# Milling Technology

- **Strip edge milling machines**
  - for steel
    - pipe mills for spiral tubes
    - pipe mills for longitudinal seam tubes (HF-lines)
  - for non-ferrous metals
    - Cu-strips

- **Plate edge milling machines**
  - for steel
    - large tube production
    - ship building

- **Special milling machines for shipyards**
  - for steel
    - ball tanks on LNG carriers
    - submarine hatch milling machines
    - profile milling machines

# Sawing Technology

- **Carbide circular sawing machines**
  - for steel
    - billets
    - single tubes
    - tube layers
    - profiles
  - for non-ferrous metals
    - non-ferrous slabs
    - non-ferrous billets
    - aluminium billets

- **Carbide circular sawing machines**
  - for steel
    - double cut
    - single cut

- **Carbide whirling tube-cut-off machines**
  - for steel
    - stationary

# Rail Technology

- **Rail sawing and drilling machines**
- **Mobile rail head milling trains**
- **Stationary rail head milling machines**
  - stationary

- **Points sleeper drilling machines**
- **Turnkey production lines**

# Tool Technology

- **Saw blades**
  - Carbide circular saw blades soldered
  - Carbide circular saw blades clamped

- **Milling tools**
  - for Linsinger milling machines
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946</td>
<td><strong>Foundation</strong> of Linsinger, Steyrermühl</td>
</tr>
<tr>
<td>1957</td>
<td>Development of <strong>rapid milling (HF-milling)</strong> for edge preparation</td>
</tr>
<tr>
<td>1983</td>
<td>Patent application „<strong>SHF-milling principle</strong>“ (High-speed milling)</td>
</tr>
<tr>
<td>1989</td>
<td>Patent application „<strong>turbo milling</strong>“</td>
</tr>
<tr>
<td>1990</td>
<td>Establishment of new production series: <strong>sawing technology</strong></td>
</tr>
<tr>
<td>1990</td>
<td>Amalgamation with <strong>Weingärtner</strong> Group</td>
</tr>
<tr>
<td>1993</td>
<td>Development and manufacturing of a <strong>rail head milling train</strong></td>
</tr>
<tr>
<td>1996</td>
<td>Partial taking over of company <strong>Wagner</strong>, Reutlingen (Germany) (former world’s largest manufacturer of circular saws)</td>
</tr>
<tr>
<td>1999</td>
<td>Development and manufacturing of <strong>stationary rail head milling machines</strong></td>
</tr>
<tr>
<td>2000</td>
<td><strong>General contractor</strong> for complete projects</td>
</tr>
<tr>
<td>2001</td>
<td>Establishment of new production series: <strong>tool technology</strong></td>
</tr>
</tbody>
</table>
For integration into spiral- and longitudinal seam tube lines

**ADVANTAGES:**

- Extremely accurate edge and seam preparation
- Minimum cutting depth of 1 mm possible
- Clean metal surfaces without structural deformation
- Substantial increases in welding speed and at the same time a decrease of seam defects
- Less material cost as result of the minimum possible stock removal

Customers proven cost savings:

**Annual savings of 375,000 €**

With an annual production of 25,000 tons
Time of amortisation: < 1 year
Strip edge milling machines

Optimum milling technology for each application

CIRCUMFERENTIAL MILLING

Slit strip:
50 m/min line speed possible at a cutting depth of 3 mm, and a plate thickness of 4 mm.

Mill edge:
35 m/min line speed possible at a cutting depth of 5 mm and a plate thickness of 9 mm.

CONICAL MILLING (SHF)

For longitudinal seam tube lines
50 m/min line speed possible at a cutting depth of 5 mm and a plate thickness of 9 mm.

TURBO MILLING

For longitudinally welded, stainless steel tubes (laser welding).
15 m/min line speed possible at a cutting depth of 1 mm and a plate thickness of 2 mm.
Plate edge milling machines

For ship and vessel manufacturing and for large size tubes

Record output of our customer:
35 plates per hour
with 12.2 m length
Type PFMrovZLL 3000 CNC

BASE MODEL:

Plate edge milling machine
For machining of one longitudinal edge with one milling station

Plate edge milling machine
For welding edge preparation of both longitudinal edges in one pass

Plate edge milling machine
For welding edge preparation consisting of 1 longitudinal and 1 transversal edge with one milling station with rotary shunt in one clamping

Plate edge milling machine
For machining of ball tank segments, on all 4 sides (ball diameter 40m)
Plate edge milling machines

For preparation of welding edge profiles

**ADVANTAGES:**

- Extremely accurate welding edge preparation
- Height copying milling units – constant profile course
- High cutting efficiency, low tool costs
- Milling unit with profile milling tools applicable, alternative tilting milling unit

Increase of quality through tighter plate tolerances

Extract of possible profiles

- Plate edge milling machine for weld preparation on 2 plates on both longitudinal and cross edges with one double milling station and 2 cross milling stations
- Plate edge milling machine for weld preparation on 2 plates on longitudinal edges with one double milling station
- Plate edge milling machine for weld preparation on 4 sides with 2 milling stations and automatic tool changing device
Carbide circular saws for billets

