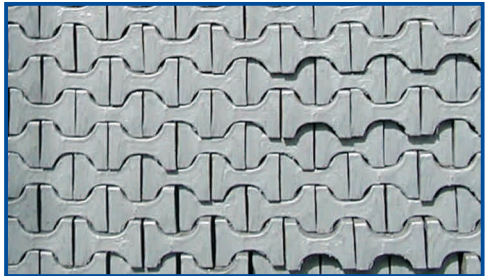


# Stahlwerk Thüringen GmbH

**A modern steel production site  
with tradition**



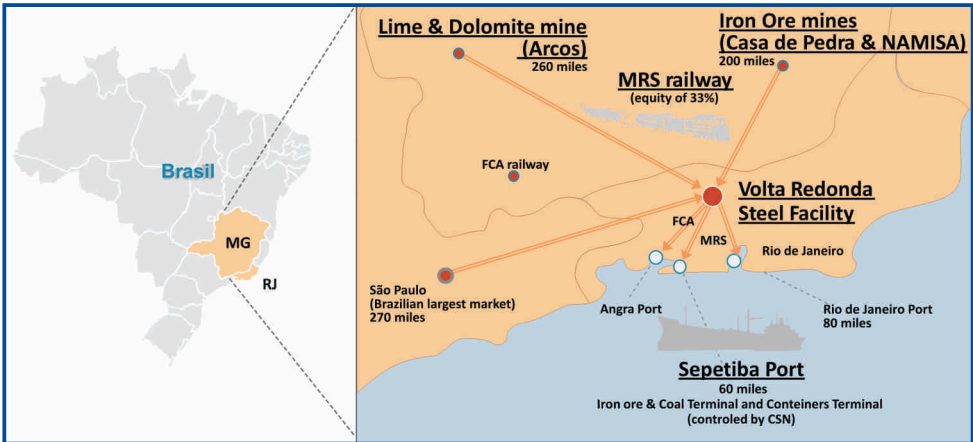
## The CSN group (Companhia Siderúrgica Nacional)






Stahlwerk Thüringen GmbH has been part of the Brazilian CSN group since February 2012.

### Outline of the CSN history

- 9 April 1941: CSN was founded by the Brazilian government as a state-owned enterprise
- 1946: first blast furnace put in operation, acquisition of mines for the supply of ore, lime and dolomite
- 1993: privatization of CSN
- 1996: expansion of activities regarding energy generation (hydroelectric plants) and logistics (harbor facilities and railroad)
- 1998: acquisition of two important trading companies
- 1999 - 2000: acquisition of thermo-electric and hydroelectric plants with the goal of being self-sufficient in energy
- Since 2000: further acquisition of companies

### Locations and business segments of the CSN group in Brasilia



Steel	Mining	Cement	Logistics	Energy
				
Flat Steel Long Steel	Casa de Pedra & NAMISA	Cement Plant	MRS Railway & Transnordestina	Thermal & Hydro Electric Plants
			Itaguaí Logistics Platform	

## The history of the steel production site Unterwellenborn

On 8 January 1872 the administration office of the Duchy Sachsen-Meiningen reported that the ironwork company Maximilianshütte, based in Haidhof/Sulzbach-Rosenberg, intended to construct a metallurgical plant for the production of pig and cast iron in Unterwellenborn.

Six years after the foundation two blast furnaces and one bessemer steel plant were producing steel. Around the turn of the century, two new blast furnaces and a Thomas steel works were erected which were better suited to the local ore deposits.

In the years following the First World War modernizations and expansion programs were carried out. Four new blast furnaces and the Thomas steel works were built. In addition a rolling mill with blooming train was erected providing the blooms for a two high rolling mill and a three-high train. The plant produced small and medium sized universal beams, angle iron, channels, steel plates, railway tracks and track accessories.

After partial destruction in the Second World War, on 6 February 1946 production started in the blast furnace II.

The basic structure of the plant hardly changed during the GDR era, but a considerable effort was made to increase efficiency.

To rationalize the production of steel sections in the former GDR and to remain competitive in the international arena, a decision was taken at the end of the 1970s to build a modern rolling mill in Unterwellenborn. In 1985 the combined section mill was commissioned, after the reunification of Ger-

many which formed the basis for the survival of the plant.

After the Luxembourgian ARBED acquired the combined section mill and the necessary land, the new company Stahlwerk Thüringen GmbH (SWT) started production on 1st July 1992.

Blast furnaces, basic oxygen steel-making plant and blooming train were closed down to create space for a new electric steel plant with continuous casting plant which started production in 1995.

