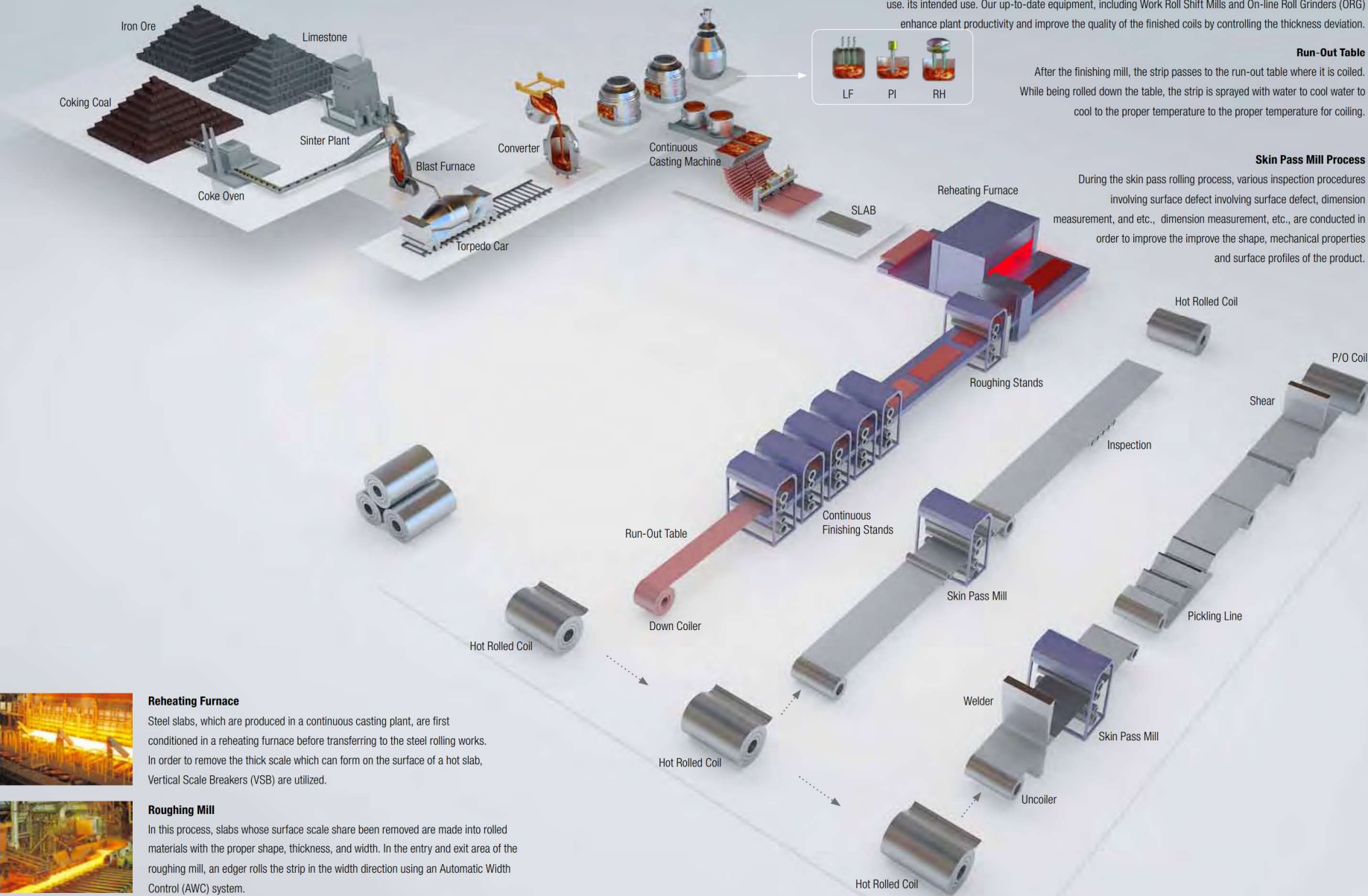


Manufacturing Process & Equipment

In order to deliver quality products, meeting customer's requirements, POSCO is equipped iwth the latest fully-automated computer controlled cutting edge facilities and technologies. These tools guarantee products of the highest precision and quality for our customers.



Reheating Furnace

Steel slabs, which are produced in a continuous casting plant, are first conditioned in a reheating furnace before transferring to the steel rolling works. In order to remove the thick scale which can form on the surface of a hot slab, Vertical Scale Breakers (VSB) are utilized.



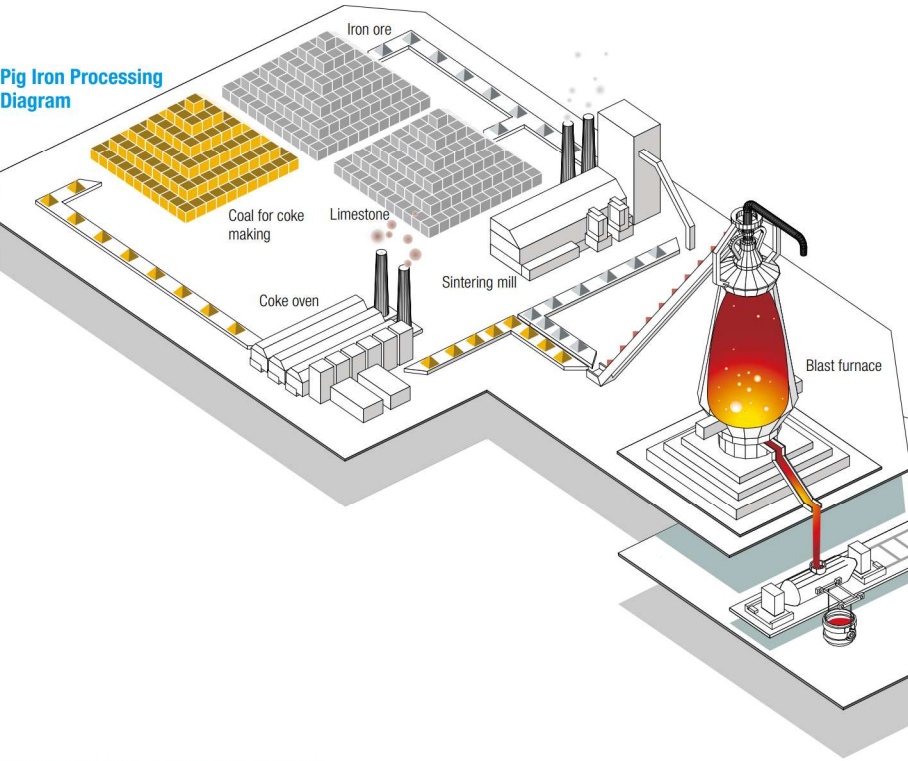
Roughing Mill

In this process, slabs whose surface scale share been removed are made into rolled materials with the proper shape, thickness, and width. In the entry and exit area of the roughing mill, an edger rolls the strip in the width direction using an Automatic Width Control (AWC) system.