For solid material, tubes and profiles of steel

**ADVANTAGES:**

- Designed for 3-shift operation
- Material strength up to 1400 N/mm² to be machined
- Linkage in production lines, turnkey

**VERTICAL:**

<table>
<thead>
<tr>
<th>type</th>
<th>max. saw blade Ø</th>
<th>max. work piece Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSA 500</td>
<td>500 mm</td>
<td>145 mm</td>
</tr>
<tr>
<td>KSA 800</td>
<td>800 mm</td>
<td>250 mm</td>
</tr>
<tr>
<td>KSA 1010</td>
<td>1010 mm</td>
<td>350 mm</td>
</tr>
<tr>
<td>KSA 1250</td>
<td>1250 mm</td>
<td>445 mm</td>
</tr>
<tr>
<td>KSA 1600</td>
<td>1600 mm</td>
<td>565 mm</td>
</tr>
<tr>
<td>KSA 1900</td>
<td>1900 mm</td>
<td>630 mm</td>
</tr>
</tbody>
</table>

**INCLINED BED:**

<table>
<thead>
<tr>
<th>type</th>
<th>max. saw blade Ø</th>
<th>max. work piece Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSS 1250</td>
<td>1250 mm</td>
<td>445 mm</td>
</tr>
<tr>
<td>KSS 1600</td>
<td>1600 mm</td>
<td>565 mm</td>
</tr>
<tr>
<td>KSS 1900</td>
<td>1900 mm</td>
<td>630 mm</td>
</tr>
</tbody>
</table>

- Downward chip flow
- Designed for large material cross sections
Carbide circular saws for tube layers

In precision or seamless tube mills

ADVANTAGES:

• Minimum burr, sellable cut

• Very short cutting times per tube

• Building of layer’s results in large cost savings in handling and space requirements

• Tension and crack-free cut

VERTICAL:

<table>
<thead>
<tr>
<th>type</th>
<th>max. saw blade Ø</th>
<th>max. layer width</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSA 800 L</td>
<td>800 mm</td>
<td>400 mm</td>
</tr>
<tr>
<td>KSA 1010 L</td>
<td>1010 mm</td>
<td>650 mm</td>
</tr>
<tr>
<td>KSA 1250 L</td>
<td>1250 mm</td>
<td>850 mm</td>
</tr>
<tr>
<td>KSA 1600 L</td>
<td>1600 mm</td>
<td>1050 mm</td>
</tr>
<tr>
<td>KSA 1900 L</td>
<td>1900 mm</td>
<td>1250 mm</td>
</tr>
</tbody>
</table>

Cutting time per tube: 2 sec.  
(Ø 101,5 x 6, St 52, KSA 1010L)
Carbide circular sawing machine

- For single cut: up to 1 x Ø 145 mm
- For double cut: up to 2 x Ø 90 mm

Comparison of sawing cycle:

<table>
<thead>
<tr>
<th></th>
<th>Circular saw</th>
<th>Band saw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 80 mm</td>
<td>70 sec.</td>
<td>6 sec.</td>
</tr>
<tr>
<td>Ø 80 mm</td>
<td>60 sec.</td>
<td>2 x 45 sec.</td>
</tr>
<tr>
<td>2 x Ø 80 mm</td>
<td>7 sec.</td>
<td>2 x 4 sec.</td>
</tr>
</tbody>
</table>

The technical advantage:

Double cut = double sawing capacity nevertheless weight optimisation
Carbide non-ferrous circular sawing machines

For billets and slabs

<table>
<thead>
<tr>
<th>Type</th>
<th>Max. Saw Blade Ø</th>
<th>Work Piece</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSA 1250 Cu</td>
<td>1250 mm</td>
<td>820 x 250 mm</td>
</tr>
<tr>
<td>KSA 1600 Cu</td>
<td>1600 mm</td>
<td>1050 x 300 mm</td>
</tr>
<tr>
<td>KSA 1900 Cu</td>
<td>1900 mm</td>
<td>1250 x 300 mm</td>
</tr>
<tr>
<td>PSA 1600</td>
<td>1600 mm</td>
<td>1300 x 300 mm</td>
</tr>
<tr>
<td>KSA 800 Cu</td>
<td>800 mm</td>
<td>Ø 250 mm</td>
</tr>
<tr>
<td>ALU 1250</td>
<td>1250 mm</td>
<td>Ø 450 mm</td>
</tr>
</tbody>
</table>

Cutting time: 1.6 min.
(1250 x 260 mm DHP-Cu)
Rail sawing and drilling machines

For rolling mills, welding shops, track maintenance shops and railway points manufacturers

**ADVANTAGES:**

- Sawing and drilling in one pass
- Individual turnkey solutions; integrated in production flow
- Optional:
  - Drilling hole expansion units
  - Deburring units

