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Gyeonggi-do, Korea
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LiaoBu Town, Dongguan City, Guangdong Province, China
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Minato-Ku Tokyo, Japan 105-0001
Tel : 81-3-5512-5380 Fax: 81-3-5501-3234





CLAD METALS

Perfect synergy of multi-metal functions

Engineering Metal Solutions

High-quality products designed with specialized technology and customized solutions. Chang Sung Corporation produces and supplies a broad variety of clad metals through our excellent bonding skills, customized service and standardized manufacturing process.

CSC'S CLADDING SKILLS ARE LEADING THE WAY TO THE FUTURE

Chang Sung Corporation specializes in Clad Metals

Chang Sung Corporation has over 20 years of experience in manufacturing clad metals. Since developing the cladding method for the first time in Korea, we have continued to make great strides in research and development in order to meet the complex requirements of our customers and to maintain our lead in the clad metal industry in Korea. Through the strenuous efforts of our R&D center, we have been able to develop various manufacturing methods including electroplating, soldering, and rolling. We are always preparing for the future with the latest clad metal products.



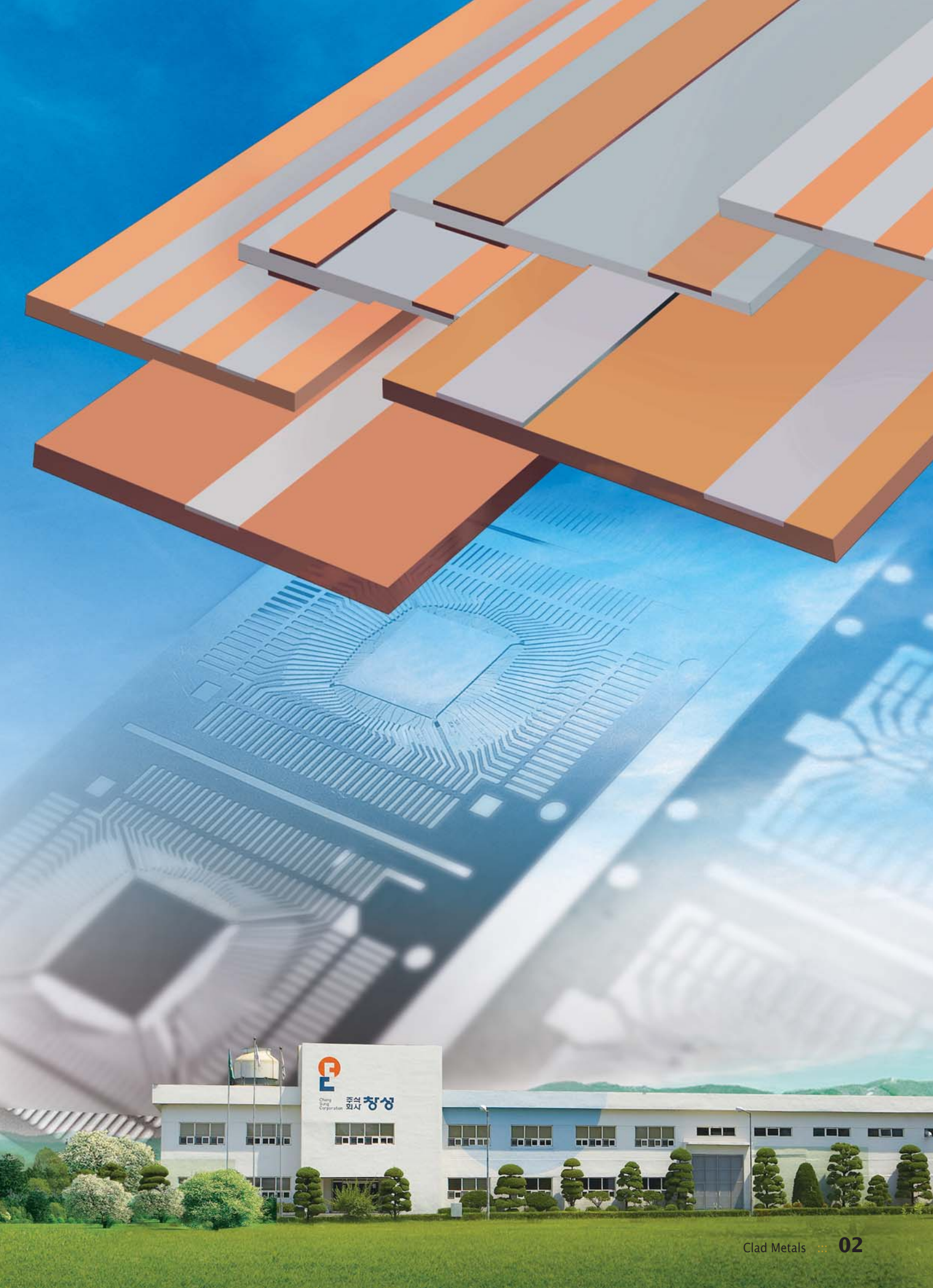
**THE FIRST MANUFACTURER
IN KOREA**



**CUSTOMIZED
SERVICE**



**ECO-FRIENDLY
MANAGEMENT**



E
주식회사 창성
Changseong Corporation

CLAD METALS FROM CHANG SUNG CORPORATION



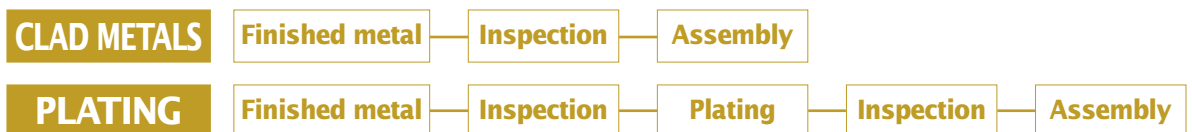
Introduction to Clad Metals

