Aluminium Dross and Scrap Recycling
The Hybrid Tilting Rotary Furnace MASTERmax from KMF

www.kmf.at
What we do

Recycling Furnaces
Tilting Rotary Furnaces „MASTERmax“ for Aluminium Recycling

Mills & Grinders
Stirr ball mills and hydro classifiers for various industrial minerals

Special Machinery
Ffleece applicators „FLEECEmax“ for profiled sheet metals, contract manufacturing

Engineering & Construction
Construction Layouting FEM Calculation Design
MASTERmax in 0° Horizontal Position
MASTERmax in -8° Backtilted Position
MASTERmax in 25° Tilted Position for Deslagging
Multiple Scrap, One Furnace

UBC
Shredder, Chips
Dross
Clean Scrap, Ingots
Wheels, painted and unpainted
Painted sheet scrap
MASTERmax Cycle for Liquid and Dry Slag Process

- Quick charging
- Economic melting
- Filling
- Scrap/Dross
- Slag discharging
- Easy tapping at rear end tap hole
The Tilting Hybrid Rotary Furnace MASTERmax

- engineering your visions -
Hybrid Tilting Rotary Furnace MASTERmax with Maximized Recycling Efficiency

- Most innovative technology available
- Modular capacity range from 2 t to 25 t
- Daily scrap throughput from 15 t to 130 t
- Tiltable from -8° up to 25°

- Turn-Key plants inclusive holding furnaces, ingot casting machines and dust filters, chip processing units, launder heaters
BATCHmax – Charging Machine

- Turning charging box
- Minimized charging time
- Minimized door opening time (ca. 80s)
- Uniform distribution of scrap along the whole furnace
Efficient Tapping and Cleaning

Excellent phase separation due to tapping valve at the furnace bottom

Process slag is discharged through furnace door
Process Optimization with Real Time Weighing System
MELTmax – Melt Processor with Touch Panel

MasterMax V2.0
controlled by MeltMax

partner companies:
METREM  MM Tec  MET  SG-ET

language selection: english
MELTmax – Melt Processor with Touch Panel

Overview of furnace

- Furnace temperature: 801.5 °C
- Exhaust temperature: 820.8 °C
- Furnace pressure: 2.2 mbar
- CO-value: 0.18 %
- O2-value: 0.0 %
- Weight: 610 kg
MELTmax – Melt Processor with Touch Panel
MELTmax – only 1 operator is needed to run the furnace
MASTERmax Features

- Rugged horizontal design and high furnace chamber ratio for controlled melting of organically contaminated scraps with up to 8% organics.
- Counter (reverse) flow combustion system for optimum energy efficiency and maximum combustion of hydrocarbons, assisted by optional oxygen injection.
- Real time weighing system with unique precision for immediate materials balance after each charge.
- Tapping valve with positive slag and metal phase separation.
- Unique melt processor MELTmax with scrap data base, salt factor calculation and total process control for repeatable results of melting cycle.
- Compliance with EC emission laws in connection with suitable bag filter unit.
- Higher yield and lower salt additions due to controlled furnace atmosphere, thus minimizing presence of oxygen during melting.
- Operation either with horizontal axis for highly contaminated scrap and thin walled scrap requiring the liquid slag process, or with inclined axis up to 8° for the low salt, dry slag process.
- Special temperature resistant high hot-strength insulation for stability of the refractory lining and long refractory life with low maintenance costs due to non-wetting lining.
- Automatic operation with permanent PLC process control and display of all parameters.
Design, Construction and Installing of Turn-Key Recycling Cast Houses

- Scrap boxes
- Sample crucible
- MASTERmax TRF
- Holding furnace
- Connecting Launders
- Dust Filter Plants
- Thermos crucible for liquid transportation
- Ingot casting machine
- Cast accessories
- Financing Options
Basic Engineering – Turn Key Aluminium Recycling Plant Layout
Clean Scrap with MASTERmax

- Salt: 3-4%
- Yield 93 – 97%
- Gas 40 – 50 m³/t scrap
Coated Sheet Scrap with MASTERmax

Salt: 4-6%

Yield 85 – 90%

Gas 35 – 40 m³/t scrap
13-18 m³/t O₂ Injection
Baled UBC with MASTERmax

Salt: 5-7%

Yield 75 – 80%

Gas 35 – 40 m³/t scrap
15-25 m³/t O₂ Injection
Shredded UBC with MASTERmax

Salt: 5-7%

Yield 80 – 88%

Gas
35 – 40 m³/t scrap
15-25 m³/t O₂ Injection
Chips with max 5% moisture with MASTERmax

Salt: 5-15% dep. on chip size and contamination level

Yield 88 – 92%

Gas 40 – 45 m³/t scrap
Contaminated cast scrap with MASTERmax

Salt: 6-8%

Yield 85 – 90%

Gas
30 – 35 m³/t scrap
15-20 m³/t O₂ Injection
Oxidized flotated shredder scrap with MASTERmax

Salt: 7-9%

Yield 75 – 85%

Gas
35 – 40 m³/t scrap
15-25 m³/t O₂ Injection
Dross with app. 35-50% Aluminium with MASTERmax

Salt: 6-8%
Yield 30 – 45%
Gas 40 – 45 m³/t scrap
Dross with app. 50-75% Aluminium with MASTERmax

Salt: 5-6%
Yield 45 – 70%
Gas 35 – 40 m³/t scrap
### Operating Figures of KMF Hybrid Tilting Rotary Furnace MASTERmax

Generally 4% – 6% higher yield and 30% – 70% less energy consumption compared to fixed axis rotary and reverbatory furnaces.

