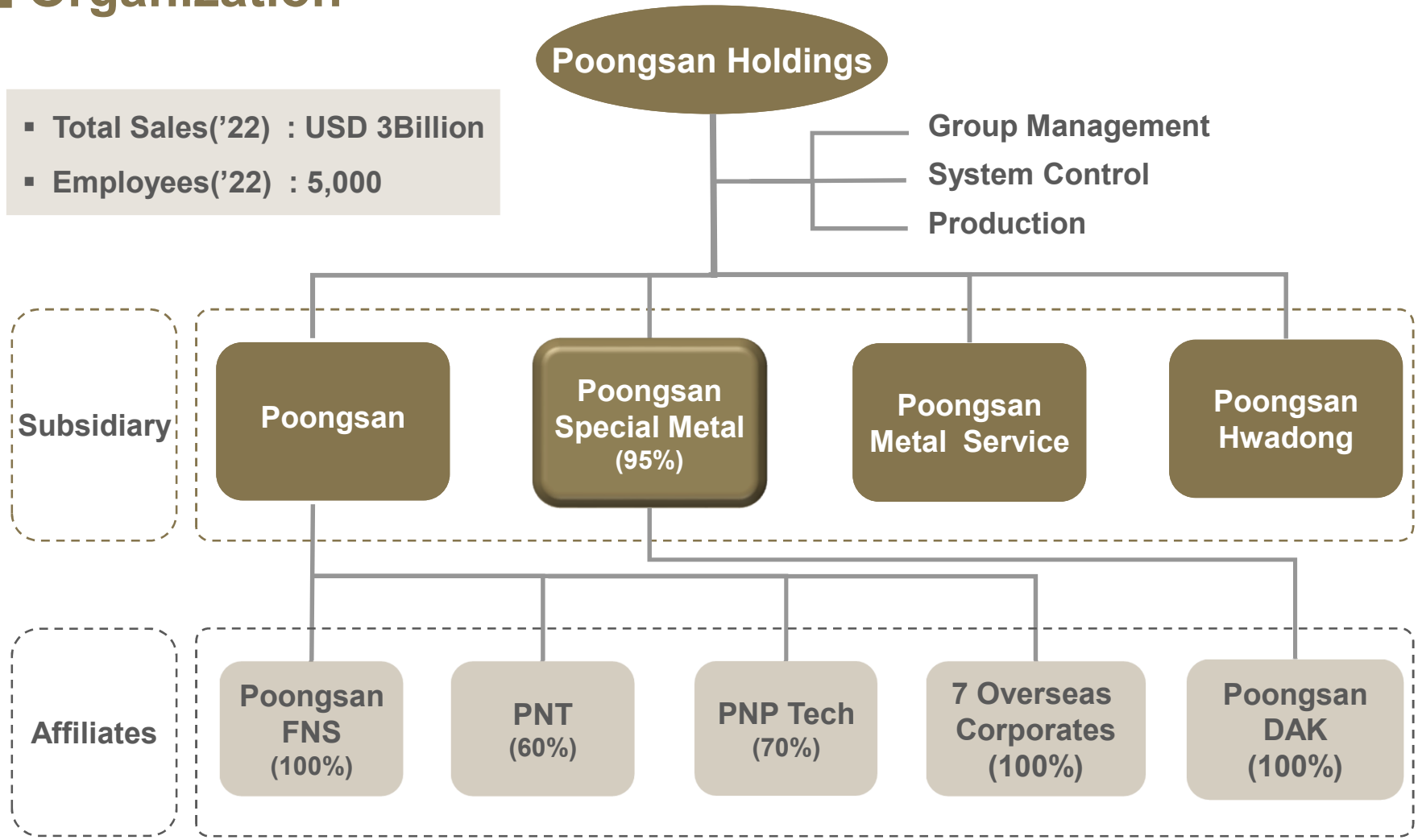
Introduction of

POONGSAN SPECIAL METAL CORP.

1. COMPANY OVERVIEW

■ Organization

- Total Sales('22) : USD 3Billion
- Employees('22) : 5,000



- 4 subsidiaries, 11 affiliates

2.1 AFFILIATES - KOREA

POONGSAN HOLDINGS (Head Office)

POONGSAN SPECIAL METAL
Stainless Steel Strips, High Ni Alloy, Precious Coin Blanks

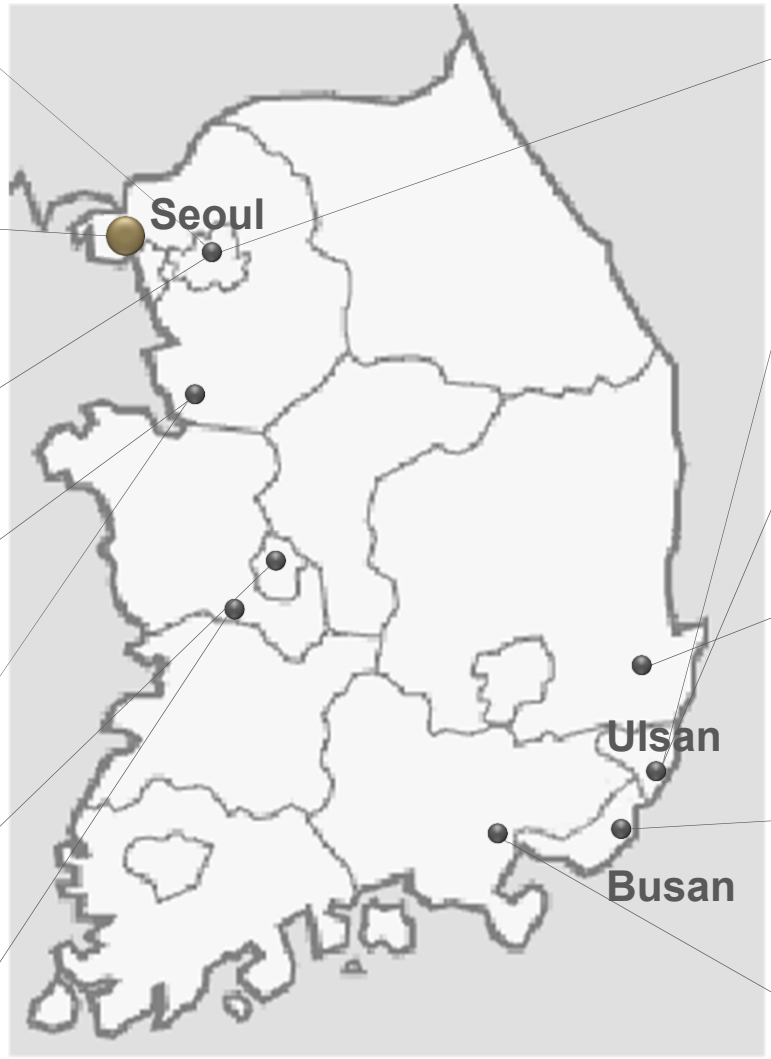
POONGSAN HWADONG
Commemorative Coins

POONGSAN METAL SERVICE
Slitting & Logistics services

POONGSAN DAK
Ni-plated Copper Strips, Plating

R&D Institute for Defense

POONGSAN FNS
Fuse Products & Sensors for Defense Sectors



POONGSAN (Head Office)

