatic brake
  - GSBC & rGSBC

- **Smart basis**
  - Pneumatic brake system
  - ABS & EBS

- **Smart brake control (Cube Control)**
Build new business in RVS

Industry trends

- Availability
- Lifecycle Management
- Transport Capacity
- Eco Friendliness

Applications (examples)

- Condition-based/predictive maintenance
- Aftermarket
- Automation
- Energy savings / metering

RVS solutions (examples)

- European train operator use case
- HVAC monitoring & energy saving
- Investment into Railnova
- RailServices portfolio for optimized LCC
- Increased train density
- Environment sensing
- Driver advisory system
- Smart metering

1) Lifecycle costs  2) Reproducible Braking Distance
**Build new business in CVS**

<table>
<thead>
<tr>
<th>Industry trends</th>
<th>Digital Services</th>
<th>Automation</th>
<th>Energy &amp; Eco Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Connectivity/ Digital Truck</td>
<td>Automated Driving</td>
<td>E-Mobility/ Emission Reduction</td>
</tr>
</tbody>
</table>

**Applications (examples)**

<table>
<thead>
<tr>
<th></th>
<th>Driver safety management</th>
<th>ADAS</th>
<th>HAD actuation &amp; motion control</th>
<th>Electrification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

**CVS solutions (examples)**

<table>
<thead>
<tr>
<th></th>
<th>Collecting safety data and video for coaching &amp; evaluation</th>
<th>ADAS offering with strong partners</th>
<th>Combining steering, braking, and motion control</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>

CVS strongly positioned to innovate products for the E-Mobility age (BEV and FCEV)

*Only minor part of CVS portfolio affected by electrification*
Knorr-Bremse drives digitalization in two dimensions

**Digital products and services**

- **Solution portfolio**
  - From mechatronic to smart & connected products
  - **New capabilities** (e.g., analytics) and platforms for new products and services
  - Build digital business models

**Internal digitalization**

- **Inhouse operations**
  - Standardized end-to-end processes
  - Digitalization

---

**Product enhancement with digital technology**

**Condition Monitoring**
- Remotely monitor condition of KB products

**Predictive Maintenance**
- Optimize operations and maintenance process together with customers
Capital allocation priorities: clear framework with focus on organic growth and bolt-on M&A

- **6 – 7%** R&D ratio
- **5 – 6%** CapEx ratio
- **40 – 50%** Dividend payout ratio

**High priority**
- Bolt-on M&A
- Share buybacks

**Low priority**
- Organic
- In-organic
## M&A – clear strategy

### Priorities

1. **Pursue attractive and selective segments in rail and truck for future outperformance**
2. **Focus on bolt-on acquisitions in rail and truck, no focus on third pillar**
3. **Strengthen our core business with new capabilities**
4. **Continue active portfolio management along stringent strategic and financial criteria**

### Strategic Principles

#### Markets & Segments
- Highly **attractive growth segments** with strong **entry barriers**
- **Technological differentiation**

#### Business Model
- **Leading** market position and/or leading technology
- **Sustainable** competitive advantage
- **Resilient** business model

#### Synergies
- **Best owner** principle
- Tangible and realistic **synergies**
- Easy to integrate with high **cultural fit**
M&A – clear financial guardrails

Priorities

- Attractive segments
- Bolt-on acquisitions
- Strengthen core business
- Active portfolio management

Financial principles for larger transactions

- Value accretive for KB
- Strong cash generation
- High profitability (ROS + ROCE)
- High aftermarket revenue base
- Asset-light business model

- Portfolio management, if needed
- Start-ups with clear plan for strong financial profile / accretive cooperation potential
- Stringent post merger integration to ensure deliverables
Focus on operational excellence

MANAGEMENT COMMITMENT

- Global platforms
- Process digitalization and standardization
- Footprint optimization
- Continued “local for local“ set-up and value chain
- Cost improvements

HIGH PERFORMANCE
Culture

ENTREPRENEURIAL
Mindset

HR
Excellence

LEAN
Group Set Up

COST & EFFICIENCY
Focus

OPERATIONAL EXCELLENCE
FY21: Guidance achieved in a challenging environment

<table>
<thead>
<tr>
<th>Revenue</th>
<th>op. EBIT margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>€m</td>
<td></td>
</tr>
<tr>
<td>6,600-6,800</td>
<td>13.0-13.5%</td>
</tr>
<tr>
<td>6,706</td>
<td>13.5%</td>
</tr>
</tbody>
</table>

Promised: Outperformance in major markets, Resilient profitability, Strong cash preservation during Covid, Corporate Governance improvements

Delivered: Stronger growth than markets, op. EBIT margin of 13.5%, FCF of € 600m and CCR of 93%, ESG target in STI included and reporting shortened, EPS at 3.85 and ROCE 24.9%
## Group Guidance 2022

<table>
<thead>
<tr>
<th>Revenues</th>
<th>Operating EBIT margin</th>
<th>Free Cashflow</th>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>€m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY21</td>
<td>FY22e</td>
<td>FY21</td>
<td>FY22e</td>
</tr>
<tr>
<td>6,706</td>
<td>6,900-7,200</td>
<td>13.5%</td>
<td>10.5-12.0%</td>
</tr>
<tr>
<td>600</td>
<td>300-500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- No significant further deterioration in geopolitical and economic conditions compared with current situation
- No significant deterioration in gas and energy supply
- Current FX rates stable
- No further setbacks occur as a result of Covid
Mid-term outlook: continued profitable growth of Knorr-Bremse towards 2025

Organic revenues in €bn

- 2020: 6.2
- 2021: 6.6 – 6.8
- 2022e: 6.8 – 7.2
- 2025e: 8.1 – 8.6

+ M&A on top

Revenue CAGR

<table>
<thead>
<tr>
<th>RVS</th>
<th>5 – 6%</th>
<th>18.0 – 19.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVS</td>
<td>7 – 8%</td>
<td>12.0 – 13.5%</td>
</tr>
</tbody>
</table>

Group

<table>
<thead>
<tr>
<th>ROCE</th>
<th>CCR over cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥30%</td>
<td>80 – 90%</td>
</tr>
</tbody>
</table>

EBIT margin (ROS)

- 2021: 13.5%
- 2022e: 12.5 – 14.0%
- 2025e: 14.0 – 16.0%

EBITDA margin

- 2020: 17.9%
- 2022e: 19.0 – 21.0%

Note: Operating margins shown 2021 and 2025; based on market expectations mirrored in other CMD presentation parts.
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RVS – Outperformance and resilience

### Market leadership

Global #1 market leader across products and regions (e.g. ~50% market share in brake systems)

### Strong growth profile

RVS with long track record of outperforming underlying markets

### Technology innovation

- Strong technology innovator shaping industry standards
- Continuation of R&D investments

### High barriers to entry

- Safety-critical products with significant homologation barriers
- RVS only supplier certified for all standards and norms globally

### Resilience

- Expansion of business through customer-region-product mix
- Strong aftermarket (~46% revenue share)

### Profitability

Outstanding profit margins with track record of margin expansion and disciplined cost management (EBIT margin ~18%)
RVS – the leading safety critical systems supplier for rail with a track record of market outperformance

