BS GROUP
Bearing Solutions

DOORMOVER
SLIDINGDOOR PARTS

# Ball bearings, Rollers and Assemblies for Sliding Doors in the car industry

# About Us

BS GROUP
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- The BS Group is a partner of the HLT Group. The HLT Group supports all market segments and forms a joint function for qualified systems and products from EU to Asia and quality products from China to EU and Asia .

- The BS Group has sustainable partnerships with long-term Chinese suppliers for special components and standardized products in larger quantities.

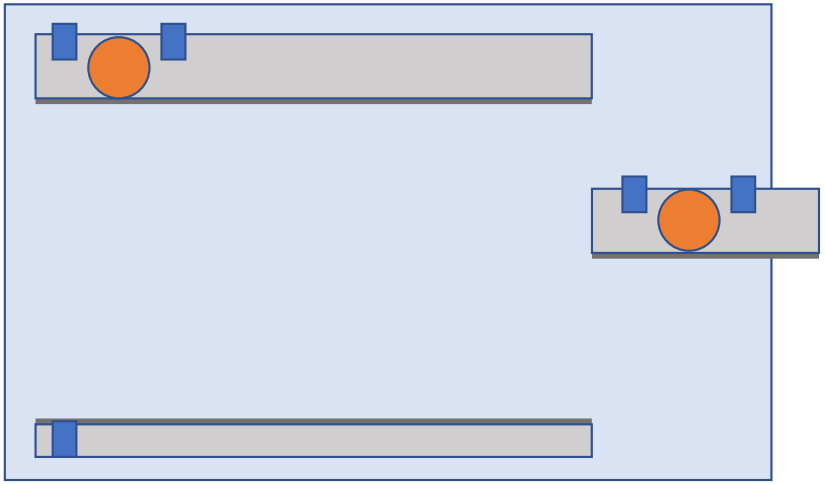
- Realization of new and high-quality manufacturing processes, quality assurance and logistics as well as final assembly and storage of small to large quantities in **Prague, CZ**.

- Development and delivery of customized products and services for industrial applications with a focus on JIT logistics - directly to the customer production line.

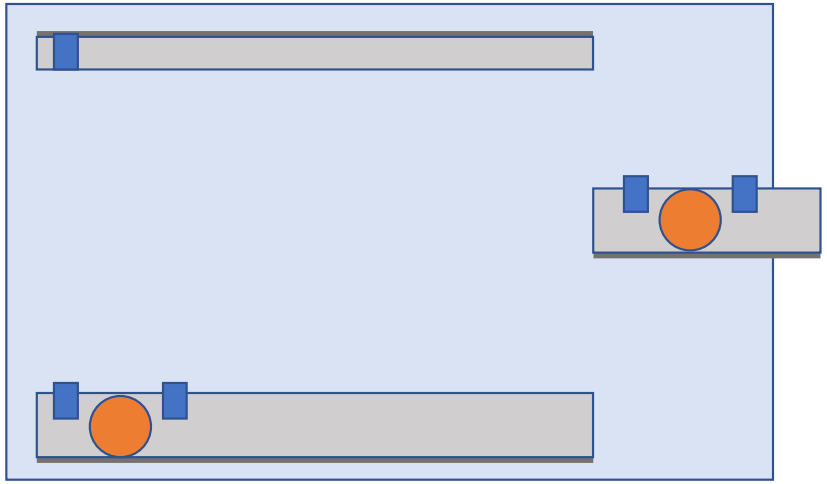
- The BS Group has a competence center for the production of engineering plastics in north-western part of Czech Republic. Parts out of different pastics can be produced on 4 injection molding machines.

# SLIDING DOOR SYSTEMS

Hanging Door



Staying Door



# MATERIAL + PERFORMANCE REQUIREMENTS

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Guiding Rollers:

- Material with good combination of hardness / softness
    - Soft material for absorbing vibrations when door is closed because of permanent contact between SLD and car frame.
    - Material with higher Shore D hardness to avoid deformation (flattening) when door is closed
- Material that can handle high peak load forces while moving around the corner at middle hinge shortly before closing position.

Carrier Rollers:

- Material that can handle higher load forces with less deformation in long lifetime performance (> 200.000 opening/closing cycles)
- Unfilled material to avoid any wear on painted or coated rails
- Material with low water absorption
    - to avoid the lost of press fit between plastic ring and bearing
    - To keep the tolerances
- Material that can handle salty air and sandy conditions

# CURRENT MATERIALS

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The trend in the automotive industry for family vans or commercial cars in EUROPE is towards sliding doors at this vehicle sizes. The newer generations are mainly with automatic doors. Advantage is the reduce the miss use with motor driven doors. The opening or closing speed is constant during the complete operation. Forces on the rollers at the end positions are reduced based on the lower speed of these sliding doors.

In EUROPE the OEM`s use currently three different types of Plastic materials for the rollers:

- **GLUSIMID® C12 (PA 12C)**
  Machined rollers out of casted rods.

