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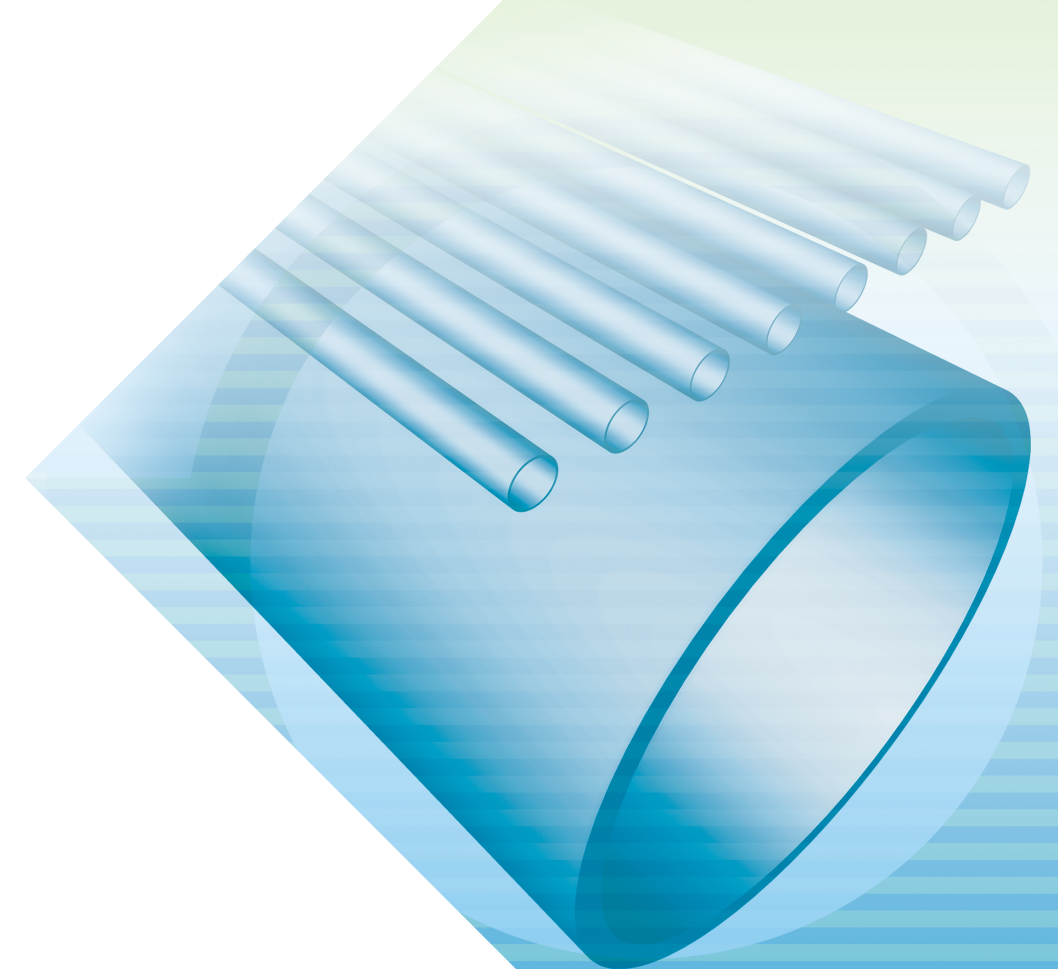
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Pipes & Tubes  
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# Pipes & Tubes

Pipes  
& Tubes



**NIPPON STEEL CORPORATION**



# Pipes & tubes of NIPPON STEEL

NIPPON STEEL has produced and sold a complete range of steel products and has served every need in Japan and overseas for over a long period of time as a comprehensive steel manufacturer.

In the pipe & tube unit, we have the latest production facilities that can cover all products, such as those involving seamless rolling, electric resistance welding, butt welding, and arc welding, as well as a product control system based on non-destructive inspection using computers.

In addition, the comprehensive unique capabilities of NIPPON STEEL include application technologies and construction technologies varying from high-grade pipes for lines, oil wells, and power generation, etc., to general pipes & tubes such as those for piping and structures. We believe that such technologies will serve you and your needs.

We would like to gain your interest in the pipe & tube products of NIPPON STEEL.

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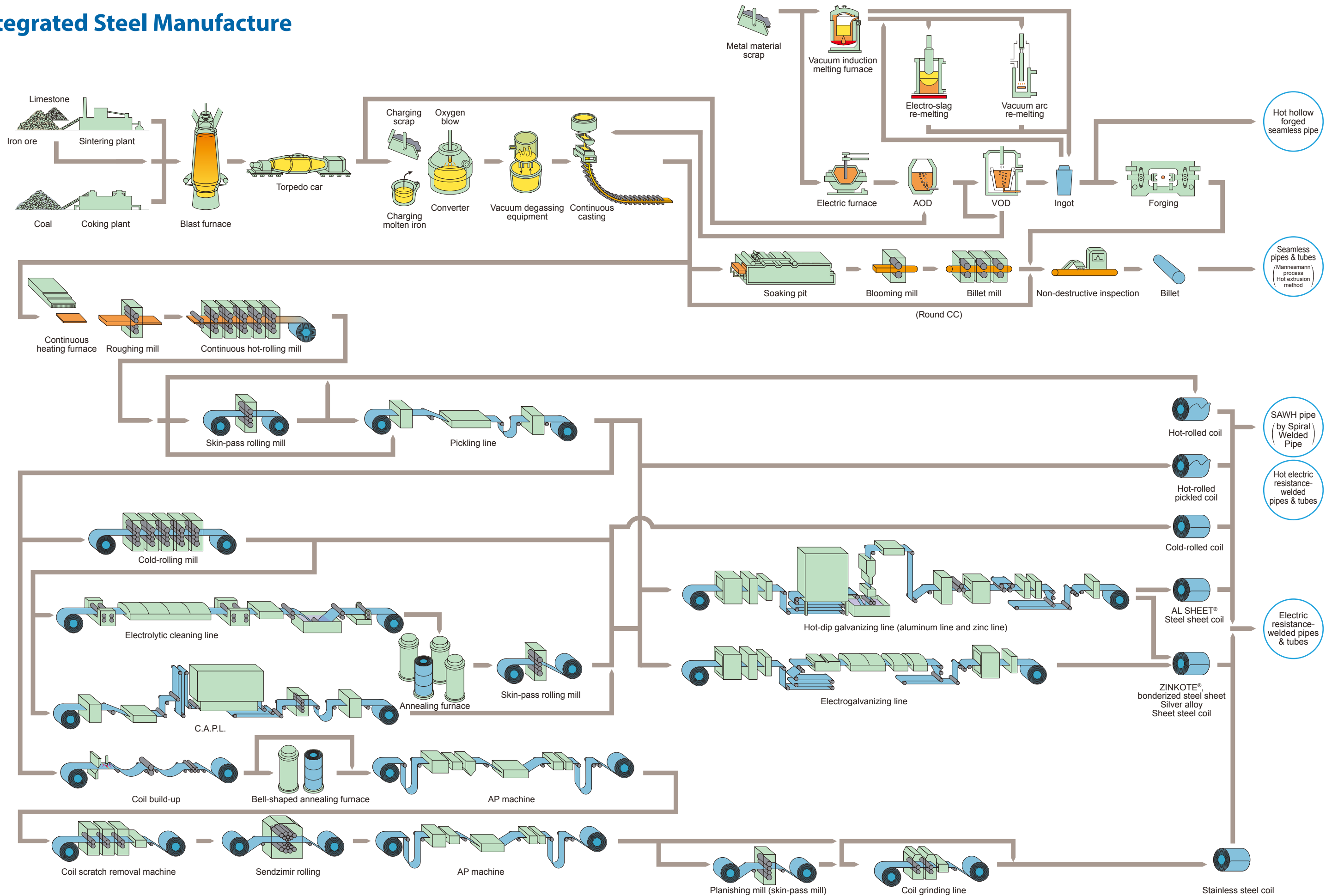
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# Integrated Steel Manufacture