Ulsan Plant
Copper & Copper Alloy Sheets & strips, rods & wires, coin blanks
R&D Institute for Materials

PNT
Tin-plated Copper Alloy Strips

Angang Plant
Ammunitions, Components Precision Forgings

Busan Plant
Ammunitions & Sporting Ammunitions, Machinery & Equipment

Changwon Plant
Multi Gauge

2.2 AFFILIATES - GLOBAL

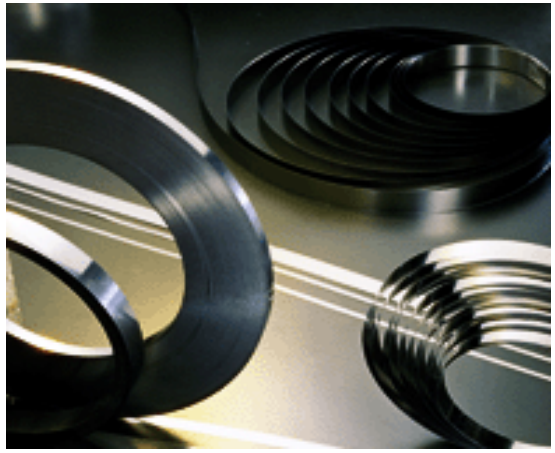
POONGSAN'S GLOBAL NETWORK

*SSC (Slitting Service Center) : China(Shanghai, Lianyungang, Shenzhen), Malaysia, Japan

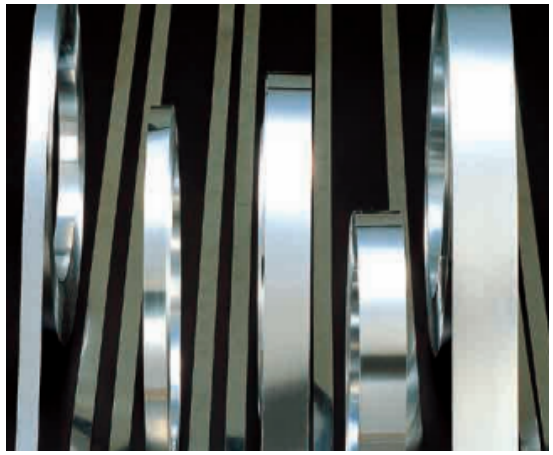
4. History

1	Founded Poongsan Metal Industry Co.	1968. 10	
2	Established Bupyung Factory Started producing rolled products	1969. 12	
3	Founded Poongsan Special Metal Industry Co. (Joint venture with Nippon Mining Group) Started producing stainless steel strips	1978. 06	1991. 06
4	Spun off into Poongsan Special Metal from Poongsan Holdings	2008. 07	
5	Relocated to the new Ganghwa factory Installed high precision rolling machine to produce Ultra thin products(10㎛)	2019. 06	~