Clad Metal can be defined as the combination of two or more metals metallurgically bonded under high pressure, resulting in a substance with physical and electrical properties not available in a single metal or alloy. According to the types of bonding and materials, CSC's specialty clad metals are divided into inlay clad, overlay clad, solder clad, contact tape clad and various combinations thereof.

The Advantages of Clad Metals

One of the greatest advantages of clad metals is the reduced material and fabrication cost.

In addition, customers can expect advanced properties not found in a single metal or alloy including lower porosity, better formability, design flexibility, and superior quality compared to normal plating products in many applications.

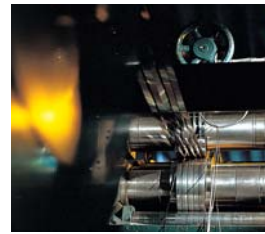


Manufacturing Process



1_Preparation

Precious metals and base metals are thoroughly cleaned to remove contaminants on the surfaces and then brushed to get better bonding quality.



5_Slitting

After rolling clad metals to the required widths, they are slit according to the dimensions required by our customers.



2_Bonding

Two or more metals are placed together and cold-rolled under extremely high pressure by a specially designed bonding mill. This process makes a high metallurgical strength at the atomic level possible in finished clad metal products.



6_Leveling

Clad metals are leveled and straightened using tension levelers.



3_Annealing

To ensure full bonding strength and to relieve any residual stress during the bonding operation, bonded clad metals are heat-treated.