2021 key financials

- € 3.5bn sales
- 4.6% CAGR 2010-2021
- € 725m op. EBITDA (21.9% margin)
- € 595m op. EBIT (17.9% margin)
- 46% aftermarket share

2021 sales split

- by region (€ 3.5bn)
  - Europe: 52%
  - Americas: 10%
  - Asia /Australia: 38%

- by channel
  - OE: 54%
  - AM: 46%

Notes: BilRUG sales allocated proportionally between OE and aftermarket; 1) RVS market share estimates for OE and aftermarket without labour; 2) All active rail vehicles without freight cars with a minimum of one Knorr-Bremse system related to brakes, entrance systems and HVAC installed; 3) Total reported RVS sales growth including OE and aftermarket based on German GAAP (HGB) 2010-2016; from 2016 IFRS 4) BilRUG sales allocated proportionally between OE and aftermarket
Long-term growth in global rail will continue, despite Covid U-shape

Development of relevant sub-systems market volume¹ (OE + RS in €bn)

1) Big Five - Brakes, Doors, HVAC, Power Electrics, TCMS; Source: Knorr-Bremse information and internal market research

1) 2019: 10.3
   2020: 9.5 (Covid-impacted CAGR ~4%)
   2021: (Covid-impacted CAGR ~4%)
   2022: (Covid-impacted CAGR ~4%)
   2023: (Covid-impacted CAGR ~4%)
   2024: (Covid-impacted CAGR ~4%)
   2025e: 11.7

U-shape development of sub-system market

Asia Pacific
North America
South America
Europe / Africa

¹ OE: Original Equipment; RS: Replacement Parts; CAGR: Compound Annual Growth Rate
Future growth will come from markets in Europe, Asia and North America

Market development OE
in €m, CAGR in %

Selected biggest growth markets

<table>
<thead>
<tr>
<th>Market position</th>
<th>CAGR '19-'25</th>
<th>Selected biggest growth markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America &amp; Mexico MT</td>
<td>~11%</td>
<td>~8.5%</td>
</tr>
<tr>
<td>Austria</td>
<td>~27%</td>
<td>1,100</td>
</tr>
<tr>
<td>France</td>
<td>~6%</td>
<td>1,800</td>
</tr>
<tr>
<td>Russia &amp; CIS (High Grade)</td>
<td>~4%</td>
<td>2019</td>
</tr>
<tr>
<td>Scandinavia</td>
<td>~10%</td>
<td>2025e</td>
</tr>
<tr>
<td>Spain &amp; Portugal</td>
<td>~26%</td>
<td></td>
</tr>
<tr>
<td>India (High Grade)</td>
<td>~5%</td>
<td></td>
</tr>
<tr>
<td>South East Asia, HK, TW</td>
<td>~14%</td>
<td></td>
</tr>
<tr>
<td>Selected biggest growth markets</td>
<td>~9%</td>
<td></td>
</tr>
<tr>
<td>RoW²</td>
<td>~3%</td>
<td></td>
</tr>
</tbody>
</table>

1) Brakes, Doors, HVAC, rounded to the nearest 50
2) Rest of World w/o selected biggest growth markets & w/o China

Source: KB internal market research; Values recognize FX rates
The enormous brake distances in Rail require outstanding braking performance

Different braking distances at 80km/h

- Car
  1.500kg
  - 31m

- Truck with trailer
  40.000kg
  - 40m

- LRV
  60.000kg
  - 85m

- MU regional & commuter
  240.000kg
  - 220m

- Loco hauled freight train
  4.000.000kg
  - 600m

Different braking distances at 330km/h

- High-speed train
  at 330km/h
  - 330m

Changing weather and environmental conditions significantly impact brake distances.
Global Tier-1 partner of choice for OEMs and rail operators in all regions

Top 10 customers 2021 (% of sales)

<table>
<thead>
<tr>
<th>Customer</th>
<th>Sales Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>China Railway</td>
<td>~14%</td>
</tr>
<tr>
<td>ALSTOM</td>
<td>~12%</td>
</tr>
<tr>
<td>Siemens</td>
<td>~5%</td>
</tr>
<tr>
<td>Stadler</td>
<td>~5%</td>
</tr>
<tr>
<td>Indian Railways</td>
<td>~4%</td>
</tr>
<tr>
<td>Hitachi</td>
<td>~4%</td>
</tr>
<tr>
<td>DB</td>
<td>~3%</td>
</tr>
<tr>
<td>Transmasholding</td>
<td>~3%</td>
</tr>
<tr>
<td>CAF</td>
<td>~2%</td>
</tr>
</tbody>
</table>

Other major Knorr-Bremse customers

>300 relevant rail operator customers

Europe / Africa

>50 relevant OEM customers

Americas

Asia / Australia

Notes: 2021 sales and customer data based on 31.12.2021; Share of top 10 customers as % RVS sales 2021 may not add up due to rounding; ¹ incl. ex-Bombardier, excl. JV ² incl. beneficiary companies
RVS holds global #1 position across key product categories

Global market share 2021\(^1\) (% of revenues)

- **Brake systems** (~70% of RVS revenues)
  - Knorr-Bremse: 50%
  - Wabtec/Faiveley: 20%
  - Others: 30%
  - Market size: ~€ 4.5bn

- **Entrance systems** (~10% of RVS revenues)
  - Knorr-Bremse: 30%
  - Kangni: 20%
  - Others: 55%
  - Market size: ~€ 1.2bn

- **HVAC** (~7% of RVS revenues)
  - Knorr-Bremse: 20%
  - King: 15%
  - Wabtec/Faiveley: 10%
  - Others: 55%
  - Market size: ~€ 1.1bn

Notes: Based on German GAAP (HGB); Market share estimates are rounded to the nearest multiple of 5%; For competitors, a price estimate was used; 1) Market share based on deliveries, estimates for OE and AM without labor. Source: Knorr-Bremse information and internal market research.
Historic development of OE and AM business

Strong growth both in OE and AM

RVS sales by type (until 2017 German Gaap/HGB, 2018-2020 IFRS, €bn, 2010-2021) ¹)

Note: some figures may not add up due to rounding; 1) BilRUG sales allocated proportionally between OE and aftermarket

<table>
<thead>
<tr>
<th>Year</th>
<th>OE</th>
<th>AM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1.5</td>
<td>0.5</td>
<td>2.0</td>
</tr>
<tr>
<td>2011</td>
<td>1.5</td>
<td>0.7</td>
<td>2.2</td>
</tr>
<tr>
<td>2012</td>
<td>1.5</td>
<td>0.7</td>
<td>2.2</td>
</tr>
<tr>
<td>2013</td>
<td>1.4</td>
<td>0.8</td>
<td>2.2</td>
</tr>
<tr>
<td>2014</td>
<td>2.0</td>
<td>1.0</td>
<td>3.0</td>
</tr>
<tr>
<td>2015</td>
<td>1.8</td>
<td>1.2</td>
<td>3.0</td>
</tr>
<tr>
<td>2016</td>
<td>1.9</td>
<td>1.2</td>
<td>3.1</td>
</tr>
<tr>
<td>2017</td>
<td>2.1</td>
<td>1.4</td>
<td>3.5</td>
</tr>
<tr>
<td>2018</td>
<td>2.1</td>
<td>1.4</td>
<td>3.5</td>
</tr>
<tr>
<td>2019</td>
<td>2.1</td>
<td>1.5</td>
<td>3.6</td>
</tr>
<tr>
<td>2020</td>
<td>1.8</td>
<td>1.5</td>
<td>3.3</td>
</tr>
<tr>
<td>2021</td>
<td>1.8</td>
<td>1.5</td>
<td>3.3</td>
</tr>
</tbody>
</table>