Arcelor was founded in 2001 with the merger of the Spanish ACERALIA, the Luxembourgian ARBED and the French USINOR. It is based in Luxembourg and SWT was affiliated to Arcelor until the end of 2006.

Due to a merger between Arcelor and Mittal Steel, the EU Competition Commission demanded that plants must be sold to competitors and so Stahlwerk Thüringen became part of the Spanish Alfonso Gallardo Group.

Since February 2012, SWT GmbH has been part of the Brazilian steel producing group CSN (Companhia Siderúrgica Nacional).



*The Maxhütte in 1988, view of the blast furnace area*



## The Electric Steel Plant

The electric steel plant was built from 1993 to 1995 to ensure self-sufficiency in blooms for the rolling mill.

The electric steel plant consists of the scrap yard, the melting shop with a direct current (DC) arc furnace and an alternating current (AC) ladle furnace, the continuous casting plant with continuous casting machine and all necessary peripheral facilities.

The entire production complex of the electric steel plant has been constructed in strict compliance with the require-

ments for the protection of the environment against noise and dust pollution.



*Construction of the electric steel plant*

## The Scrap Yard

The recyclable steel required for the mill is delivered by rail or road. All incoming scrap is checked for radioactive substances prior to unloading.

Two gantry cranes are used to transfer the scrap to the stockyard. The stockyard has a capacity of 45.000 tons. All appropriate environmental precautions have been taken and a protective layer

is in place to prevent harmful substances from contaminating the ground water.

Two remote-controlled diesel-hydraulically driven transfer wagons carry the recycled steel in containers that also function as charging vessels for the melting shop.



*Scrap Yard*

## The Melting Shop

The electric arc furnace is charged with two containers of recycled steel per cycle. The furnace needs approx. 50 minutes to convert this material into 120 metric tons of molten steel.



*The DC electric arc furnace in operation*

The furnace operates on the direct current electric arc principle. An electric arc is generated between a graphite electrode with a diameter of 750 mm and the bottom of the furnace which acts as the anode.

This energy, supplemented by natural gas/oxygen burners, is used to melt the scrap. The 120 MVA (Mega Volt Ampere), required to run this DC arc furnace, is almost the same as the electric power required for a town with a

population of 120,000 inhabitants.

At the end of the melting process, the molten metal, with a temperature of approximately 1,600°C, is transferred into a casting ladle situated below the furnace. This is the start of the further metallurgical processing of the steel.



*Tapping of the electric arc furnace*

The casting ladle is then positioned under the ladle furnace. The ladle furnace is an alternating current electric arc furnace with a power requirement of 18 MVA; the ladle also serves as a reaction vessel. The purpose of this process is to achieve the necessary composition and final temperature of the steel. At this point the appropriate additional materials (alloys) are added and the metallurgical process starts with reference to the results from the analysis and measurements.

After about 35 minutes the ladle is transported to the casting shop on a transport wagon.

All emissions created during the melting and processing within the casting shop are extracted and cleaned using the latest powerful de-dusting plant. This enables the maximum allowable values to be consistently below the legal limits



*The de-dusting plant of the melting shop*

### The Casting Shop

The ladle is elevated onto the turret that rotates it into the casting position. The tundish distributes the steel to four water-cooled copper moulds which form the desired beam blank.

Below the moulds the strands are guided in roll segments and intensively cooled. The casting arc radius is 8 meters. Once solid, the strands pass

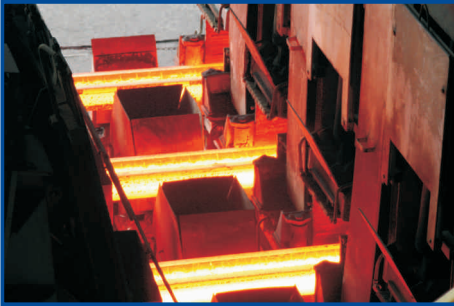
through guides which transport and straighten them out of the casting arc into the horizontal plane ready for the next stage.

The strands are then cut into pieces of the required length with automatic flame cutters.