7_Inspection

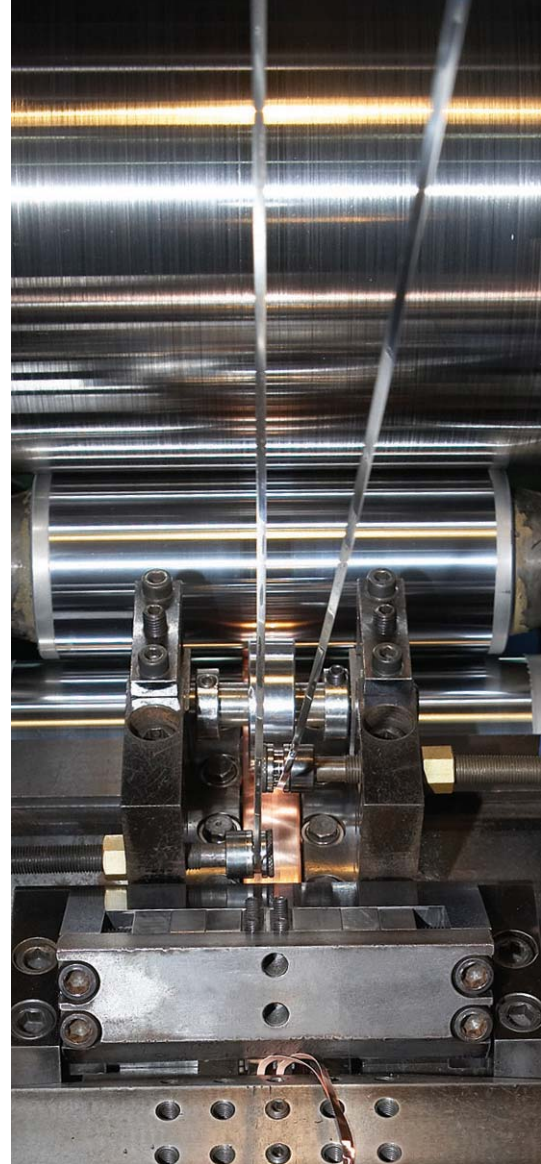
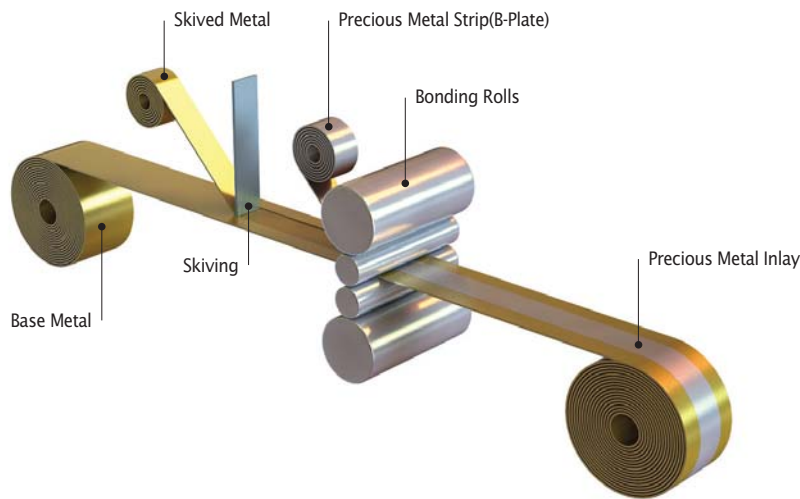
Mechanical properties of clad metals including hardness, tensile strength, and elongation are tested before shipment. Other specifications are also thoroughly inspected.



4_Rolling

The finished clad metals are produced by cold-rolling and annealing. In this process, keeping the correct proportion of precious metals to base metals is very important.

CLADDING



▼ Product Types



▼ OVERLAY Dimensions

BASE METAL Thickness	Min.	0.02mm
	Max.	1.5mm
BASE METAL Width	Min.	2mm
	Max.	100mm
OVERLAY Thickness	Min.	0.1 um

