Fans for the Steel Industry
The next generation of technology
Company Overview.

Innovations of TLT-Turbo GmbH

- 1873 First centrifugal flow fan for mine ventilation
- 1950 First axial flow fan with blade adjustment for mine ventilation
- 1985 First fan for "wet" flue gas desulphurization
- 1997 First wind tunnel fan with CFRP-impeller
- 2007 Centrifugal fan with an impeller diameter of 5.3 m
- 2011 Fan for quietest aero-acoustic wind tunnel
- 2015 Centrifugal fan with 12.3 MW required power
- 2016 First MVR Turbo Fan with ceramic hybrid bearing

TLT-Turbo check of facts

- More than 140 years of expertise in construction of fans
- Present in 8 countries with own business locations and with 50 representatives across 40 countries
- More than 6000 installed fans worldwide
- Locations for manufacturing and development in Germany, USA, China and South Africa
- Test stands in Germany, China and USA
- Use of the latest design tools like FEH and CFD

Fans under hard operating conditions

Fans in steel mills and steel works.

Difficult conditions like high speed, high and changing temperatures, dust load, high peripheral speed, wear and much more! How do you cope with these challenges? That is exactly the field of application, where our fans were applied.

Fans in steel plants are typical “centrifugal fans” (single or double flow). They can be found for example in converter dedusting plants (wet systems), sinter plants, dedusting systems for blast furnaces and steel works, pellet plants and much more. Axial impulse fans are only installed in converter dedusting plants with dry cleaning systems.

As wear is always a problem the impellers have to be protected with different systems like compound plates or newly with spray systems. The hardness increases up to approximately 75 HRS. The challenge of fans in steel plants is the fact, the fan has a long period between maintenance outages. So, it is absolutely necessary, that the fan is optimized engineered for the application.

Behind every fan stands our high class product quality and the strong fan brand. In order to provide our customers with the utmost products, our departments offer their best performance. Our R&D department provides their excellent engineering capabilities, followed by our project management with a guaranteed high process quality and finally a correct and unproblematic installation by our field service.

Fans for the Steel Industry.
Typical arrangements.

- Pelletizing Plants
- Sintering Plants
- Converter with Wet and Dry cleaning Applications
- Coke Dry Quenching Systems
- Dedusting Fans
- Gas Booster Fans

Photo: Phoenix West
Pelletizing Plant.

CAF – Cooling Air Fan

Typical Data

- Volume flow: 130 - 607 m³/s
- Temperature: 25 - 40 °C
- Pressure increase: 6000 - 9400 Pa
- Shaft power: 1100 - 5000 kW

Special Features

- Designed for high volume flows and ambient temperature.
- Double inlet centrifugal fan with aerofoil blades or axial impulse fan

Scheme of a Pelletizing Plant.
UDF – Updraught Drying Fan

**Typical Data**
- Volume flow: 210 - 560 m³/s
- Temperature: 250 - 400 °C
- Pressure increase: 6400 - 8500 Pa
- Shaft power: 1700 - 5400 kW

**Special Features**
- Draws process gas (250-400 °C) from the hood above the second cooling zone into the updraught drying zone.
- Protected by hard-surfaced liners.

WRF – Windbox Recuperation Fan

**Typical Data**
- Volume flow: 401 - 776 m³/s
- Temperature: 300 - 400 °C
- Pressure increase: 6300 - 8700 Pa
- Shaft power: 3200 - 7600 kW

**Special Features**
- Handles hot process gas (300-400 °C).
- Protected by hard-surfaced liners.
### WEF – Windbox Exhaust Fan

**Typical Data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume flow</td>
<td>350 - 608 m³/s</td>
</tr>
<tr>
<td>Temperature</td>
<td>50 - 300 °C</td>
</tr>
<tr>
<td>Pressure increase</td>
<td>6400 - 8500 Pa</td>
</tr>
<tr>
<td>Shaft power</td>
<td>3000 - 7060 kW</td>
</tr>
</tbody>
</table>

**Special Features**

- Installed behind filter with lower dust content (ca. 100 mg/m³).
- Double inlet fans with backward-curved blades.
- Protected by hard-surfaced liners.

