DELIVERING FULL ADHESION UNDER ALL TRACK CONDITIONS. Controlled and safe stopping distances in the busy rail environment of today are essential. Difficult operating conditions such as moisture, foliage or even ice on the track can affect service performance and dealing with these issues requires a real understanding of the wheel and rail interface dynamics. In-Bremen understands this dynamic and can offer solutions which efficiently and economically improve the friction between wheel and rail.

CONTINUOUS DEVELOPMENT

In-Bremen has combined experience with continuous investment in research and development to deliver solutions that can add value to your requirements. Care for the environment is a key consideration in the development of the latest generation of sanding systems. Issues such as the need for sand reduction whilst delivering higher system availability and features such as functionality monitoring has led to some exciting new developments in the area. Systems are designed and developed for individual customers by using a modular concept. Today at its facility in Mindelheim, Austria, In-Bremen is producing a wide range of solutions for a huge variety of applications.

These systems are all subject to the highest quality standards from initial concept right through to delivery to the customer.

FEATURES AND BENEFITS
- Speed and accuracy depend on an optimal sand flow rate - grit consumption can be reduced by up to 50% and particle emissions can be minimized
- Drying, heating and loosening of the grit - readily available for operation
- Heating of sand pipe nozzle - increases mixing temperatures and so...
- Reduced risk function - avoids grit remaining in the delivery hose
- Electrical and pneumatic control of condition of sanding systems
- Grips for monitoring functions in the sand box
- Get... delivery monitoring function in the sand pipe
- Lighter weight and smaller installation space - savings in operation costs
- Modular design - delivers a wide range of system options
- Dover delivery optimal performance - including life-cycle costs.
- Continuous innovation - building on long-term experience with all vehicle types.

FUNCTIONALITIES AND BENEFITS
- Sanding systems for Light rail vehicles (street cars, tramways) without central air supply. A dedicated air supply compressor with up to 1 bar pressure is required to perform fitted functions. Normally standard are type new-type VDS, VOD, VDS6.
- Sanding systems for street cars with central air supply. Pressure shall exceed at least 5 bars for small sand grit. A pressure of 7.5 to 10 bars opens the full range of adjustment for a wide range of sand qualities.

All types of sanding units can be upgraded with optional sand level sensors (including monitoring devices), heated sand nozzles, and other sensors. So sand boxes are available standard as well as made-to-order from Bremen recommends the use of fine freely-dried sand of 0.7 to 1.2 mm grit size. Local sand qualities are supported where required as an adjustment of the system during the course of the system integration test.
DELIVERING FULL ADHESION UNDER ALL TRACK CONDITIONS

Controlled and safe stopping distances in the busy rail environment of today are essential. Difficult operating conditions such as moisture, foliage or even ice on the track can affect service performance and dealing with these issues requires a real understanding of the rail wheel interface dynamics. K Norr-Bremse understands this dynamic and can offer solutions which efficiently and economically improve the friction between wheel and rail.

CONTINUOUS DEVELOPMENT

K Norr-Bremse has combined experience with continuous investment in research and development to deliver sanding systems that can address any requirement. Care for the environment and innovation are key considerations in the development of the latest generation of sanding systems. Issues such as the need for sand reduction whilst delivering higher systems availability and features such as function monitoring has led to some exciting new developments in this area. Systems are designed and developed for individual customers by using a modular approach. Today at its facility in Mödling, Austria, K Norr-Bremse is producing a wide range of solutions for a huge variety of different applications. These systems are all subject to the highest quality standards from initial concept right through to delivery to the customer.

