Tilting Rotary Furnace

A quantum leap in melting technology
The Tilt Rotary Furnace

Melting Solutions Limited offer the TR range of advanced Tilt Rotary Furnaces available in capacities from 1-21.5 tonnes aluminium (0.5 - 11 m³). TR furnaces provide state-of-the-art technology for melting a wide range of scrap and for processing drosses. Complete melting plant solutions are also available from Melting Solutions Limited, including charging machines, holding furnaces, casting equipment and pollution control to meet the very highest environmental standards. All from one experienced supplier built on proven results from our users.

The Melting Solutions Limited TR Furnaces offer great flexibility. One furnace able to process drosses, mixed scrap, contaminated scrap (with iron) chips, UBC and foils. For companies looking to upgrade from fixed axis rotary melting or reverberatory melting the TR Furnaces offer significant advantages with attractive pay back.

- Low energy melting at 750 kW per tonne.
- High production rates, unrivalled melting speed
- Full automation PLC and SCADA
- Minimum labour costs
- Quality engineering ensures long service life with minimum maintenance
- High metal recovery
- Integrated ‘turn-key’ solutions from a world leader in melting technology

The advantages are:
- 25% fuel saving
- 50% increase in throughput
- 30% saving on slag disposal
- 50% saving in salt flux
- Reduced labour, fully automated process

TILT ROTARY PROCESS

Tilt Rotary Furnaces have significant advantages compared to fixed axis rotary furnaces. The diagrams above compare the operation of fixed axis rotary furnaces with tap holes to the OTTO JUNKER (UK) Ltd hydraulic lip axis Tilt Rotary Furnace:

Conventional fixed axis single pass (blue aluminium / red slag)
1. Scrap and salt are charged into the furnace. Charging is restricted by the small charge hole.
2. The charge is melted by a single pass burner arrangement, limiting efficiency.
3. Aluminium is run out through a tap hole. Opening and closing the tap hole is slow and labour intensive.
4. Slag is run out through a second tap hole. Slow and labour intensive.

A high salt-to-oxide ratio is required to ensure the slag is liquid to run through the small tap hole.
1. Furnace is charged very quickly using the much larger charge opening.
2. Melting by double pass burner arrangement. Saving energy - faster melting.
3. The furnace is tilted to pour out the aluminium. The dry slag remains in the furnace - no time wasted opening tap hole.
4. Finally the furnace is rotated and tilted simultaneously to tip out the dry salt slag for disposal. Amount of slag greatly reduced because a liquid slag is not needed - no time wasted opening slag hole.
5. Faster rotation - better separation of aluminium from slag.
FURNACE SPECIFICATION

The Melting Solutions TR range of Tilt Rotary Furnaces are available in a standard range of capacities from 1,000 kgs to 21,500 kgs.

Options of oil firing or gas firing are available. On furnace capacities of 5 tonnes and above, oxy-fuel burners firing either oil or gas are available. Please refer to the specification chart and individual drawings of the furnace range attached.

Normally the standard Melting Solutions Limited scope of supply includes:

- The main furnace assembly
- Complete hydraulic system
- Burner system
- Supply of refractory lining
- PLC control

Furnaces up to 2,000 kgs size are supplied complete from Melting Solutions Limited with the refractory lining already installed. Up to 2,000 kgs the furnaces ship within an open top container, or by road, requiring minimal installation and connection to adequate services. Refractory linings on larger sizes are installed on site.

TECHNICAL SUPPORT

All Melting Solutions furnaces are backed by full engineering and technical support to help plan the furnace installation, for example, we usually provide design and drawings for furnace extraction hoods and ductwork connecting to filter plants allowing the client to manufacture these items locally saving transport costs.

Where required, Melting Solutions can provide a complete turn-key solution including charging machines, holding furnaces, casting and pollution control usually using bag filters.

Turn-key projects are backed by on-site installation supervision, commissioning and operator training where required. Assistance is given with environmental applications and liaison with local environmental authorities which is a key part, particularly for new melting facilities.
INTEGRATED MELTING PLANT

Melting Solutions offer Tilting Rotary Furnaces as combination ‘turn-key’ melting plants for production of specification alloyed ingot and di-oxidant production from scrap and drosses.