Pipe-making facilities and product types

Classification	Pipe-making facilities		Location of mills	Production capacity (tons/year)	Available production size (outer diameter: mm)												Thickness (mm)	Product type	
	Production method				40	80	120	160	200	300	400	500	1000	2000	3000	4000			
Seamless pipes & tubes	Ugine-Sejournet Hot extrusion process	(Hot finish)	Kyushu Works Oita Area (Hikari Pipe & Tube Div.)	48,000	<div><div>34.0175.0</div><div>6.0168.3</div></div>												2.0~25.0	<div>Carbon steel, alloy steel, and stainless pipes &amp; tubes</div> <div>Hot-extruded shape steel</div> <div><div><div></div><div>Casing &amp; Tubing</div></div><div><div></div><div>Green tube for drill pipes</div></div><div><div></div><div>Line pipes</div></div><div><div></div><div>Pipes for boilers and nuclear power</div></div><div><div></div><div>Pipes &amp; tubes for heat exchangers</div></div><div><div></div><div>Pipes &amp; tubes for mechanical structures</div></div><div><div></div><div>Mechanical tube</div></div><div><div></div><div>Pipes &amp; tubes for pressure vessels</div></div><div><div></div><div>Pipes &amp; tubes for the chemical industry</div></div></div> <div><div></div><div>Industrial machine parts</div></div> <div><div></div><div>Construction and civil work materials</div></div> <div><div></div><div>Pipes &amp; tubes for general structure</div></div>	
		(Cold finish)	Kansai Works Amagasaki Area	60,000	<div><div>36.0275</div><div>6.0219.1</div></div>												0.9~16.0		
		(Hot finish)	Kansai Works Amagasaki Area	14,400	<div><div>165.2952.5</div><div>219.1508</div></div>												3.0~35.0		
		(Cold finish)	Kansai Works Amagasaki Area	14,400	<div><div>219.1508</div></div>												1.0~30.0		
	Mannesmann Hot hollow forging mandrel mill process	(Hot finish / Wakayama)	Kansai Works Wakayama Area	600,000	<div><div>168.3426.0</div></div>												15.0~160		
		(Hot finish / Kainan West)	Kansai Works Wakayama Area	350,000	<div><div>73.0182.0</div></div>												12.7~40.0		
		(Hot finish / Kainan East)	Kansai Works Wakayama Area	250,000	<div><div>31.8141.3</div></div>												4.5~50.0		
		(Cold finish / Kainan)	Kansai Works Wakayama Area	60,000	<div><div>15.0127.0</div></div>												4.5~46.0		
			Kansai Works Wakayama Area	250,000	<div><div>31.8141.3</div></div>												2.5~40.0		
			Kansai Works Wakayama Area	60,000	<div><div>15.0127.0</div></div>												1.7~23.5		
Arc-welded pipes & tubes	Spiral Welded Pipe (SAWH)	Kyushu Works Yawata Area	102,000	<div><div>4001625.6</div></div>												4.5~19.0	<div><div></div><div>Line pipes</div></div> <div><div></div><div>Pipes &amp; tubes for water supply (coated pipes &amp; tubes)</div></div> <div><div></div><div>Pipes &amp; tubes for general structures</div></div> <div><div></div><div>Sludge draining pipes</div></div> <div><div></div><div>Pipe piles</div></div> <div><div></div><div>Pipe sheet piles</div></div> <div><div></div><div>Pipes &amp; tubes for marine structures</div></div>		
		East Nippon Works Kimitsu Area	168,000	<div><div>4002500</div></div>												6.0~25.4			
Electric resistance-welded pipes & tubes	High-frequency induction welding process (2")	Nagoya Works Kansai Works Wakayama Area (OEM by related company*)	36,000	<div><div>21.765.0</div></div>												0.8~6.5	<div><div></div><div>Line pipes</div></div> <div><div></div><div>Pipes &amp; tubes for oil wells</div></div> <div><div></div><div>Pipes &amp; tubes for boilers and heat exchangers</div></div> <div><div></div><div>Pipes &amp; tubes for mechanical structures</div></div> <div><div></div><div>Pipes &amp; tubes for water supply</div></div> <div><div></div><div>Pipes &amp; tubes for general structures</div></div> <div><div></div><div>Pipe piles</div></div> <div><div></div><div>Corrosion-resistant pipes and coated pipes &amp; tubes</div></div> <div><div></div><div>Mechanical tube</div></div> <div><div></div><div>Pipes &amp; tubes for automobile structures</div></div> <div><div></div><div>Pipes &amp; tubes for cylinder tubes</div></div>		
	High-frequency induction welding process (SR)	Kyushu Works Oita Area (Hikari Pipe & Tube Div.)	60,000	<div><div>13.860.5</div></div>												1.4~9.0			
	High-frequency induction welding process (4")	East Nippon Works Kimitsu Area	66,000	<div><div>19.0114.3</div></div>												1.6~10.5			
	High-frequency induction welding process (4")	Nagoya Works Kansai Works Wakayama Area (OEM by related company*)	72,000	<div><div>38.1114.3</div></div>												1.4~10.0			
	High frequency induction welding process (8")	Kansai Works Wakayama Area (OEM by related company*)	—	<div><div>114.3216.3</div></div>												2.0~14.7			
	High frequency resistance welding process (16")	Nagoya Works	360,000	<div><div>114.3406.4</div></div>												2.1~19.1			
	High frequency resistance welding process (24")	Kyushu Works Oita Area (Hikari Pipe & Tube Div.)	460,000	<div><div>318.5609.6</div></div>												3.0~22.0			
Hot-finish electric resistance-welded pipe (SW)	High-frequency induction welding process (SW)	East Nippon Works Kashima Area	276,000	<div><div>21.7114.3</div></div>												2.0~10.0	<div><div></div><div>Galvanized pipes &amp; tubes</div></div> <div><div></div><div>Pressure steel pipes</div></div> <div><div></div><div>Pipes &amp; tubes for general structures</div></div> <div><div></div><div>Pipes &amp; tubes for civil work (Grooved pipes, dimples pipes)</div></div>		

\* Related company : NIPPON STEEL PIPE CO., LTD.



NIPPON STEEL product standards

Classification of application	Product for application	Main product name	Grade	Applicable production process	Available outside diameter	Main characteristics/applications
Piping	Pipes & tubes for piping	Electric resistance-welded carbon steel tubes for piping	STPY400-E	Electric resistance welding	216.3~609.6mm	Electric resistance-welded carbon steel pipes & tubes used for relatively low-pressure steam, water, gas, air, etc.
Heat transfer	Stainless pipes & tubes for boilers and heat exchangers	Stress corrosion crack-resistant stainless pipes & tubes	YUS®190	Seamless	15.9~57.1mm	Ferrite stainless steel pipes with excellent stress corrosion crack resistance and grain boundary corrosion resistance; these are used for water heaters, etc.
		High-corrosion-resistant stainless pipes & tubes	YUS 170, YUS 270 DP3W, HR3C	Seamless	15.9~139.8mm	Stainless pipes & tubes with excellent corrosion resistance against a chloride environment and against sulfuric acid/organic acid environments; these are suitable for refuse incineration boilers, seawater desalination plants, etc.
	Low-alloy pipes & tubes	Sulfuric acid-resistant pipes & tubes	S-TEN®1, CR1A	Seamless, arc welding, electric resistance welding	21.7~4,000mm	This exhibits excellent sulfuric acid resistance for boilers, heat exchangers, air preheaters, and various exhaust gas pipes, etc., which may cause sulfuric acid dew-point corrosion due to sulfurous acid gas.
	Pipes & tubes for boilers	Superheater tubes Reheater pipes, main steam pipes	HCM2S®, NF616 SUPER304H®	Seamless	6~950A	Pipes & tubes with excellent steam oxidation resistance, high-temperature strength, and weldability; these contribute to the improved efficiency of thermal power generation boilers.
Structure	Outside coated pipes & tubes	Heavy-duty anti-corrosion pipe piles	NS-PAC®	Arc welding, electric resistance welding	φ 400~1,800mm	A urethane elastomer is spray-coated on the outside surface of the pipe & tube. This is effective for problematic potential corroded areas such as the splash zones of pier piles or embankments. It has a better price and a longer life compared to conventional coating, as well as an advantage in eliminating electrolytic protection.
		Heavy-duty anti-corrosion pipe sheet piles	NS-PAC®	Arc welding	φ 400~1,800mm	
	Pipes & tubes for construction structures	Tapered pipes & tubes for construction structures	NS-TPP	Electric resistance welding	Max. φ 318.5mm	Tapered pipes & tubes with excellent freedom of shape; these are used for lighting poles, sign poles, etc.
	Shaped steel for construction structures	Hot extrusion shaped steel for construction structures	NSNO-SM NSNO-COR-TENO NSNO-SUS	Hot extrusion	Max. φ 215mm	Hot extrusion shaped steel supported by a small lot with free design; this is suitable for achieving an architectural space with originality by using these pipes & tubes as a construction material with design capability.
	Pipes & tubes for civic work projects	Grooved pipes, dimples pipes	STK400-MDD SGP-MD, NSDP400N STK400-MD	Hot electric resistance-welding, seamless	48.6~165.2mm	Steel pipes with a large stepped area that increases friction force with the ground and that features large supporting power; these are the most suitable for the application of house foundations or tunnel reinforcements.
	Low-alloy pipes & tubes	Weather-resistant pipes & tubes	COR-TEN® SMA-W	Seamless, arc welding, electric resistance welding	21.7~4,000mm	With the function of alloy elements, a fine and hard oxide layer is formed on the surface. This prevents the further progress of corrosion. The maintenance of the coating is not required. This is suitable for iron towers or buildings.
		Seawater-resistant pipes & tubes	MARILOY®S-400	electric resistance welding	25~600A	Pipes & tubes with excellent weldability and seawater corrosion resistance by adding alloy elements; these are suitable for seawater piping, gas coolers using seawater, cooling piping, and marine structures.
		Weldable high-tensile pipes & tubes	WEL-TEN® SUMISTRONG	Seamless	17.3~426mm	Pipes & tubes with high tensile force, excellent weldability, corrosion resistance, wear resistance, and notch toughness; these are suitable for strong construction members or industrial machines such as crane booms.
	Aluminum-plated pipes	Al sheet steel pipes for automobiles	—	Electric resistance welding	25.4~114.3mm	Pipes & tubes developed for automobile exhaust gas treatment; these are excellent in machine processing and heat resistance at high-temperature zones.
	Original pipes for drawings/joints	Material pipes	KSKM, KSHT, KSBE, KSS, KEG, KEH	Seamless, electric resistance welding	21.7~609.6mm	Pipes used for automobiles or industrial machines through the cold processing of a drawing tube or joint (elbow); various production methods and steel types for each application are available.
	Composite pipes	Composite pipes for automobile noise prevention	NSD	Electric resistance welding	42.7~101.6mm	A glass cloth is inserted in between the double pipes. This is used for exhaust tubes to reduce noise from the automobile exhaust system.
	ZINKOTE steel pipes	Exhaust pipes for automobiles	—	Electric resistance welding	21.7~114.3mm	This is suitable for low-temperature exhaust tubes in automobile exhaust gas systems.
	Stainless pipes & tubes for mechanical structures	Heat-resistant stainless pipes & tubes for automobile exhaust gas	YUS®731 YUS 490D, 180, 180S YUS 410W, 436S	Seamless, electric resistance welding	27.2~139.8mm	Pipes & tubes developed for automobile exhaust gas treatment; austenite type (YUS 731) with excellent heat resistance and oxidation resistance at a high-temperature zone and ferrite type (YUS 490D, 180, 436S) are available. Also, stainless Al sheet steel pipes that have aluminum plating for salt damage protection are available (YUS 490D Al sheet, etc.).
Oil & Gas	Pipes & tubes for drilling	Pipes & tubes for drilling	STMR-M	Seamless	17.3~130mm	Pipes & tubes with the strength and ductility of JIS and ASTM-R80 or more to meet increasing drilling depth; these are suitable for very deep drilling.
	Pipes & tubes for oil wells	Tubing, casing	SM® series NT series	Seamless, electric resistance welding	60.3~406.4mm 406.4~508mm	Oil well pipes for the development of oil, natural gas, and geothermal heat with excellent characteristics regarding strength, crush resistance, and low-temperature toughness.

