Top-Gas Recovery Turbine (TRT)

Energy recovery system for blast furnace plants
Top-Gas Recovery Turbine (TRT)

Within the blast furnace process (integrated steel mills) an implementation of a Top-Gas Recovery Turbine plant provides a high potential economic and environmental solution to recover and gain power from existing energy. An expander turbine utilizes the pressure and thermal energy which is provided by the compressed “Top Gas” from a blast furnace. This gas expander is specially designed for all technical requirements to process the blast furnace gas. Highly resistant against dust particles and water drops the turbine blades and nozzles guarantee a very long lifetime (25 years and more). A Top-Gas Recovery Turbine has no negative effect on the blast furnace production, with the controllable nozzles at the Top-Gas Recovery Turbine giving an absolutely steady top pressure.

**Key features**

> Low revolution of 1500/min (50Hz), 1800/min (60Hz)
> Low pressure differential over the stages
> Low dust deposit at the blades
> All internals coated including blades and nozzles
> Gas sealing device with low nitrogen consumption
> Bearings outside of gas chambers
> Double Flow Design compensates axial loads
> Fast and exact Top Gas Pressure control
> Long maintenance intervals
> Less energy losses (no gearbox is necessary between turbine and generator)
> No additives for spraying water necessary (cleaning of controllable nozzles)

**Benefits**

The turbine expander recovers about 33% of the pressure energy which is supplied from the blower to the blast furnace. Blast furnace plants without Top-Gas Recovery Turbines lose this energy by gas expansion via control valves (inside the washer or with “Septum Valves”). The expander process doesn’t affect the calorific energy of the blast furnace gas. This recovery of electrical energy has no CO2 pollution

> High-energy output – high efficiency
> Reliable and proven technology
> Compact design leads to an easy implementation into an existing structure
> Long maintenance intervals and long lifetime
> 30 years experience in Top-Gas Recovery Turbine business and 36 installed turbines worldwide
> Return of investment within 3 years possible (depending on plant size)
> Dual Duty Turbine - Only one installation serving two blast furnaces
**Product Specification**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>Up to 100 Deg C blast furnace gas temperature</td>
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<tr>
<td><strong>Volume</strong></td>
<td>Up to 1,000,000 Nm³/h of blast furnace gas</td>
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<tr>
<td><strong>Pressure</strong></td>
<td>Up to 2.50 bar(g) inlet blast furnace gas pressure</td>
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<tr>
<td><strong>Power output</strong></td>
<td>Up to 35 MW</td>
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<tr>
<td><strong>Type</strong></td>
<td>Axial single flow, multi stages expansion turbine</td>
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<tr>
<td><strong>Speed</strong></td>
<td>1500 rpm for 50 Hz; 1800 rpm for 60 Hz</td>
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<tr>
<td><strong>Generator speed</strong></td>
<td>1500 rpm for 50 Hz; 1800 rpm for 60 Hz</td>
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**Dual duty multi-stage turbine**

IMI Z&J's Dual Duty Turbine enables the simultaneous support of two blast furnaces. The production of 2 x 13 MW in combination with less maintenance and long service periods provides the advantage of less investment to our customers. Only one Top-Gas Recovery Turbine plant for two blast furnaces has to be built. Both blast furnaces use independent Top Pressure Controls.