*The steel is poured into moulds*



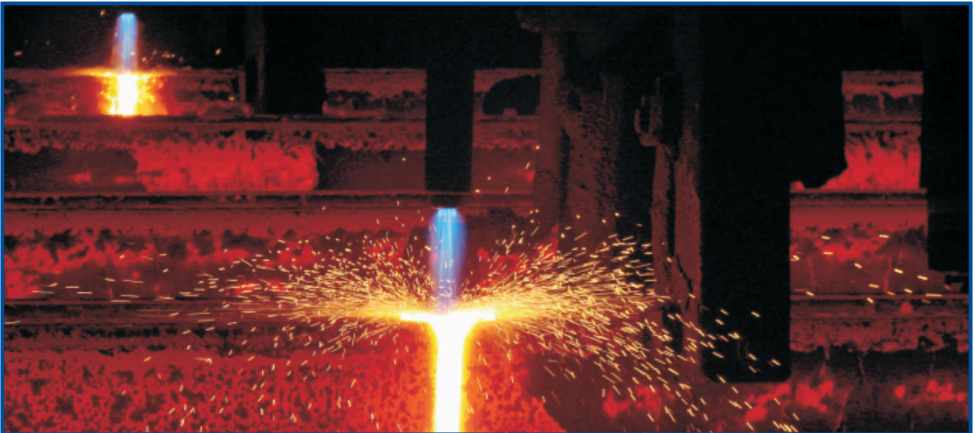


*The exit of the continuous casting machine*

A manipulator transfers the beam blanks with a temperature of approximately 800°C to the rolling mill. The aim of the casting process is to produce the longest possible continuous casting sequences.

SWT produces three blank formats, the so called beam blanks. These blanks are processed to have a form which is similar to the finished product.

This results in a considerable increase in efficiency of production in the rolling mill.



*The flame-cutting machines cut the beams (Beam Blanks) to the requested length to be processed in the rolling mill*



*Transport of the Beam Blanks to the rolling mill*



*Beam Blanks for the rolling mill*

## The Section Rolling Mill

The section rolling mill of Stahlwerk Thüringen GmbH was erected between 1980 and 1984 as a combined section mill with the first rolling taking place in the summer of 1984.

The rolling mill started production in 1985.

In the summer of 2002, important plant equipment such as reheating furnace, tandem group, straightener, saws and automation system were replaced by new ones.

At the turn of the year 2010/2011, the break down stand was completely replaced.

### The Rolling Train

The rolling train produces sections with the duo or universal rolling process with specially formed grooved rolls, either using the reversing principle, whereby the section bar is run backwards and forwards in several passes, or the universal rolling procedure.

Before rolling, the beam blanks – both our own as well as those from external suppliers – are placed in a natural gas fired pusher type furnace where they are heated to a temperature of approximately 1,200°C.

Beam blanks that have been cast at our own steel plant are about 500°C when charged into the pusher type furnace. This “warmth transfer” creates heating energy savings.

When the beam blanks have reached the correct temperature for rolling, a discharge device takes them out of the furnace and the layers of oxide that have built up during the reheating process are removed by means of a high-pressure water descaler (170 bar). This is carried out by spraying water onto the beam.



*Exit pusher type furnace with discharging device*



Three rolling stand groups in the rolling mill include a break down stand coupled with a hot cropping saw, a tandem group and a finishing group.

The capacity of the rolling train, depending on the profile form and dimensions, is between 80 up to 180 tons per hour.

After having passed the finishing stand,

the dimensional accuracy of the rolled section is measured by means of a laser technology.

Using beam blanks with the tailor-made form produced in the steel plant having the almost finished dimensions means fewer passes and less rolling time per beam blank compared to rolling rectangular beams.



*The break down stand of the rolling train*

### The Roll Changing Shop



*Format Changeover*

Adjacent to the rolling train, the roll changing shop provides the facilities for preparing the stands for the subsequent planned profile and the preparation is carried out during the rolling process.

This quick format changeover takes only about 20 minutes and ensures high rolling output.

### The Roll Turning Shop

The grooved rolls are machined on eight CNC-controlled roll turning lathes in the roll turning shop.

Both used rolls are reconditioned and new rolls are manufactured in this facility.

These rolls are the tool for steel forming in the rolling train and weigh up to 22 tons.



*The roll turning shop*

### The Finishing Department

The sections, which can be up to 100 meters long, cool down on a walking beam cooling bed until a temperature of about 80 °C is reached

before being straightened in a 9-roll straightener. This reduces the stresses within the material caused by the cooling process.



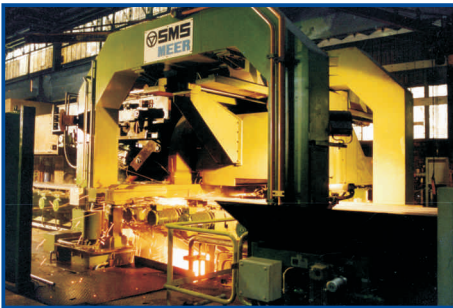
*Straightener*

Then the sections are cut on a cold saw plant, consisting of 3 saws, to get the length requested by the customers. Lengths from 5 m up to maximal 28 m are possible.