At the heart of the system is an advanced technology Tilting Rotary Furnace that will melt anything from iron castings to UBC, bales, and drosses in the same furnace. Operators have seen metal recovery improve by 5% on average over the same type of scrap melted in traditional reverberatory melting furnaces.

- Average of 5% extra metal recovery
- Lower energy cost, 25% saving in fuel
- Increase output
- Fully automated to reduce labour
- Very flexible to change alloys
- Iron content in melt closely controlled at low levels
- Melting Solutions offer a turn-key package with pollution control
- Range of furnace sizes and outputs available

TILTING HOLDING / ALLOYING FURNACE

FULLY AUTOMATED SYSTEM WITH ADVANCED PLC PROCESS CONTROL WITH SCADA
Tilt Rotary Furnaces

WORLDWIDE REFERENCES

ALUSERV
Bahrain
TR 21 gas fired melting plant with 10 tonne tilting holding furnace, ingot casting machine and filter plant. Processing high volumes of drosses.

BALTICAL
Kaunas, Lithuania
TR 10 gas fired. Melting plant complete with 2 x 20 t tilting melting/holding furnaces with 2 x ingot casting machines. Melting low grade scrap, castings with iron and drosses.

BLAYDON METALS
Newcastle-Upon-Tyne, UK
TR 3 gas fired. Complete melting plant with 3.5 m³ vibratory charging machine, 5 t tilting holding furnace and di-ox cube casting machine. Dedicated plant for melting taint tabor (old rolled) mixed scrap producing di-ox products for steel works.

CAST ALUMINIUM INDUSTRIES
Dubai, UAE
TR 5 with oxy fuel firing (oxy – oil). Dedicated dross melting plant 15,000 t/year.

CHALCO (CHINA ALUMINIUM)
Tsingdao, China
TR 15 with oxy fuel firing (oxy – gas). A flexible melting plant for all types of scrap, turnings, drosses, UBC etc. Automated 10 m³ charging machine, automated slag moulds and pouring launder. 100 t per day melting plant.

F.E. MOTTRAM
Congleton, UK
Project to upgrade furnace door on a 9 t MDY/ALTEK furnace.

FORUM
Zaporozhye, Ukraine
TR 1 natural gas fired. Part of a melting plant 2 x 5 t reverberatory furnaces with casting machine. For melting drosses and low grade scrap.

HONG POH METALS
Melaka, Malaysia
TR 1 oil fired. Dedicated melting plant for drosses. Supplied with 10,000 m³/hr filter plant.

KRASAINIE
Lejumi Riga, Latvia
TR 3 natural gas fired. Melting low grade scrap and drosses.

NORTON ALUMINIUM
Cannock, UK
TR 5 natural gas fired. Melting mixed low grade scrap. Special 1.8 m extra large diameter door with latest side tilt feature.

NORTON PVT
Mumbai, India
2 x TR 6 dual fuel oil/gas fired furnaces with enlarged door 1.8m. Processing mixed scrap and drosses.

RMC CUSIANA
Italy
TR6 gas fired with enlarged door 1.8m. Processing mixed scrap and drosses.

RUSAL
TSVETMETOBRABOTKA
Samara, Russia
TR 5 natural gas fired. Melting plant for drosses and low grade scrap with a casting line for 500 kgs sows. Including a 30,000 m³/Hr filter plant.

SPONTEX
Wjesnia, Poland
TR 3 natural gas fired. Specialist plant for di-ox production for steel works. Melting UBC and drosses.
Specifications

Tilt Rotating Furnace 1 t - 21.5 t (0.5 - 11.0 m³)

**TR1-3 OIL OR GAS FIRED AIR FUEL**

<table>
<thead>
<tr>
<th>Model</th>
<th>kgs Alu</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>V m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR 1</td>
<td>1,000</td>
<td>850</td>
<td>2,540</td>
<td>1,100</td>
<td>4,450</td>
<td>2,235</td>
<td>2,250</td>
<td>0.5</td>
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<tr>
<td>TR 2</td>
<td>2,000</td>
<td>1,100</td>
<td>3,050</td>
<td>1,400</td>
<td>5,400</td>
<td>3,200</td>
<td>2,885</td>
<td>1.0</td>
</tr>
<tr>
<td>TR 3</td>
<td>3,000</td>
<td>1,300</td>
<td>3,200</td>
<td>1,700</td>
<td>6,750</td>
<td>4,500</td>
<td>3,200</td>
<td>1.6</td>
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</table>