▼ INLAY Dimensions

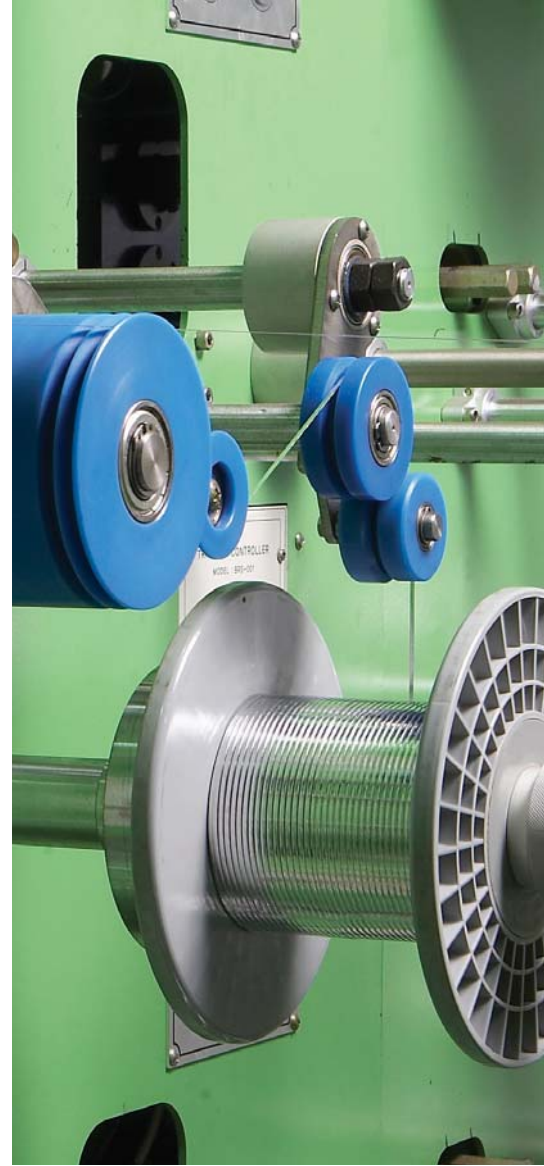
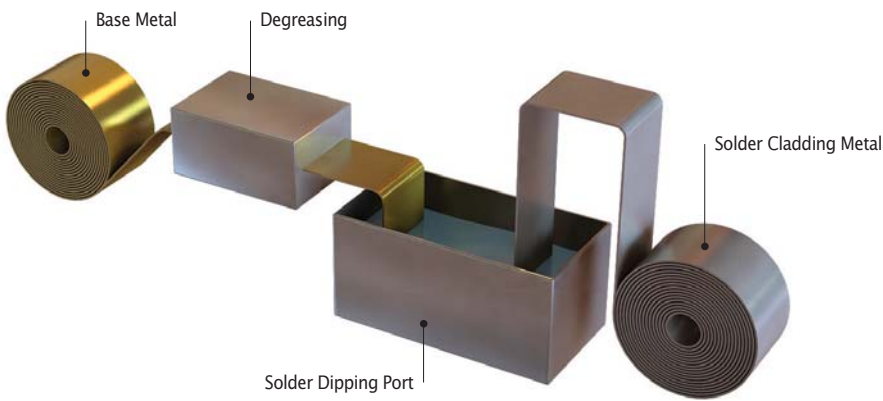
BASE METAL Thickness	Min.	0.02mm
	Max.	1.5mm
BASE METAL Width	Min.	2mm
	Max.	100mm
INLAY Thickness	Min.	0.02µm
	Max.	40% of overall thickness
INLAY Width	Min.	1.2mm
	Max.	40mm

▼ Materials

Precious Metals	Base Metals
99.99 Au	
75 Au, 25 Ag	
67 Au, 33 Ag	
58 Au, 42 Ag	
50 Au, 50 Ag	
69 Au, 25 Ag, 6 Pt	Nickel Silver
10 Au, 30Ag, 10Pt, 35Pd, Cu-Zn	Nickel
70 Au, 10Ag, 5Pt, Cu-Zn	Copper
	Brass
99.95 Ag	Bronze
92.5 Ag, 7.5 Cu	Beryllium Copper
90 Ag, 10 Cu	Aluminum
75 Ag, 24.5 Cu, 0.5 Ni	Copper Nickel
72 Ag, 28 Cu	MX96
90 Ag, 10 CdO	MX215
85 Ag, 15 CdO	Others
99 Ag, 1 Cd	
90 Ag, 10 Ni	
85 Ag, 15 Ni	
99.9 Pd	
90 Ag, 10 Pd	
70 Ag, 30 Pd	
50 Ag, 50 Pd	
Others	

SOLDER CLADDING

Solder clad metal is produced from hot dipping, precise slitting, and winding technology. This innovative process eliminates the need for an extra soldering process during assembly thus proving to be more cost-effective.