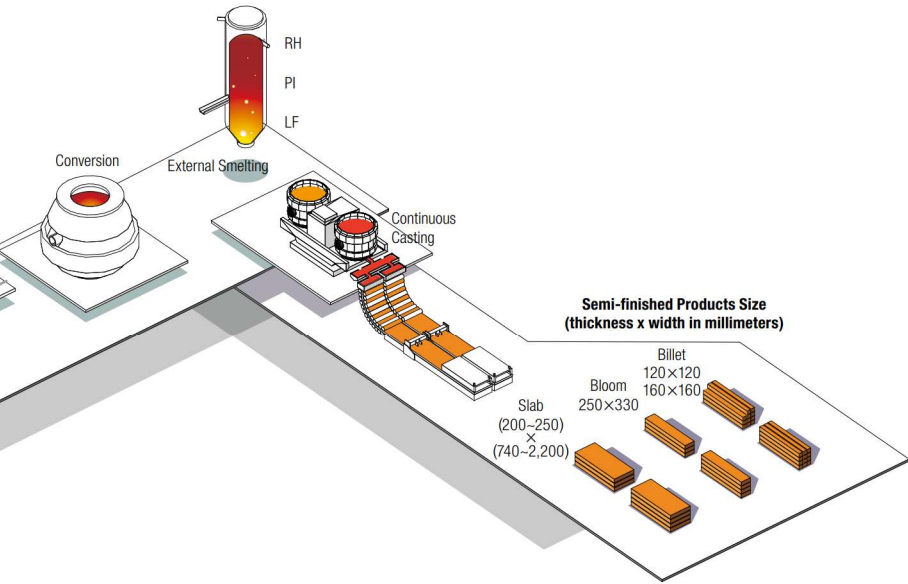


Manufacturing Processes

Pig Iron Processing Diagram



Steelmaking/Continuous Casting Processes



Stages of Pig Iron Processing in Detail

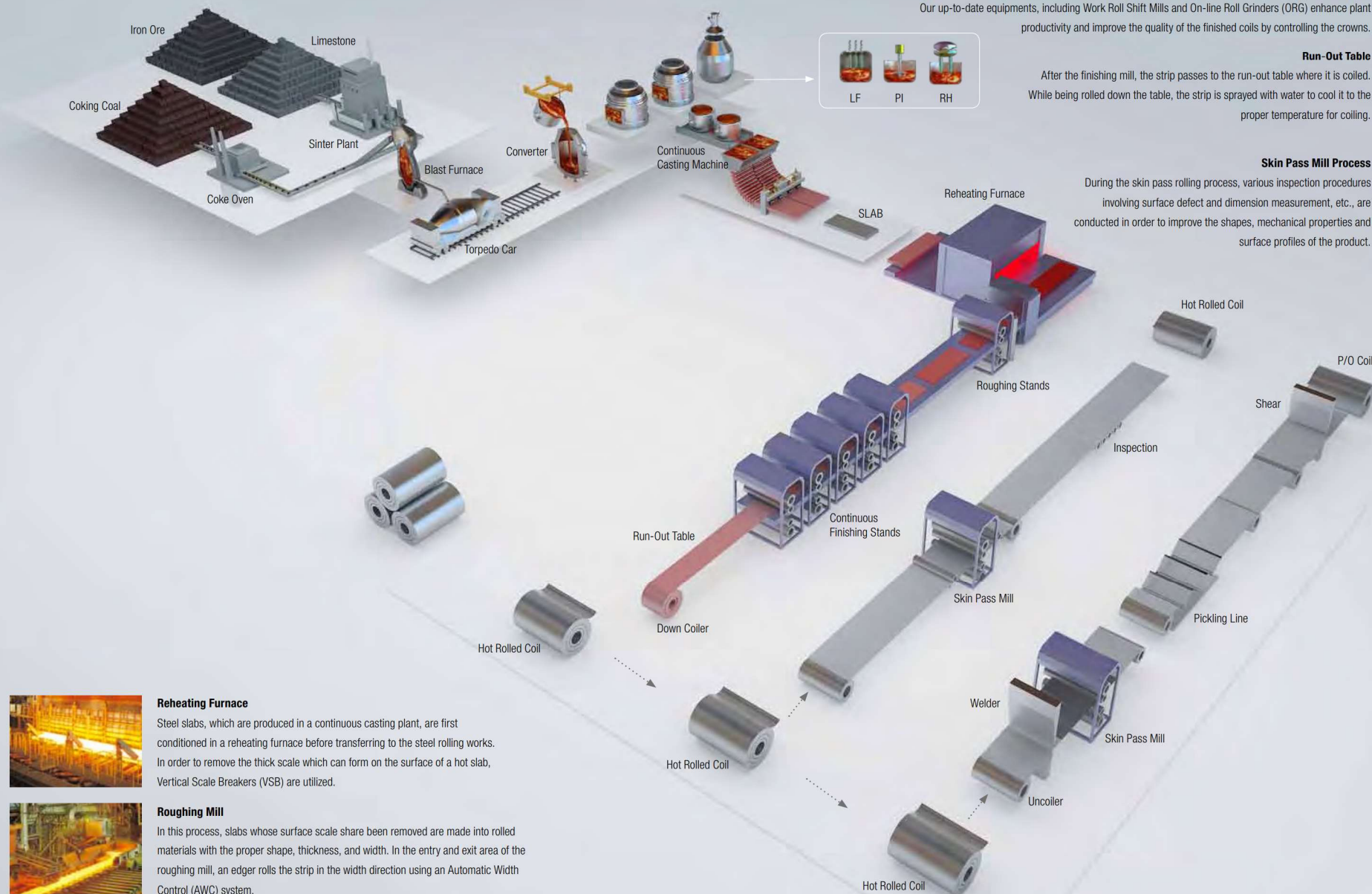
| Process | Description |
|----------------|---|
| Sintering | Iron ore, the main ingredient in steelmaking, is sorted by size into subgroups such as pelletized ore (10~25mm), lump ore (larger than 25mm), and fine ore (less than 10mm). After being crushed and sorted at the raw material factory, lump ore is sent to post-processing facilities in the form of pelletized or fine ore. |
| Fuel treatment | Limestone and powdered coke are mixed with fine ore, which is produced from crushing lump ore. The mixture is first heated at about 1,200°C, cooled, and then crushed into sintered ore of 10~50mm granule dimensions. - Operating facilities: five in Pohang and four in Gwangyang |
| Coke treatment | Coke is produced by heating various coals over 1,000°C to remove water and ash. The suitable grain size of coke to be used in blast furnaces is 25~75mm considering air permeability and chemical reactivity. - Operating facilities: five in Pohang and four in Gwangyang |
| Blast Furnace | Sintered ore, lump coke and other powdered raw materials are introduced at the top of the furnace in multiple stages. Then, the bottom of the furnace is brought up to a temperature of about 1,100°C to heat the coke/iron ore mixture, inducing a reduction reaction to produce molten iron. - Operating facilities: six in Pohang (including the first COREX furnace) and five in Gwangyang |

Steelmaking/Continuous Casting Processes

| Process | Description |
|--------------------------------|--|
| Converter | - Molten iron in the furnace is converted to molten steel by adding oxygen, and impurities are removed during this process. - Pohang: 3 converters of 100-ton capacity each at the 1st steelmaking plant, 3 converters of 300-ton capacity each at the 2nd steelmaking plant - Gwangyang: 3 converters of 250-ton capacity each at the 1st steelmaking plant, 3 converters of 250-ton capacity each at the 2nd steelmaking plant |
| Additional Refining Facilities | These processes remove impurities and make subtle adjustments to the chemical composition of the molten steel product of the converter. |
| | RH - Acronym for Reinstahl Huttenwerke & Heraus - Ar or N ₂ is blown into the molten steel ladle to remove an impurity in this process, hydrogen gas, and to separate and raise non-metallic inclusions to the surface. - Decarbonizing can be accomplished by adding an oxygen injection process. |
| | PI - Powder injection - Through a lance, powders such as Ca-Si are injected to remove sulfuric elements. Non-metallic inclusions are separated and then raised to the surface by stirring the bottom of the molten steel volume. |
| | LF - Ladle Furnace - During this process, a high current electric arc is used to incuse the temperature of the molten steel. |
| Continuous Caster | - Molten steel, which has undergone external refining processes (RH, PL and LF), is poured into molds to produce specific desired shapes. Intermediate products such as slabs, blooms, and billets are produced. |

Manufacturing Processes & Equipment for Hot Rolling

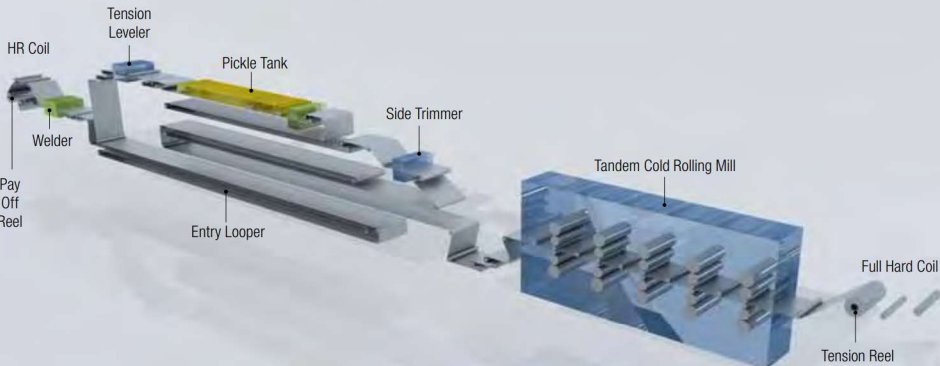
In order to deliver quality products, meeting customer's requirements, POSCO is equipped with the latest fully-automated computer controlled cutting edge facilities and technologies. These tools guarantee products of the highest precision and quality for our customers.



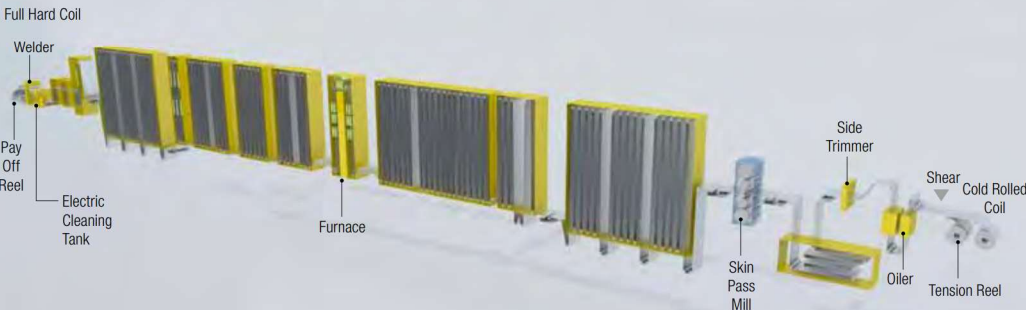
Manufacturing Processes & Equipment for Cold Rolling

In order to deliver quality products meeting customer requirements, POSCO is equipped with the latest fully-automated, computer-controlled, cutting-edge facilities and technologies. These tools guarantee products of the highest precision and quality for our customers.