CAGR (2010-2021)

- Total: 4.6%
- AM: 10.2%
- OE: 1.7%
RVS grew within each business unit, despite Covid impact, AM outperformed

Revenue development in €bn

<table>
<thead>
<tr>
<th>Year</th>
<th>OE</th>
<th>AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>2.2</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>2021</td>
<td>3.3</td>
<td>46%</td>
</tr>
</tbody>
</table>

[Index 100 = 2012]

- **KNORR-BREMSE (OE)**
  - Brakes: x1.2, 2.3%
  - Doors: x1.1, 1.7%
  - HVAC: x1.1, 1.6%
  - Others: x1.8, 7.2%

- **RAILSERVICES (AM)**
  - Brakes: x1.9, 8.6%
  - Doors: x2.0, 9.0%
  - HVAC: x2.6, 12.4%
  - Others: x2.6, 12.9%

Constant increase in the installed base... → ...drives the profitable Aftermarket
Aftermarket business will continue to be an important growth engine

**Revenue split**

2021 in €bn

- OE 54%
- AM 46%

**Long-term goal**

- > 45%

**Opportunities**

- Use installed fleet
- Modernization
- New service models & digital solutions

**Challenges**

- Competition by OEMs, focusing more on service
- Insourcing and lifecycle costs optimization, incl. stretching overhaul cycles
CO₂ emission targets not achievable in transportation without rail

Greenhouse gas emissions from transport¹

Passenger transport – long distance [in g/pkm]
- Airplane: 214
- Car: 143
- Public transport: 29

Passenger transport – local transport [in g/pkm]
- Car: 143
- Minibus: 80
- Public transport: 55

Freight transport [in g/tkm]
- Truck: 111
- Ship: 30
- Rail: 17

1) 2019, reference for Germany, Sources: https://www.allianz-pro-schiene.de/themen/umwelt/daten-fakten/ (accessed on September 8, 2021), based on Umweltbundesamt

Fact Book
RVS is the only supplier world-wide certified for all local standards and norms

Market protected by unique level of complexity …

- **Major global standards**: 4
- **Unique configurations for vehicle types**: 7
- **Brake subsystems**: 3
- **Safety-critical components**: >100
- **Country- and customer-specific variants**: Multiple
- **100k active brakes articles to homologate**

… and long homologation time for each component

<table>
<thead>
<tr>
<th>Standard</th>
<th>Key regions</th>
<th>Typical time-to-market</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Development (yrs)</td>
</tr>
<tr>
<td>GOST</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>UIC</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>GOST</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Combination of IP ownership and homologation creates high barriers to entry

1) GOST based on recent homologation process, other norms based on expert estimates by Knorr-Bremse; 2) Estimated average required “time-to-market” of a basic freight car solution
Agenda

- Introduction
- Key Company Highlights
- Rail Vehicle Systems (RVS)
- Commercial Vehicle Systems (CVS)
- R&D Focus
- Financials
- Sustainability
- Capital Markets Summary
- Appendix
CVS with high-quality business model – Outperformance and resilience

**Market leadership**

A global market leader increasing market share (~25% for brake systems & vehicle dynamics)

**Strong growth profile**

Continuously outperforming markets with rising content per vehicle (5% sales CAGR vs. ~2% TPR growth between 2012-2021)

**Technology innovation**

Technology leader with continuous significant investment in innovation and R&D

**High safety requirements**

Global key supplier with system know-how and vehicle dynamics capabilities

**Resilience**

Strong aftermarket share (~27% revenue share), cost efficiency, regional diversification as well as track record in strong cost management execution

**Profitability**

Technology differentiation, superior products, systems approach, scale advantage and consequent cost management (operating EBIT margin ~11%)
CVS – One of two global leaders with an outstanding position in braking and safety-relevant systems

Highlights

- Global market position
- Technology leader
- Global market share
- c.13k Employees

2021 key financials

- €3.8bn sales
- 6.5% CAGR 2010-2021
- €501m op. EBITDA (14.8% margin)
- €361m op. EBIT (10.7% margin)
- 27% aftermarket share

2021 sales split

- by region
  - Europe 42%
  - Americas 35%
  - Asia /Australia 23%
- by end-market
  - OE 63%
  - AM 27%

Notes: Sales, EBITDA, EBIT and respective margins based on IFRS; other figures based on German GAAP (HGB) 1) 2020 global addressable Truck, Bus and Trailer OE market.; 2) Total reported CVS sales growth including OE and AM 3) Sales split by region based on IFRS; Other splits based on German GAAP (HGB)
Knorr-Bremse is the partner of choice for global OEMs with long-standing relationships

Top 10 customers 2021 (% of sales) | Years of relationship | Other major Knorr-Bremse customers
---|---|---
PACCAR | 11% | >30
DAIMLER | 10% | >90
TRATON | 9% | >90
 | 8% | >30
NAVISTAR | 4% | >20
DONGFENG | 4% | >5
ZF | 3% | >30
FAW | 3% | >5
WEICHAI | 3% | >5
IVECO | 3% | >90

Top 10 = 58% of total CVS sales 2021

Note: Share of top 10 customers as % CVS sales 2021 may not add up due to rounding.
CVS is market leader in all major product fields

Global market share 2021¹ (% of revenues)

- **Brake Systems & Vehicle Dynamics²**
  - Knorr-Bremse 25% (Since 2017: + 2p.p.)
  - Others 24%
  - ZF/Wabco 19%
  - Others 56%

- **Energy Supply & Distribution³**
  - Knorr-Bremse 49% (Since 2017: + 3p.p.)
  - Others 24%
  - ZF/Wabco 27%

- **Fuel Efficiency⁴**
  - Knorr-Bremse 23% (Since 2017: unchanged)
  - Others 55%
  - ZF/Wabco 22%

---

² Air Disc Brake, Valves / Pedal Unit, Actuators, Foundation Drum Brake, Steering, ABS, EBS, ESP, DAS, ELC; incl. segment Others
³ Compressors, Air Treatment
⁴ Vibration Dampers, Engine Air Control, Transmission – Gear and clutch actuation
## Historic development of OE and AM business