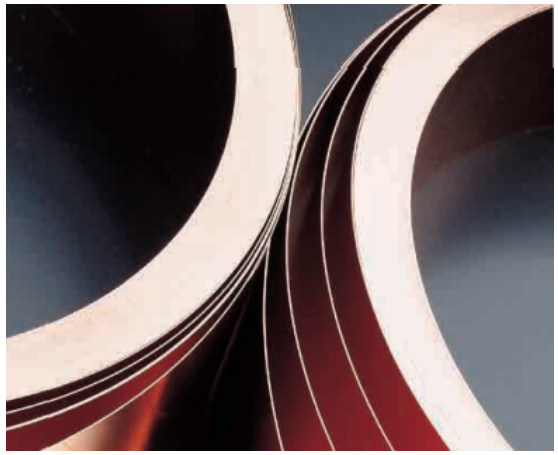
5. Major Products



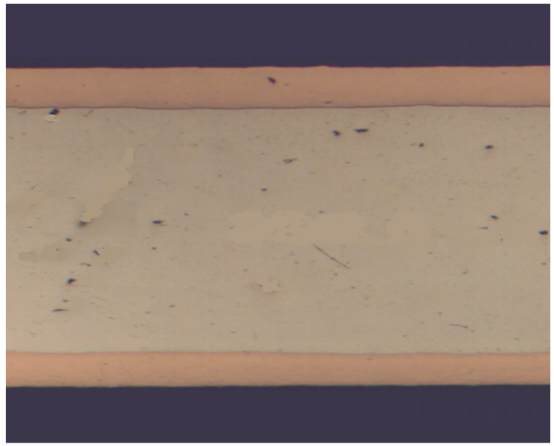
Stainless Steels



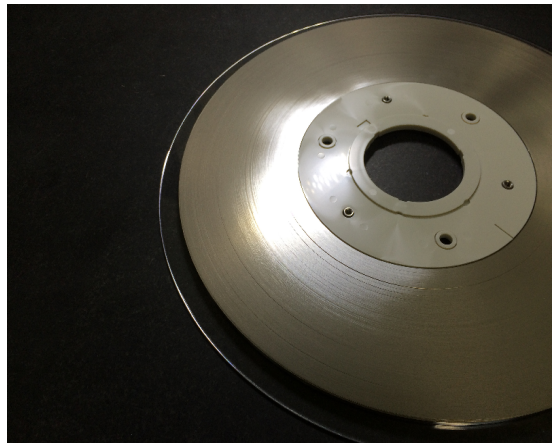
High Nickel Alloys



Copper & Copper Alloys



Clad Metals



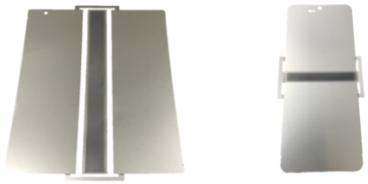
Materials for LIBs

Coins & Medals

Features of our products for Mobile applications

Thin & Formable

Light & Foldable



Strong & Non-Magnetic

Conductive Thermally & Electrically

SD/SIM Metal Shell

STS, Plated STS

Camera Module

STS, Cu alloy

Li-ion Battery

Ni, Cu, Clad, STS

Shield Case

Cu alloy, Clad

Display Back Sheet

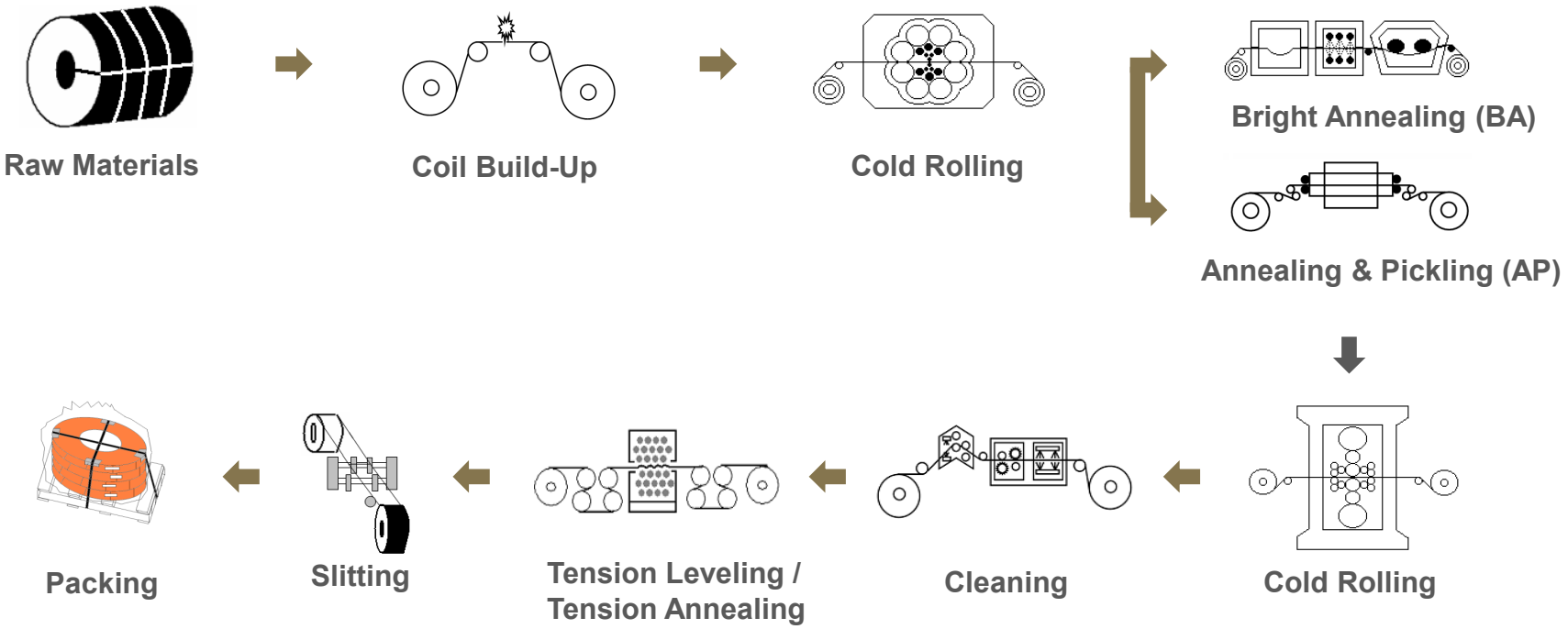
STS, Ti, Clad

Vapor Chamber

STS, Cu alloy

Stainless Steels and Nonferrous Alloy Strips

■ Manufacturing Process

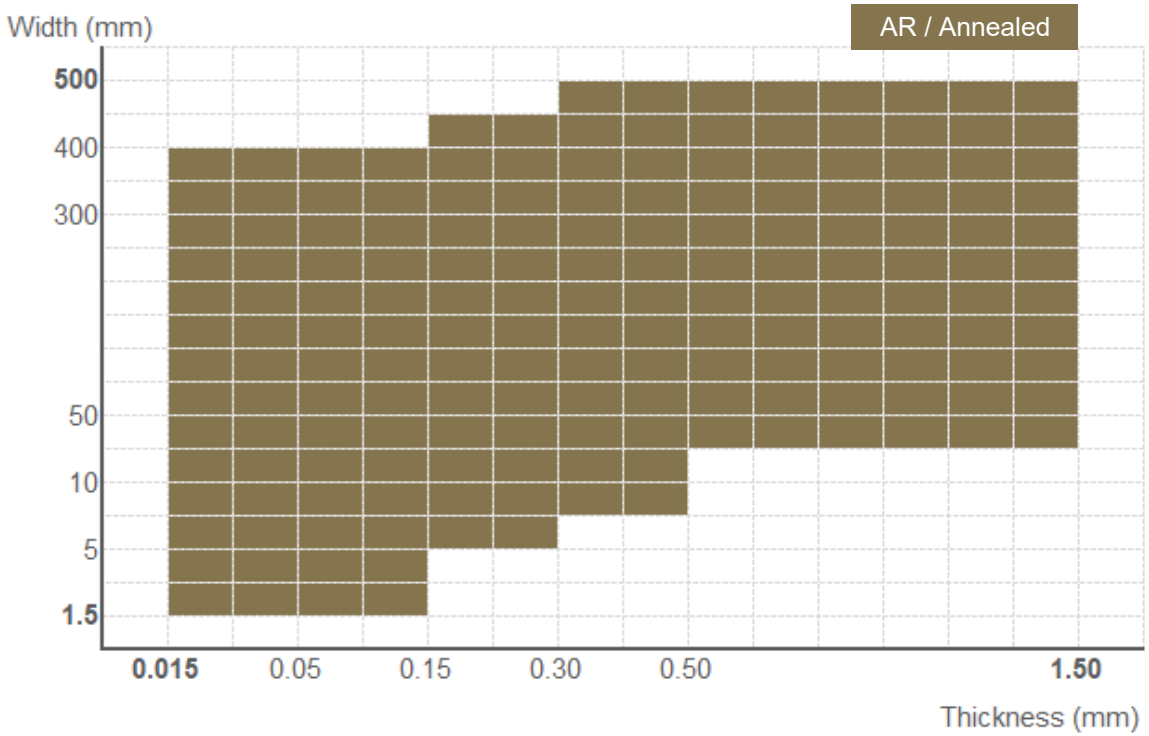


Specification of Facilities

● Cold Rolling Mill	● Annealing Furnace	● Slitter
Reversing 20 High Cold Rolling Mill x 3	Horizontal Type x 4 (BA 3, AP 1)	Wide width Slitter x 5
Reversing 18 High Cold Rolling Mill x 1	Tension Annealing Type x 1	Narrow width Slitter x 2
Reversing 12 High Cold Rolling Mill x 2	Vacuum Furnace x 3	

Stainless Steels and Nonferrous Alloy Strips

Available Sizes



Size Tolerance

Thickness (mm)	Special Tolerance
≤ 0.15	± 5%
0.15 < t ≤ 0.25	± 4%
0.25 < t ≤ 0.60	± 3%
0.60 < t ≤ 1.50	± 2%