PL/TCM
(Pickling Line and Tandem Cold Mill)



CAL
(Continuous Annealing Line)



Pickling
The hot-rolled coil passes through a pickling line, where scale breaker machines and hydrochloric acid solutions are used to remove surface scale and oxide film, which cause surface flaws during the final stage of cold rolled steel processing.



Annealing
After cold-rolling, the steel is hard and brittle, and its grains are elongated in the rolling direction. To obtain the desired grain structure and improve the mechanical properties, the material is reheated in a furnace and subjected to cycles of rapid heating and cooling. Steel products with extra deep drawing qualities and high tensile strength can be produced via this high productivity manufacturing method. Two annealing methods are commonly used: batch annealing and continuous annealing.



Cold Rolling
Pickled coils are cold rolled in tandem mills to a specified thickness, typically 40–90%, of original material dimensions. Fully automated thickness and shape adjustment is ensured through state of the art process machinery.



Skin Pass
A final rolling process is performed in order to remove minor surface defects such as stretch marks and to produce a smooth, lustrous surface. Skin Pass results in a further thickness reduction of about 1%.

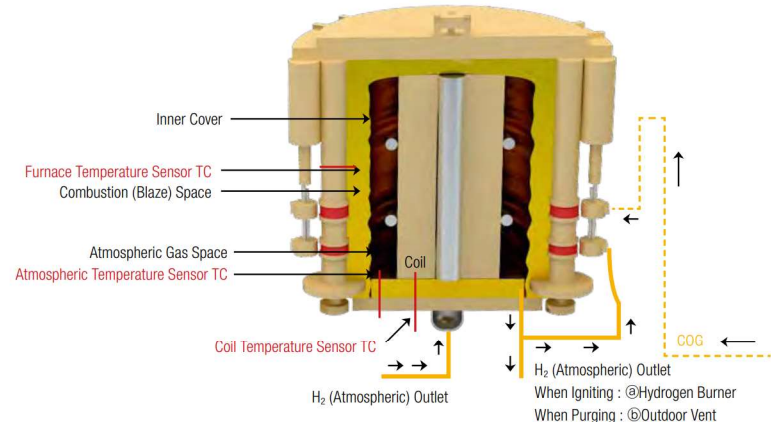
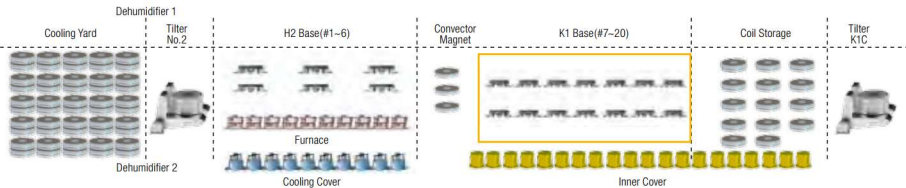


Electrolytic Cleaning
The purpose of electrolytic cleaning is to remove lubricant oil and contaminants on the cold rolled steel prior to the annealing process. All traces of surface oil are removed through mechanical and chemical action as the cold rolled coil passes through an alkaline solution bath.



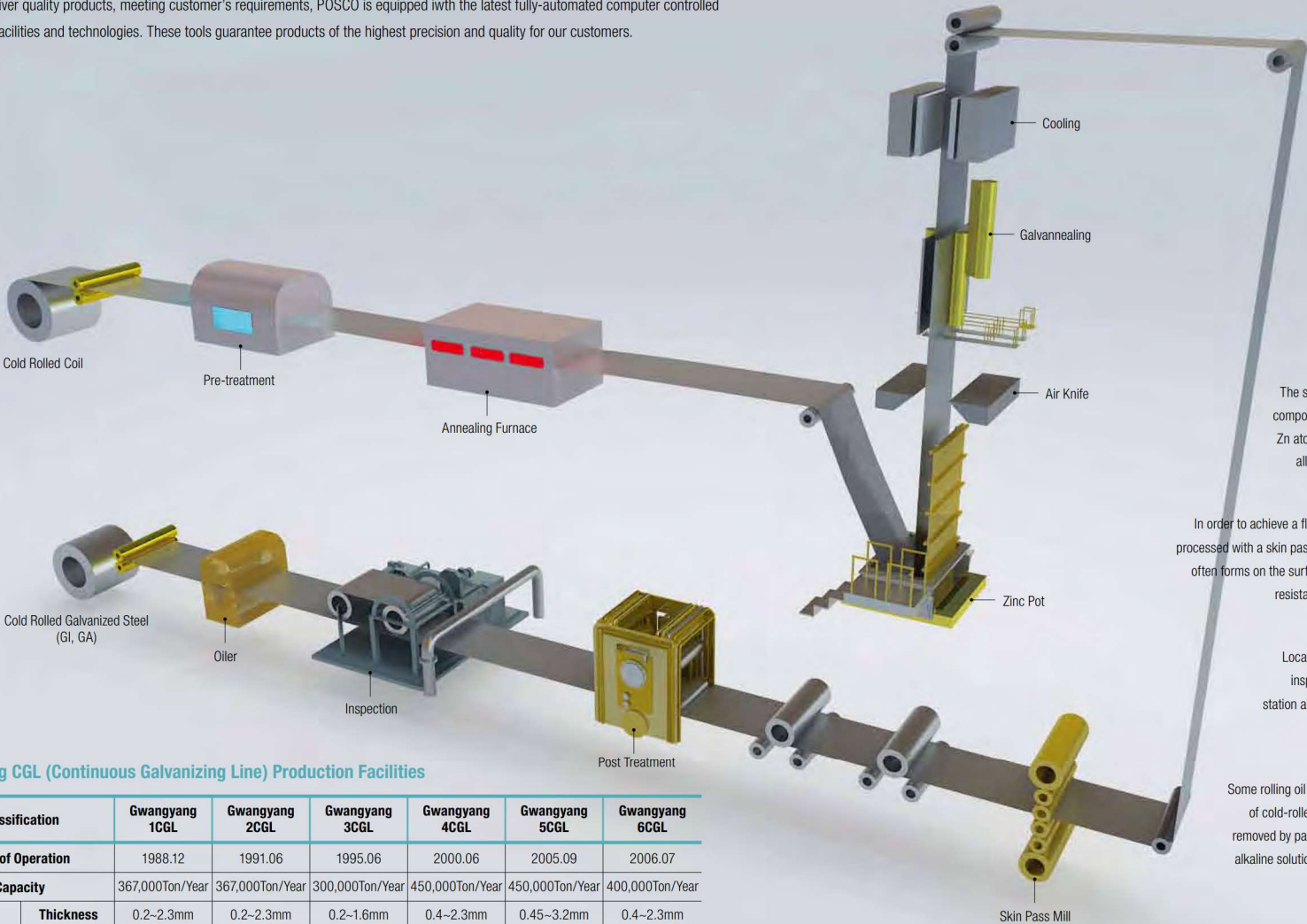
Finishing and Inspection
During this final stage of manufacturing, cold rolled strips are trimmed to customer specified size. The finished product is subject to final inspection, where thickness, width and surface quality are verified. Samples are sent for laboratory testing of mechanical properties as appropriate for specific end use.

BAF
(Batch Annealing Furnace)



Manufacturing Processes & Equipment

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Galvannealing

The surface of steel sheet can be coated with a zinc compound prior to reheating in an annealing process. Zn atoms diffuse into the Fe to create a Zn-Fe series alloy. This process is referred to as Galvannealing.



SPM & Chemical Treatment

In order to achieve a flat surface and elegant finish, the steel sheet is processed with a skin pass mill. In order to prevent the white rust, which often forms on the surface of activated zinc, and to improve corrosion resistance, the surface is coated with a Cr-free resin.



Inspection & Coiling

Located at the line's exit section are a side trimmer, inspection table and oil coating equipment. At this station all products are inspected and judged relative to material specifications required by the client.



Electrolytic Cleaning

Some rolling oil and other contaminants remain on the surface of cold-rolled steel sheets following processing. These are removed by passing the electrically charged sheet through an alkaline solution which induces an electro-chemical reaction.



Annealing

The material properties of pre-treated steel sheet can be altered and improved through re-crystallization during the annealing process.