FEATURES AND BENEFITS

- Speed and accentuation depend on sand flow rate - consumption can be reduced by up to 50% and particle emissions can be minimized
- Drying, heating and dosing of the grit - readily available for operation
- Heating of sand pipe nozzle - minimizes freezing temperatures and ice
- Electronic function - avoids grit remaining in the delivery hose
- Electric and pneumatic control of condition of sanding systems
- Grit flow rate monitoring function in sand box
- Grit delivery monitoring function in the sand pipe
- Clamping weight and smaller installation space - savings in operational costs
- Modular design - delivers a wide range of system options
- OptiControl dosing - delivers optimum performance - including life-cycle costs
- Continuous innovation - building on long experience with all vehicle types

SANDING SYSTEMS

Sanding systems for light rail vehicles (street cars, trams) without central air supply. A dedicated air supply compressor with up to 1 bar pressure is required to perform the required function. Normally all levels are dry (see types VSD1, VSD2 or VSD6).

Sanding systems for rail vehicles with central air supply. Pressure shall exceed at least 5 bars for small sand grit. A sand pressure of 7 bars opens the full range of adjustment for a wide range of sand qualities.

SEI

This sanding system is based on an ejector principle for dosing and conveying the grit. Additional functionalities and benefits are:

- Sanding rate from 150 to 780 g/30s
- Drying of grit by heating the lower area of the sand box (option)
- Uni- or bi-directional sanding
- Time controlled amount of used sand
- Speed controlled sand delivery rate with defined volume per meter of track
- Reduction of sand consumption by up to 50%
- Reduction of offloading cycles
- Reduction of grit dust pollution, especially in urban areas
- Reduction of stickiness
- Heating for warming up the grit
- Heating for warming up the drying air
- Electrical sanding system
- Tight sand box
- Time controlled amount of used sand
- Speed controlled sand delivery rate with defined volume per meter of track

SEB

This sanding system is based on an ejector principle for dosing and conveying the grit. Additional functionalities and benefits are:

- Sanding rate from 150 to 780 g/30s
- Drying off the grit in the sand box
- Heating for warming up the flow between compressor and dosing device (option)
- Blow-out function to clean the sand hose after sandings during winter or in harsh environmental conditions
- Electrical sanding system
- Time controlled sanding rate
- Electric air flow and sand temperature control
- Electric or pneumatic dosing device (option)
- Time controlled amount of used sand
- Speed controlled sand delivery rate with defined volume per meter of track

SD

This conventional sanding system has the optimal control performance with the basic functionality. It is based on an underpressure principle with a tailor-made control or air dosing device.

- Sanding rate from 150 to 780 g/30s
- Sand box with definedlooking
- Bidirectional sanding system

SDN1.1

This latest system of sand dosing device is able to offer the entire range of functional boxes even for very difficult SIU conditions of the sand delivery hose. Depending on the type of pneumatic control, one or two steps or a continuous flow rate can be adjusted within a defined range. A lot of functionalities can be left out of the customer’s requirements.

- Sanding rate from 260 to 1000 g/30s
- Drying the grit in the water sand box with air after delivery
- Heating for warming up the air flow and sand
- Tight sand box
- Electrical dosing system
- Time controlled amount of used sand
- Speed controlled sand delivery rate with defined volume per meter of track

SDN 4

This latest system of sand dosing device is able to offer the entire range of functional boxes even for very difficult SIU conditions of the sand delivery hose. Depending on the type of pneumatic control, one or two steps or a continuous flow rate can be adjusted within a defined range. A lot of functionalities can be left out of the customer’s requirements.

- Sanding rate from 260 to 1000 g/30s
- Drying the grit in the water sand box with air after delivery
- Heating for warming up the air flow and sand
- Tight sand box
- Electrical dosing system
- Time controlled amount of used sand
- Speed controlled sand delivery rate with defined volume per meter of track

All types of sanding units can be upgraded with optional sand level sensors (including monitoring devices), heated sand nozzles, sand flow sensors, etc. Sand boxes are available standardized as well as tailor-made. K Norr-Bremse recommends the use of Sanflex sand of 0.7 to 1.2 mm grit size. Local sand qualities are supported but require an adjustment of the system during the course of the system integration test.

SANDING SYSTEMS
**DELIVERING FULL ADHESION UNDER ALL TRACK CONDITIONS.** Controlled and safe -keeping distances in the busy rail environment of today are essential. Difficult operating conditions such as moisture, fog or ice on the track can affect service performance and dealing with these issues requires a real understanding of the wheel and rail interface dynamics. Bremme understands this dynamic and can offer solutions which efficiently and economically improve the friction between wheel and rail.

