

# Preparation Technology for Recyclings and Waste Materials

- |                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                   |
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| <ul style="list-style-type: none"> <li>■ <b>Sludges</b></li> <li>■ <b>Filter cakes</b></li> <li>■ <b>Dusts</b></li> <li>■ <b>Ashes</b></li> <li>■ <b>Grounds</b></li> </ul> | <p><b>For all applications</b></p> <ul style="list-style-type: none"> <li>■ if sludges or filter cakes are to be blended with dusts to form granular material or agglomerates</li> <li>■ if ashes or dusts are to be transformed into granules</li> <li>■ if recyclings are to be mixed with binders</li> <li>■ if contaminated grounds are to be mixed with additives</li> </ul> |
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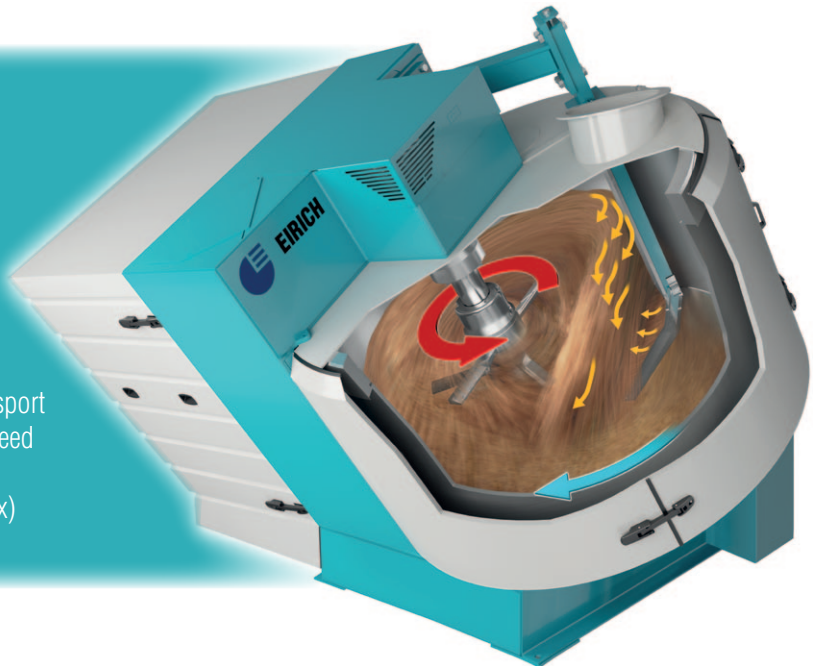
## The unique mixing principle

**Rotating mixing pan**  
for material transport

**Variable-speed mixing tool,**  
**slow to fast**  
for mixing

### The effect

The separation between material transport and the mixing process allows the speed of the mixing tool (and thus the power input into the mix) to be varied within wide limits



### This mixing principle enables

- The mixing tool can be run faster than in simple mixing systems
- The power input into the mix can be adapted specifically to the process material
- During one rotation of the mixing pan 100 % material circulation
- Optimal mixing effects without using high-speed rotating choppers
- In comparison with horizontal mixers, no wear due to product contact on the shaft seals
- Various consistencies can be processed in one and the same mixer
- For mixer volumes of up to 3 m<sup>3</sup>, only 1 mixing tool necessary

### EIRICH customers tell from experience

- Materials of any kind and consistency are prepared in short time and high quality
- If contaminated grounds are treated, the amounts of additives can be reduced (better distribution)
- Considerably less wear compared to other mixers
- Clearly higher availability
- No material caking on the mixer shaft, as often observed when using horizontal mixers

### Well-known companies worldwide apply the EIRICH mixing technology

#### Examples

- REMONDIS Industrie Service GmbH, Bramsche: Recycling of aerosol cans
- GEKA Gesellschaft zur Entsorgung von chemischen Kampfstoffen und Rüstungsaltslasten mbH, Munster: Treatment of contaminated soil
- Befesa Zinc Freiberg GmbH & Co. KG: Agglomeration of zinc-containing dusts, residues and raw materials for waelz processes
- Hüttenwerke Krupp-Mannesmann GmbH (HKM): Reprocessing of any applicable sludge and dust, recirculation on a sintering belt
- voestalpine Stahl Linz GmbH: Pelletizing of converter dust for the re-use within converters
- Paul Wurth S.A.: Agglomeration of residues and raw materials for the PRIMOREC Process
- ThyssenKrupp Steel Europe AG (TKS):
- Taiwan Steel Union CO LTD: Reprocessing of any applicable sludge and dust
- Outotec Oyj: Agglomeration of steel mill dust