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### HEF – Hood Exhaust Fan

**Typical Data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume flow</td>
<td>600 - 635 m³/s</td>
</tr>
<tr>
<td>Temperature</td>
<td>150 - 160 °C</td>
</tr>
<tr>
<td>Pressure increase</td>
<td>6300 - 10400 Pa</td>
</tr>
<tr>
<td>Shaft power</td>
<td>1700 - 7100 kW</td>
</tr>
</tbody>
</table>

**Special Features**

- Similar design features as the windbox exhaust fans.
- Protected by hard-surfaced liners.
- An axial flow fan would also be possible (only without wear protection).
Sinter Waste Gas Fan.

Typical Data
- Volume flow: 370 - 500 m³/s
- Temperature: 120 - 200°C
- Pressure increase: 15000 - 20800 Pa
- Shaft power: 5000 - 11150 kW

Special Features
- Draws the process gas (120-200 °C) through the sinter machine and electrical precipitator to the stack.
- The gas contains highly abrasive dust (ca. 50-100 mg/m³).
- The double suction impeller is equipped with wear protection in form of hard-surfacing.

Scheme of a Sintering Plant.

Photo: Landschaftspark Duisburg
Converter with "Wet" Cleaning Application.

Waste Gas Fan

Typical Data:
- Volume flow: 50 - 60 m³/s
- Temperature: 60 - 70 °C
- Static pressure: 20,000 - 28,000 Pa

Special Features:
- Dust loaded with 1 g/m³ (build-up and wearing).
- Gas-tight application, 52-66 % CO gas.
- Blade and main disc of the impeller are equipped with wear protection.
- Spiral of casing with additional wear protection.
- Rotor designed for 35,000 load-cycle changes.
- Impeller with water cleaning system
- Fan control: speed control via VFD.

Scheme of a Converter with wet cleaning application.
Converter with "Dry" Cleaning Application.

Waste Gas Fan

Typical Data:
- Volume flow: 30 - 170 m³/s
- Temperature: approx. 150 °C
- Static pressure: 6,000 - 9,000 Pa

Special Features:
- Designed as "Axial Impulse Fans" because of possible deflagrations in the plant.
- Based on the deflagrations, the stator parts are designed for a overpressure of 1.5 bar.
- Higher tightness against the ambient area because of toxic parts in the gas composition.

Scheme of a Converter with dry cleaning application.
Coke Dry Quenching System.

Coke Gas Recirculation Fan

Typical Data:
- Volume flow: 50 - 150 m³/s
- Temperature: approx. 175 °C
- Static pressure: 10,000 - 14,000 Pa

Special Features:
- Designed as centrifugal fans with wear protection on impeller and housing to protect the fan against the abrasive coke dust.
- Operation behind cyclone.
- Mostly double width, double inlet design, with impeller supported on both sides on an elevated concrete foundation.
- These fans are controlled by speed and additionally by inlet damper.

Scheme of a coke dry quenching system.
Wear protection.

- Exchangeable compound plates (hard-facing plates)
- Surface hardness: approx. 61 – 63 HRC

- Combination of compound plates with thermal sprayed load disk
- Surface hardness of thermal spraying layer approx. 70 – 75 HRC

Wear – What are favorable influences:

- The reduction of the rotational speed
- The smaller relative speed of dust particles to fan blades
- The increase of material hardness
- The shape of the blades

Wear – Where does it come from - What are TLT’s measures?

- TLT’s measures to reduce wear due to dust:
  - Use of optimal backward curved steel plate blades
  - Installation of wear protection with a hardness until 75 HRC
  - TLT-longlife-thin layer tungsten carbide protection (HVOF - TLT H101)