**TR5-21 OIL OR GAS FIRED AIR OR OXY FUEL OPTIONS.**

<table>
<thead>
<tr>
<th>Model</th>
<th>kgs Alu</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>V m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR 5</td>
<td>5,000</td>
<td>1,400</td>
<td>3,200</td>
<td>2,100</td>
<td>5,710</td>
<td>5,700</td>
<td>3,665</td>
<td>2.5</td>
</tr>
<tr>
<td>TR 8</td>
<td>8,000</td>
<td>1,500</td>
<td>4,000</td>
<td>2,300</td>
<td>6,510</td>
<td>5,700</td>
<td>4,000</td>
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<tr>
<td>TR 10</td>
<td>10,000</td>
<td>1,800</td>
<td>4,700</td>
<td>2,400</td>
<td>8,040</td>
<td>6,760</td>
<td>5,000</td>
<td>5.0</td>
</tr>
<tr>
<td>TR 15</td>
<td>15,000</td>
<td>2,000</td>
<td>6,000</td>
<td>2,800</td>
<td>8,675</td>
<td>7,000</td>
<td>5,460</td>
<td>7.5</td>
</tr>
<tr>
<td>TR 21</td>
<td>21,500</td>
<td>2,000</td>
<td>6,000</td>
<td>3,000</td>
<td>8,675</td>
<td>7,250</td>
<td>5,660</td>
<td>11.0</td>
</tr>
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</table>

**UNIQUE DOOR WITH SIDE TILT FEATURE**

1. CLOSED POSITION FURNACE CAN TILT WITH BURNER FIRING DURING THE MELT INCREASING MIXING AND HEAT TRANSFER.
2. SIDE TILT PARTLY OPENS DOOR TO VIEW THE CHARGE WITH BURNER ON. CASTING CAN BE DONE IN PARTLY OPEN POSITION SAVING ENERGY AND OXIDATION.
3. DOOR PIVOTS FULLY OPEN FOR ACCESS WITH CHARGING MACHINE TO THE EXTRA LARGE CHARGE HOLE UP TO 2 M DIA.
## Performance Data

