Static Mixers Solutions for Injection Molding
Your partner in the plastics processing industry

- Founded in 2012 as a spin-off of Sulzer Chemtech
- Subsidiaries in Winterthur, Switzerland and Linden, Germany
Your partner in the plastics processing industry

- More than 30 years experience in plastic processing
- The biggest standard mixer portfolio in the industry
- Complete customized solutions including housings and nozzles
- Fast delivery of standard mixers and mixing nozzles within 5 days
- Local support in most important countries through own sales agents or local reps
- More than 30’000 references worldwide
Leading in static mixing technology

- **1975** First Mixer Application Plastics Processing
- **1995** First Mixing Nozzle
- **1996** SMB-R Melt Blender
- **1997** SMB-H Melt Blender
- **1998** SMB-M Melt Blender
- **1999** SMB-T Melt Blender
- **2000** SMB-I Melt Blender
- **2001** SMB-M Melt Blender
- **2002** SMB-N Melt Blender
- **2003** SMB-O Melt Blender
- **2004** New LSR Mixing Block
- **2007** Mix Tip
- **2008** Mix Body for sensitive applications
- **2009** Mix Body for sensitive applications
- **2010** Launch new Mixing Nozzle KSM
- **2013** SMB plus Melt Blender

**Foam Extrusion**

**Application Plastics Processing**
Applications

- Injection Molding
- Hot Runner
- LSR
- Extrusion
- XPS
- Physical high density foam extrusion

Polymers

- Thermoplastics
  - LDPE, HDPE, LLDPE, PP, PS, HIPS, etc.
- Technical Polymers
  - POM, PMMA, TPU, PET, PBT, SAN, ABS, PC, LCP, PA, PC/ABS
- Filled Polymers
  - Glass-fibers, mineral fillers, etc.
- Foamed polymers
  - PS, PE, PP, PET, PVC
How it works

- Homogenization of additives as master batch, color, flame retardant, different polymer grades etc.
- Reduction of radial and axial temperature variations
- Equalization of velocity differences across the flow channel
Static mixers in injection molding
Applications where a mixing nozzle helps

1) Acute problems as color streaks, poor tolerance, brilliant spots, high scrap rate, poor mold filling, disbalanced cavities

2) All applications using master batch & liquid colors, flame retardants, additives, recyclates and fillers
   - reduced cycle time
   - saving of master batch / additives
   - Increased life time of screw (filled plastics)
   - Increased usage of recycle material
Benefits of Promix Mixing Nozzles

- Effective avoidance of color streaks
- Equalized color depth / better color appearance
- Saving of 20 – 30% master batch (= 1’000 to >10’000 CHF savings / year)
- No brilliant spots due to homogenization of temperature profile
- Reduced cycle time due to optimized processing parameters
- Better tolerances
- Improved processing of recyclates (usability of more recyclate or better product quality)
- Improved balancing of hot runner systems
Effective color homogenization

- Saving of 20 – 30% master batch = 1000 – >10’000 CHF per year
- Equalized color depth / better color appearance
How it works

Temperature homogenization

A Promix mixing nozzle leads to significantly smaller radial and axial temperature deviations.
How the cycle time can be reduced

- Shorter cooling time due to reduced possible melt temperature (-10 to 20 °C) resulting from flat temperature profile during screw stroke, especially attractive for applications where cooling time is limiting the cycle time → cooling time > melting time i.e. for thick wall parts

- Shorter melting time required due to reduced screw backpressure (approx. 5 bar instead of 15 -30 bar), especially attractive for applications where melting time is limiting the cycle time → melting time > cooling time i.e. for thin-walled parts with long flow paths

- Reduced injection speed can reduce shrinking and therefore lead to faster cooling (amorphous Polymers)
Common concerns

- The required additional pressure drop of a static mixer is too high ➔ the typical injection pressure increase with a Promix static mixer is only 50 - 150 bar specific (+10 to 15 %)

- A static mixer is difficult to clean ➔ a Promix static mixer can be best cleaned inline with only 3 to 5 times the volume of the mixer

- I have latest technology injection molding machines and need therefore no static mixers ➔ also new machines have a potential for process optimizations as better color distribution, cycle time reductions, reduction of master batch consumption etc.