### Strong growth both in OE and AM

CVS sales by type (HGB, €bn, 2010-2017) 1) 2018-21 IFRS

<table>
<thead>
<tr>
<th>Year</th>
<th>OE</th>
<th>AM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1.7</td>
<td>0.6</td>
<td>2.3</td>
</tr>
<tr>
<td>2011</td>
<td>2.1</td>
<td>0.6</td>
<td>2.7</td>
</tr>
<tr>
<td>2012</td>
<td>2.1</td>
<td>0.6</td>
<td>2.7</td>
</tr>
<tr>
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<td>0.6</td>
<td>2.7</td>
</tr>
<tr>
<td>2014</td>
<td>2.2</td>
<td>0.7</td>
<td>2.9</td>
</tr>
<tr>
<td>2015</td>
<td>2.5</td>
<td>0.7</td>
<td>3.2</td>
</tr>
<tr>
<td>2016</td>
<td>2.5</td>
<td>0.8</td>
<td>3.3</td>
</tr>
<tr>
<td>2017</td>
<td>2.9</td>
<td>0.8</td>
<td>3.7</td>
</tr>
<tr>
<td>2018</td>
<td>3.2</td>
<td>0.8</td>
<td>4.0</td>
</tr>
<tr>
<td>2019</td>
<td>3.3</td>
<td>0.8</td>
<td>4.1</td>
</tr>
<tr>
<td>2020</td>
<td>2.8</td>
<td>0.8</td>
<td>3.6</td>
</tr>
<tr>
<td>2021</td>
<td>2.5</td>
<td>0.9</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Notes: 
1) Some sales split may not add up due to rounding.
2) BilRUG sales allocated proportionally between OE and aftermarket.
3) Global Truck and Bus market excluding aftermarket and Trailer.

Source: Knorr-Bremse information and internal market research; IHS for truck production rate.

### CAGR (2010-2021)

- **Total**: 6.5%
- **AM**: 3.8%
- **OE**: 7.7%
Conversion in legislation drives the global adoption of technologies provided by Knorr-Bremse

Conversion in legislation drives the global adoption of technologies provided by Knorr-Bremse

Legislative decisions foster demand for Knorr-Bremse solutions

**CVS growth opportunities driven by higher CPV despite limited volume growth**

**Truck production is flat and does not contribute to growth**

Growth driver will be the current content per vehicle (CPV) with **traffic safety technologies until mid 2020s**

In the long run, CPV must be driven by technologies for **new trends automated driving, e-mobility and connectivity**

<table>
<thead>
<tr>
<th></th>
<th>Global¹</th>
<th>North America²</th>
<th>Europe³</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Truck production</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAGR</td>
<td>Mid-term until mid-20s</td>
<td>Long-term until 2030</td>
<td>Mid-term until mid-20s</td>
<td>Long-term until 2030</td>
</tr>
<tr>
<td></td>
<td>0%</td>
<td>0%</td>
<td>-1%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Growth in KB CPV</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with traffic safety</td>
<td>~ +4%</td>
<td>&lt;4%</td>
<td>&lt;4%</td>
<td>&gt;4%</td>
</tr>
<tr>
<td>solutions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Growth in KB CPV</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>focus on technologies for automated driving, e-mobility &amp; connectivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Incl. Turkey & Korea  2) Class 6 – 8  3) West & East Europe

Source: Knorr-Bremse analysis, IHS Markit, McKinsey analysis
In the future however, CVS will gain more content per vehicle growth with solutions for Automated Driving, Emission Reduction & E-Mobility and Connectivity.

Current CVS portfolio with focus on traffic safety perfectly fits market demands.

Illustrative growth potential

Growth contribution of industry trends

World’s leading supplier of safety relevant CV systems

Grow in current portfolio

Generate new business by optimizing TCO and emissions along the truck lifecycle

Traffic safety

Today

2025

2030

Time

Automated driving

Emission Reduction & E-Mobility

Connectivity

Highlight

Highlight

Fact Book 51
CVS offers both driver assistance and automated driving solutions

<table>
<thead>
<tr>
<th>Degree of Automation</th>
<th>Driver Assistance</th>
<th>Automated Driving</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 driver only</td>
<td>Braking, Steering, Sensors, Level 1 and 2 functions</td>
<td>Braking, Steering, Vehicle dynamics, Related redundancy</td>
</tr>
<tr>
<td>1 assisted</td>
<td>Lane Departure Warning, Adaptive Cruise Control, AEBS</td>
<td>Traffic Jam Pilot, Parking Pilot, Autonomous Yard Maneuvering</td>
</tr>
<tr>
<td>2 partial automation</td>
<td>Highway Departure Braking, Lane Keeping Assist, Highway Assist</td>
<td>Full Pilot</td>
</tr>
<tr>
<td>3 high automation</td>
<td>CVS as vehicle dynamics supplier in consortium/partnership approach</td>
<td></td>
</tr>
<tr>
<td>4 full automation</td>
<td>CVS as vehicle dynamics supplier in consortium/partnership approach</td>
<td></td>
</tr>
<tr>
<td>5 driverless</td>
<td>CVS as vehicle dynamics supplier in consortium/partnership approach</td>
<td></td>
</tr>
</tbody>
</table>
CVS offers automated driving solutions in a partnership approach - Actuation, Truck Motion Control and Redundancy are CVS’ core competencies

<table>
<thead>
<tr>
<th>Perception</th>
<th>Decision</th>
<th>Actuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Eye icon]</td>
<td>![Gear icon]</td>
<td>![Hand icon]</td>
</tr>
<tr>
<td>Complete environment perception of truck &amp; trailer</td>
<td>Continuous situation analysis, motion planning and definition of driving path</td>
<td>Coordinated interaction of actuators for vehicle dynamics</td>
</tr>
<tr>
<td><strong>Software</strong>&lt;br&gt;Provided by partner</td>
<td><strong>Software (driver stack)</strong>&lt;br&gt;Provided by partner</td>
<td><strong>Braking system, steering system incl. redundancy system</strong>&lt;br&gt;Provided by Knorr-Bremse</td>
</tr>
<tr>
<td>![Sensor Hardware icon]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor Hardware&lt;br&gt;Provided by partner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>![Hardware icon]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware&lt;br&gt;Provided by partner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>![Software icon]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>![Knorr-Bremse logo]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provided by partner</td>
<td></td>
<td>Provided by Knorr-Bremse</td>
</tr>
</tbody>
</table>

Redundancy system

Big OE or system supplier as system integrator

Fact Book 53
Knorr-Bremse teams up with Continental to become a leading Automated Driving system supplier for commercial vehicles

- Function know-how based on passcar experience & carryover from passcar
- Hardware for localization (radar, camera) and Automated Driving Control Unit

- Truck- & trailer-specific vehicle dynamics: Vehicle guidance and stability control
- Fail-operational architecture
- Commercial vehicle-specific function development, application and release

Consumer Benefits
- Industry benchmark perception decision and actuation from the one source
- Superior performance through full-system approach
- Cost-optimized systems for commercial vehicles

Joint Project Scope
- Development of systems, components and functionality for Automated Driving
- Validation and release of complete highly Automated Driving systems
- Collaboration in joint project house
Truck Motion Control combines braking, steering and vehicle dynamics

1) ADAS = Advanced Driver Assistance Systems
Different offerings for automated driving in a partnership approach

Stand-alone KB offering:
- Actuation, Truck Motion Control and Redundancy supplied by CVS

In partnership as a consortium:
- System with actuation, TMC, perception & hardware for the decision layer together with Continental as sensors and hardware partner
- Complete system including driver stack in collaboration with an AI partner in addition to the sensors and hardware partner