\* COR-TEN is the registered trademark of United States Steel Corporation in the United States, Japan, etc. We are allowed to use the trademark.



## Applications Pipes & tubes for piping



Inter city pipeline



Various pipes in condominiums: ELP®-NTA (gas, water supply, water drain, hot water supply, etc.)



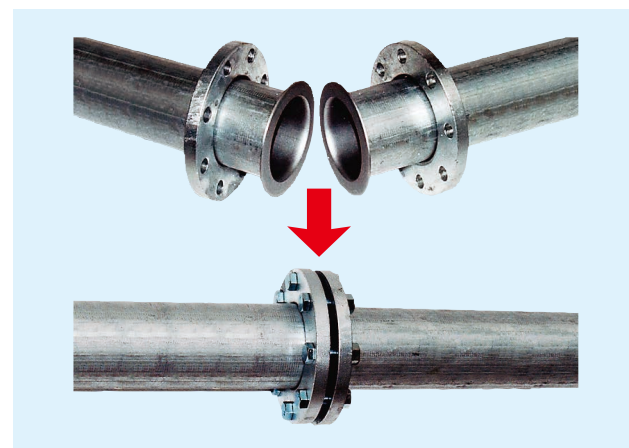
Offshore pipeline: NS-PEL® (green)



Fire-extinguishing pipe

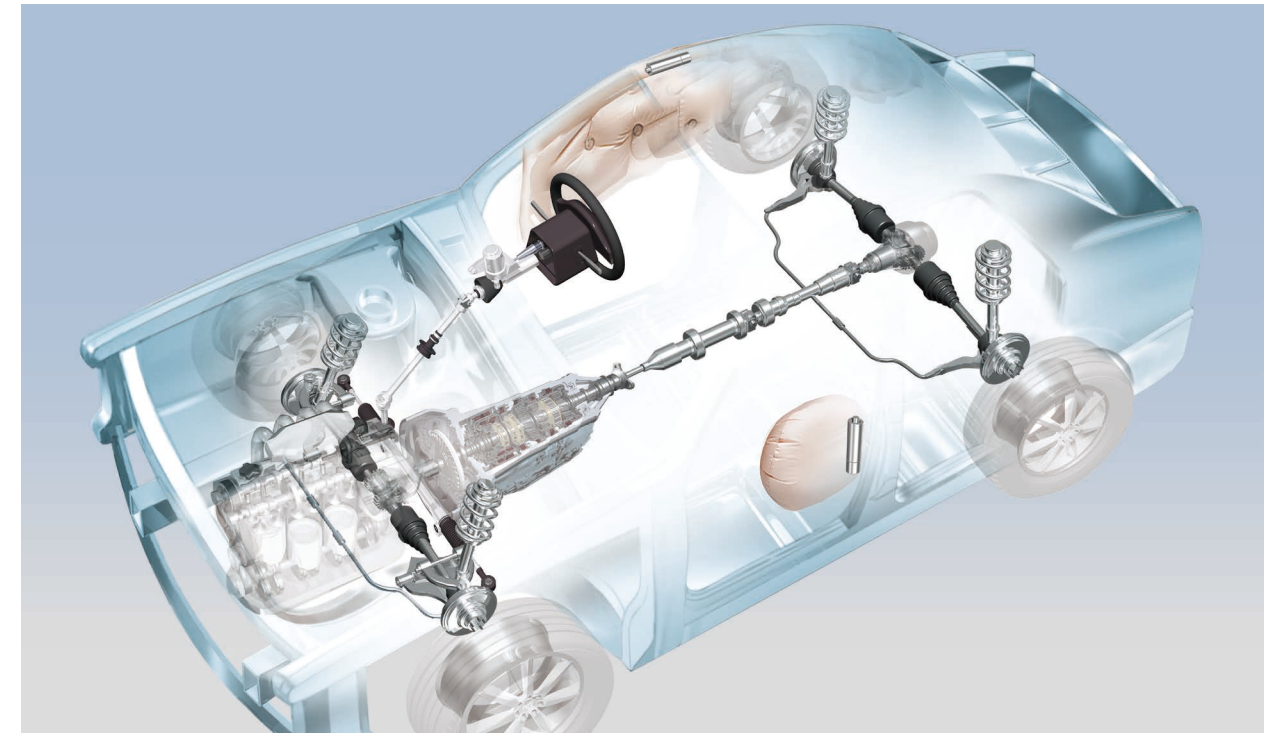


Regional cooling conduit



Flare joints of equipment pipes in buildings

## Pipes & tubes for mechanical structures



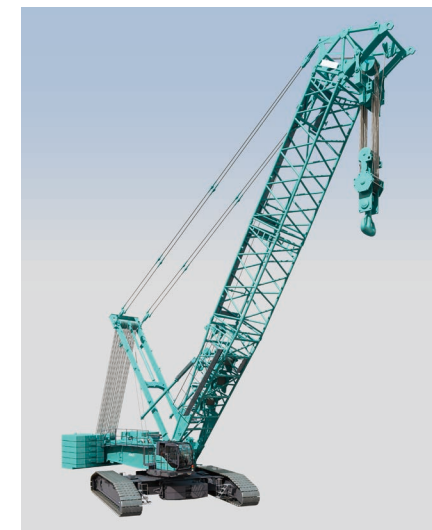
Pipes & tubes for automobiles



Printing roll



Vibration-absorbing cylinder



Pipes & tubes for construction machines (crane booms, lattices)



Pipes & tubes for construction machines (cylinders, bushings)



## Pipes & tubes for marine structures and general structures



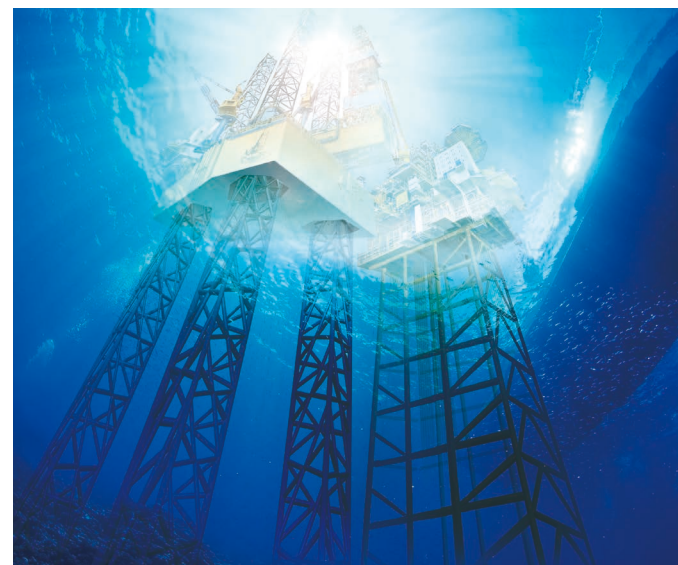
Pipe & tube columns for high-rise buildings