▼ Product Types



Double



Overall



Selective



Top

▼ Dimensions

BASE METAL Thickness	Min.	0.05mm
	Max.	1.5mm
BASE METAL Width	Min.	1.2mm
	Max.	100mm
PLATING Thickness	Min.	3µm
	Max.	50µm

▼ Materials

Soldering Metals	Base Metals
60Sn, 40Pb	Copper
63Sn, 37Pb	Bronze
62Sn, 36Pb, 2Ag	Brass
96.5Sn, 3.5Ag	Nickel
96.5Sn, 3Ag, 0.5Cu	Stainless
43Sn, 43Pb, 14Bi	
100Sn	
42Sn, 58Bi	

▼ Materials

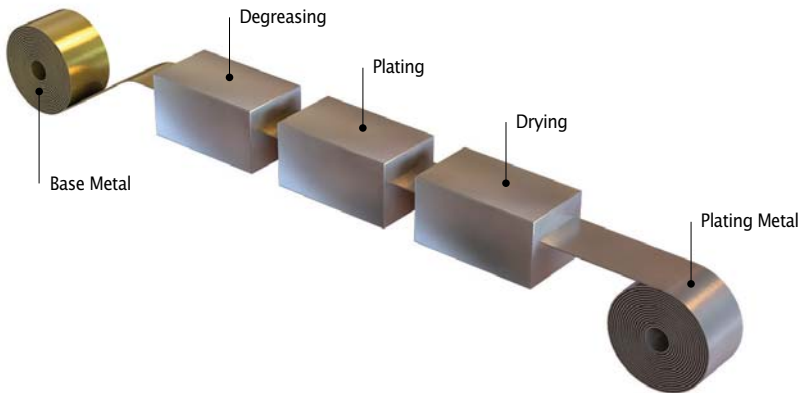
Materials	Solid Temp(°C)	Liquid Temp(°C)
SnPb40	183	189
SnPb37	183	183
SnPb36Ag2	179	179
SnPb43Bi14	144	163
Sn100	232	232
SnAg3.5	221	221
SnAg3Cu0.5	217	220
SnBi58	138	138

ELECTRO PLATING

Electro plating uses a reel to reel method that guarantees consecutive production at a high speed based on the specifications of our customers.

The advantages of this method include good productivity and a high yield, resulting in cost-efficiency especially in mass production.

Partial plating on the metals using masking tape is also possible. Ag, Au, Sn, Ni, Pd are normally used as plating metals and Ni, Cu are used as base metals.



► Product Types



Double



Overall



Selective



Top

► Dimensions

BASE METAL Thickness	Min.	0.02mm
	Max.	1.5mm
BASE METAL Width	Min.	1.2mm
	Max.	150mm
Plating Thickness	Min.	0.01 μm
	Max.	7.0 μm

► Materials

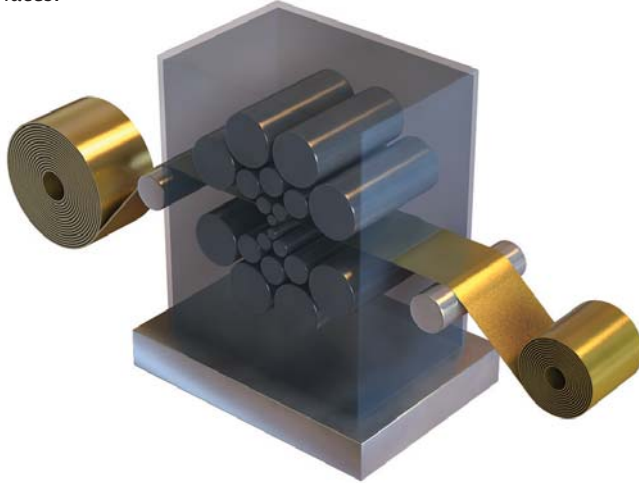
Plating Metals	Base Metals
Au	Copper
Ag	Bronze
Sn	Brass
Ni	Nickel
Pd	Stainless

► Plating Property

Roughness	Rz : 0.3~7um
Corrosion control	0, X
Brightness	Bright, Dull

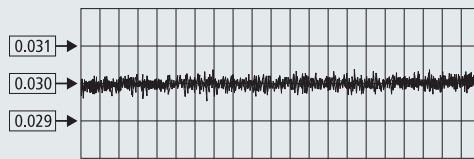
FINE REROLLING

We are able to make ultra thin products with 20 step and 12 step Senzimir mills as well as products with extraordinary surfaces.