Hot-Dip Galvanizing

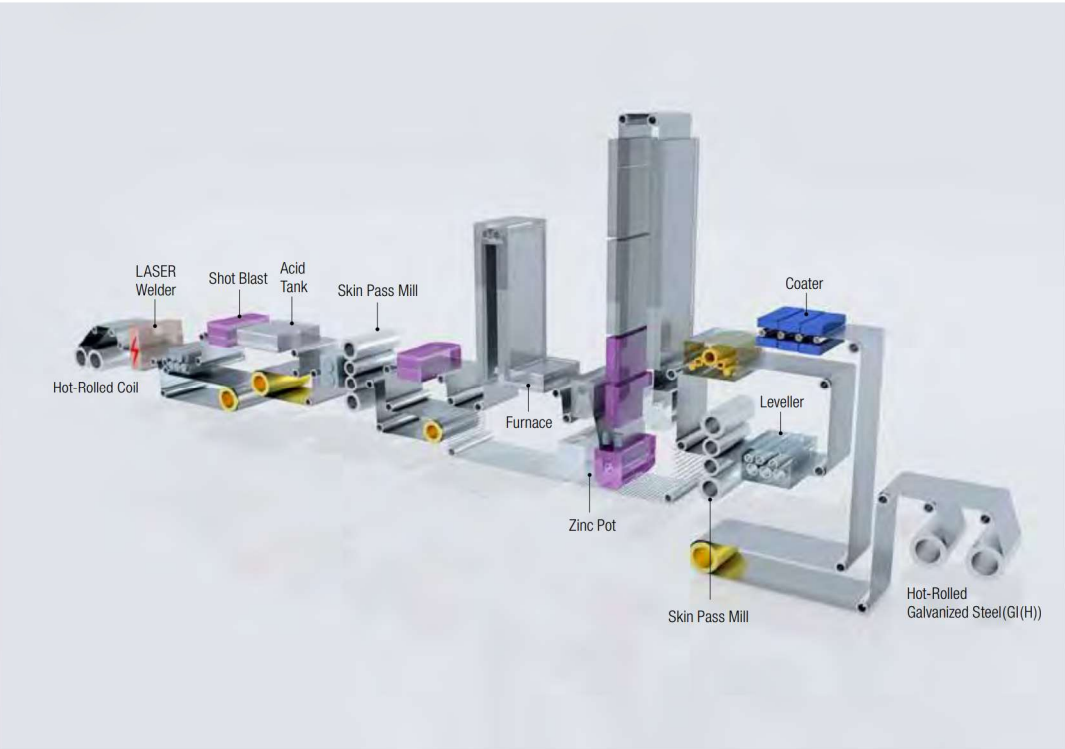
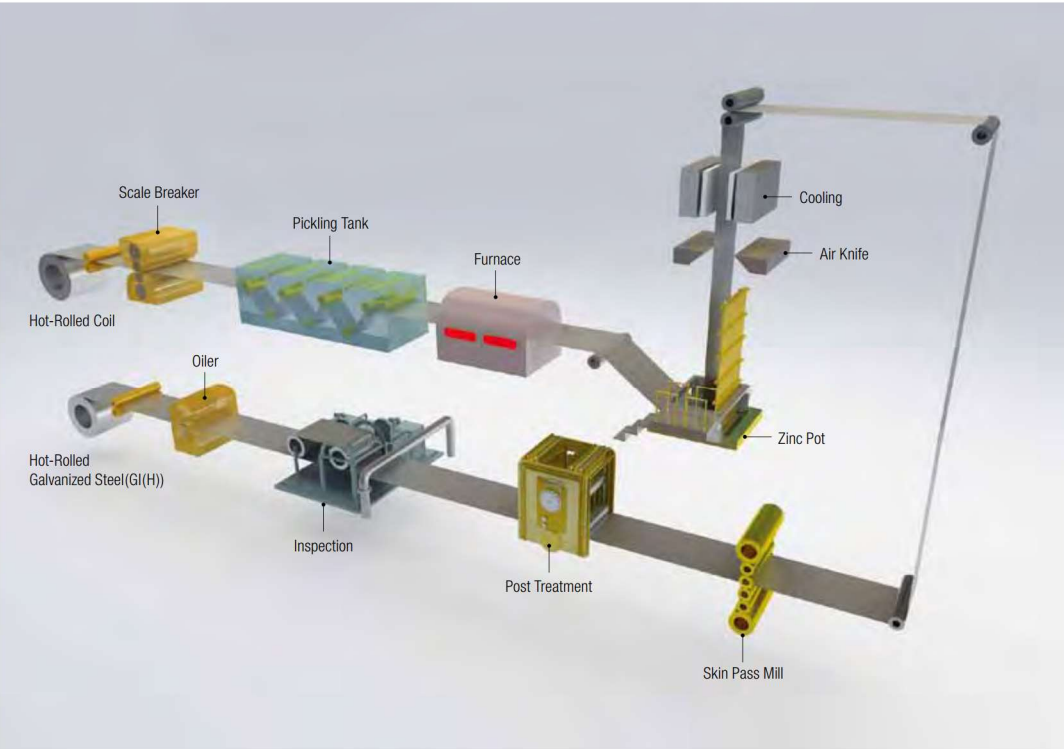
After passing through the annealing furnace, steel sheet is dipped into a zinc pot where molten Zn is coated onto the surface. The desired coating weight is achieved by removing excess zinc before solidification with high pressure air from an air knife.



Gwangyang CGL (Continuous Galvanizing Line) Production Facilities

| Classification | | Gwangyang 1CGL | Gwangyang 2CGL | Gwangyang 3CGL | Gwangyang 4CGL | Gwangyang 5CGL | Gwangyang 6CGL |
|--------------------|-----------|--|------------------------|------------------------|------------------------|------------------------|------------------------|
| Date of Operation | | 1988.12 | 1991.06 | 1995.06 | 2000.06 | 2005.09 | 2006.07 |
| Capacity | | 367,000Ton/Year | 367,000Ton/Year | 300,000Ton/Year | 450,000Ton/Year | 450,000Ton/Year | 400,000Ton/Year |
| Available Size | Thickness | 0.2~2.3mm | 0.2~2.3mm | 0.2~1.6mm | 0.4~2.3mm | 0.45~3.2mm | 0.4~2.3mm |
| | Width | 720~1,860mm | 720~1,570mm | 600~1,270mm | 900~1,860mm | 800~1,860mm | 800~1,860mm |
| | Weight | 5~40ton | 5~35ton | 5~33ton | 5~35ton | 5~35ton | 5~35ton |
| Coating Weight | | 60~300g/m ² | 60~300g/m ² | 60~300g/m ² | 60~300g/m ² | 60~300g/m ² | 60~300g/m ² |
| Product Grade | | Commercial, (light) Drawing, Deep Drawing, Extra-deep Drawing, Structural, High-strength Steel | | | | | |
| Chemical Treatment | | Oiling, Cr-free, Phosphate, Metal Chlorides | | | | | |
| Type of Furnace | | Vertical | | | | | |
| Inside Diameter | | 508 / 610mm | | | | | |

Manufacturing Processes & Equipment



Gwangyang HCGL (High-speed Continuous Galvanizing Line) Production Facilities

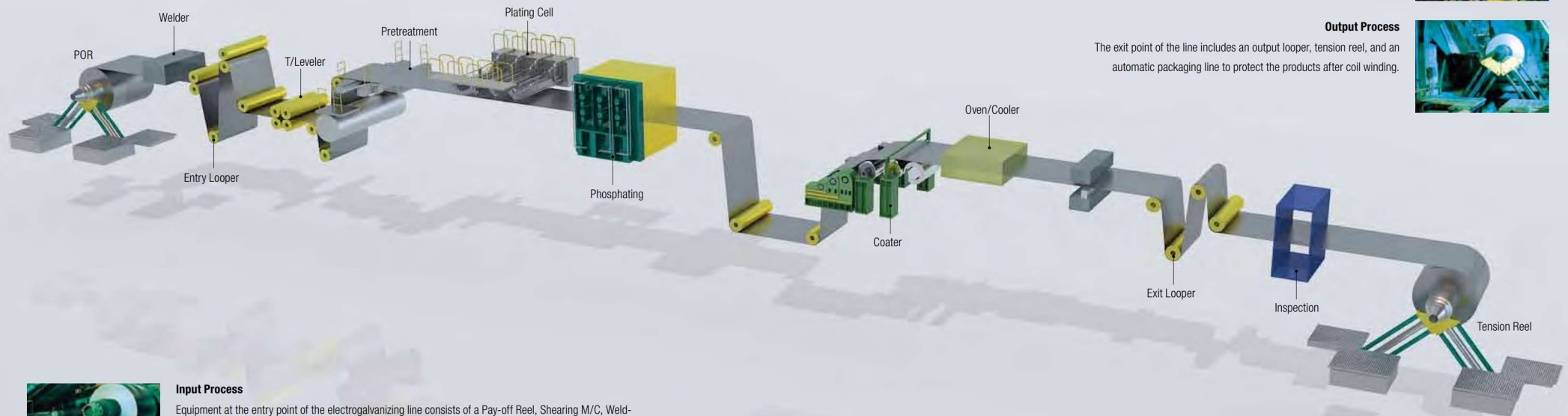
| Classification | | Gwangyang HCGL |
|--------------------|-----------|---------------------------|
| Date of Operation | | 2005.08 |
| Capacity | | 616,000Ton/Year |
| Available Size | Thickness | 1.4~4.5mm |
| | Width | 720~1570mm |
| Coating Weight | | ~725(g/m ²) |
| Product Grade | | Commercial, Structural |
| Chemical Treatment | | Chromate, Cr-free, Oiling |