CVS fosters system competency and future content per vehicle increase potential

- General requirement for redundant Electric/Electronics architecture increases content per vehicle → redundancy ensures the safe vehicle movement even in case of the failure of a system relevant component
- The addition of torque overlay steering to CVS' portfolio adds content to the vehicle, more advanced steering solutions at higher price further increase content per vehicle
CVS will benefit from transition of integrated combustion engine trucks towards electrified trucks

Impact for CVS

- Shift from ICE to EV vehicles offers **first mover advantage**
- More complex Electrics/Electronics architecture in electric vehicles **increases content per vehicle**
- KB products in “other systems” and in energy storage offer **growth potential for CVS**
- Value reduction in drivetrain **does not affect CVS significantly**
- Potential content per vehicle increase via **electric vehicle adapted products** and **completely new product fields**

**Value structure of a truck**

Illustrative

- **Internal Combustion Engine Vehicle**
- **Battery Electric Vehicle**
- **Drivetrain**
- **Energy storage**
- **Other systems**

No significant impact for CVS

Growth opportunities for CVS with adapted product portfolio

Potential growth opportunities in selected niche areas for CVS in assessment
CVS founded an internal incubation unit for e-mobility solutions

Defining our role in the environment of the e-mobility ecosystem for commercial vehicles

Internal incubation unit set up for solutions for e-mobility

- Adaptation of existing product portfolio towards EV
- Definition of new product fields
- First product concepts already transferred to CVS business units
- 52 patents applications have been generated out of the CVS e-Cubator until today

OEM inhouse systems

KB CVS focus

Carry over products from passenger cars

Commercial vehicle specific systems
CVS is offering a broad product portfolio for electric trucks

**EV adapted portfolio**

- **eCompressor**
  - Electric screw compressor
  - Mid air demand eCompressor (rotary vane)
  - Low air demand compressor for future EV requirements

**EV brake control & vehicle dynamics**

- Optimized and scalable holistic EV motion control, including energy recuperation

**New EV product fields**

- **Redundant power management system**
- **EV brake resistor**
- **Opportunities in fuel cell electric vehicles in assessment**

- On the market
- In development
- Market launch soon
- In assessment
Internationalisation: Global growth strategy focuses on North America penetration as well as Chinese and Indian market share expansion

**Exploit leading position**
- Bendix acquisition as enabler for footprint expansion
- Sheppard acquisition to strengthen position as global system supplier of integrated steering and braking systems
- Capitalisation of technological expertise and brand
- Increased content per vehicle (technology as driver)
- Continuous cost structure improvements

**Leverage local presence**
- Intensive localisation with key local players
- Capitalise on strong position in OE channel
- Increased content per vehicle (technology as driver)
- Expand network to establish truck aftermarket
- Exploit position in electric bus

**Expand market share**
- Strong business growth with major Indian customers
- Expansion of product portfolio (dampers, drum brakes)
- Localisation programme creating scale effects

Notes: Based on German GAAP (HGB); FTE includes leasing (EOP) 1) Plant under expansion; Source: Knorr-Bremse information
Agenda

- Introduction
- Key Company Highlights
- Rail Vehicle Systems (RVS)
- Commercial Vehicle Systems (CVS)
- **R&D Focus**
- Financials
- Sustainability
- Capital Markets Summary
- Appendix
R&D is at the very core of Knorr-Bremse’s DNA

With over **12,000 patents**\(^1\)
Knorr-Bremse secures the future innovation roadmap. Largest patent portfolio in the industry\(^2\)

**5 state-of-the-art R&D centres** globally complemented by 23 local engineering entities with customer proximity

**Focused & disciplined approach** ensuring highest efficiency

Significant synergies between RVS and CVS

More than **80%** of the most industry-defining **innovations** over the last decades came from Knorr-Bremse

Extensive external network with over **15 R&D partnerships**

Long-term targeted R&D ratio: **6-7% of revenues**\(^3\)

Notes: 1) Granted and applied patents; 2) Based on published number of patent families (granted and applied); 3) Knorr-Bremse 2020 R&D financial information based on IFRS;
...resulting in synergies and cross-proliferation

Cross-divisional R&D examples

- **1990 Air Disc Brake**
- **1985 Screw Compressor**
- **201/2022 Collision Avoidance**
- **1992 Air Disc Brake**
- **2011 Screw Compressor**
- **2008 Collision Avoidance**

**Technology transfer for ADB from RVS to CVS**

**RVS Screw Compressor technology adopted for CVS applications**

**Collision Avoidance for RVS based on CVS system know-how within the field of sensor technology**

- Faster time-to-market
- Higher cost benefit
- Focused customer solutions
Leveraging Knorr-Bremse’s synergies & partnerships: centres of excellence as basis for sustained technology leadership

Globally $\Sigma \sim 3,600$ FTE$^{1)}$

Knorr-Bremse’s innovations are supported by a network of specialized development centres with joint production and R&D

Notes: 1) FTE refers to number of employees in R&D function (includes engineers, technicians, merchants) EOP 2019, TCI allocated to Asia
Knorr-Bremse deploys structured and effective processes to drive innovation results

Knorr-Bremse R&D process

Knorr-Bremse’s innovations are designed for clear customer impact...

- Optimisation of TCO
- Reduction of energy consumption, noise, weight
- Safety & reliability
- Connectivity, wireless solutions, ethernet
- Adaption to regulation

...and maximum economic benefit for Knorr-Bremse

- All projects assessed based on NPV
- Prioritisation of projects according to IRR
- Optimise time-to-market
- Short payback time of investment
- Ability to leverage innovation across customer portfolio

Notes: 1) TCO refers to total cost of ownership; 2) NPV refers to net present value; 3) IRR refers to internal rate of return
Close co-operation with customers & strategic partners

Government partnerships
- Shift2Rail: EU supported initiative amongst suppliers and OEMs to jointly develop an efficient transportation system
- VDA¹ participation in ~20 committees
- Design of norms/standards
- Early anticipation of industry trends
- Grants/subsidies

VC partnerships with Start-ups
- Partnerships with accelerators
- Investment in start-ups
- Technology access
- R&D acceleration

Partnerships with Universities
- Research cooperations
- Access to future talent
- Scouting of new technologies at minimal cost

JVS with OEMs / technology partners
- 18 joint ventures globally
- Joining complementary competences to extend product and service lines, and capacities
- IP protection
- Local presence
- Flexible solutions for customers

Countries Knorr-Bremse is present
Notes: 1) VDA - Verband der Automobilindustrie (German Association of the Automotive Industry)
Agenda

- Introduction
- Key Company Highlights
- Rail Vehicle Systems (RVS)
- Commercial Vehicle Systems (CVS)
- R&D Focus
- Financials
- Sustainability
- Capital Markets Summary
- Appendix
Financial excellence foundation: success factors for future profitable growth fully intact

- Focus on attractive market segments
- Technology and market leadership
- Strong execution
- Efficient capital allocation
- Strong bottom-line-/cost focus with lean set-up
- Entrepreneurial culture
- Pricing power
- High aftermarket exposure and resilience