Two stackers are available for stacking the cut sections into bundles weighing 2 to 5 metric tons. Once weighed, bundled and labelled, the packages are transferred to the dispatch department where, using four cranes with lifting

magnets, they are either directly loaded onto goods wagons put into temporary storage for consolidation with other orders from other customers.

Stahlwerk Thüringen GmbH currently has an outdoor section storage facility with a capacity of 10,000 metric tons of steel sections. Here two cranes are deployed for loading the goods onto trucks.



*Cold saws*



*Shipping hall*

## Logistics

There is an internal railway system for the transportation of steel with a works feeder line and a railway network of 28 km with 4 radio remote controlled diesel locomotives and 100 wagons.

The Rail Transport Company of Stahlwerk Thüringen (EVU) carries out logistic services for scrap and steel sections transportation in central Germany and to the Czech Republic.



*Sections on the way to the customer*



## Our Management System

Unterwellenborn has been known for a long time for the production of quality steel all over the world.

Stahlwerk Thüringen GmbH is the first metallurgical plant in Germany to have been certified for an integrated management system according to the standards DIN EN ISO 9001, DIN EN ISO 14001 and OHSAS that includes both the quality assurance in the interests of the clients and the environmental protection, as well as health and safety protection in the workplace.

This results in high quality products, satisfied customers, delivery reliability and a minimum of complaints. To ensure the product quality the material characteristics are verified at different stages of the production process.



*Impact and tensile testing machine*

The independent laboratory of Stahlwerk Thüringen GmbH is regularly checked by the Association for Accrediting and Certification.

The laboratory and the sample workshop are equipped with modern test technologies and machines that enable efficient testing of the mechanical properties of our steel products to the

relevant standards.

Great importance is attached to the optimization of steel grades, the introduction of new products in the rolling mill and to the quality development.

## Product Certifications

Stahlwerk Thüringen GmbH is certified by Lloyd's Register EMEA, Germanischer Lloyd, Det Norske Veritas, Bureau Veritas and is the Q1-supplier of DB AG. Furthermore, all products correspond to the EU-CE-regulation.





## Our products

The range of products produced by Stahlwerk Thüringen GmbH includes IPE and HE sections, U-channels and UPE-channels and steel sleepers. In total more than 200 sections are produced according to various national and international standards.

### IPE-sections according to DIN 1025 / DIN EN 10034

IPE 120 up to IPE 550  
IPEA 140 up to IPEA 550  
IPEO 180 up to IPEO 550

### HE-sections according to DIN 1025 / DIN EN 10034

HEAA 100 up to HEAA 260  
HEA 100 up to HEA 260  
HEB 100 up to HEB 260  
HEM 100 up to HEM 220

### Channels according to DIN 1026-1 (U)

Channels according to DIN 1026-2 (UPE)  
U 100 up to U 400, UPE 120 up to UPE 400

### Sections according to BS 4

UB 152 x 89 x 16 up to UB 533 x 210 x 122  
UC 152 x 152 x 23 up to UC 203 x 203 x 86  
BP 203 x 203 x 45 and BP 203 x 203 x 54  
HP 220 x 220 x 57  
PFC 180 x 75 x 20 and PFC 300 x 100 x 46

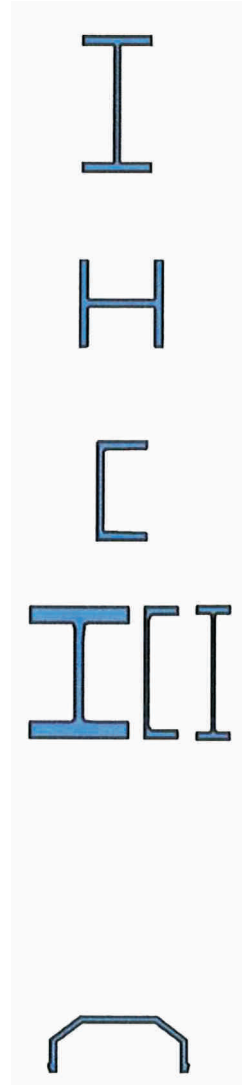
### Sections according to ASTM A6 / A6M

W 4 x 13 up to W 21 x 83  
C 8 up to C 15  
HP 8

### Sections according to JIS G 3192

### Special sections

Special sections for railway tracks (sleepers)



## Steel grades

- General structural steel according to EN 10025-2; ASTM A36; ASTM A572; ASTMA992; JIS G3101/G3106
- Fine grained structural steel according to EN 10025-4
- Weather resistant structural steel according to EN 10025-5
- Special steel grades for shipbuilding and low temperature applications
- Offshore-grades according to EN 10225

Our sales department is at your disposal for detailed information about dimensions and steel grades. You can find contact details on the back of this brochure.