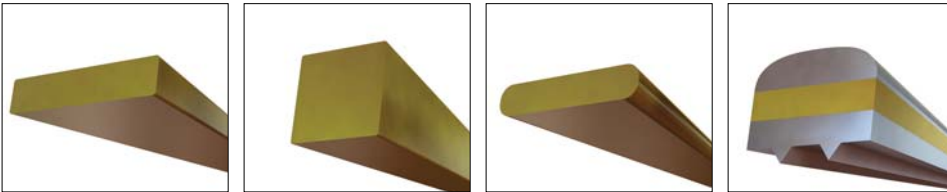
► Dimensions

BASE METAL Thickness	Min.	0.02mm
	Max.	1.5mm
BASE METAL Width	Min.	1.2mm
	Max.	150mm



FORM ROLLING

We are able to provide a variety of shaped products including flat types, arc-edge types and round types using the latest in rolling technology. Traverse spools or disk type packaging are both available.

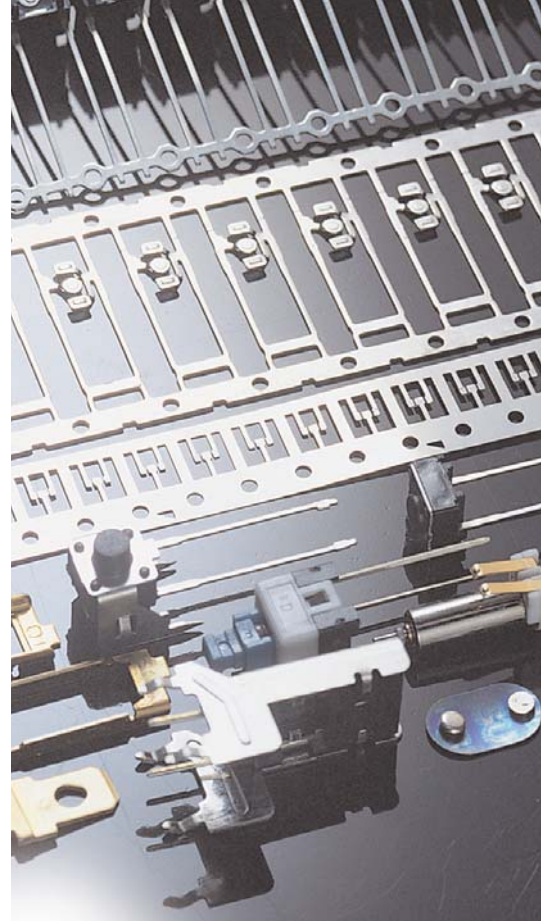


► DIMENSIONS

BASE METAL Thickness	Min.	0.05mm
	Max.	1.5mm
BASE METAL Width	Min.	1.2mm
	Max.	150mm

► Materials

Category	Name
Nickel Silver	C7521, C7701
Nickel	N200, N201
Copper	C1020, C1100
Brass	C2600, C2680
Bronze	C5191, C5210
Beryllium Copper	C1700, C1720
Copper Nickel	C7060, C7150



APPLICATIONS

For Clad Metal Technology

▼ Product Types

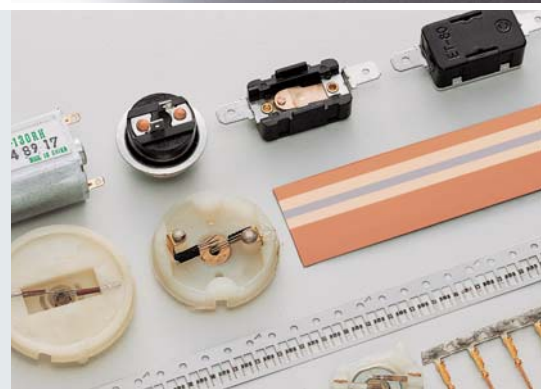
▼ PRODUCT SUMMARY

INLAY CLADS

Inlay clad metals are produced by a more reliable process compared to the normal plating process. This is cost-effective because it controls the precise positions and dimensions of precious metals on the base metals.