Pohang CGL (Continuous Galvanizing Line) Production Facilities

| Classification | | Pohang #1CGL |
|--------------------|-----------|---------------------------|
| Date of Operation | | 2012.04 |
| Capacity | | 750,000Ton/Year |
| Available Size | Thickness | 1.0~4.0mm |
| | Width | 800~1670mm |
| Coating Weight | | ~725(g/m ²) |
| Product Grade | | Commercial, Structural |
| Chemical Treatment | | Chromate, Cr-free, Oiling |

Manufacturing Process & Equipment

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Input Process

Equipment at the entry point of the electrogalvanizing line consists of a Pay-off Reel, Shearing M/C, Welding M/C, Looper, and Tension Leveler. The pay-off reel transports stacked or cold-rolled steel materials to the shearing machine which cuts and connects them in preparation for welding. Then comes the welding machine, the looper and a tension leveler which controls the flatness of the untreated sheet steel.



Pre-Treatment Process

An electrolytic cleaning line consists of an electrolysis tank, an acid bath and a rinse tank to remove contaminants and oxide films from the surface of the steel before electroplating.



Electric Galvanizing Equipment

POSCO produces electro-galvanized steel sheet using the LCC-H (Liquid Cushion Cell-Horizontal) galvanizing process. In this process, the steel is coated on both sides simultaneously as it passes horizontally through the line.

Phosphate Thin-Film Coating Process

A phosphate thin-film is applied to the surface of the zinc layer through chemical or electro-chemical reactions. The film is intended to provide temporary anti-corrosion protection and to generate a secure painting substrate.



Anti-Fingerprinting Process

An organic, inorganic or organic-inorganic hybrid film is applied to the surface of sheet steel in order to supplement its corrosion resistance and to enhance desirable properties such as resistance to fingerprint marks and workability.



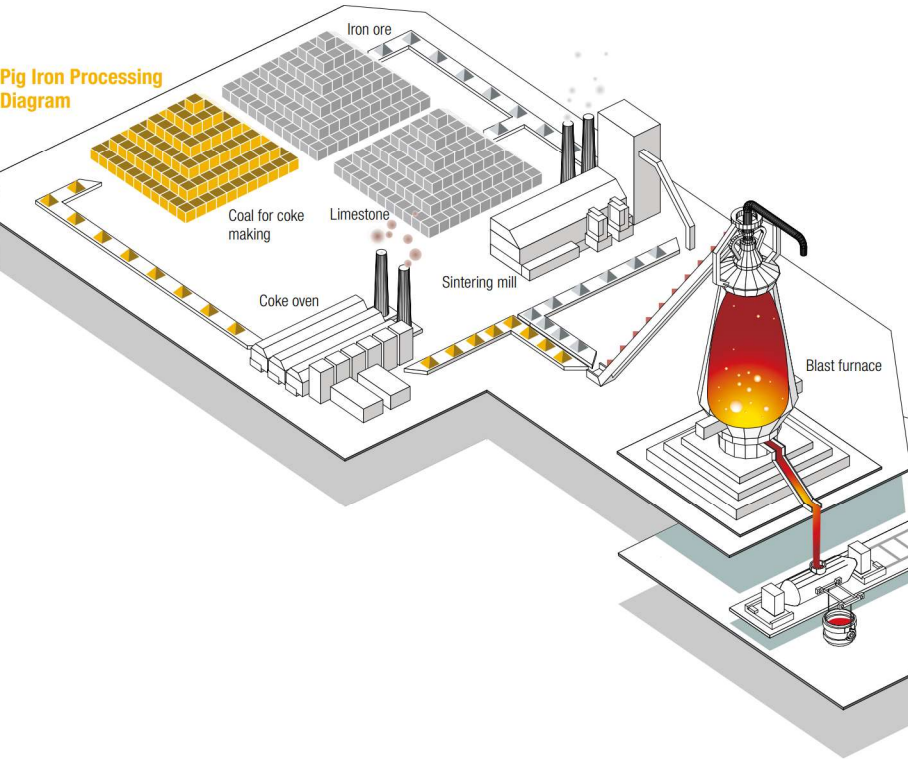
Output Process

The exit point of the line includes an output looper, tension reel, and an automatic packaging line to protect the products after coil winding.