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**CONTINUOUS DEVELOPMENT** Kone Bremse has continued its experiences with continuous investment in research and development to deliver sanding systems that can address any requirement. Care for the environment is a key consideration in the development of the latest generation of sanding systems. Issues such as the need for sand reduction whilst delivering higher performance, low emission and dealing with these issues requires a real understanding of the wheel and rail interface dynamics. Bremse understands this dynamic and can offer solutions which efficiently and economically improve the friction between wheel and rail.

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**FEATURES AND BENEFITS**

<table>
<thead>
<tr>
<th>Features/ Benefits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed and acceleration dependent optimized sand flow</td>
<td></td>
</tr>
<tr>
<td>- Sand consumption can be reduced by up to 50% and particle emissions can also be minimized</td>
<td></td>
</tr>
<tr>
<td>Drying, heating and mixing of the grit - readily available for operation</td>
<td></td>
</tr>
<tr>
<td>Mixing of sand pipe co-ex - combines mixing and temperature mix</td>
<td></td>
</tr>
<tr>
<td>- Reduces function - avoids grit remaining in the delivery hose</td>
<td></td>
</tr>
<tr>
<td>Electrical and pneumatic control of conditions of sanding systems</td>
<td></td>
</tr>
<tr>
<td>Grips are monitored with monitoring function in the sand box</td>
<td></td>
</tr>
<tr>
<td>Delivery monitoring function in the sand pipe</td>
<td></td>
</tr>
<tr>
<td>- Ejector principle for dosing and conveying the grit</td>
<td></td>
</tr>
<tr>
<td>- Drying of grit in the sandbox</td>
<td></td>
</tr>
<tr>
<td>- Heating for warming up the grit</td>
<td></td>
</tr>
<tr>
<td>- Blowing out function to clean sand box</td>
<td></td>
</tr>
<tr>
<td>- Heating for warming up the grit</td>
<td></td>
</tr>
<tr>
<td>- Speed controlled sand delivery rate with defined volume per meter of track</td>
<td></td>
</tr>
</tbody>
</table>

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**SANDING SYSTEMS**

- **SEJ**
  - This sanding system is based on an ejector principle for dosing and conveying the grit. Additional functionalities and benefits are:
  - Sanding rates from 150 to 700g / 30s
  - Eco-friendly, no grit remaining in the delivery hose
  - Extended service life (up to 12 years)
  - Continuous monitoring - monitoring grit remaining in the delivery hose

- **SDN 15**
  - Very similar to the SEJ sanding system, but with additional functionalities and benefits:
  - Sanding rates from 150 to 700g / 30s
  - Drying of grit in the sandbox
  - Heating for warming up the grit
  - Blowing out function to clean the sand box
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

- **SEB**
  - Very similar to the SEJ sanding system, but with additional functionalities and benefits:
  - Sanding rates from 150 to 700g / 30s
  - Drying of grit in the sandbox
  - Heating for warming up the grit
  - Blowing out function to clean the sand box
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

- **SDN 4**
  - This conventional sanding device is based on an overpressure principle with a tailored concept for all sanding devices:
  - Sanding rates from 150 to 700g / 30s
  - Sand box with defined leakage
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

- **SDN 11.1**
  - This latest system of sand dosing device is able to offer the entire range of functionalities even for very difficult conditions of the sand delivery hose.
  - Very similar to the SEJ sanding system, but with additional functionalities and benefits:
  - Sanding rates from 150 to 700g / 30s
  - Drying of grit in the sandbox
  - Heating for warming up the grit
  - Blowing out function to clean the delivery hose
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track
  - Single pipe connection in-between the main reservoir pipe and sanding control and sanding device for all automatic functionalities (optional)
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

All types of sanding units can be upgraded with optional sand level sensors (including monitoring device), heated sand nozzles and sand sensor devices. Sand box are available standardised as well as ratio made. From Bremse recommends the use of dual free sifted of 0.7 to 1.2 mm grit size. Local sand quality is supported but required in an adjustment of the system during the course of the system integration test.