APPLICATIONS

Parts for micro motors, automotive parts, home appliances, switches, connectors etc.

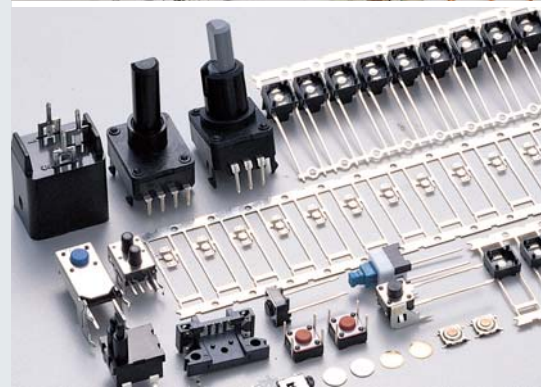


OVERLAY CLADS

Overlay clad metals are defined as a combination of two or more metals of the same size. One-sided and two-sided cladding is available at competitive prices. Overlay clad metals are mostly used for tact switches, dome switches, volume switches, and their terminals.

APPLICATIONS

Tact switches, dome switches, volume switches, slide switches, terminals etc.



CONTACT TAPES

Contact tapes require smaller amounts of precious metals than inlay or overlay clad metals. They are good alternatives for rivets, buttons and wire welds for switches, contacts, and relays. Contact tapes also exhibit good adaptability in processes of speedy stamping and welding operations.

APPLICATIONS

Rivets, buttons, wire welds, switches, contacts, relays etc.



EVEN THINNER, EVEN SMALLER, EVEN LIGHTER



▼ Product Types

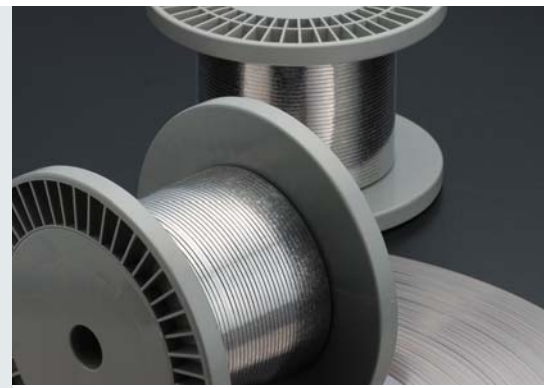
▼ PRODUCT SUMMARY

PV RIBBONS

Photovoltaic Ribbons are produced from hot dipping, precise slitting and winding technology. Soldering based on customer's specific requirements is available. We also offer Pb-free products.

APPLICATIONS

Interconnectors and Buss-bar Ribbons for Photovoltaic Modules.

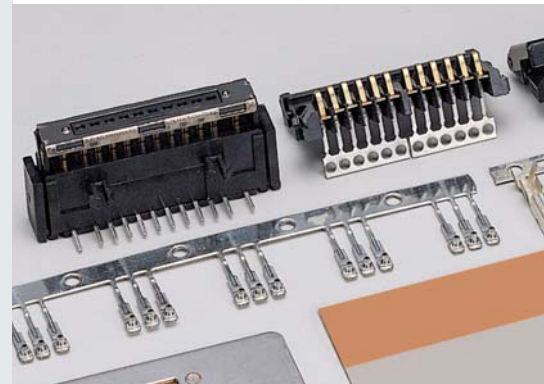


SOLDER CLADS

These products are especially cost-effective as no extra soldering processes are necessary for assembly.

APPLICATIONS

Telephones, connectors, automotive parts, data processing equipment, computer devices etc.



LEAD TABS

Metal cable, one of the most important materials as a tunnel, allows electricity to move to fuel cells.