**Top-name manufacturers around the world work with EIRICH mixing technology.**  
**We would be glad to provide references on request. EIRICH is a reserach partner for universities.**  
**Put us to the test. We would be glad to tell you more.**

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**ENVIRONMENTAL TECHNOLOGY**

## Better mixing results and notably less wear with Eirich mixing technology

### 1. Neutral study: Eirich mixer in comparison e.g. with horizontal mixer and ring trough mixer (turbine mixer)

From the article "Focus on mixer performance and glass batch quality" by Fons Rikken, Philips Lighting Components, Eindhoven in GLASS INTERNATIONAL SEPTEMBER/OCTOBER 2004, pp. 76 - 77

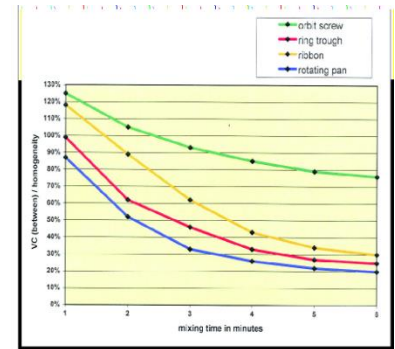
Philips has been operating more than 40 mixers from different manufacturers. Investigations were carried out in order to find out how well quantities of 100 ppm can be admixed by different mixing systems. For this purpose, 5 samples were taken from each mixer (glass batch for lighting, dry, without cullets) in minute intervals and subsequently divided into 4 portions for examination. Every point in the curves, which represent the coefficient of variation depending on time, is hence the mean value of 20 determinations.

#### 1.1. Mixers with low power input (1 up to 2 kW/100 kg)

Result:

The best mixing effect is obtained using the mixer with rotating mixing pan (Eirich mixer type D, horizontal mixing pan, without rotor, blue curve)

*The ring trough mixer / turbine mixer requires 6 minutes to reach the mixing quality the Eirich mixer (without rotor) obtains in 4 minutes.*



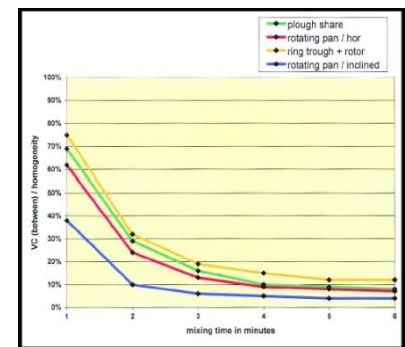
#### 1.1. Mixers with higher power input (up to 5 kW/100 kg)

Result:

The best mixing effect is achieved using the Eirich R type mixer (blue curve) equipped with a rotating, inclined mixing pan.

The second-best result is obtained using the mixer with rotating mixing pan (Eirich mixer type D, horizontal mixing pan, with rotor)

*The ring trough mixer / turbine mixer with integrated whirler and plowshare mixer require 6 minutes to reach the mixing quality the inclined Eirich mixer (R-type) obtains in 2 minutes.*



### 2. Statements on wear: Eirich mixer versus horizontal mixer

Conclusions of a customer who has operated Eirich R mixers and plowshare mixers for four years in parallel:

**Horizontal mixers: Clearly more wear, considerably higher costs for spare parts**

Product: Dry mortar	Eirich mixer RV 19 (1500 l)	Plowshare mixer (1500 l)
Drive rating/rotor + pan	45 kW + 15 kW	37 kW
Drive rating/choppers	-	3 units, 4 kW each
Peripheral speed of the mixing tool	adjustable to the mix, up to 13 m/s	fixed speed, approx. 6.5 m/s
Costs for wear parts	mean value over a period of 4 years at 4000 h/year	5 times as high as for Eirich mixers
Reasons for this:		
Rotor shaft bearing	Cantilevered shaft with one bearing, seal not in contact with product, no wear on shaft seal due to product contact	Full-length shaft with two bearings, seal in product contact, wear on shaft seal due to product contact
Friction between material and mixing pan / vessel	The rotating mixing pan transports the material. Therefore no difference in speed between pan and material, nearly no friction, little wear.	The material is shifted across the non-moving surfaces of the vessel by the mixing tools. High difference in speed between vessel and material, friction and wear.

*After changing over from "simple" mixing systems to Eirich mixers, customers from other industries, too, regularly report about a jump in quality and considerable savings so that amortization of the additional costs of an Eirich mixer is achieved in short time.*

### 3. Power input depending on speed, direction of rotation (countercurrent or co-current) and design (star-type or pin-type rotor) of the tool.

Test material: Dry mortar  
Investigations at MFPA Leipzig, April 2005

Result: The power input can be adapted to the material (e.g. considerably increased for the disintegration of fibers, fines etc.) – if necessary up to 30 m/s.