Pipe & tube columns for high-rise buildings



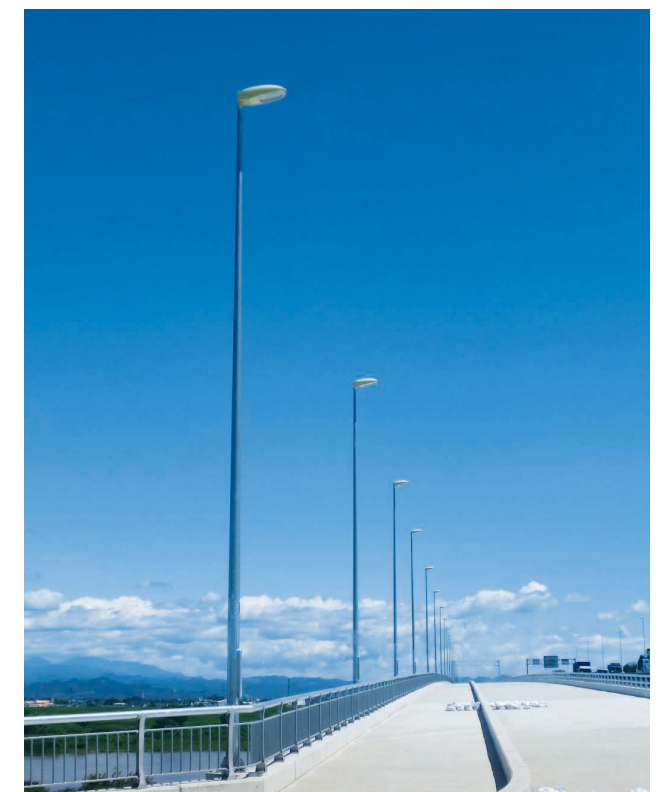
Torii



Offshore platform



Transmission tower



Lighting pole (tapered pipes & tubes)



Dimple pipe for solar panel stand



Stadium roof



Truss roof



Road bridge post



## Pipe piles/pipe sheet piles



Pipe sheet piles for earth-retaining structures



Heavy-duty coating pipe pile



Pipe piles for large offshore platforms

## Pipes & tubes for shipbuilding



Marine steel pipes



Ship's piping

## Pipes & tubes for plants



Geothermal steam pipe



LNG pipe



LNG pipe



In-plant gas piping



Petrochemical plant pipe



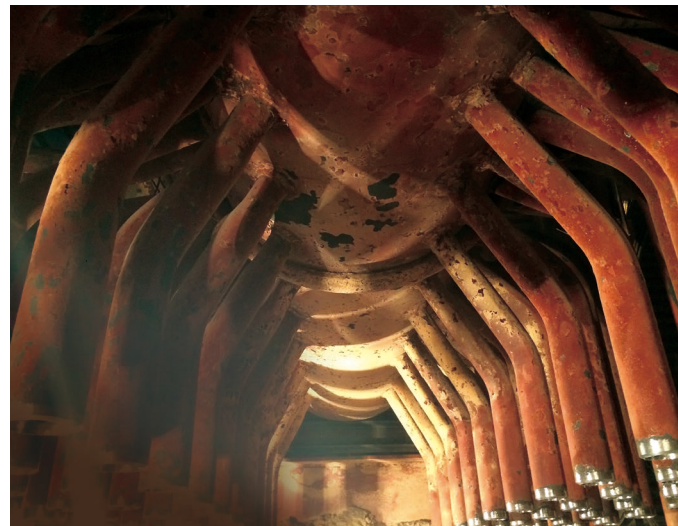
## Pipes & tubes for boilers/heat exchangers



Appearance of thermal power generation boilers



Boiler tubes



Superheater tubes and main steam pipes



Inside view of a thermal power generation boiler under construction

## Pipes & tubes for high pressure hydrogen

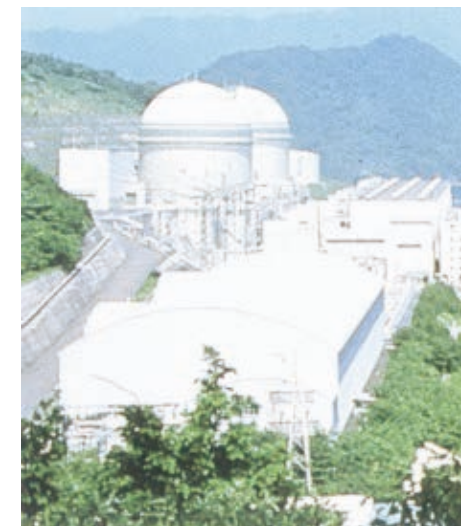


Product sample



Hydrogen station piping

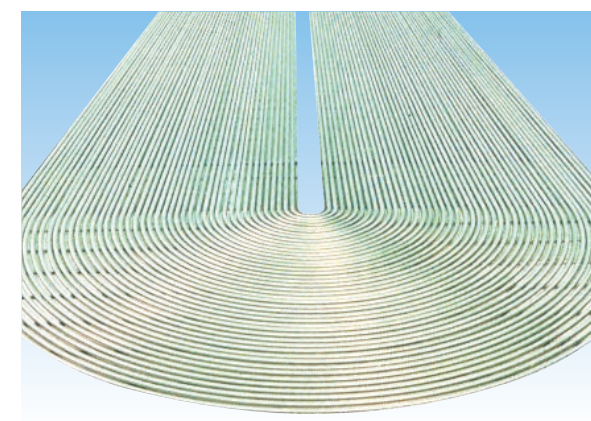
## Pipes & tubes for the chemical industry/nuclear power plant



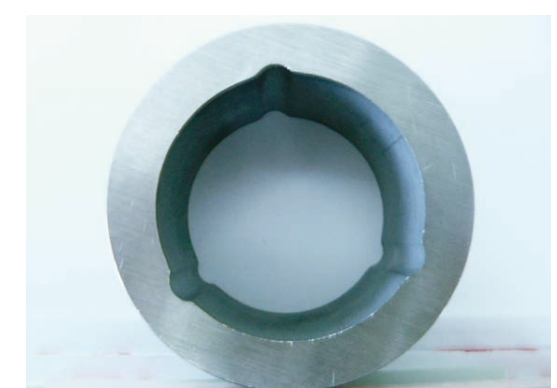
Nuclear power plant



Stick elbow



Heat exchanger tubes for steam generators (SG)



Hollow piston



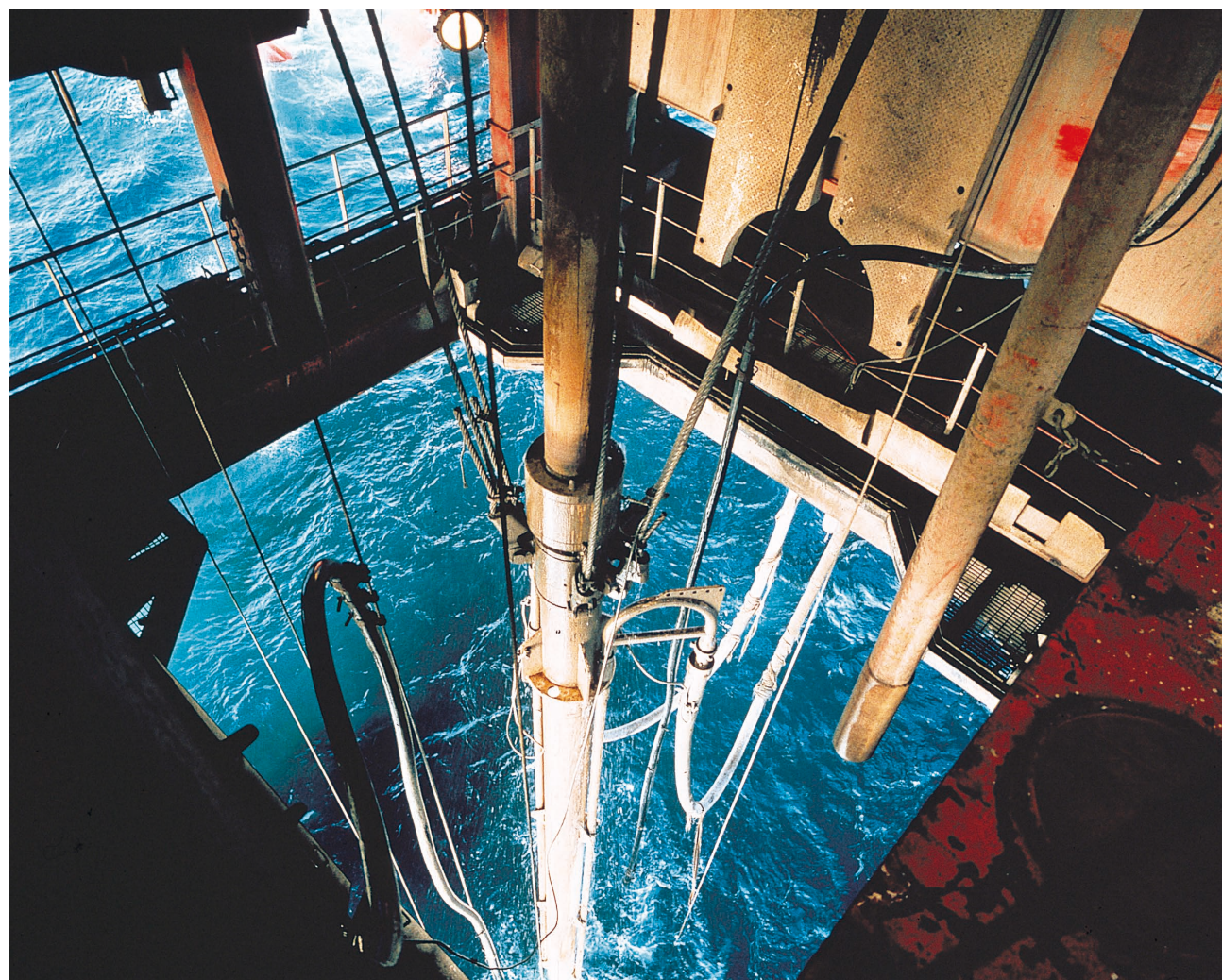
## Oil & Gas Casing & Tubing/Line pipe (offshore)