Capacity

- **20,000 Ton/yr (Avg. thickness 0.25mm)**

Precision Stainless Steel Strips

Chemical Composition

(wt%)

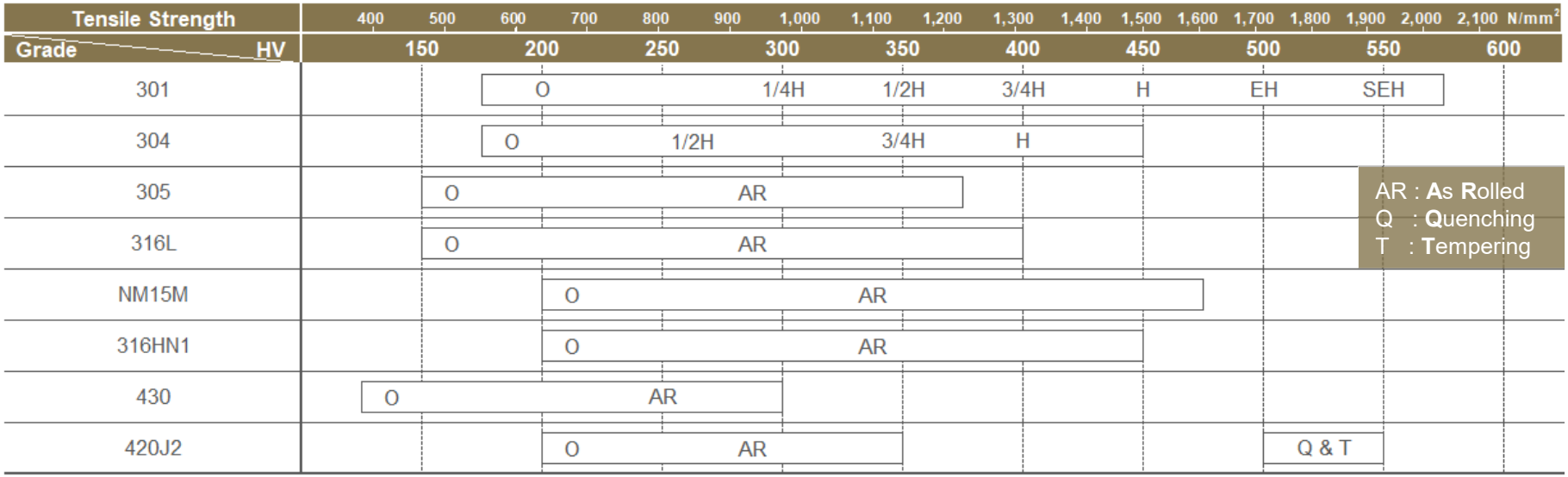
Grade		C	Si	Mn	P	S	Cr	Ni	N	Other
Austenite	STS301	0.15↓	1.00↓	2.00↓	0.045↓	0.030↓	16.0~18.0	6.0~8.0	-	-
	STS304	0.08↓	1.00↓	2.00↓	0.045↓	0.030↓	18.0~20.0	8.0~10.5	-	-
	STS305	0.12↓	1.00↓	2.00↓	0.045↓	0.030↓	17.0~19.0	10.5~13.0	-	-
	STS316L	0.03↓	1.00↓	2.00↓	0.045↓	0.030↓	16.0~18.0	12.0~15.0	-	Mo 2.0~3.0
	STS316HN1	0.03↓	1.00↓	2.00↓	0.045↓	0.015↓	19.5~22.0	8.0~11.0	0.14~0.25	Mo 0.5~1.5
	NM15M*1	0.04~0.09	0.90↓	14.0~15.0	0.045↓	0.015↓	16.5~17.5	4.0~4.6	0.30~0.35	-
Ferrite	STS430	0.12↓	0.75↓	1.00↓	0.040↓	0.030↓	16.0~18.0	-	-	-
Martensite	STS420J2	0.26~0.40	1.00↓	1.00↓	0.040↓	0.030↓	12.0~14.0	-	-	-

Non Magnetic grade

● **Other alloys are also available (According to KS, JIS, ASTM Standard)**

*1 : Nippon Yakin Grade

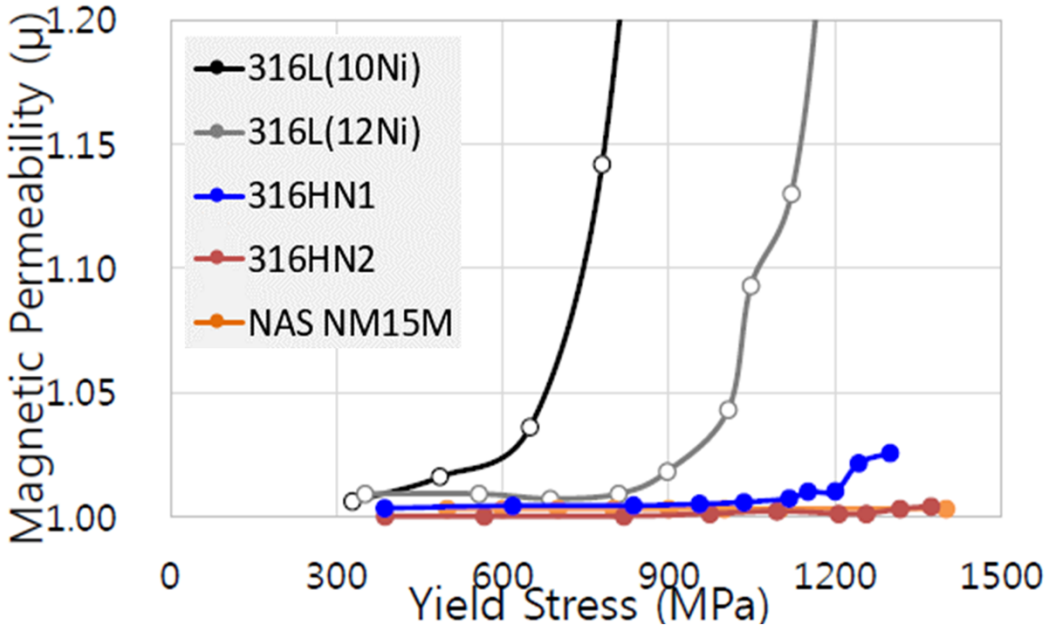
Mechanical Properties



POONGSAN SPECAIL METAL

Precision Stainless Steel Strips

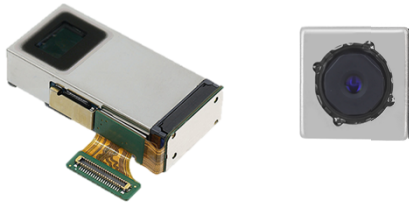
Magnetic Permeability of Non-Magnetic STS