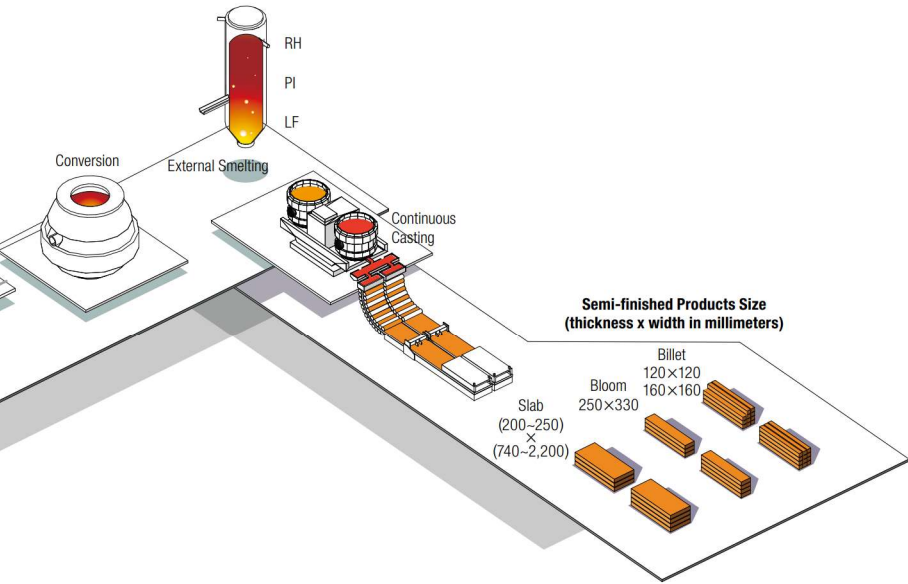


Manufacturing Processes

Pig Iron Processing Diagram



Steelmaking/Continuous Casting Processes



Stages of Pig Iron Processing in Detail

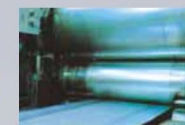
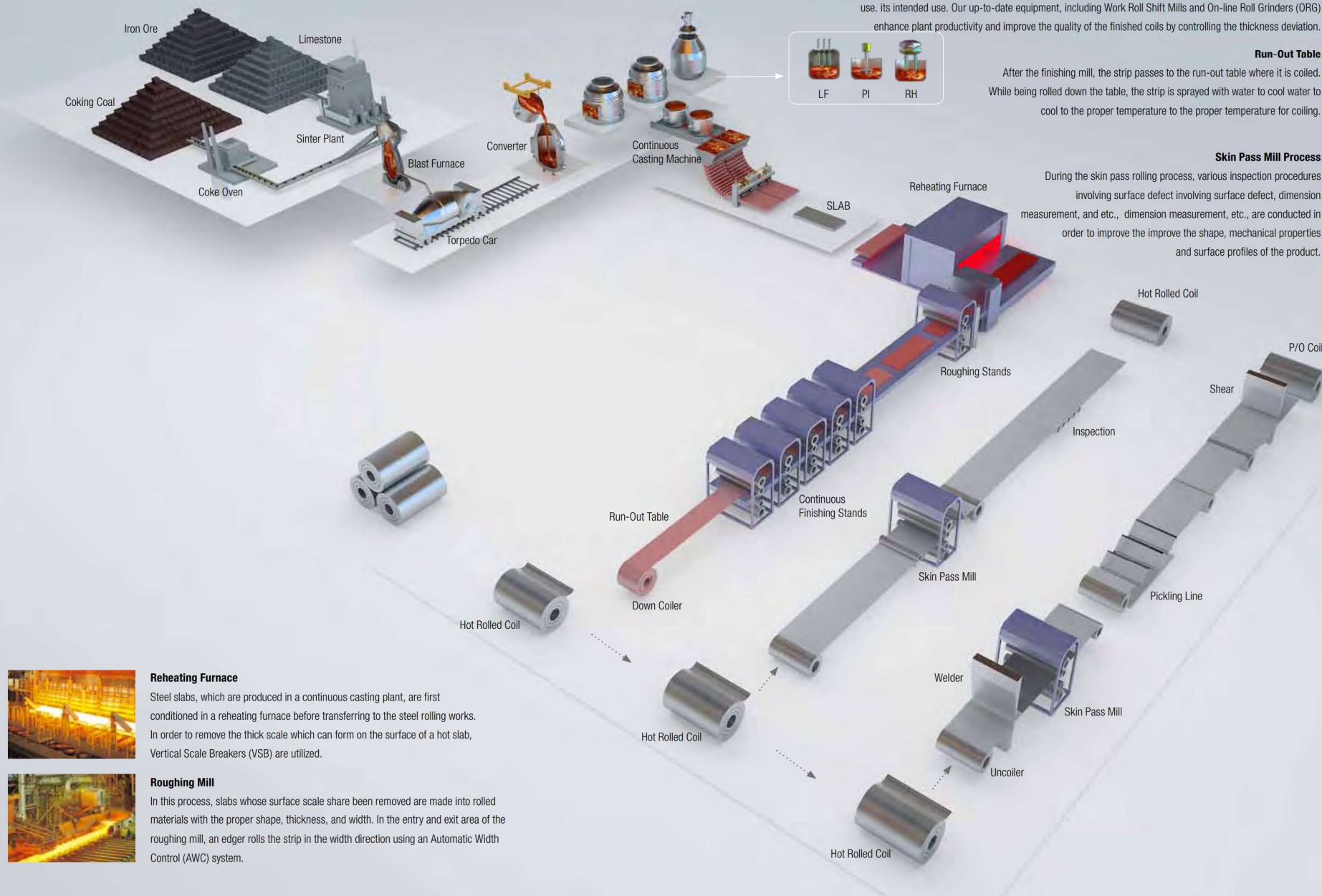
| Process | Description |
|----------------|---|
| Sintering | Iron ore, the main ingredient in steelmaking, is sorted by size into subgroups such as pelletized ore (10~25mm), lump ore (larger than 25mm), and fine ore (less than 10mm). After being crushed and sorted at the raw material factory, lump ore is sent to post-processing facilities in the form of pelletized or fine ore. |
| Fuel treatment | Limestone and powdered coke are mixed with fine ore, which is produced from crushing lump ore. The mixture is first heated at about 1,200°C, cooled, and then crushed into sintered ore of 10~50mm granule dimensions. - Operating facilities: five in Pohang and four in Gwangyang |
| Coke treatment | Coke is produced by heating various coals over 1,000°C to remove water and ash. The suitable grain size of coke to be used in blast furnaces is 25~75mm considering air permeability and chemical reactivity. - Operating facilities: five in Pohang and four in Gwangyang |
| Blast Furnace | Sintered ore, lump coke and other powdered raw materials are introduced at the top of the furnace in multiple stages. Then, the bottom of the furnace is brought up to a temperature of about 1,100°C to heat the coke/iron ore mixture, inducing a reduction reaction to produce molten iron. - Operating facilities: six in Pohang (including the first COREX furnace) and five in Gwangyang |

Steelmaking/Continuous Casting Processes

| Process | Description |
|--------------------------------|--|
| Converter | - Molten iron in the furnace is converted to molten steel by adding oxygen, and impurities are removed during this process. - Pohang: 3 converters of 100-ton capacity each at the 1st steelmaking plant, 3 converters of 300-ton capacity each at the 2nd steelmaking plant - Gwangyang: 3 converters of 250-ton capacity each at the 1st steelmaking plant, 3 converters of 250-ton capacity each at the 2nd steelmaking plant |
| Additional Refining Facilities | These processes remove impurities and make subtle adjustments to the chemical composition of the molten steel product of the converter. |
| | RH - Acronym for Reinstahl Huttenwerke & Heraus - Ar or N ₂ is blown into the molten steel ladle to remove an impurity in this process, hydrogen gas, and to separate and raise non-metallic inclusions to the surface. - Decarbonizing can be accomplished by adding an oxygen injection process. |
| | PI - Powder injection - Through a lance, powders such as Ca-Si are injected to remove sulfuric elements. Non-metallic inclusions are separated and then raised to the surface by stirring the bottom of the molten steel volume. |
| | LF - Ladle Furnace - During this process, a high current electric arc is used to increase the temperature of the molten steel. |
| Continuous Caster | - Molten steel, which has undergone external refining processes (RH, PL and LF), is poured into molds to produce specific desired shapes. Intermediate products such as slabs, blooms, and billets are produced. |

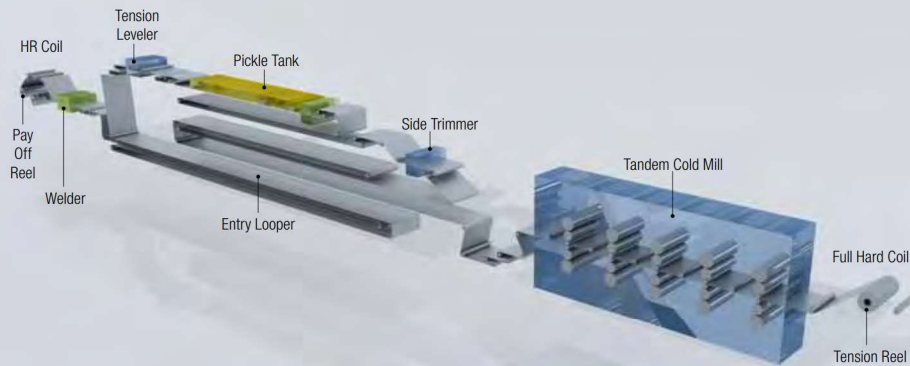
Manufacturing Processes & Equipment (Hot Rolling)

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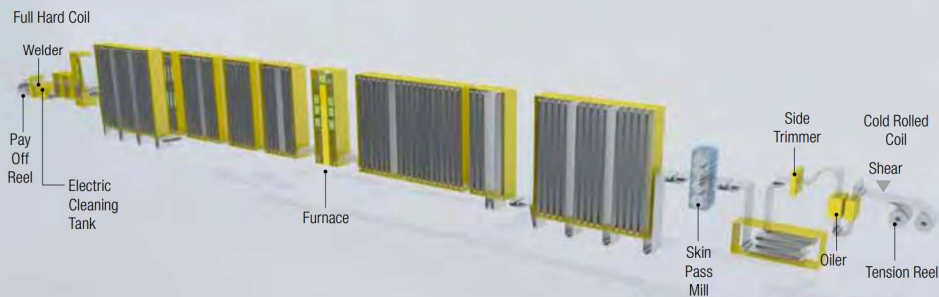


Manufacturing Processes & Equipment (Cold Rolling)

PL/TCM (Pickling Line and Tandem Cold Mill)



CAL (Continuous Annealing Line)



Pickling

The hot-rolled coil passes through a pickling line, where scale breaker machines and hydrochloric acid solutions are used to remove surface scale and oxide film, which cause surface flaws during the final stage of cold rolled steel processing.



Annealing

After cold-rolling, the steel is hard and brittle, and its grains are elongated in the rolling direction. To obtain the desired grain structure and improve the mechanical properties, the material is reheated in a furnace and subjected to cycles of rapid heating and cooling. Steel products with extra deep drawing qualities and high tensile strength can be produced via this high productivity manufacturing method. Two annealing methods are commonly used: batch annealing and continuous annealing.



Cold Rolling

Pickled coils are cold rolled in tandem mills to a specified thickness, typically 40–90%, of original material dimensions. Fully automated thickness and shape adjustment is ensured through state of the art process machinery.



Temper Rolling

A final rolling process is performed in order to remove minor surface defects such as stretch marks and to produce a smooth, lustrous surface. Temper rolling results in a further thickness reduction of about 1%.



Electrolytic Cleaning

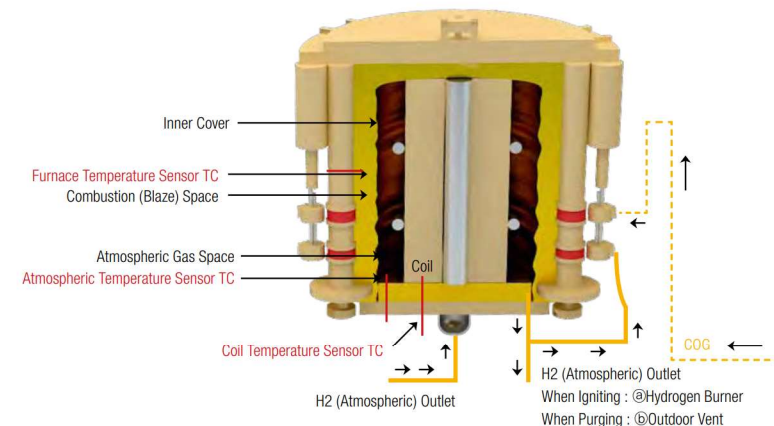
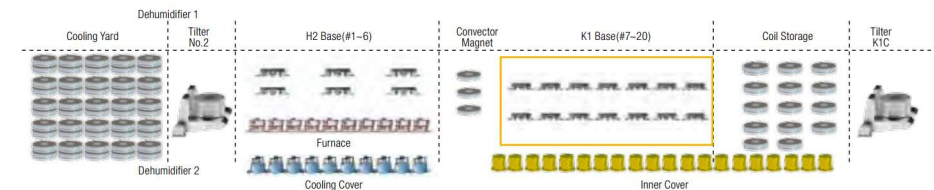
The purpose of electrolytic cleaning is to remove lubricant oil and contaminants on the cold rolled steel prior to the annealing process. All traces of surface oil are removed through mechanical and chemical action as the cold rolled coil passes through an alkaline solution bath.