Offshore line pipes for receiving crude oil



Seabed oil/gas production equipment



Offshore production well



Offshore plat form



Installation of a pipeline



Casing



## Production process Seamless pipes & tubes (Mannesmann process)

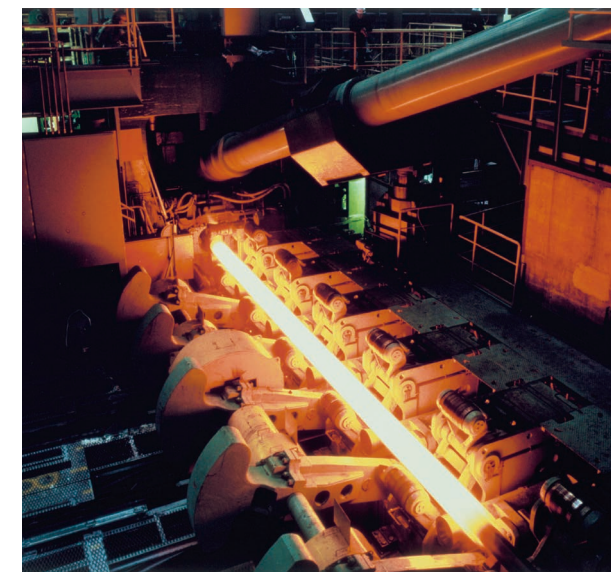
### Hot process

#### ◎ Mandrel mill process

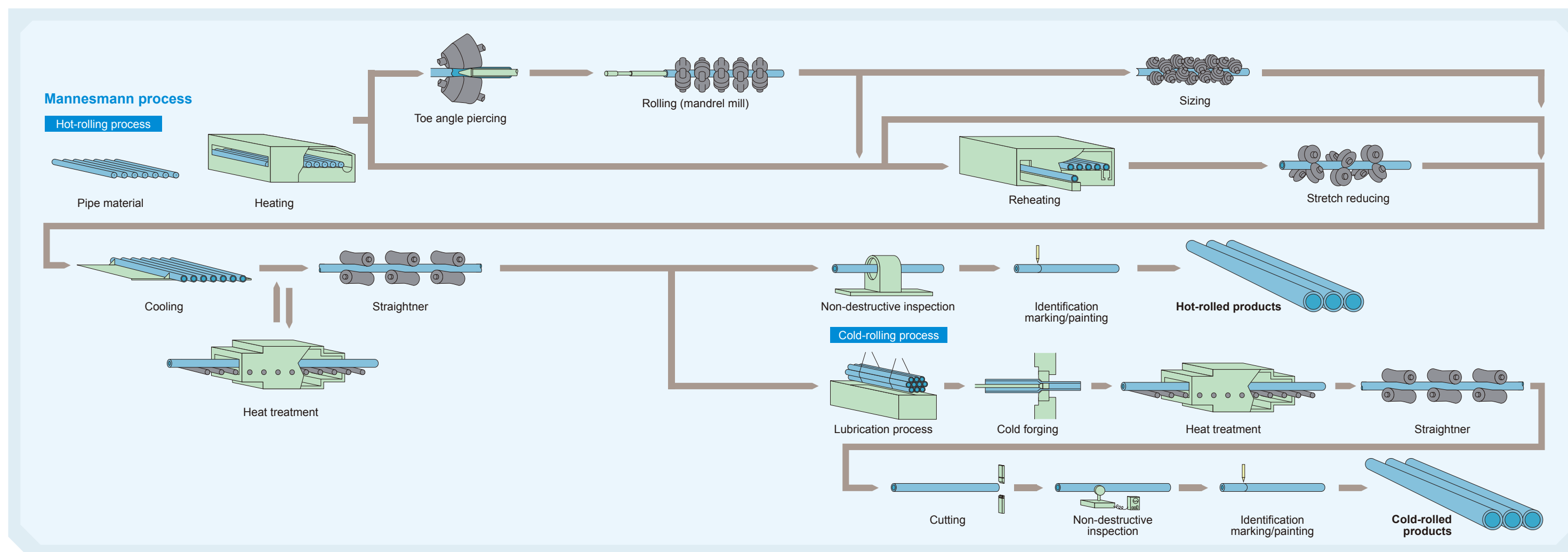
After heating the round steel billet, hollow pipes are made with a piercer with toe angle. Then, elongating rolling is performed by a mandrel mill, which consists of a multi-step continuous rolling machine, to thereby produce the mother pipe. This mother pipe is reheated and is then finished by stretch reducing mill to a specified outside diameter and thickness for the final product.

#### ◎ Cold-rolling process

When higher dimensional accuracy and mechanical properties are required compared to pipes produced by the hot-rolling process, cold drawing subsequent to hot rolling is performed for the final product.



Piercer with toe angle



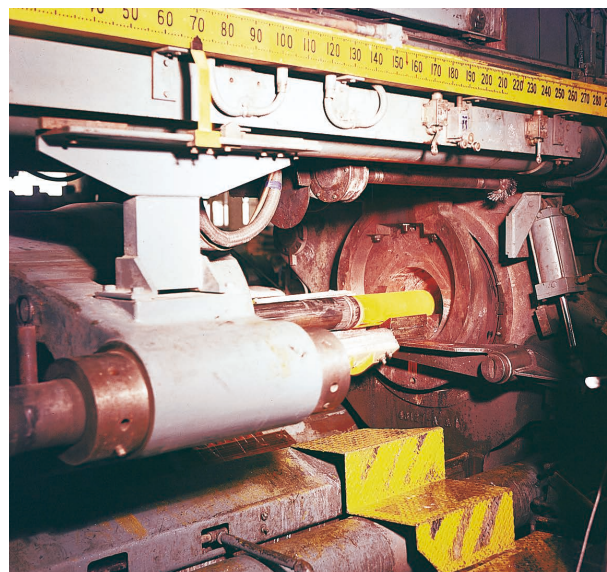


## Seamless pipe pipes &amp; tubes (hot extrusion · hot hollow forged)

### Hot extrusion process (Ugine-Sejournet process)

Hot extrusion is a process in which heated billets are inserted into the cylinder, known as a "container," and extruded with a hydraulic press. The specified outside diameter and thickness can be obtained with a die and mandrel. For pipes requiring higher dimensional accuracy and a surface finish, they are finished through cold rolling for the final product.

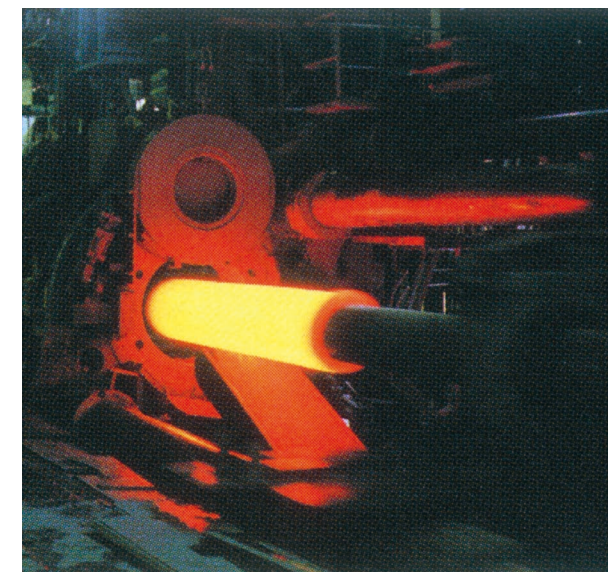
With this process, fin pipes & tubes or various shaped steel other than steel pipes & tubes can be produced.