<table>
<thead>
<tr>
<th>Notes</th>
<th>Model</th>
<th>TR 1</th>
<th>TR 2</th>
<th>TR 3</th>
<th>TR 5</th>
<th>TR 8</th>
<th>TR 10</th>
<th>TR 15</th>
<th>TR 21</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Nominal rated aluminium capacity [kgs].</td>
<td>1,000</td>
<td>2,000</td>
<td>3,000</td>
<td>5,000</td>
<td>8,000</td>
<td>10,000</td>
<td>15,000</td>
<td>21,500</td>
</tr>
<tr>
<td>2</td>
<td>Door opening inside diameter [mm].</td>
<td>850</td>
<td>1,100</td>
<td>1,300</td>
<td>1,400</td>
<td>1,500</td>
<td>1,800</td>
<td>2,000</td>
<td>2,000</td>
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<tr>
<td>3</td>
<td>Liquid capacity [volume in m³].</td>
<td>0.5</td>
<td>1</td>
<td>1.6</td>
<td>2.5</td>
<td>4</td>
<td>5</td>
<td>7.5</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>Maximum liquid aluminium capacity [kgs].</td>
<td>1,150</td>
<td>2,300</td>
<td>3,680</td>
<td>5,750</td>
<td>9,200</td>
<td>11,500</td>
<td>17,250</td>
<td>25,300</td>
</tr>
<tr>
<td>5</td>
<td>Maximum charge weight (including salt) [kgs].</td>
<td>1,150</td>
<td>2,300</td>
<td>3,680</td>
<td>5,750</td>
<td>9,200</td>
<td>11,500</td>
<td>17,250</td>
<td>25,300</td>
</tr>
<tr>
<td>6</td>
<td>Melt rate [kgs/hr].</td>
<td>575</td>
<td>1,150</td>
<td>1,840</td>
<td>2,875</td>
<td>3,066</td>
<td>3,834</td>
<td>5,750</td>
<td>7,229</td>
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<tr>
<td></td>
<td>Melting time hours for one charge as (4) above.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3.5</td>
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<tr>
<td></td>
<td>Non melting time charging, casting and discharging slag hours.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Cycle time 'tap to tap' hours.</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>No. of cycles per day (24 hrs).</td>
<td>6</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>5.4</td>
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<tr>
<td></td>
<td>Maximum charge weight (including salt) per 24 hrs [t].</td>
<td>9</td>
<td>18</td>
<td>29</td>
<td>46</td>
<td>55</td>
<td>69</td>
<td>104</td>
<td>137</td>
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<tr>
<td></td>
<td>Input per year (322 x 24 hr days) [t].</td>
<td>2,962</td>
<td>5,925</td>
<td>9,480</td>
<td>14,812</td>
<td>17,774</td>
<td>22,218</td>
<td>33,327</td>
<td>43,992</td>
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<tr>
<td></td>
<td>ENERGY USING AIR-FUEL BURNER</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burner energy kW per tonne of charge (input).</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td></td>
<td>Natural gas consumption per tonne of charge (input). [m³]</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Oil consumption per tonne of charge (input). [litres].</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Burner power (air fuel) [MW]</td>
<td>0.4</td>
<td>0.9</td>
<td>1.4</td>
<td>2.2</td>
<td>2.3</td>
<td>2.9</td>
<td>4.3</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>ENERGY USING OXY-FUEL BURNER</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burner energy kW per tonne of charge (input).</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>400</td>
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<tr>
<td></td>
<td>Natural gas consumption per tonne of charge (input). [m³]</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>40</td>
<td>40</td>
<td>40</td>
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<td></td>
<td>Oil consumption per tonne of charge (input). [litres].</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>40</td>
<td>40</td>
<td>40</td>
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<tr>
<td></td>
<td>Oxygen consumption (either oil or gas). [m³]</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>80</td>
<td>80</td>
<td>80</td>
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<tr>
<td></td>
<td>Burner power (oxy fuel) [MW]</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1.2</td>
<td>1.2</td>
<td>1.5</td>
<td>2.3</td>
<td>2.9</td>
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<tr>
<td></td>
<td>MECHANICAL</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drive power [kW]</td>
<td>5.5</td>
<td>7.5</td>
<td>11</td>
<td>30</td>
<td>50</td>
<td>63</td>
<td>110</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>Variable melting angle 0 - 15 degrees of tilt (subject to capacity).</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rotation speed (variable direction and speed inverter controlled) [RPM]</td>
<td>0-6</td>
<td>0-6</td>
<td>0-6</td>
<td>0-6</td>
<td>0-6</td>
<td>0-6</td>
<td>0-6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nominal filter plant volume [Nm³/hr] (approximate only).</td>
<td>10,000</td>
<td>15,000</td>
<td>20,000</td>
<td>30,000</td>
<td>35,000</td>
<td>45,000</td>
<td>65,000</td>
<td>80,000</td>
</tr>
</tbody>
</table>

### Notes:

1. Capacity rating.
2. Max. volume in the furnace body for liquid aluminium.
3. Max. capacity liquid aluminium density of 2,300 kgs/m³.
4. Max. charge weight 'input' including salt flux.
5. Based on ISRI grades of scrap, no excessive contamination and reasonable density of approx. 800 kgs/m³.
6. Assumes efficient automated charging and handling.

The advantages of the Melting Solutions Limited Tilting Rotary Furnace are:
- 25% fuel saving.
- 50% increase in throughput.
- 30% saving on slag disposal.
- 50% saving in salt flux.
- Reduce labour, fully automated process.

Performance data given is an indication of typical performance. Data does not constitute a guarantee. Subject to revision and change without notice. Cycle times for lightweight and material with contamination and combustibles will be extended. Please consult Melting Solutions Limited for more information.

Oxy fuel firing may reduce filter capacity depending on hood configuration. Please consult Melting Solutions Limited for further information.
Melting Solutions Limited is a leading British manufacturer of electric process heating and melting equipment.

The company has over 30 years experience offering users a unique consulting and manufacturing service for all makes and types of custom built induction heating and melting equipment. In addition to this the company also offers upgrading, modification and spares replacement of a wide range of induction process equipment and also offers project management capabilities and sub-contract machining to large manufacturers.

Our philosophy is to enter into a unique partnership with the customer right from the initial stages, through concept, design, manufacture to final installation, ensuring that each and every project is delivered on time and on budget.