Finishing and Inspection

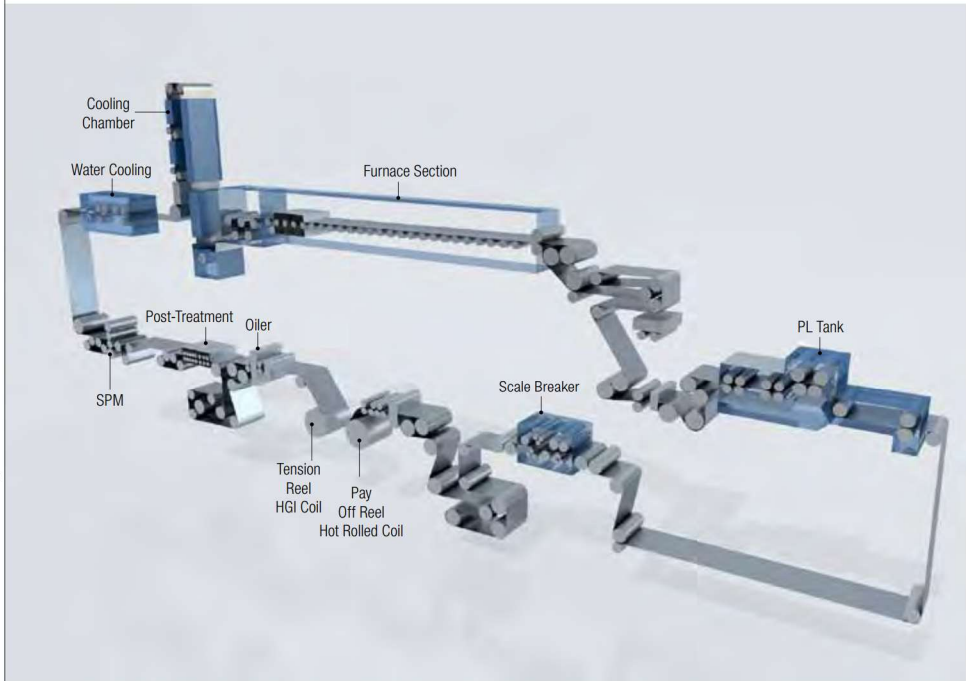
During this final stage of manufacturing, cold rolled strips are trimmed to customer specified size. The finished product is subject to final inspection, where thickness, width and surface quality are verified. Samples are sent for laboratory testing of mechanical properties as appropriate for specific end use.

BAF (Batch Annealing Furnace)



Manufacturing Processes & Equipment (Rolling)

Pickled & Hot-dipped Galvanized Steel (HGI) Manufacturing Processes



Electrolytic Cleaning
Residual rolling oil and other contaminants remain on the surface of cold-rolled steel sheets following processing. These are removed by passing the electrically charged sheet through an alkaline solution which induces an electro-chemical reaction.



Annealing
The material properties of pre-treated steel sheet can be altered and improved through re-crystallization during the annealing process.



Galvannealing
The surface of steel sheet can be coated with a Zinc compound prior to reheating in an annealing process. Zn atoms diffuse into the Fe to create a Zn-Fe series alloy. This process is referred to as Galvannealing.

SPM & Chemical Treatment
In order to achieve a flat surface and elegant finish, the steel sheet is processed with a skin pass mill. In order to prevent the occurrence of white rust, which often forms on the surface of activated Zinc, and to improve corrosion resistance, the surface is coated with a Cr-free resin.

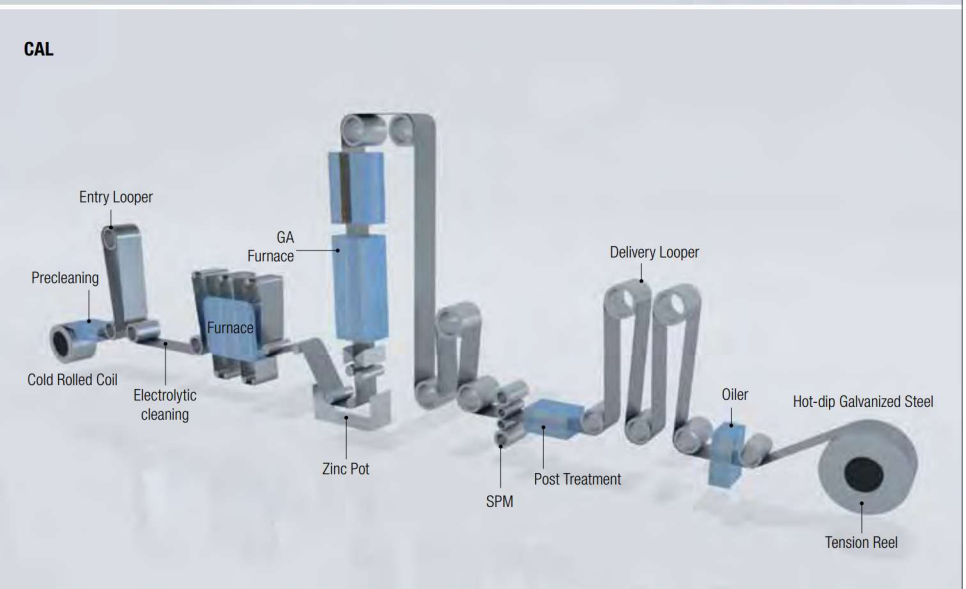
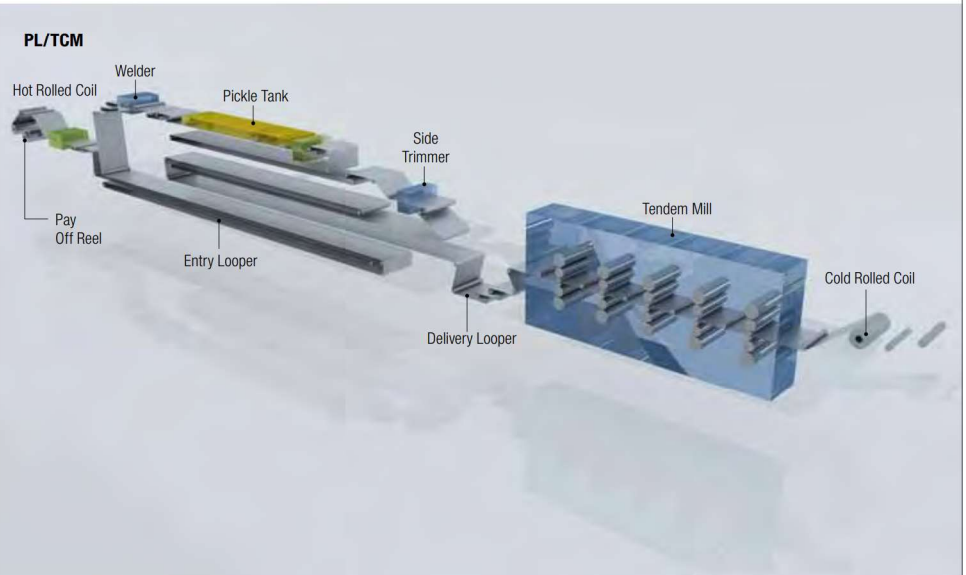


Hot-Dip Galvanizing
After passing through the annealing furnace, steel sheet is dipped into a Zinc pot where molten Zinc is coated onto the surface. The desired coating weight is achieved by removing excess Zinc before solidification with high pressure air from an air knife.



Inspection & Coiling
Located at the line's exit section are a side trimmer, inspection table and oil coating equipment. At this station all products are inspected and judged relative to material specifications required by the client.