- Static mixers can break and damage my moulds ➔ Promix static mixers are produced under highest quality standards and continuous quality control, breaking is almost not possible as long as the mixers will be used according to our operating instructions
Self cleaning effect Promix Static Mixers

- Inline cleaning of Promix mixers is highly effective and in this case required only 2 to 3 times the volume of the mixer.

- Mixer was filled with blue PP masterbatch and afterwards purged out with non colored PP.

[Images of Promix Static Mixers and colored PP samples]
LSR Mix block

**Constant high product quality with almost no maintenance**

Conventional mixers for LSR have to be cleaned 1 – 3 times a week; there is always the risk of precured LSR being found in your product.

Your advantages with the patented LSR Mix block

- Constant high product quality because LSR can not cure inside the mixer
- No cleaning in case of short production breaks
- Easy inline cleaning in case of longer production breaks
- Significantly increased external cleaning cycle (> 4 Weeks)
# Product Portfolio injection molding solutions

<table>
<thead>
<tr>
<th>Product</th>
<th>Range</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mix Tip</td>
<td>10 12</td>
<td>Compact solution for small machines up to 150 tons clamping force</td>
</tr>
<tr>
<td>Mixing Nozzle SMK</td>
<td>10 12 17 22 30 40 50</td>
<td>High performance nozzle, a must for processing of polymers containing abrasive fillers</td>
</tr>
<tr>
<td>Mixing Nozzle KSM</td>
<td>17 22 30</td>
<td>For standard applications without glass fillers, very competitive price</td>
</tr>
<tr>
<td>Mixing Nozzle Mix</td>
<td>17 22 30</td>
<td>For very low viscous polymers MFI &gt; 20 and sensitive polymers</td>
</tr>
<tr>
<td>Body</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LSR Mix Block</td>
<td>one size only</td>
<td>High performance solution for LSR application</td>
</tr>
<tr>
<td>Protector</td>
<td>10 12 17 22 30 40</td>
<td>Optional melt filter for Mix Nozzle SMK, KSM and Mix Body. Recommended when processing regrinds</td>
</tr>
</tbody>
</table>
Mixing nozzle concept

- Nozzle adapter
- Optional: Protector
- Nozzle body
- Mixer Type KSM
- Mixer Type SMK
- Mix Body Type
- Nozzle Tip
Mixing Nozzle concept and scope of supply

The concept – high quality 3-part nozzle

- Consisting of tip, body and adapter, tip and adapter are machined acc. to customer spec.
- Shortest installation-length with integrated protector
- Short delivery times

Scope of Supply

Fully hardened 3-part nozzle, allowable pressure 2500 bar, including:

- Suitable mixer
- Heating
- Thermocouples
- Protector is optional
## Case Study 1

<table>
<thead>
<tr>
<th>Application</th>
<th>Garden chair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine size</td>
<td>10500 kN</td>
</tr>
<tr>
<td>Screw diameter</td>
<td>95 mm</td>
</tr>
<tr>
<td>Material</td>
<td>PP</td>
</tr>
<tr>
<td>Mixer</td>
<td>SMK-R 30/4</td>
</tr>
<tr>
<td>Shot weight</td>
<td>3000 g</td>
</tr>
<tr>
<td>Cycle time</td>
<td>68 sec.</td>
</tr>
<tr>
<td>Weekly machine utilization</td>
<td>120 h</td>
</tr>
<tr>
<td>Masterbatch level without mixer</td>
<td>2 %</td>
</tr>
<tr>
<td>Masterbatch level with mixer</td>
<td>1.6 %</td>
</tr>
<tr>
<td>Masterbatch savings per cycle</td>
<td>20 %</td>
</tr>
<tr>
<td>Weekly cost savings in Euro</td>
<td>173</td>
</tr>
</tbody>
</table>