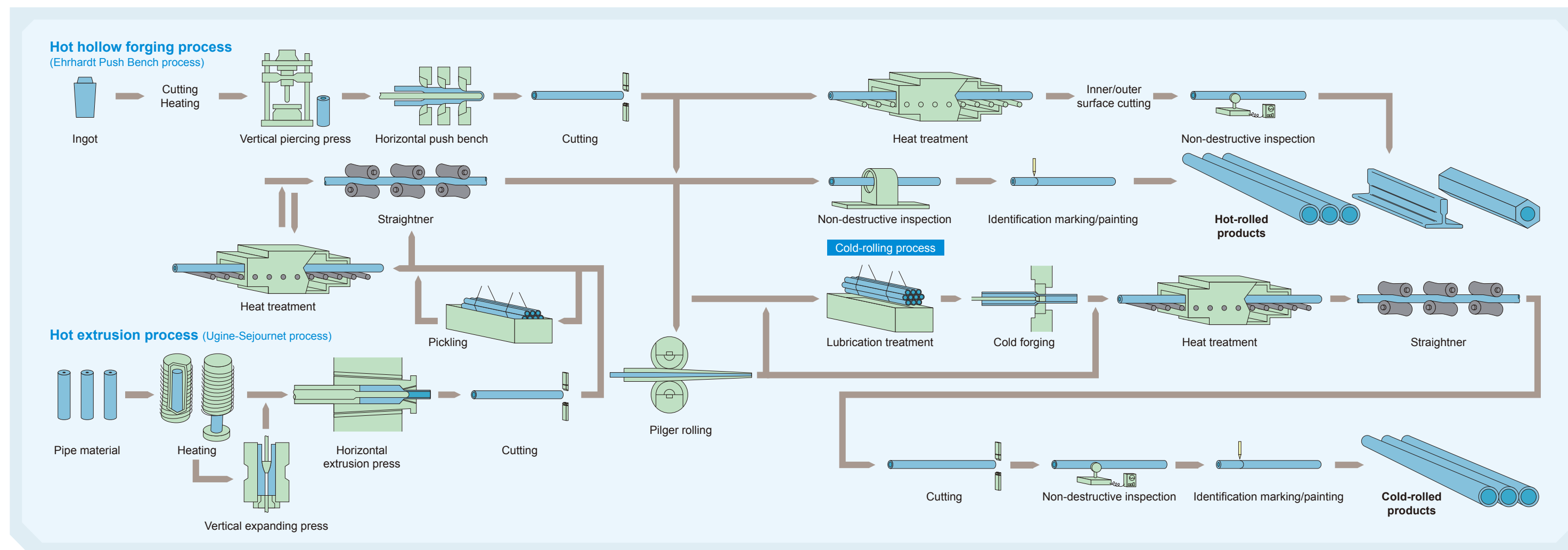
Hot extrusion machine

### Hot hollow forging process (Ehrhardt Push Bench process)

Hot forging is a process for producing large-diameter thick pipes that are used in severe environments, such as main steam pipes at power plants.



Horizontal push bench machine

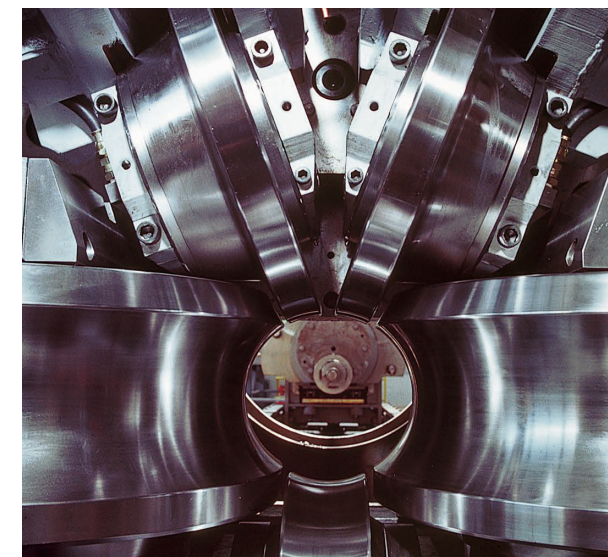




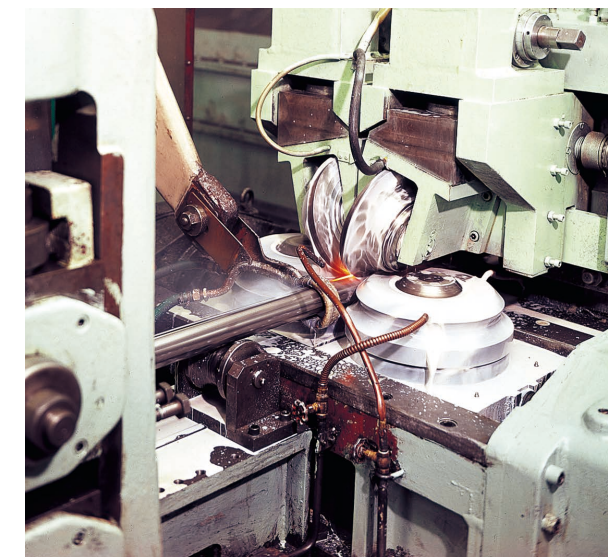
## Electric resistance-welded pipes & tubes

Electric resistance-welded pipes & tubes are produced by forming the coil into a cylindrical form with top/bottom and left/right forming rolls while continuously rewinding the coil to be electric resistance welded.

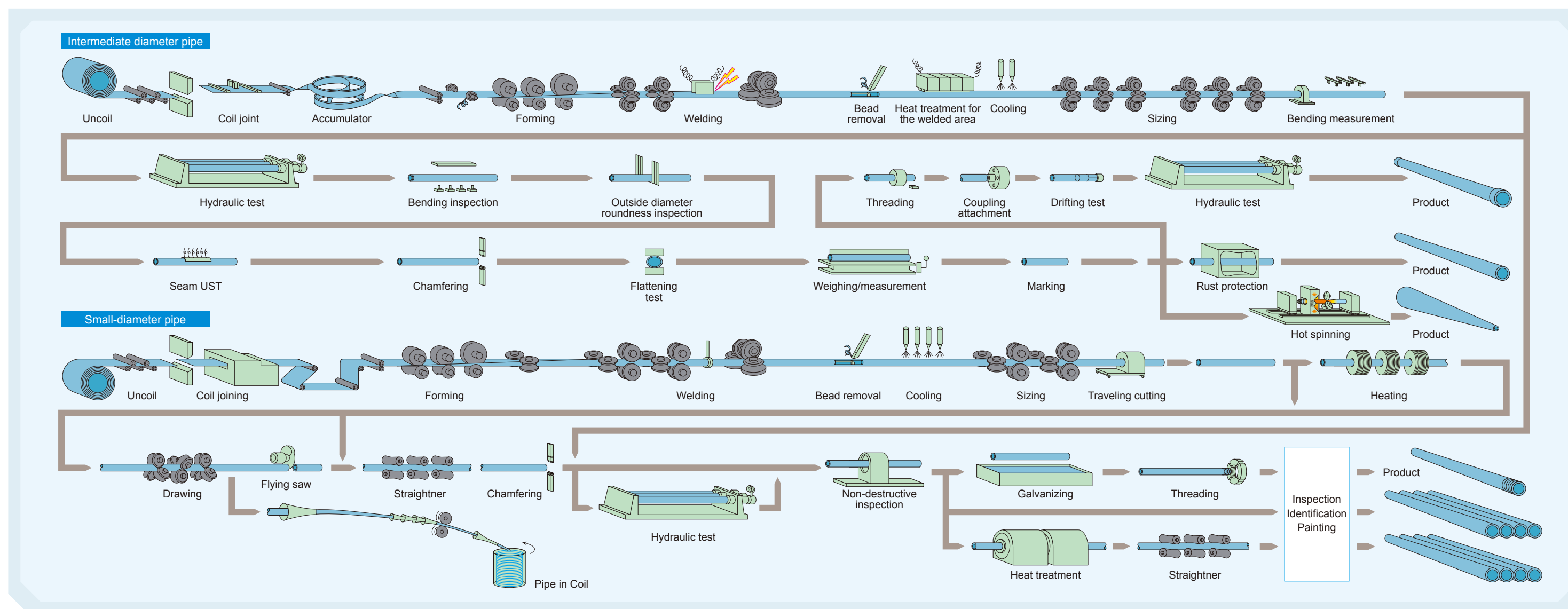
For a hot-finish electric resistance-welded pipe & tube (SR pipe), a long-size electric resistance welded pipe & tube is heated in a continuous heating furnace and drawn and finished by a stretch reducer. It is used to produce small-diameter pipes. Furthermore, NIPPON STEEL produces PIC (Pipe in Coil) in which the pipe is formed into a coil as a long-size pipe, in particular. Heat exchanger tubes by cold drawing are also produced.



