



Mixing Technology for the Metallurgical Industry

Ore dressing

Mixing and agglomeration systems for ore fines (ore concentrates from flotation, e.g. iron ore for pellet production for direct reduction or blast furnace feed)

Pellets for

- blast furnaces
- direct reduction

Sinter mix preparation

Mixing and agglomeration systems for feeding the sintering belt

- total sinter mix
- ore fine fraction
- filter dust plus ore fines

Treatment of residues

Recycling systems for residues (dust, sludge, mill scale, ...) for mixing, agglomerating, pelletizing, briquetting, extruding, pressing of bricks, ...

For the thermal treatment

- on sintering belts
- in Waelz (rotary) kilns
- in multiple hearth furnaces
- in shaft furnaces

The unique working principle

Rotating mixing pan

for material transport

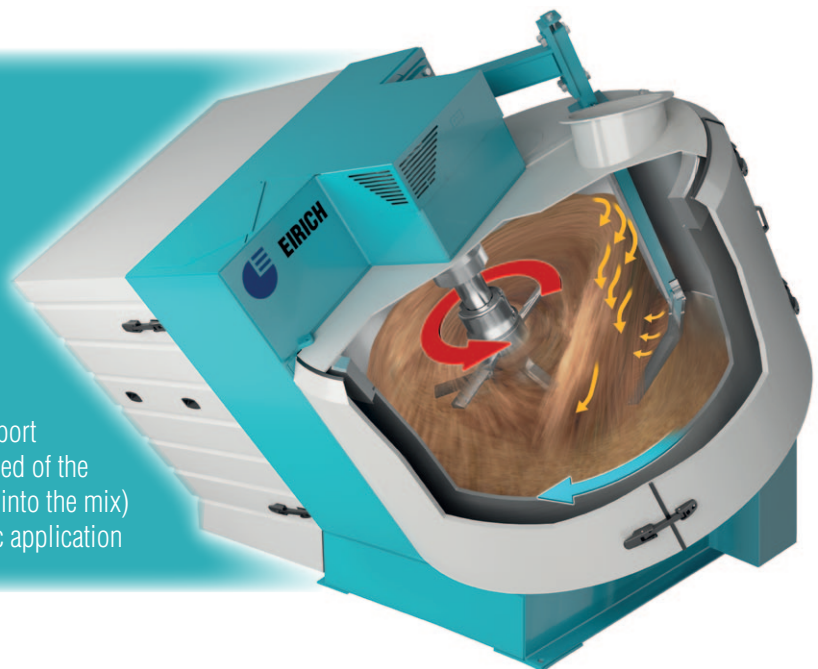
Variable-speed mixing tool,

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 adjusted optimally to the specific application



This mixing principle enables:

- The mixing tool can be run variably, at low or high speed
- The input of power into the mix can thus be controlled specifically
- High tool speeds allow e. g. dusts and sludges to be blended to granules, without material caking at the mixing tool
- Medium tool speeds allow high-quality mixtures to be produced
- Low tool speeds allow granules to be gently mixed or coated with additional substances
- One and the same mixer is suitable for mixing, granulating, coating, kneading

EIRICH customers tell from experience:

- The sintering quality increases: higher strengths, higher permeability*
- Cost advantages: less coke requirement, the capacity of the sintering system increases*
- Less binders are necessary if ore fines are treated
- Processing ore fines, replacement of wear parts is required not before a system's running time of 9 months
- Distinctly fewer repairs due to wear compared to mixers
- Significantly higher availability compared to cylindrical mixers

* Improvement of granulation of raw material by using the high-agitating mixer at Kokura No. 3 sintering plant, 1995 Ironmaking conference Proceedings, 535-540

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

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

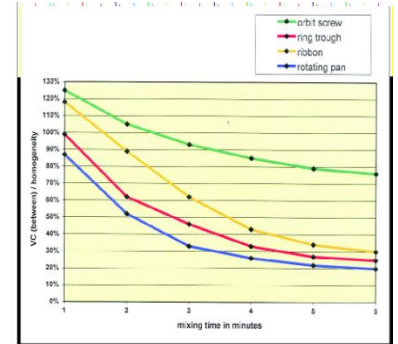
Philips has been operating more than 40 mixers from different manufacturers. Investigations were carried out in order to find out how well quantities of 100 ppm can be admixed by different mixing systems. For this purpose, 5 samples were taken from each mixer (glass batch for lighting, dry, without cullets) 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.



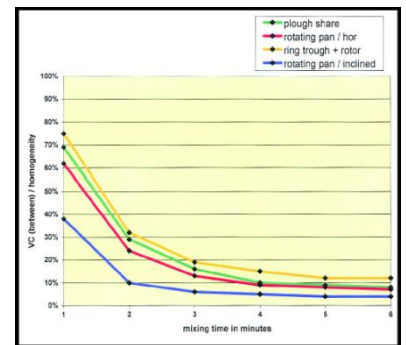
1.1. Mixers with higher power input
(up to 5 kW/100 kg)

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.