**Pay back time:** 3 months

**Savings Euro 9000 p.a. due to reduced color cost**
**Case Study 2**

<table>
<thead>
<tr>
<th>Application:</th>
<th>Brush</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine size:</td>
<td>1900 kN</td>
</tr>
<tr>
<td>Screw diameter:</td>
<td>45 mm</td>
</tr>
<tr>
<td>Material:</td>
<td>PP</td>
</tr>
<tr>
<td>Mixer:</td>
<td>SMK-R 17/4</td>
</tr>
<tr>
<td>Shot weight:</td>
<td>200 g</td>
</tr>
<tr>
<td>Cycle time:</td>
<td>60 sec.</td>
</tr>
<tr>
<td>Weekly machine utilization:</td>
<td>80 h</td>
</tr>
<tr>
<td>Masterbatch level without mixer:</td>
<td>3 %</td>
</tr>
<tr>
<td>Masterbatch level with mixer:</td>
<td>1.5 %</td>
</tr>
<tr>
<td>Masterbatch savings per cycle:</td>
<td>50 %</td>
</tr>
<tr>
<td>Weekly cost savings in Euro:</td>
<td>111</td>
</tr>
</tbody>
</table>

**Pay back time:** 3 months

**Savings Euro 5770 p.a. due to reduced color cost**
Case studies: Pay back due to shorter cycle time

Case Study 4

Application: Dog bed
Machine size: 5000 kN
Screw diameter: 80 mm
Material: PP
Mixer: SMK-R 17/4
Shot weight: 1100 g
Cycle time without mixer: 39 sec.
Cycle time with mixer: 36.5 sec.
Cycle time reduction: 6 %
Weekly machine utilization: 120 h
Masterbatch level without mixer: 1.5 %
Masterbatch level with mixer: 1.5 %
Weekly cost savings in Euro: 318

Pay back time: 1 month

Savings Euro 16’500 p.a. due to shorter cycle time
## Case studies: Pay back due to shorter cycle time

### Case Study 3

<table>
<thead>
<tr>
<th>Application</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine size</td>
<td>12000 kN</td>
</tr>
<tr>
<td>Screw diameter</td>
<td>130 mm</td>
</tr>
<tr>
<td>Material</td>
<td>PPC</td>
</tr>
<tr>
<td>Mixer</td>
<td>SMK-R 30/4</td>
</tr>
<tr>
<td>Shot weight</td>
<td>2500 g</td>
</tr>
<tr>
<td>Cycle time without mixer</td>
<td>120 sec.</td>
</tr>
<tr>
<td>Cycle time with mixer</td>
<td>110 sec.</td>
</tr>
<tr>
<td>Cycle time reduction</td>
<td>8.3 %</td>
</tr>
<tr>
<td>Weekly machine utilization</td>
<td>108 h</td>
</tr>
<tr>
<td>Masterbatch level without mixer</td>
<td>2 %</td>
</tr>
<tr>
<td>Masterbatch level with mixer</td>
<td>2 %</td>
</tr>
<tr>
<td>Weekly cost savings in Euro</td>
<td>1200</td>
</tr>
</tbody>
</table>

**Pay back time:** 1.5 months

Savings Euro 62’400 p.a. due to shorter cycle time
References injection molding

Machine builders

KraussMaffei
Berstorff

Bottlenfeld
Innovative Injection Molding

ARBURG

NEGRI BOSSI

BOY
Spritzgiessautomaten

babyplast
Kleinstspritzgießmaschine

ENGEL
be the first.

Sumitomo SHI DEMAG

Masterbatch producers

PolyOne

Clariant

FINKE
Pigmente · Flüssigfarben · Masterbatches