Hot-dip Galvanized Steel (GI, GA) Manufacturing Processes

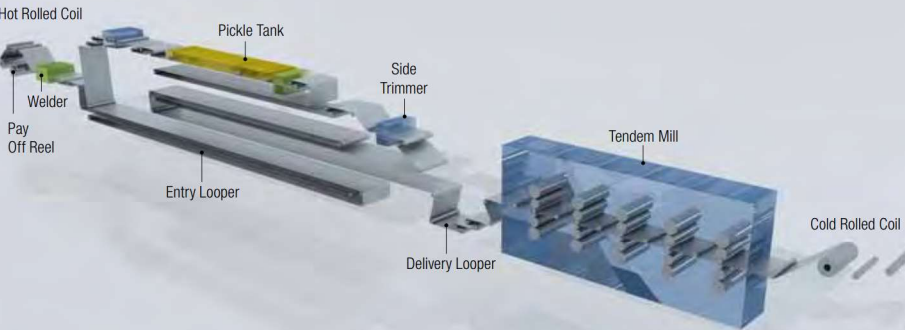


Hot-dip Galvanized Steel

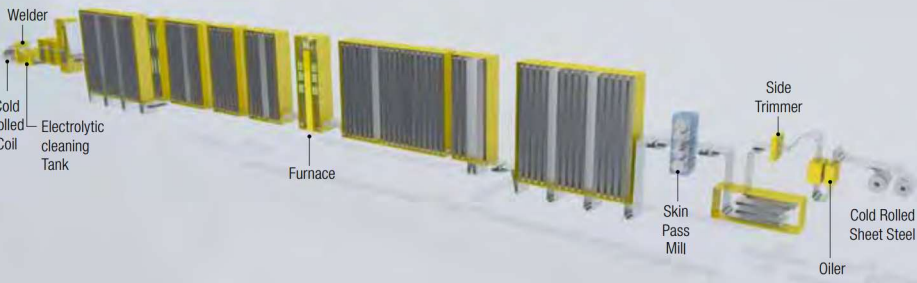
Manufacturing Processes & Equipment

Electro-Galvanized Steel (EGI) Manufacturing Processes

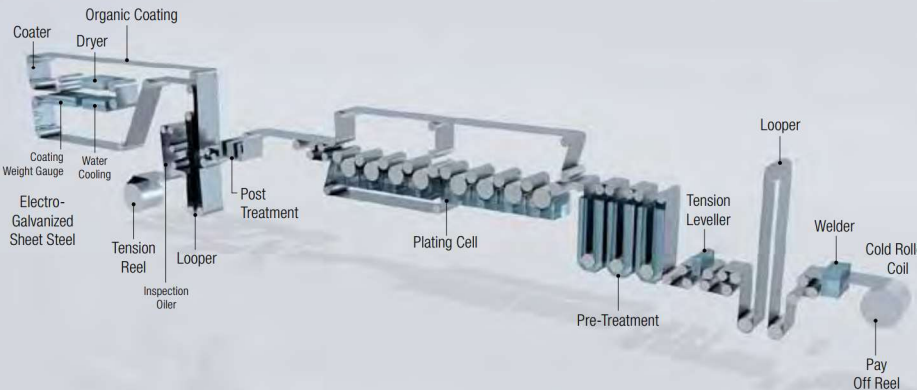
PL/TCM



CAL



EGL



Input Process
Equipment at the entry point of the electrogalvanizing line consists of a Pay-off Reel, Shearing M/C, Welding M/C, Looper, and Tension Leveler.



Pre-Treatment Process
An electrolytic cleaning line consists of an electrolysis tank, an acid bath, and a rinse tank to remove contaminants and oxide films from the surface of the steel before electroplating.



Electric Galvanizing Equipment
POSCO produces electro-galvanized steel sheet using the LCC-H (Liquid Cushion Cell-Horizontal) galvanizing process. In this process, the steel is coated on both sides simultaneously as it passes horizontally through the line.



Phosphate Thin-Film Coating Process
A phosphate thin-film is applied to the surface of the zinc layer through chemical or electro-chemical reactions. The film is intended to provide temporary anti-corrosion protection and to generate a secure painting substrate.



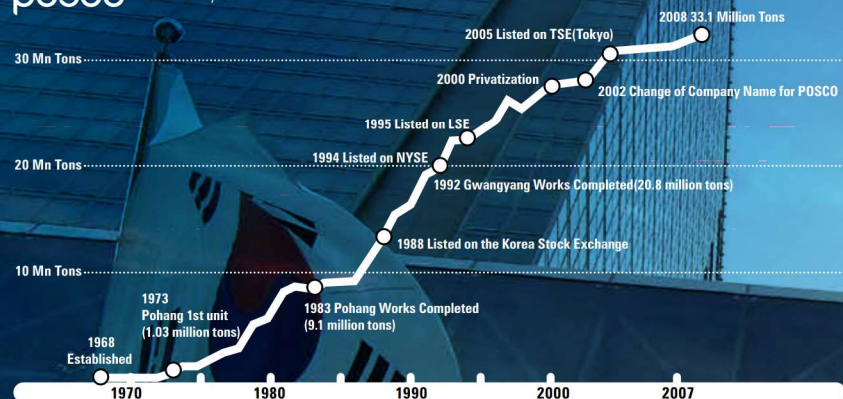
Anti-Fingerprinting Process
An organic, inorganic, or organic-inorganic hybrid film is applied to the surface of sheet steel in order to supplement its corrosion resistance and to enhance desirable properties such as resistance to fingerprint marks and workability.



Output Process
The exit point of the line includes an output looper, tension reel, and an automatic packaging line to protect the products after coil winding.

POSCO is a leading global steel company

posco Brief History



RANKED 1ST IN COMPETITIVENESS (WORLD STEEL DYNAMICS, FEB 2013)

| Rank | Company | Score | Production (mn ton) | Criteria |
|------|-----------------|-------|---------------------|--|
| 1 | POSCO | 7.76 | 39.9 | Tech. Innovation, Conversion Cost |
| 2 | NLMK | 7.33 | 14.9 | High Growth Market, Raw Material |
| 3 | Severstal | 7.32 | 15.1 | Raw Material, Labor Costs |
| 4 | JSW Steel | 7.23 | 8.5 | Expanding Capacity, Labor Costs |
| 5 | Nippon Sumitomo | 7.15 | 47.9 | Value-added product mix, Conversion cost, yields |

* Weighted-Average Score based

2011 MOST ADMIRABLE METALS COMPANY (FORTUNE, MAR 2011)

GLOBAL OPERATIONS

| | |
|------------------|---|
| USA | JV with US Steel in 1.5mtpa CR mill JV with US Steel and SeAH to produce API pipes |
| Mexico | New automotive steel sheet plant in June 2009 |
| China | 82.5% interest in ZPSS with a capacity of 0.8mtpa(STS) 80.0% interest in QPSS with a capacity of 0.2mtpa(STS) |
| India | Construction of integrated steel mill and iron ore mines in Orissa State CR mill with a capacity of 1.8mtpa CGL mill with a capacity of 0.3mtpa |
| Indonesia | JV with Krakatau Steel Construction of Integrated steel mill with a capacity of 6mtpa |
| Vietnam | CR mills with a capacity of 1.2mtpa |
| Turkey | Construction of STS CR mill with a capacity of 0.2mtpa |
| Korea | <Pohang Works> Capacity of 15.0mtpa <Gwangyang Works> Capacity of 18.0mtpa |

STEEL PLATE HISTORY

POHANG WORKS

| | |
|-----------|---|
| Jul. 1972 | Plate Mill 1 / Pohang Works completed |
| Feb. 1978 | Plate Mill 2 / Pohang Works completed |
| Nov. 1988 | Plate Mill 2 Accelerated Cooling Control Facilities completed |
| Jun. 1990 | Production of STS plate began |
| Sep. 1997 | Plate Mill 3 / Pohang Works completed |
| Jul. 2001 | ERP(Enterprise Resource Planning) introduced |
| Nov. 2003 | Plate Mill 3 Accelerated Cooling Control Facilities completed |
| Jun. 2005 | Revamping of Plate Mill 2 completed |

GWANGYANG WORKS

| | |
|-----------|------------------------------------|
| Aug. 2010 | Plate Mill completed |
| Jul. 2011 | Heat Treatment Equipment completed |

Manufacturing Processes & Equipment

In order to deliver quality products POSCO is equipped with the latest fully-automated, computer-controlled, cutting-edge facilities and technologies. These tools guarantee products of the highest precision and quality for our customers.



Billet Conditioning

To improve the surface quality of wire rods, billets are descaled by shot blasting, and inspected for surface flaws by magnetic particle tester. Grinding machines are used to remove any surface flaws. In addition, continuous ultrasonic testing is conducted to guarantee the prime quality.



Reheating

Reheating furnace is carefully examined, to produce prime materials in customers' desired properties. To prevent decarburization, billets are preheated at a low temperature, followed by a full heating process, to suit a right temperature for billets' rolling procedure. The rolling speed and fuel-to-air ratio in the reheating furnaces are fully controlled.



Rolling

The rolling procedure must be carefully controlled, to adjust temperature, pressure and deformation rate to form customers' desired characteristics. Moreover, surface roughness, sizes, and deviations are subject to adjustment to prevent any flaws.



Cooling

Precise control of temperature, air volume, speed, opening and closing of slow-cooling sections are all variables that affect physical properties. Uniform fast-cooling methods are used for high carbon steel wires, and slow-cooling method is applied for alloy and low-carbon steel.



Inspection

Samples of leading and trailing edges of wire rods are collected for quality assurance tests, which include surface flaw detection. Once wire rods are deemed prime, products are then packaged and tagged to clients' requirements.