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**SANDING SYSTEMS FOR RAIL VEHICLES**

- **Sanding system for Light rail vehicles (street cars, trams)**
  - Supply pressure for small sand grit size: 0.7 to 1.2 mm grit size. Local sand quality is supplied but required in an adjustment of the system during the course of the system integration test.

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**SANDING SYSTEMS FOR LIGHT RAIL VEHICLES**

- **Sanding system for Light rail vehicles**: Light rail vehicles have different requirements compared to conventional railway vehicles. It is based on an overpressure principle using a tailore made injector. Depending on the type of pneumatic control, one or two steps can be performed. A continuous flow rate can be adjusted within a defined range. A lot of functionalities can be performed under defined conditions.
  - Sanding rates from 150 to 700g / 30s
  - Sand box with defined leakage
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

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**SANDING SYSTEMS FOR RAIL VEHICLES**

- **Sanding system for Rail vehicles**: Rail vehicles have different requirements compared to conventional railway vehicles. It is based on an overpressure principle using a tailore made injector. Depending on the type of pneumatic control, one or two steps can be performed. A continuous flow rate can be adjusted within a defined range. A lot of functionalities can be performed under defined conditions.
  - Sanding rates from 150 to 700g / 30s
  - Sand box with defined leakage
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

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**SANDING SYSTEMS FOR MEDIUM RAIL VEHICLES**

- **Sanding system for Medium rail vehicles**: Medium rail vehicles have different requirements compared to conventional railway vehicles. It is based on an overpressure principle using a tailore made injector. Depending on the type of pneumatic control, one or two steps can be performed. A continuous flow rate can be adjusted within a defined range. A lot of functionalities can be performed under defined conditions.
  - Sanding rates from 150 to 700g / 30s
  - Sand box with defined leakage
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

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**SANDING SYSTEMS FOR HIGH RAIL VEHICLES**

- **Sanding system for High rail vehicles**: High rail vehicles have different requirements compared to conventional railway vehicles. It is based on an overpressure principle using a tailore made injector. Depending on the type of pneumatic control, one or two steps can be performed. A continuous flow rate can be adjusted within a defined range. A lot of functionalities can be performed under defined conditions.
  - Sanding rates from 150 to 700g / 30s
  - Sand box with defined leakage
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

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**SANDING SYSTEMS FOR LIGHT RAIL VEHICLES**

- **Sanding system for Light rail vehicles**: Light rail vehicles have different requirements compared to conventional railway vehicles. It is based on an overpressure principle using a tailore made injector. Depending on the type of pneumatic control, one or two steps can be performed. A continuous flow rate can be adjusted within a defined range. A lot of functionalities can be performed under defined conditions.
  - Sanding rates from 150 to 700g / 30s
  - Sand box with defined leakage
  - Intelligent monitoring system
  - Time-controlled amount of sand
  - Speed-controlled sand delivery rate with defined volume per meter of track

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**SANDING SYSTEMS FOR MEDIUM RAIL VEHICLES**

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  - Sanding rates from 150 to 700g / 30s
  - Sand box with defined leakage
  - Intelligent monitoring system
  - Time-controlled amount of sand
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Sanding Systems

Applications
High-Speed Trains | Light Rail Vehicles | Locomotives | Metros | Region and Commuter Trains | Special Vehicles

Sanding Systems Types

<table>
<thead>
<tr>
<th>Pressure Bar</th>
<th>Sanding Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 bar</td>
<td>Sanding</td>
</tr>
<tr>
<td>1 bar</td>
<td>Sanding / Drying</td>
</tr>
<tr>
<td>5 bar</td>
<td>Sanding / Drying / Blow Out</td>
</tr>
<tr>
<td>10 bar</td>
<td>Sanding / Drying / Blow Out</td>
</tr>
</tbody>
</table>

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