Precision Stainless Steel Strips

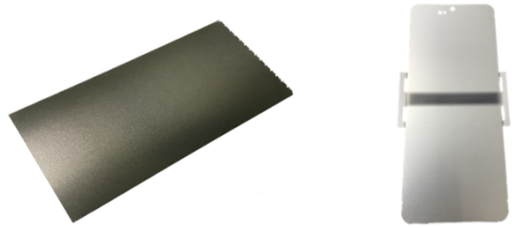
■ Application

● Camera Module



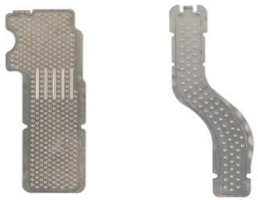
Size	NM15M, 430-AR 0.10~0.15mm
Application	Mobile devices
Quality Control	Dimension, Magnetic p'ty

● Metal Back Sheet



Size	316L, 316HN1-AR 0.07~0.30mm
Application	Mobile devices
Quality Control	Flatness, Low μ

● Vapor Chamber



Size	316L-BA/AR 0.03~0.05mm
Application	Mobile devices
Quality Control	Formability, Flatness

● Connectors

Size	316L, 304-BA/AR 0.15~0.30mm
Application	Mobile devices
Quality Control	Surface, Dimension

Precision Stainless Steel Strips

■ Application

● Metal Gasket

Size	301-AR 0.10~0.25mm
Application	Automotive engines
Quality Control	Flatness, Strength

● Brake Pad Spring

Size	301-AR 0.40~0.50mm
Application	Automotive brakes
Quality Control	Strength, Roughness

● Molding

Size	430-BA 0.40~0.50mm
Application	Automotive exteriors
Quality Control	Roughness, Brightness

● EGR Coolers, ABS Module

Size	316L, 444-BA 0.15~0.40mm
Application	Automotive

Nonferrous Alloys

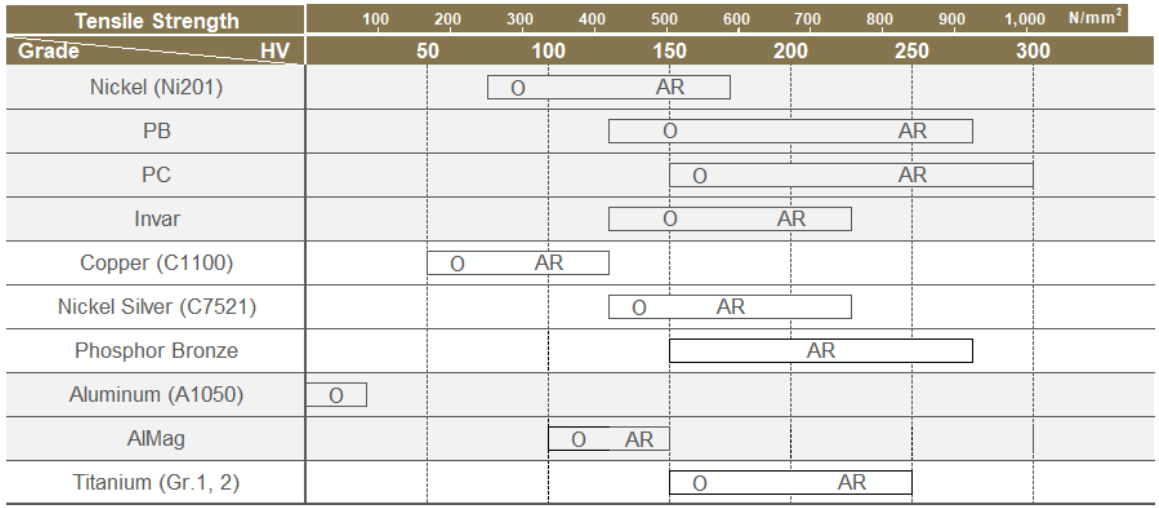
Chemical Composition

(wt%)

Material	Ni	Cu	Al	C	Si	Fe	Mn	P	Zn	Etc.
Nickel (Ni201)	99.0↑	0.20↓	-	0.02↓	0.30↓	0.40↓	0.30↓	-	-	S 0.01↓
PB	47.0~49.0	0.30↓	-	0.05↓	0.50↓	Bal.	0.80↓	-	-	-
PC	75.0~80.0	1.0~6.0	-	0.05↓	0.50↓	Bal.	1.50↓	-	-	Mo 3.0~5.0
Invar	35.5~36.5	-	-	0.05↓	0.30↓	Bal.	0.60↓	-	-	-
Copper (C1100)	-	99.9↑	-	-	-	-	-	-	-	-
Nickel Silver (C7521)	16.5~19.5	62.0~66.0	-	-	-	0.25	0~0.5↓	-	Bal.	Pb 0.03↓
P-Bronze (C5194)	-	Bal.	-	-	-	0.10↓	-	0.03~0.35	0.20↓	Sn 7.0~9.0
Aluminum (A1050)	-	0.05↓	99.5↑	-	0.25↓	0.40↓	0.05↓	-	0.05↓	Ti 0.03↓
AlMag	-	0.10↓	Bal.	-	0.25↓	0.40↓	0.10↓	-	0.10↓	Mg 5.8~6.4

Material		Ti	O	N	H	C	Fe	Al	V	Pd	Etc.
Titanium	Gr.1	Bal.	0.18↓	0.03↓	0.015↓	0.08↓	0.20↓	-	-	-	-
	Gr.2	Bal.	0.25↓	0.03↓	0.015↓	0.08↓	0.30↓	-	-	-	-

Mechanical Properties



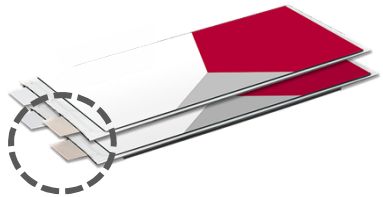
Physical Properties

Material	Density (g/cm³)	Electrical Conductivity(%)	Young's Modulus(GPa)
STS304	7.9	2.4	195
Nickel	8.9	18	207
Copper	8.9	100	110
Aluminum	2.7	64	68
Titanium	4.5	3.1	116

Nonferrous Alloys

Application

● Li-ion Battery Tab



Size	Ni, Cu, Al-O 0.05~0.20mm
Application	Li-ion batteries
Quality Control	Dimension, Mechanical p'ty

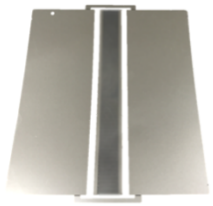
● PCM (Protection Circuit Module)

Size	Ni-O 0.15~0.30mm
Application	Li-ion battery packs
Quality Control	Surface

● Torque Sensor

Size	PB, PC-O/AR 0.35~0.65mm
Application	Automotive steering parts
Quality Control	Mechanical, Magnetic p'ty