Profitable growth
Track record of strong and sustainable top-line growth …

Historical sales\(^1\)\(^2\) by division

(€m)

<table>
<thead>
<tr>
<th>Year</th>
<th>German GAAP</th>
<th>Transition(^2)</th>
<th>IFRS</th>
<th>CAGR(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RVS</td>
<td>CVS</td>
<td></td>
<td>2005-21</td>
</tr>
<tr>
<td>2005</td>
<td>2,743</td>
<td>1,773</td>
<td></td>
<td>5.8%</td>
</tr>
<tr>
<td>2006</td>
<td>3,121</td>
<td>1,968</td>
<td></td>
<td>4.1%</td>
</tr>
<tr>
<td>2007</td>
<td>3,251</td>
<td>1,966</td>
<td></td>
<td>7.8%</td>
</tr>
<tr>
<td>2008</td>
<td>3,384</td>
<td>1,975</td>
<td></td>
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</tr>
<tr>
<td>2009</td>
<td>2,761</td>
<td>1,701</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>3,712</td>
<td>2,066</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>4,241</td>
<td>2,098</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>4,300</td>
<td>2,070</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>4,303</td>
<td>5,206</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>5,217</td>
<td>5,824</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>5,217</td>
<td>6,154</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>5,471</td>
<td>6,616</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td>6,154</td>
<td>6,937</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>6,616</td>
<td>6,157</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td>6,937</td>
<td>6,706</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: 1) Divisional historic figures do not add up to group sales excluding consolidations/other; 2) 2014 represents the first year that Knorr-Bremse prepared its financial statements in accordance with IFRS. Prior to 2014, financial statements were only prepared in accordance with German GAAP (HGB). IFRS differs in certain aspects from German GAAP (HGB), and accordingly data presented in accordance with German GAAP (HGB) may not be comparable to data prepared in accordance with IFRS; Source: Knorr-Bremse information
… combined with disproportionate EBITDA growth

Historical EBITDA\(^1\)\(^2\) profitability

(\(\text{\euro m}\))

\begin{align*}
\text{German GAAP} & \quad \text{Transition}^2) & \quad \text{IFRS} \\
2005 & 349 & 2014 & 987 & 1,060 & 1,269 \\
2006 & 410 & 2009 & 266 & 336 & 1,204 \\
2007 & 438 & 2010 & 528 & 667 & 1,303 \\
2008 & 420 & 2011 & 628 & 678 & \text{IFRS} \\
2009 & 268 & 2012 & 212 & 198 & \text{Transition}^2) \\
2010 & 193 & 2013 & 336 & 379 & 815 \\
2011 & 150 & 2014 & 354 & 389 & 730 \\
2012 & 178 & 2015 & 381 & 381 & 764 \\
2013 & 230 & 2016 & 349 & 349 & 815 \\
2014 & 258 & 2017 & 392 & 392 & 730 \\
2015 & 230 & 2018 & 426 & 426 & 764 \\
2016 & 264 & 2019 & 504 & 504 & 764 \\
2017 & 257 & 2020 & 516 & 516 & 764 \\
2018 & 290 & 2021 & 523 & 523 & 764 \\
2019 & 651 & \text{Group} & 1,107 & 1,107 & 764 \\
2020 & 617 & \text{CAGR}^2) & 1,203 & 1,203 & 764 \\
2021 & 634 & \text{2005-20} & 8.0% & 7.8% \\
\end{align*}

Notes: 1) Divisional historic figures do not add up to group sales excluding consolidations/other; 2) 2014 represents the first year that Knorr-Bremse prepared its financial statements in accordance with IFRS. Prior to 2014, financial statements were only prepared in accordance with German GAAP (HGB). IFRS differs in certain aspects from German GAAP (HGB), and accordingly data presented in accordance with German GAAP (HGB) may not be comparable to data prepared in accordance with IFRS; Source: Knorr-Bremse information
... all supported by solid aftermarket sales growth

<table>
<thead>
<tr>
<th>RVS – Aftermarket sales</th>
<th>CVS – Aftermarket sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>(€m)</td>
<td>(€m)</td>
</tr>
<tr>
<td>2014</td>
<td>2014</td>
</tr>
<tr>
<td>971</td>
<td>701</td>
</tr>
<tr>
<td>2021</td>
<td>2021</td>
</tr>
<tr>
<td>1,518</td>
<td>905</td>
</tr>
</tbody>
</table>

CAGR 6.6% CAGR 3.7%

Notes: 1) Based on IFRS; BilRUG sales allocated proportionally between OE and aftermarket
FY21: Order Intake for Group, RVS & CVS

**Group**

<table>
<thead>
<tr>
<th>FY20</th>
<th>Organic</th>
<th>M&amp;A</th>
<th>FX</th>
<th>FY21</th>
</tr>
</thead>
<tbody>
<tr>
<td>€6,442</td>
<td>861</td>
<td>53</td>
<td>-69</td>
<td>€7,287</td>
</tr>
<tr>
<td>+13.1%</td>
<td>Book-to-bill</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RVS**

<table>
<thead>
<tr>
<th>FY20</th>
<th>Organic</th>
<th>M&amp;A</th>
<th>FX</th>
<th>FY21</th>
</tr>
</thead>
<tbody>
<tr>
<td>€3,485</td>
<td>25</td>
<td>-32</td>
<td>-7</td>
<td>€3,471</td>
</tr>
<tr>
<td>-0.4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CVS**

<table>
<thead>
<tr>
<th>FY20</th>
<th>Organic</th>
<th>M&amp;A</th>
<th>FX</th>
<th>FY21</th>
</tr>
</thead>
<tbody>
<tr>
<td>€2,954</td>
<td>898</td>
<td>28</td>
<td>-62</td>
<td>€3,818</td>
</tr>
<tr>
<td>+29.2%</td>
<td>EVAC € 25m (FY21)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**EVAC**

- €25m (FY21)
- €28m (Q1/21)

**R.H. Sheppard**

- €28m (Q1/21)
FY21: Revenue for Group, RVS & CVS

**Group**

<table>
<thead>
<tr>
<th>(€m)</th>
<th>FY20</th>
<th>FY21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>6,157</td>
<td>6,706</td>
</tr>
<tr>
<td>M&amp;A</td>
<td>542</td>
<td>60</td>
</tr>
<tr>
<td>FX</td>
<td>-54</td>
<td></td>
</tr>
</tbody>
</table>

+8.9% organic growth

- EVAC €31m (FY21)
- R.H. Sheppard €29m (Q1/21)

**RVS**

<table>
<thead>
<tr>
<th>(€m)</th>
<th>FY20</th>
<th>FY21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>3,337</td>
<td>3,317</td>
</tr>
<tr>
<td>M&amp;A</td>
<td>-52</td>
<td></td>
</tr>
<tr>
<td>FX</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

-0.6% organic growth

- EVAC €31m (FY21)

**CVS**

<table>
<thead>
<tr>
<th>(€m)</th>
<th>FY20</th>
<th>FY21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organic</td>
<td>2,819</td>
<td>3,390</td>
</tr>
<tr>
<td>M&amp;A</td>
<td>596</td>
<td>29</td>
</tr>
<tr>
<td>FX</td>
<td>-54</td>
<td></td>
</tr>
</tbody>
</table>