- **GLUSIMID® MR12 (PA 12C re-granulated)**
  Re-granulated chips out of GLUSIMID® C12 modified for injection molding process.

- **GLUSIMID® M46**
  Standard material for using in injection molding process.

# CURRENT MATERIALS

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**Glusimid® C12**

**Positive:**

- High quality material
- Good combination between Hardness (wear Resistance) and Softness (damping absorp-tion of vibrations)
- Machined rollers ➔ tight tolerances possible
- Material is used in EUROPE since 25 years for guiding + carrier roller in SLD`s

**Negative:**

- Higher material price
- Limited casting companies ➔ no high availability of semi finished products
- Special equipment for casting process necessary
- Slow process becaus of long polymerization time

# CURRENT MATERIALS

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**Glusimid® MR12**

**Positive:**

- Material performance just 20% less of Glusimid® C12
- Modified for injection molding process

**Negative:**

- Chips out of Glusimid® C12 necessary
- Material experiences since 2014 ➔ no long term results
- Not for higher forces ➔ higher wear

# CURRENT MATERIALS

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**Glusimid® M46**

**Positive:**

- High availability ➔ several material producers worldwide
- Injection molding process
- Price and quality wise acceptable alternative to Glusimid® C12
- Long time experience in SLD-projects worldwide

**Negative:**

- Material developed for “higher temperature applications" (80-150°C)
- High water absorption ➔ risk of loosing press fit
- Fast destroyment of rollers at overload
- Hard material with worth damping performance

# COMPARISON MATERIAL PROPERTIES

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| Property | Unit | Glusimid C12 | Glusimid MR12 | Glusimid M46 | Glusimid M6 | Glusimid M6GF3 | Glusimid M66 |
|---|---|---|---|---|---|---|---|
| Fillers | | No | No | No | No | 30% Glassfibers | No |
| Density | g/cm3 | 1,025 | 1,025 | 1,18 | 1,13 | 1,35 | 1,14 |
| Color | | natural | black | red-brown | natural | | nuatural |
| Humidity absorption<br>Reference atmosphere<br>Water absorption | Weight-% | <br>0,9<br>1,4 | <br>~ 2,1<br>~ 3,8 | <br>**2,8**<br>**9,5** | <br>1,6<br>**9,3** | <br>2,1<br>**7,0** | <br>**2,9**<br>**8,5** |
| Upper use temperature on air:<br>Short time<br>Continuous | °C | <br>150<br>80 | <br>150<br>80 | <br>200<br>135 | <br>190<br>120 | <br>160<br>100 | <br>190<br>105 |
| Minimal use temperature | °C | -40 | -30 | -40 | -30 | -30 | -30 |
| **Tensile stress at yield*** | MPa | 60 | 41 | 55 | 43 | **125** | 50 |
| Break stress | MPA | 52 | 47 | - | 70 | | - |
| Elongation at yield stress | % | 8 | 24 | - | 22 | | 20 |
| **Elongation at break*** | % | >50 | > 200 | >100 | >50 | 5,0 | >150 |
| Tensile modulus | MPA | 2100 | **1650** | **1300** | **1350** | **6000** | **1100** |
| Izod notched impact strength at 23°C | kJ/m2 | 6 | 9 | 13 | 14 | 15 | 5 |
| Vicat B50 | °C | 140 | 147 | **238** | **196** | **215** | **238** |
| Hardness Shore D | | 76 | 70 | **90** | **82** | **86** | **84** |
| Coefficient of friction against steel | | 0,35 | 0,32 | 0,33 | 0,35 | 0,4 | 0,36 |

*** value humid (50%)** **Critical value**

# COMPARISON MATERIAL PROPERTIES

BS GROUP Bearing Solutions

| Property | Glusimid C12 | Glusimid MR12 | Glusimid M46 | Glusimid M6 | Glusimid M6GF3 | Glusimid M66 |
|---|---|---|---|---|---|---|
| Price | - | o | + | o | o | o |
| Availability | - | - | + | + | + | o |
| Abrasion | ++ | ++ | ++ | ++ | - | ++ |
| Density | ++ | ++ | o | o | o | o |
| Humidity absorption<br>Reference atmosphere<br>Water absorption | ++ | + | - | - | o | - |
| Upper use temperature on air:<br>Short time<br>Continuous | + | + | ++ | ++ | + | + |
| Minimal use temperature | ++ | ++ | ++ | ++ | ++ | ++ |
| Tensile stress at yield* | + | o | + | o | -- | + |
| Break stress | + | + | - | ++ | - | - |
| Elongation at yield stress | + | + | - | + | - | + |
| Elongation at break* | + | ++ | + | + | -- | ++ |
| Tensile modulus | + | o | o | o | ++ | - |
| Izod notched impact strength at 23°C | o | o | + | + | + | o |
| Vicat B50 | ++ | + | -- | -- | -- | -- |
| Hardness Shore D | + | + | -- | - | -- | - |
| Coefficient of friction against steel | + | + | + | + | o | + |
| **Total material performance** | ++ | + | + | o | -- | - |

# CONTACT

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