● Metal Back Sheet



Size	Pure Ti, AlMag-AR 0.10~0.15mm
Application	Mobile devices
Quality Control	Flatness

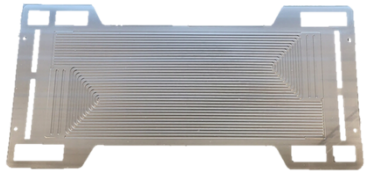
Nonferrous Alloys

■ Application

● Shield Case

Size	C7521, C194-AR 0.15mm
Application	Mobile devices
Quality Control	Mechanical p’ty

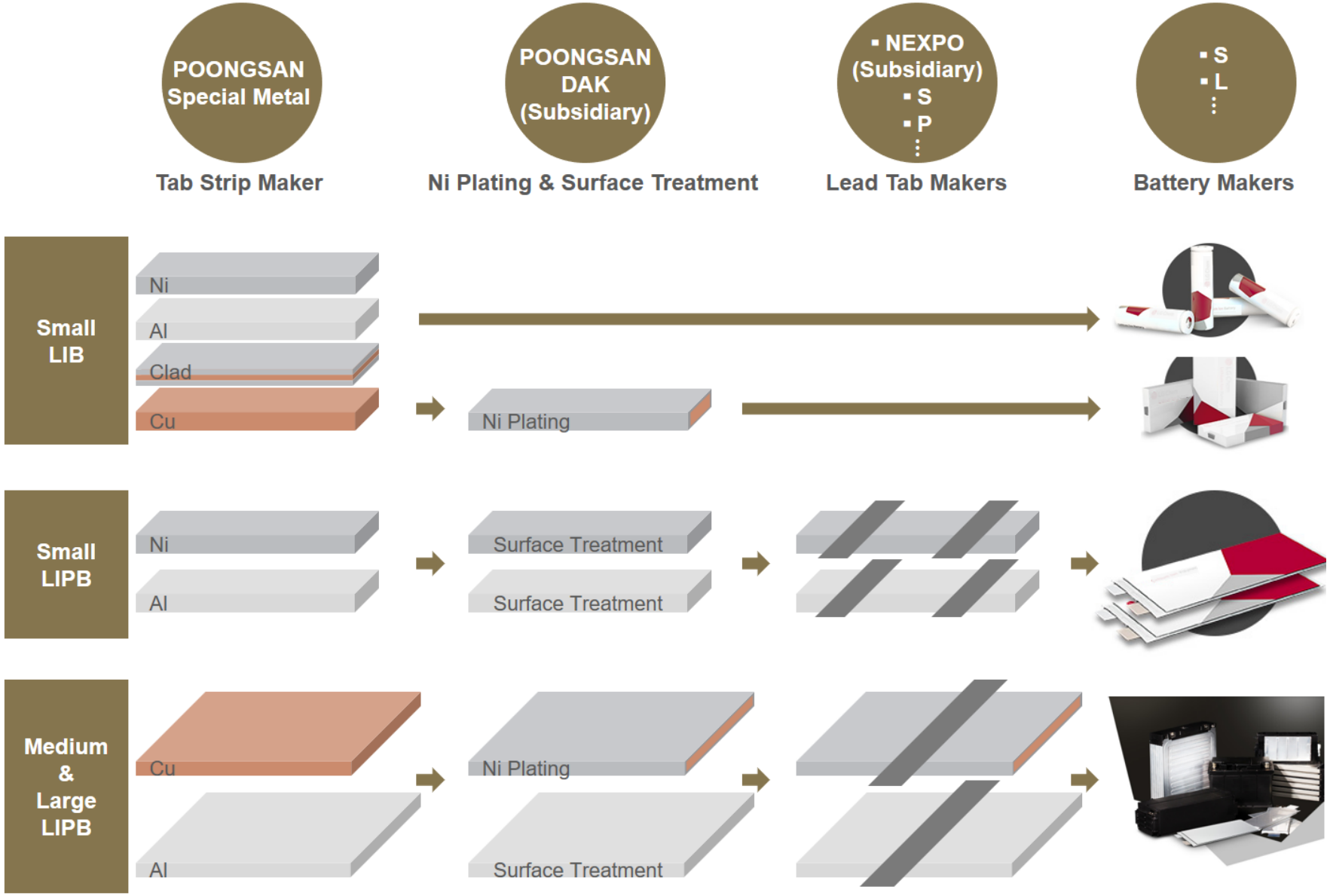
● Separator



Size	Pure Ti-O 0.08~0.10mm
Application	Fuel cells
Quality Control	Flatness, Mechanical p’ty

Nonferrous Alloys

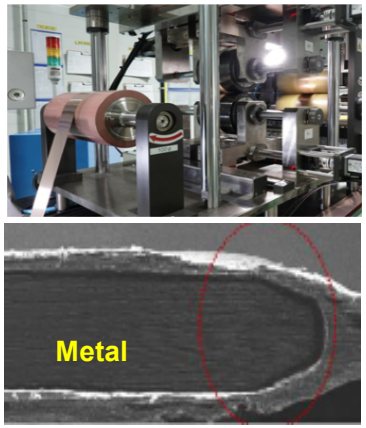
Lead Tab Materials for Li-ion Batteries



Surface Treatment

Process

Raw Material Inspection

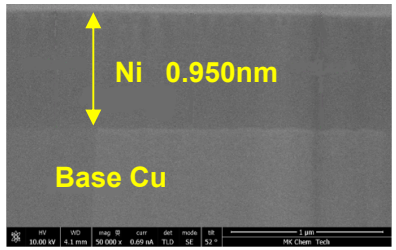


Edge Tapering

Ni Plating

Capacity

Treatment		Size(mm)	Capa. (Ton/yr)	Remark
Ni Plating	Electrolytic	0.03~0.6t	1,800	Ni Thickness 1~5μm
	Electroless	0.03~0.6t	1,200	
Surface Treatment		0.05~0.6t	600	Aluminum, Nickel