Squeeze roll  
(intermediate diameter pipe)



High-frequency induction electric resistance welding machine  
(small-diameter pipe)



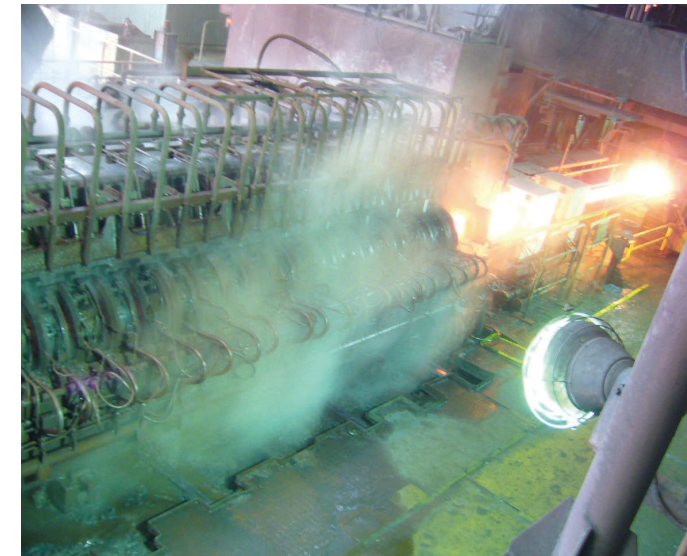


## Hot electric resistance-welded pipes & tubes

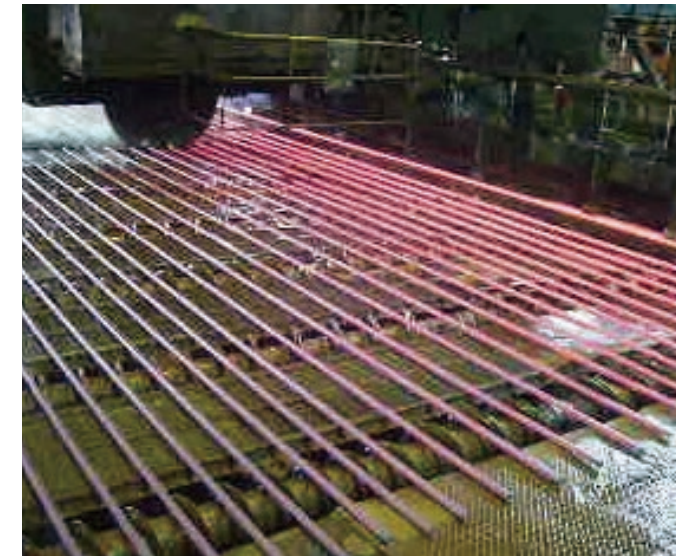
Hot electric resistance-welded (SW) pipes & tubes are produced by electric resistant welding the heated coil and finishing it to a specified size with a reducing mill.



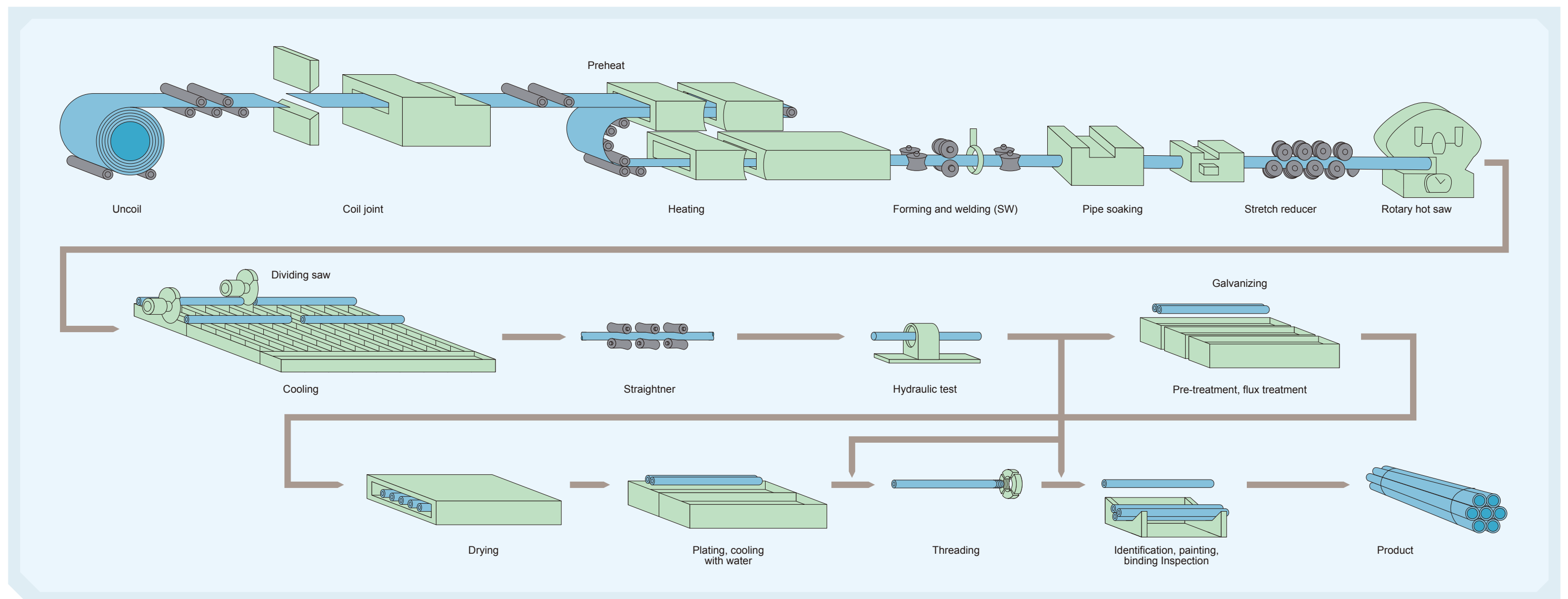
Forming and welding machine for hot electric resistance welding



Stretch reducer



Cooling floor

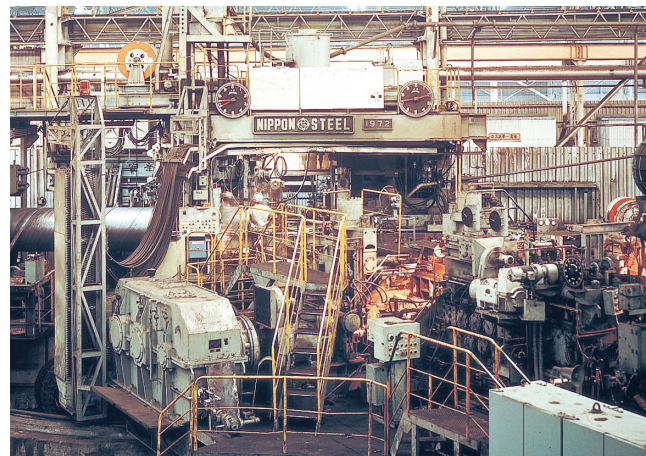




## Arc-welded pipes & tubes

### SAWH pipe (by Spiral Welded Pipe)

Spiral welded pipes are produced by bending and forming a coil into a spiral with a forming roll while continuously rewinding the coil, and by welding the joints from the inside and outside.



Spiral pipe production equipment

## Secondary machining

NIPPON STEEL performs various secondary machining on the produced pipes & tubes according to the order specifications or applications.

### Pipes & tubes for piping

- Internal/External coatings  
Internal coatings with epoxy paints, powdered polyethylene, unplasticized polyvinyl chloride, etc.  
External coatings with 3-layer polyethylene, 3-layer polypropylene, fusion bonded epoxy, polyurethane, various paints, etc.
- Threading
- Bevel machining
- Joint machining
- Production of irregular shape pipes

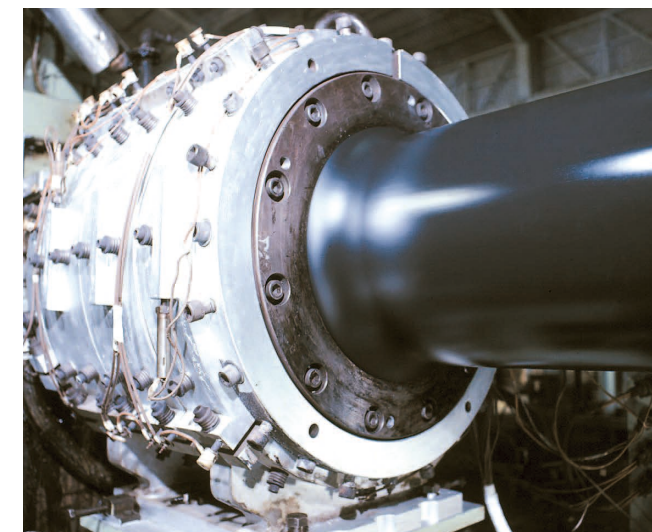
### Pipe piles and pipe sheet piles

- Various piles, sheet piles, and rust prevention

Remarks: We will introduce companies for swaging, expanding, bending, cutting to length, etc.