+20.2% organic growth

- EVAC €31m (FY21)
- R.H. Sheppard €29m (Q1/21)
FY21: op. EBIT for Group, RVS & CVS

Group

- FY20: €814m, +11.6% to FY21: €908m
- Organic: +12.4%
- M&A: -2%
- FX: -5%
- EVAC: €0.1m (FY21)
- R.H. Sheppard: €-2m (Q1/21)

RVS

- FY20: €637m, -6.6% to FY21: €599m
- Organic: +0.1%
- M&A: -1%
- FX: +6.6%
- EVAC: €0.1m (FY21)

CVS

- FY20: €235m, +53.6% to FY21: €361m
- Organic: +56.5%
- M&A: -2%
- FX: -5%
- EVAC: €0.1m (FY21)
- R.H. Sheppard: €-2m (Q1/21)
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The basis of our responsibility

Our values
- Entrepreneurship
- Technological Excellence
- Reliability
- Passion
- Responsibility

UN Global Compact
Commitment to ten basic principles:
- Human rights
- Labor standards
- Environmental protection
- Anti-corruption

CR Policy
- Comprises our understanding of Corporate Responsibility
- Sets down guidelines for our CR focus areas
- Points out the main focus of our efforts to realize social and environmental responsibility
Our CR policy and focus areas

Strategy and management
We aim for **sustainable value creation**. By this we understand achieving long-term economic success while at the same time acting responsibly towards our employees and business partners as well as the environment and society. We are committed to **sustainable corporate governance** that includes environmental and social aspects in strategic planning, management and corporate processes. We act and work according to **legal and ethical principles** laid down in our Group-wide Code of Conduct.

Employees and governance
We create an attractive working environment in which the principles of **mutual trust, team-work, diversity and equality of opportunity** as well as fair and respectful treatment of each other are recognized and practiced. We offer a **safe and healthy working environment** and enable our employees to develop their **own individual potential**.
We conduct an ongoing **dialogue with our managers** on the subject of value-oriented, sustainable corporate governance.

Products and partners
We consistently work on developing **innovative products** and solutions that combine a high degree of customer value with a contribution to sustainable development. Safety is always our overriding goal.
We **work closely with our customers and suppliers** to jointly ensure continuous improvement of product quality and minimal undesirable impact on the environment and society.
We take into account and support the activities of our **business partners aimed at improving their environmental and social compatibility**.

Environment and climate
We accept our **responsibility for ensuring a clean environment and protecting the climate** and operate in compliance with our **HSE Policy** (Healthy, Safety and Environment).
We have set ourselves the goal of handling **resources in a responsible manner**, consistently reducing CO₂ emissions, minimizing and where possible avoiding undesirable impact on nature and the environment and actively using opportunities to **protect the environment**.
We are concerned to optimize the **environmental compatibility of our products across their entire life-cycle**.

Commitment and society
We are involved, as a member of society, in **social issues** and are engaged world-wide as a **good corporate citizen**. We supplement the activities of the charitable organization Knorr-Bremse Global Care e.V. with social projects implemented directly at our production sites (Local Care).
We encourage and support **social involvement on the part of our employees**.
We see ourselves as **partners for the regions** in which we live and work, and we support their long-term development.

Communication and co-operation
We seek constructive **dialogue with our stakeholders** and provide them with regular and transparent updates on our sustainability activities.
We support social, educational and environmental projects and enter into **partnerships with organizations** that contribute towards sustainable development.
In 2018 Knorr-Bremse selected its Core Sustainable Development Goals (SDGs)
Carbon neutrality from YE2021

Carbon neutrality from 2021

- Climate strategy with ambitious targets
  - 50% CO₂ emission reduction by 2030
  - Carbon-neutrality at KB sites since YE21
- Additionally: Increasing purchase of renewable energy and carbon offsetting
- Starting point of CO₂ emissions in 2018 at 143,000 tons

Contribution by our products

- Rail is a cornerstone of eco-friendly transport solutions
- Truck products support lower fuel consumption
- ~9% of KB’s revenues are driven by remanufactured and recycled products
- Circular economy supported by remanufactured and overhauled products

Focus on 5 SDGs

- In 2018 ~150 top managers of KB committed to 5 core United Nations Sustainability Development Goals
- Sponsorship of Executive Board Members to drive initiatives around the KB world

Knorr-Bremse AG is part of the new DAX 50 ESG index
The KB climate strategy 2030

- Reduction measures for 2020
  - Energy efficiency
  - Own production
  - Green power supply
  - Compensation

- Governance for the implementation
  - House of Climate Initiative Group
Fostering ESG ambitions: high ESG commitment embedded in newly defined strategy and remuneration

**Environment**
- **Climate strategy**
  - Carbon neutrality (incl. off-setting) at KB sites by 12/21
  - Extend to Scope 3 target setting
- **Circular economy**
  - High contribution from remanufactured/recycled products (currently: ~10% of revenues)

**Social**
- **Diversity**
  - Improve gender balance in global workforce and mgmt. (current share of women: ~14% in mgmt., ~20% overall)
- **Safety at work**
  - Workplace accidents <1 per 200,000 hours worked
- **Social projects**
  - Global Care: Strengthen strategic partnerships
  - Local Care: Increase employee engagement

**Governance**
- **Compliance**
  - Global anti-corruption training for high-risk employee groups; certification of CMS design and effectiveness; strengthen Human Rights processes
- **Mgmt. remuneration**
  - Stringent cascading of ESG targets

**Future objectives**

**RATINGS:**

- **Current:** B-
- **Goal:** AC+ (52, 18.9)

**New KPI in mgmt. compensation system as of 1.1.22 (20% STI weight)**
Knorr-Bremse takes active part in corporate memberships throughout the world

United Nations Global Compact (participation since 2010)

<table>
<thead>
<tr>
<th>Membership</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APTA - American Public Transportation Association, USA</td>
<td>UNIFE - Sustainable Transport Committee of the Union des Industries Ferroviaires Européennes, BEL</td>
</tr>
<tr>
<td>AAR - Association of American Railroads, USA</td>
<td>VDA - Verband der Automobilindustrie e. V., GER</td>
</tr>
<tr>
<td>AIAG - Automotive Industry Action Group, USA</td>
<td>Working Groups: Sustainable supply chain &amp; products</td>
</tr>
<tr>
<td>MEMA - Motor &amp; Equipment Manufacturers Association, USA</td>
<td>Railponsible – founding member (sustainable rail supply chain initiative)</td>
</tr>
<tr>
<td>New York and New Jersey Minority Supplier Development Council, USA</td>
<td>VDB - Fachgruppe Umwelt im Verband der Bahnindustrie e. V., GER</td>
</tr>
<tr>
<td></td>
<td>APRA - Automotive Parts Remanufacturers Association - Chairman Europe</td>
</tr>
</tbody>
</table>
Our 9 material (non-financial) corporate responsibility areas

Evaluation of non-financial facts was carried out on the basis of qualitative considerations regarding the extent of business relevance and its impact (2018)