Specification of Facilities

● Plating Line

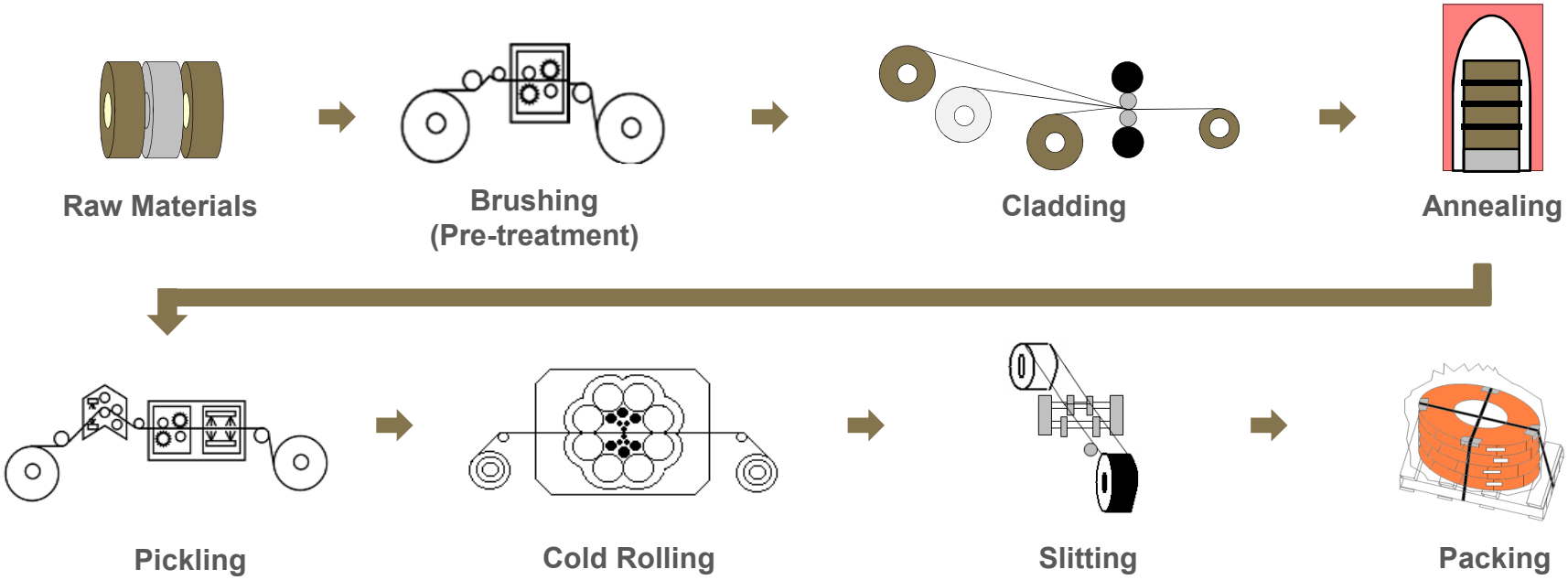
- Electrolytic Ni Plating x 2
- Electroless Ni Plating x 3
- Surface Treatment x 3

● Edging Line

- Edge Line x 4

Clad Metals

Manufacturing Process

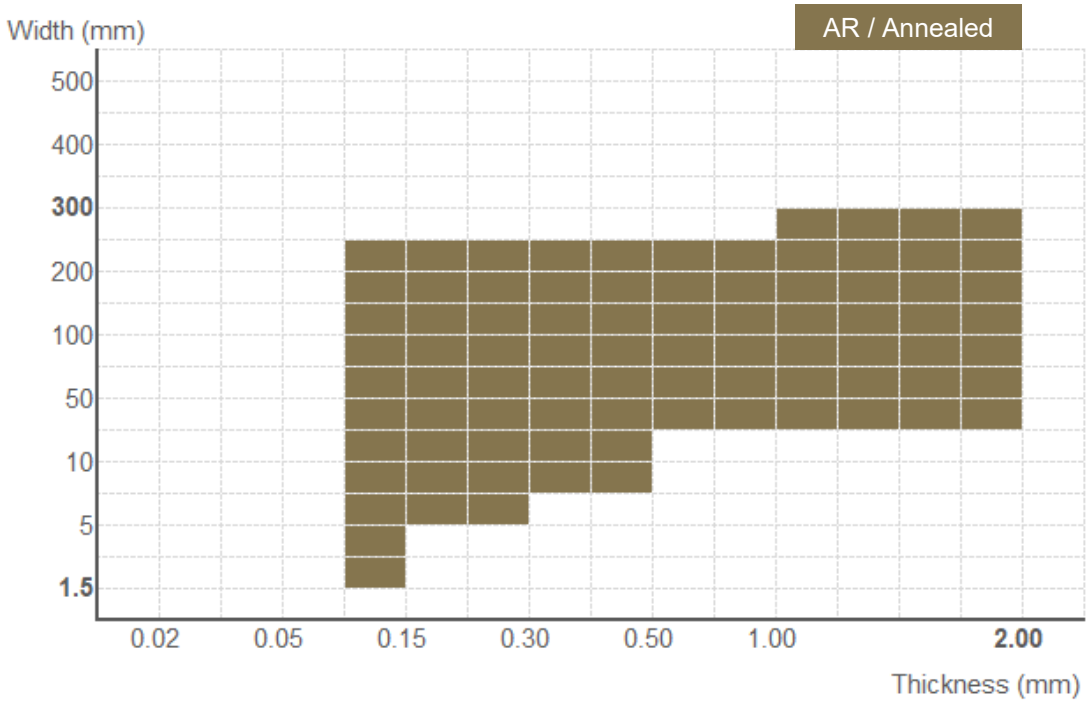


Specification of Facilities

Cladding Mill	Furnace
4 High Bonding Mill x 1	Bell Furnace x 2

Clad Metals

Available Sizes



● **The minimum thickness of layer is 10% of the thickness of the clad strip**

Size Tolerance

Thickness (mm)	Special Tolerance
≤ 1.0	± 0.010
1.0 < t ≤ 1.5	± 0.015
> 1.5	± 0.020

Capacity

● **7,000 Ton/yr**

Clad Metals

Products

Application	Composition			
Electronic Components	Nickel Copper Nickel	Nickel Silver*1 STS Nickel Silver	Nickel Silver Copper Nickel Silver	STS Copper STS
Currency Coins	Copper Aluminum Copper	Cupro Nickel*2 Nickel Cupro Nickel	Nickel Silver Nickel Nickel Silver	Brass Copper Brass

*1 : 64Cu-18Ni-Zn Alloy *2 : 75Cu-25Ni Alloy

Advantages

- **Improved properties depending on the components selected**
- **Customized cladding options**

  The base metals can be Copper alloy, or Nickel, or Stainless steel (Other options upon request)
- **Properties in accordance with customer's requirements**

  e.g. High corrosion resistance with a good electrical conductivity

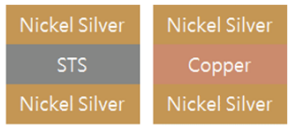
  High strength with a good thermal conductivity

  High strength with a good solderbility

Clad Metals

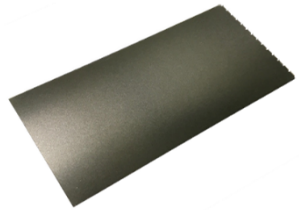
Application

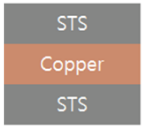
Shield Case



Size	AR 0.15~0.20mm
Application	Mobile devices
Quality Control	Strength, Conductivity