### Pipes & tubes for boilers and heat exchangers

- U bending, aluminum plating, rifle machining, drawing



External polyethylene coating: NS-PEL®

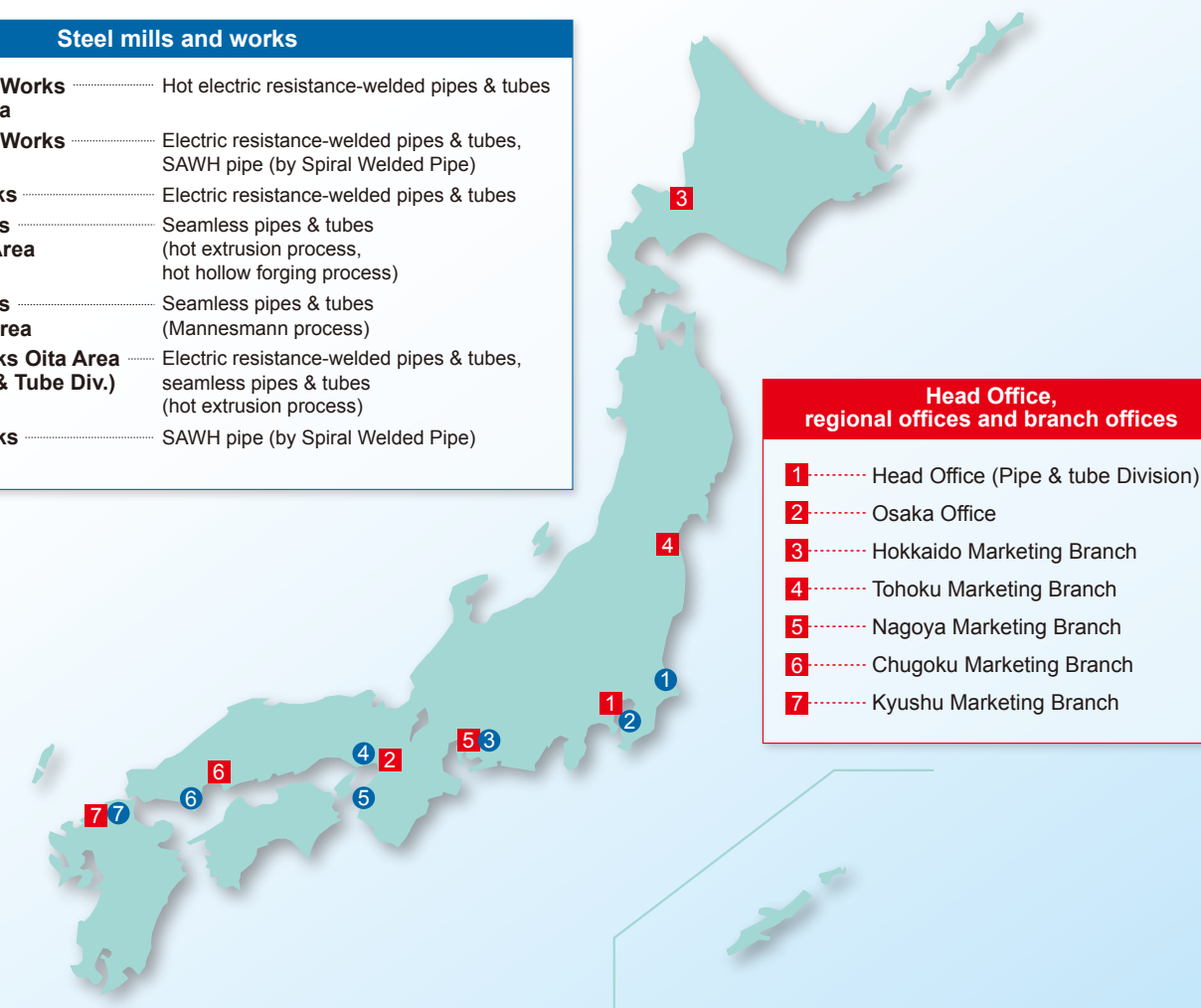
## Pipe & tube plant of NIPPON STEEL

### Steel mills and works

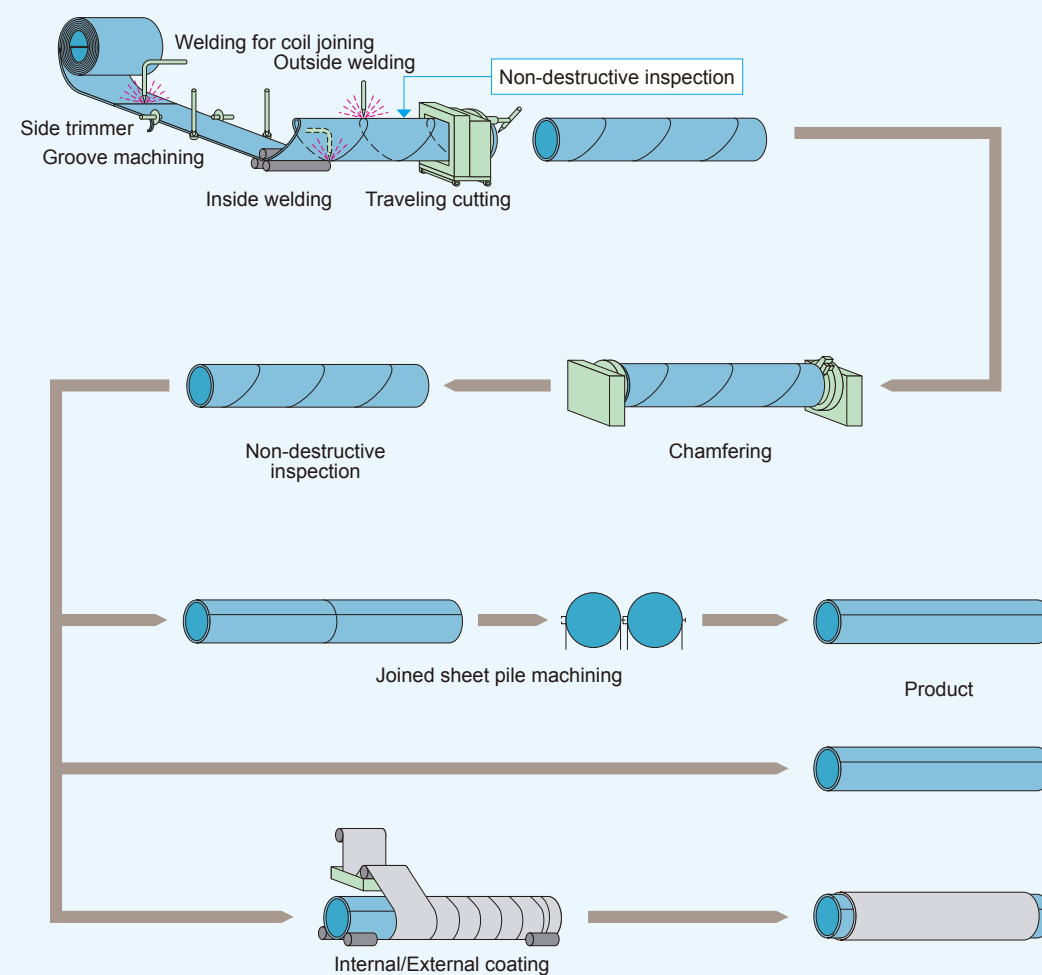
- |                                                       |                                                                                                |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------|
| ① East Nippon Works<br>Kashima Area                   | Hot electric resistance-welded pipes & tubes                                                   |
| ② East Nippon Works<br>Kimitsu Area                   | Electric resistance-welded pipes & tubes,<br>SAWH pipe (by Spiral Welded Pipe)                 |
| ③ Nagoya Works                                        | Electric resistance-welded pipes & tubes                                                       |
| ④ Kansai Works<br>Amagasaki Area                      | Seamless pipes & tubes<br>(hot extrusion process,<br>hot hollow forging process)               |
| ⑤ Kansai Works<br>Wakayama Area                       | Seamless pipes & tubes<br>(Mannesmann process)                                                 |
| ⑥ Kyushu Works Oita Area<br>(Hikari Pipe & Tube Div.) | Electric resistance-welded pipes & tubes,<br>seamless pipes & tubes<br>(hot extrusion process) |
| ⑦ Kyushu Works<br>Yawata Area                         | SAWH pipe (by Spiral Welded Pipe)                                                              |

### Head Office, regional offices and branch offices

- |   |                                    |
|---|------------------------------------|
| ① | Head Office (Pipe & tube Division) |
| ② | Osaka Office                       |
| ③ | Hokkaido Marketing Branch          |
| ④ | Tohoku Marketing Branch            |
| ⑤ | Nagoya Marketing Branch            |
| ⑥ | Chugoku Marketing Branch           |
| ⑦ | Kyushu Marketing Branch            |



### Spiral-welded pipes





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