- Anti-corruption and fair competition
- Product and system safety
- Ecological product design
- Energy and CO₂ emissions
- Personnel development
- Sustainability standards in the supply chain
- Employment conditions
- Occupational safety and health protection
- Diversity and equality
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<table>
<thead>
<tr>
<th><strong>Type of share</strong></th>
<th>Bearer shares with no-par value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bloomberg ticker</strong></td>
<td>KBX</td>
</tr>
<tr>
<td><strong>Reuters ticker</strong></td>
<td>KBX.DE</td>
</tr>
<tr>
<td><strong>German security identification number (WKN)</strong></td>
<td>KBX100</td>
</tr>
<tr>
<td><strong>ISIN</strong></td>
<td>DE000KBX1006</td>
</tr>
<tr>
<td><strong>Shares outstanding as at December 31, 2018</strong></td>
<td>161,200,000</td>
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## Bond Data

### The Corporate Bonds of Knorr-Bremse AG

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
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<tr>
<td><strong>International Securities Identification Number</strong></td>
<td>XS1837288494</td>
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<tr>
<td><strong>Issuer</strong></td>
<td>Knorr-Bremse AG</td>
</tr>
<tr>
<td><strong>Issuer ratings</strong></td>
<td>A2/outlook stable (Moody’s), A/outlook stable (Standard &amp; Poor’s)</td>
</tr>
<tr>
<td><strong>Volume</strong></td>
<td>EUR 750 million</td>
</tr>
<tr>
<td><strong>Term</strong></td>
<td>7 years</td>
</tr>
<tr>
<td><strong>Settlement</strong></td>
<td>June 14, 2018</td>
</tr>
<tr>
<td><strong>Maturity</strong></td>
<td>June 13, 2025</td>
</tr>
<tr>
<td><strong>Coupon</strong></td>
<td>1.125% p. a.</td>
</tr>
<tr>
<td><strong>Reoffer spread</strong></td>
<td>1.188% p. a.</td>
</tr>
<tr>
<td><strong>Listing</strong></td>
<td>EURO MTF Luxembourg</td>
</tr>
<tr>
<td><strong>Denomination</strong></td>
<td>EUR 1,000</td>
</tr>
<tr>
<td><strong>Applicable law</strong></td>
<td>German law</td>
</tr>
</tbody>
</table>

*Strong current rating: S&P (A) and Moody’s (A2)*
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<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>Percentage</td>
<td>CF</td>
<td>Cash flow</td>
</tr>
<tr>
<td>ABS</td>
<td>Anti-lock brake system</td>
<td>CFO</td>
<td>Chief Financial Officer</td>
</tr>
<tr>
<td>ACC</td>
<td>Adaptive Cruise Control</td>
<td>CKR</td>
<td>Czech Koruna</td>
</tr>
<tr>
<td>AD</td>
<td>Automated Driving</td>
<td>CNY</td>
<td>Chinese Yuan</td>
</tr>
<tr>
<td>ADAS</td>
<td>Advanced driver assistance systems</td>
<td>CVS</td>
<td>Commercial Vehicle Systems</td>
</tr>
<tr>
<td>ADB</td>
<td>Air Disk Brake</td>
<td>D&amp;A</td>
<td>Depreciation &amp; Amortization</td>
</tr>
<tr>
<td>AEBS</td>
<td>Advanced Emergency Braking System</td>
<td>DE</td>
<td>Germany</td>
</tr>
<tr>
<td>AG</td>
<td>Aktiengesellschaft (German: Stock Corporation)</td>
<td>Dol</td>
<td>Date of Implementation</td>
</tr>
<tr>
<td>AM</td>
<td>Aftermarket</td>
<td>e</td>
<td>Expected</td>
</tr>
<tr>
<td>BDM</td>
<td>Brake Distance Management</td>
<td>EAC</td>
<td>Electronic Air Control</td>
</tr>
<tr>
<td>bn</td>
<td>billion</td>
<td>EBIT</td>
<td>Earnings before Interest, Tax</td>
</tr>
<tr>
<td>CAGR</td>
<td>Compound Annual Growth Rate</td>
<td>EBITDA</td>
<td>Earnings before Interest, Tax, Depreciation, Amortization</td>
</tr>
<tr>
<td>CAPEX</td>
<td>Capital expense</td>
<td>EBS</td>
<td>Electronic brake system</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
<td>EGR</td>
<td>Exhaust Gas Reduction</td>
</tr>
</tbody>
</table>

**Electronic leveling control**

**End of period**

**Electronic stability program**

**Europe, European Union**

**Commercial Vehicle Systems**

**Depreciation & Amortization**

**Full-time equivalent**

**Generally Accepted Accounting Principles**

**Gross domestic product**

**Global Scalable Brake Control**

**Headquarters**

**High-speed rail**

**Hungary**

**Hungarian Forint**
<table>
<thead>
<tr>
<th>HVAC</th>
<th>Heating, ventilation &amp; air conditioning</th>
<th>LDW</th>
<th>Lane Departure Warning</th>
<th>TCO</th>
<th>Total cost of ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>IAA/IAA</td>
<td>International Automobil-Ausstellung</td>
<td>m</td>
<td>million</td>
<td>TPR</td>
<td>Truck Production Rate</td>
</tr>
<tr>
<td></td>
<td>(German: International Motor Show)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IAM/IAM</td>
<td>Independent Aftermarket</td>
<td>M&amp;A</td>
<td>Merger &amp; acquisitions</td>
<td>UIC</td>
<td>International union of railways</td>
</tr>
<tr>
<td>iCOM/iCOM</td>
<td>Intelligent Condition-Oriented</td>
<td>OEM, OE</td>
<td>Original equipment manufacturer</td>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td></td>
<td>Maintenance</td>
<td></td>
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<tr>
<td>IFRS/IFRS</td>
<td>International Financial Reporting</td>
<td>OES</td>
<td>Original equipment service</td>
<td>USD</td>
<td>US Dollars</td>
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<td></td>
<td>Standards</td>
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<tr>
<td>IN/IN</td>
<td>India</td>
<td>OPEX</td>
<td>Operating expense</td>
<td>WC</td>
<td>Working Capital</td>
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<tr>
<td>IoT/IoT</td>
<td>Internet of Things</td>
<td>p.a.</td>
<td>per annum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IPO/IPO</td>
<td>Initial Public Offering</td>
<td>PWM</td>
<td>Private Wealth Management</td>
<td></td>
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</tr>
<tr>
<td>JV/JV</td>
<td>Joint venture</td>
<td>R&amp;D</td>
<td>Research &amp; Development</td>
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<tr>
<td>KB/KB</td>
<td>Knorr-Bremse</td>
<td>ROE</td>
<td>Return on Equity</td>
<td></td>
<td></td>
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<tr>
<td>KB2020/KB2020</td>
<td>Knorr-Bremse 2020</td>
<td>ROS</td>
<td>Return on Sales</td>
<td></td>
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<td>KPI/KPI</td>
<td>Key Performance Indicator</td>
<td>RVS</td>
<td>Rail Vehicle Systems</td>
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<td>LCC/LCC</td>
<td>Life-cycle cost</td>
<td>TCMS</td>
<td>Train Control Management System</td>
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