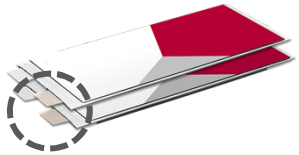
Metal Back Sheet

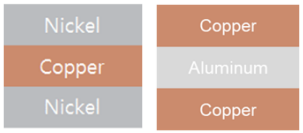




Size	AR 0.20~0.30mm
Application	Mobile devices
Quality Control	Conductivity

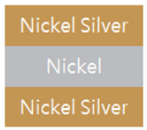
Li-ion Battery





Size	O 0.08~0.10mm
Application	Li-ion batteries
Quality Control	Electrical resistivity

Coins



Size	AR 1.5~2.0mm
Application	Coins
Quality Control	Dimension

Ultra Thin Foil

Available Sizes

- **Thickness** 10μm~ **Width** ~550mm

Features

- **Mass production system enables the stable supply of High-quality thin foil**

Cold Rolling Mill for foil

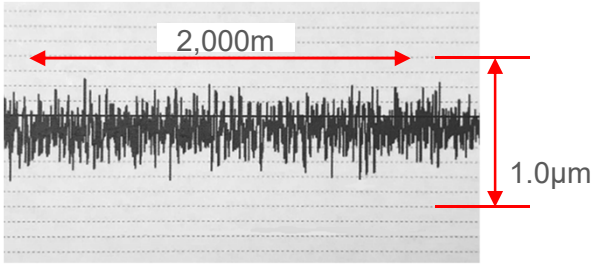
Tension leveler

Annealing furnace for foil

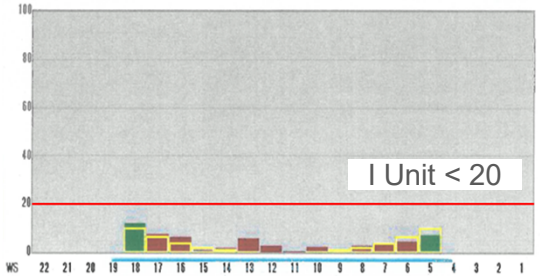
- **Assure High thickness accuracy, Fine flatness, Better formability**

High precision rolling machine with AGC(X-ray Gage), AFC system

Foil annealing furnace with anti-deformation device



Auto Gage Control

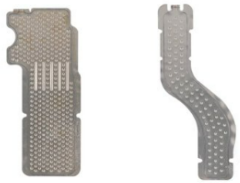


Auto Flatness Control

Ultra Thin Foil

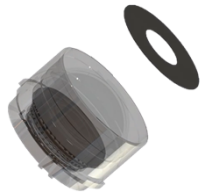
Application

● Vapor Chamber



Size	316L-O/AR 30~80μm
Application	Mobile devices
Quality Control	Formability, Flatness

● Lens Spacer

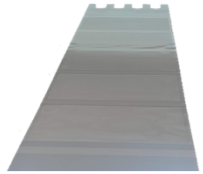


Size	C5191-AR 15~40μm
Application	Camera lens module
Quality Control	Dimension, Mechanical p’ty

● Battery Pouch

Size	304L-O 20~60μm
Application	Li-ion batteries
Quality Control	Formability, Flatness

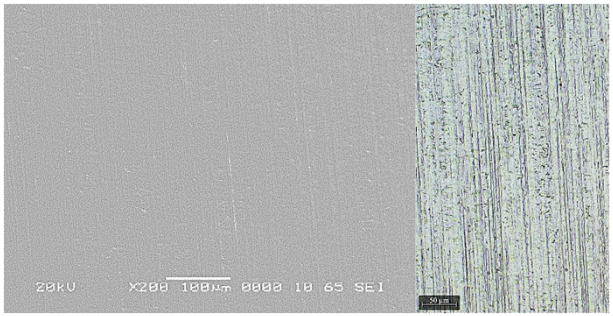
● Metal Mask



Size	Invar-AR 20~50μm
Application	Mobile devices
Quality Control	Flatness, Mechanical p’ty

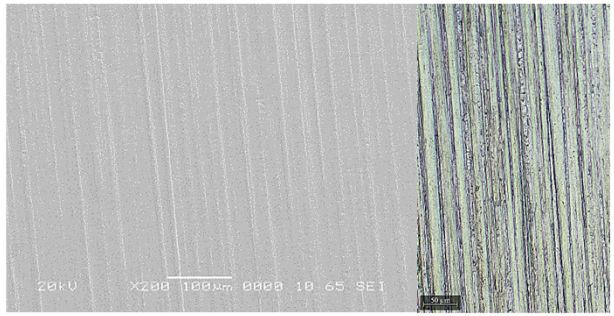
Surface Finish

Bright Finish



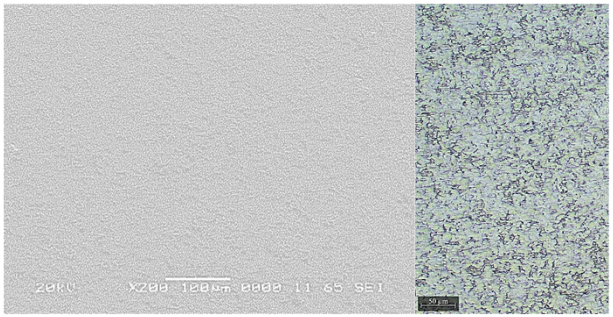
Roughness(μm)	**Ra** 0.08 **Rz** 0.70
Glossiness(60˚)	400

Brush Finish



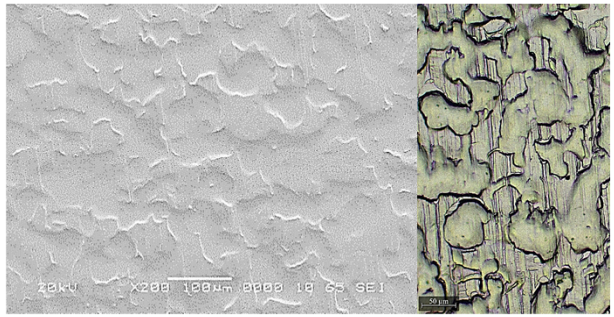
Roughness(μm)	**Ra** 0.35 **Rz** 2.0
Glossiness(60˚)	150 (TD)

White Finish (Dot Finish)



Roughness(μm)	**Ra** 0.08 **Rz** 0.70
Glossiness(60˚)	300

Pearl Finish



Roughness(μm)	**Ra** 1.00 **Rz** 5.0
Glossiness(60˚)	100

● **Customized surfaces(Gloss, Roughness) are also available**

Thank you