<table>
<thead>
<tr>
<th>Material</th>
<th>Energy Consumption [kWh/t]</th>
<th>Yield [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean scrap</td>
<td>350-400</td>
<td>95-97</td>
</tr>
<tr>
<td>Organically contaminated scrap</td>
<td>300-350</td>
<td>85-90</td>
</tr>
<tr>
<td>UBC</td>
<td>300-400</td>
<td>75-88</td>
</tr>
<tr>
<td>Chips with max. 5% humidity</td>
<td>400-450</td>
<td>88-92</td>
</tr>
<tr>
<td>Dross (35-75% Al)</td>
<td>350-450</td>
<td>40-70</td>
</tr>
</tbody>
</table>
### Comparision of TRF and Reverbatory/Sidewell Furnace

<table>
<thead>
<tr>
<th>Material</th>
<th>MASTERmax Tilting Rotary Furnace</th>
<th>Sidewell furnace / Twin Chamber Furnace</th>
</tr>
</thead>
<tbody>
<tr>
<td>DROSS</td>
<td>Suitable</td>
<td>Not suitable</td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td>Not suitable</td>
</tr>
<tr>
<td>COATED LARGE COILS</td>
<td>Suitable</td>
<td>Not suitable</td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td>Not suitable</td>
</tr>
<tr>
<td>COATED FOIL</td>
<td>Suitable</td>
<td>Not suitable</td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td>Not suitable</td>
</tr>
<tr>
<td>CHIPS</td>
<td>Suitable</td>
<td>Suitable only for processed, dried chips. Vortex and pump necessary, high capital investment</td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td>Suitable only for processed, dried chips. Vortex and pump necessary, high capital investment</td>
</tr>
<tr>
<td>COATED PRODUCTION SCRAP</td>
<td>Suitable</td>
<td>Suitable</td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td>Suitable</td>
</tr>
<tr>
<td>UBC</td>
<td>Suitable</td>
<td>Suitable</td>
</tr>
<tr>
<td></td>
<td>Suitable</td>
<td>Suitable</td>
</tr>
</tbody>
</table>

**Notes:**
- Suitable for 30% to 80% aluminium content
- Suitable for unprocessed chips up to approx. 6% moisture, yield up to 83%, 400 kWh/t
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- Suitable for unprocessed chips up to approx. 6% moisture, yield up to 83%, 400 kWh/t
- Suitable for 85% – 90%, 350 kWh/t
- Suitable for 85% – 90%, 350 kWh/t
- Suitable for 85% – 90%, 750 kWh/t
- Suitable for 85% – 90%, 750 kWh/t
- Suitable for 75% – 80%, 350 kWh/t
- Suitable for 75% – 80%, 350 kWh/t
- Suitable for 75% – 80%, 750 kWh/t
- Suitable for 75% – 80%, 750 kWh/t
Comparison of TRF and Reverbaratory/Sidewell Furnace

Comparision of Yield

- **TRF-Yield [%]**
- **Sidewell/Twinchamber-Yield [%]**

*Only possible with dried clean chips*
Comparision of TRF and Reverbatory/Sidewell Furnace

Comparision of Energy Consumption

- TRF-energy consumption [kWh/tinput]
- Sidewell/Twinchamber energy consumption [kWh/tinput]
Worldwide Transport, Assembly and Installation

- Crane capacity up to 60 t
  - Forklift capacity up to 6 t
    - Railway connection
      - Worldwide installation, commissioning and production training
Selected Reference Projects

- 8 t MASTERmax, Hungary
- 9 t MASTERmax, Turkey
- 12 t MASTERmax, Spain
- 12 t MASTERmax, Czech Republic
- 9 t MASTERmax, Germany
- 5 t MASTERmax, India
 9 t MASTERmax, India
Customer Profile

Europe
- Andritz (A)
- Agip (I)
- Arcelor Mittal (F)
- Cincinnati (A)
- Corus (UK)
- Engel (A)
- Euroclad (UK)
- Global Hydro Energy (A)
- Hobas (A)
- JAKE (D)
- Kone Cranes (Fin)
- Köfem (Hungary)
- Lindner Recyclingtechnik (A)
- Samesor (Fin)
- Hobas (CH)
- Maerz Ofenbau (CH)
- Mitsubishi (D)
- Omya (CH)
- Plannja (DK)
- Rheinfelden Alloys (D)
- RHI (A)
- Salvagnini (A)
- Siemens VAI (A)
- SMS (D)
- Danieli (I)
- Heraklith (A)
- CoreAL (ES)
- Lenzing (A)
- Polysius (D)

Africa/Asia / Middle East
- Mondi Paper (South Africa)
- Mitsui (JP)
- TAHA (Bahrain)
- Kiliçlar (Turkey)
- Rio Tinto (NZ)
- Axayya Alloys (India)
- LCP Building (Singapore)
- Marudhar Industries
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