<table>
<thead>
<tr>
<th>type</th>
<th>Number of drilling spindles</th>
<th>Rail profiles H x B (mm) up to</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSB 800</td>
<td>0</td>
<td>200 x 220</td>
</tr>
<tr>
<td>LSB 800-S1</td>
<td>1</td>
<td>200 x 220</td>
</tr>
<tr>
<td>LSB 800-S3</td>
<td>3</td>
<td>200 x 220</td>
</tr>
<tr>
<td>LSB 800-S6</td>
<td>6</td>
<td>200 x 220</td>
</tr>
</tbody>
</table>

Cycle time: 30 sec.
One cut and 6 fishplate holes for UIC 60
Rail sawing and drilling machines

Custom-made turnkey production lines

Rail sawing and drilling machine LSB 800-S1 incl. all transport devices and rail cranes for a rail welding shop

Rail sawing and drilling machine LSB 800-S2S with deburring, cold expansion unit and all transport devices incl. magazines

Rail sawing and drilling machine LSB 800-S1 for applications in a rail welding shop

Rail sawing and drilling machine LSB 800-S2S
Stationary rail head milling machine

For re-profiling of rail heads in welding shops

Machining costs to be expected:

approx. 1 € / metre

(incl. depreciation, personnel costs, tools and consumables)

Circumferential milling tool
Mobile rail milling trains

For re-profiling of the rail head on the track

- Cross profile accuracy +/- 0.1 mm
- Longitudinal profile accuracy 0.05 mm
- Surface quality Ra = ca. 3µm

ADVANTAGES:

- No flying sparks during machining
- 0.3 – 3 mm milling depth in one pass
- Side of gauge corner selectable
- Height copying for minimising of longitudinal waviness
- Modification of rail profile is possible by different form milling heads
- Machining speed up to 25 m/min
- Noise level under the wheel on the rail, is under 46 dBA

Principle sketch:
roughing – roughing - grinding

Rail profile before machining

Rail profile after milling

Rail profile after grinding
Milling tools

LINSINGER develops and produces its own tooling for all LINSINGER milling machines

Our tool service offers a number of advantages for our customers.

Brazed circular saw blades

LINSINGER optimises the carbide circular saw blades for the corresponding LINSINGER carbide circular sawing machines

ADVANTAGES:

• Optimised tools, with high life times
• Continuous tool development especially for LINSINGER machines
• Quality control at LINSINGER
• Reduction of tool costs
• Tool supply by LINSINGER
• Evaluation of all applications by LINSINGER

We optimise the cutting performance for all our customer applications
It is all a matter of the perfect tooth geometry!

Brazed circular saw blades

- Multiple changes of carbide tips possible
- Re-sharpening not necessary – no regrinding machines required
- Coated carbide tips applicable
- Special tip geometry is possible
- Less logistic expenditure
- Higher chip load and higher cutting speed result in shorter machining times

Saw blade | Number of teeth
---|---
Ø mm | 54 | 60 | 70 | 80 | 120 | 140 | 160 | 180
425 | | x | | | | | |
460 | x | | | | | |
500 | | x | | | | |
570 | x | | | | |
630 | | | | | | |
710 | x | x | | | |
800 | x | x | | |
1000 | x | | x | | |
1250 | x | | x | x | |
1600 | x | | | x | x |

Especially suitable for stainless steel
Awards

International technology award to Dr. Ernst Linsinger on occasion of the presentation of prizes „Prix de Promotion Internationale de la Technique“ in the year 1985.

Award for successful and excellent installation and putting into operation of a LINSINGER plate edge milling machine at Hyundai Pipe Co. Ltd./South Korea in the year 1991.

“Two months after the assembly of the cutting machine LINSINGER KSA 1010L 98/1567, we wish to congratulate LINSINGER on the work that has been done in Vitry-le-François.”

“The Austrian Seal of Quality was awarded to the company LINSINGER for the first time in 1986 for the excellent quality of its products.

Certificate and letter of thanks of the company Kawasaki Steel Corporation as an award for the manufacturing of a LINSINGER strip edge milling machine for the pipe mill Chita.

“We have increased the speed/production and saved $375,000 /year (saving per ton - $15) with our LINSINGER machines.”

DE BOER BYARD VOF

Innovation award of the state Upper Austria, 1995
Why Linsinger?

Your requirements

- a machine designed exactly to your requirements
- constant tools available
- minimum down time means more productivity
- guaranteed service by experienced specialists

Our solution

- individual turnkey solutions
- constant tooling development
- minimal tooling costs
- increased efficiency
- Linsinger’s own experienced tooling engineers
- Linsinger’s highly qualified team offers a professional service at all times

Therefore Linsinger!
LINSINGER Austria – a subsidiary of the Weingärtner-Group is located just off the motorway between Linz and Salzburg, in the heart of Austria, "the beautiful Salzkammergut"!

The group has 250 employees and is engaged in the manufacture of special machines, with an annual turnover of more than 35 Mio. Euro.

Nothing in the world is as good as an idea, that time has now arrived.