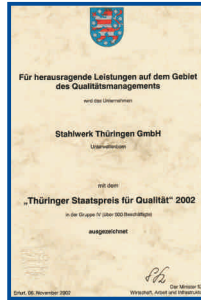
Furthermore our product catalogue with all sections and their dimensions and key data can be found on the Internet.



*Our administrative building, in the foreground IPE-sections*

## Awards

In 1999, 2000, 2001 und 2007 the company was awarded the prize “Workplace Seal of Approval” from the Evangelic Church of Germany (EKD) “Arbeit Plus” for its exemplary workplace policies and social commitment.



In 2002 Stahlwerk Thüringen GmbH was awarded the Thuringian state prize for quality, and in 2005 and 2012 the Thuringian prize for industrial safety “Johannes Bube”.

## The Art Collection of Maxhütte

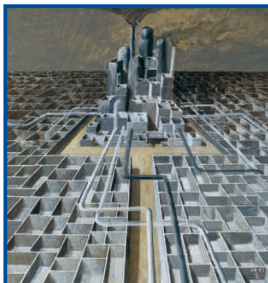
Since 1945, as with many major companies in the GDR, there have been several art campaigns in the former Maxhütte. The working environment was an officially preferred subject within the “socialist realism”. An important organization for creating the Art Collection of Maxhütte was the gallery in the Palace of Culture of Maxhütte in Unterwellenborn.

The collection has mainly a historical value: it is one of the few complete art

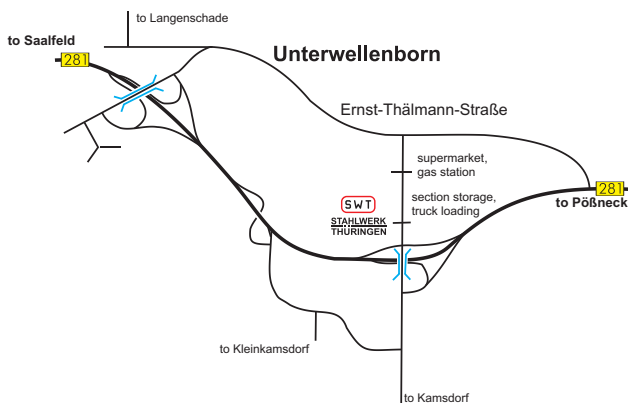
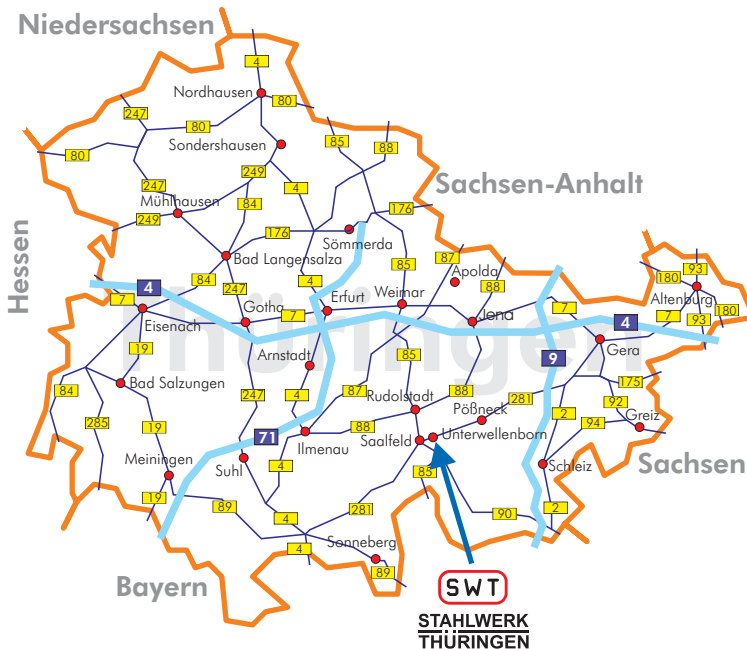
collections of a nationally-owned major company.

Since 1995, the art collection consisting of about 250 paintings and illustrations has been owned by the Free State of Thuringia. The collection is on permanent loan from Stahlwerk Thüringen GmbH and further works are added from time to time.

Mrs Dr. Maren Kratschmer-Kroneck is the curator of the collection.



## How to find us



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