We can provide suitable clad metals for metal cables with good thermal properties and electric resistance. Applications are mostly for the electrodes of fuel cells with both cathodes and anodes, separators, and sealing materials of fuel cells.

APPLICATIONS

Lead tabs for lithium-ion batteries, Fuel cells, EMI shielding.



TECHNOLOGY & INNOVATION

Chang Sung Corporation's R&D center was established in 1986 and has continuously developed new technologies to achieve the best quality in metal powders, soft magnetic cores, conductive pastes, EMC products, powder metallurgy, and clad metals.

We are always striving to come up with innovative ideas and solutions for our clients and this begins with a sufficient investment in our R&D facilities and team, which is the driving force behind our success.



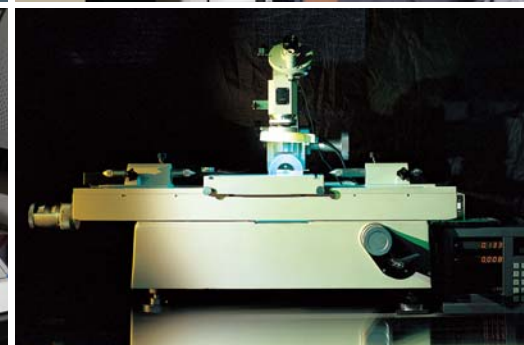
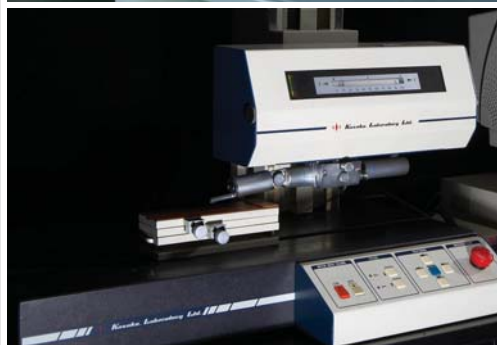
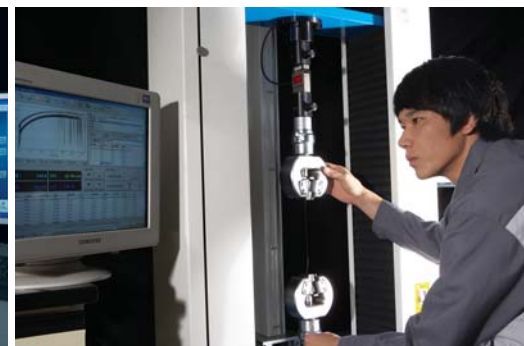
PASSION & INNOVATION

GLOBAL COMPETITIVENESS BEGINS WITH QUALITY R&D

At Chang Sung Corporation, we know that our success depends on strict quality control and inspections in our R&D center and on our production lines as well as in our ability to meet the diverse needs of all our customers in a cost-effective and punctual manner. Through our passion and innovation, we are leading the way to a brighter future in technology.

▼ EQUIPMENT

- Scanning Electron Microscope
- Laser Particle Size Analyser
- Specific Surface Analyser (BET)
- Absorption Spectrometer
- Optical Emission Spectrometer
- Optical Microscope
- Stereo Microscope
- Oxygen / Nitrogen Analyser
- Thermal Analysis Equipment (TG/DTA)
- Differential Scanning Calorimeter
- Jeta Potential Meter
- FT-IR
- Vibrating Sample Magnetometer
- B-H Analyser
- Universal Testing Machine
- Color and Color Difference Meter
- Gloss Meter
- Electrolysis Analyser
- Sonic Sifter
- Hardness Testers
- Electric Furnaces
- Dilatometer



PRODUCT DESCRIPTIONS

► PRECIOUS METALS

Category	Name	Nominal Composition(%)
Gold	24K	99.99 Au
	18K	75 Au, 25 Ag
	16K	67 Au, 33 Ag
	14K	58 Au, 42 Ag
	12K	50 Au, 50 Ag
	WE#1	69 Au, 25 Ag, 6 Pt
	SP1 SP2	10Au, 30Ag, 10Pt, 35Pd, Cu-Zn 70Au, 10Ag, 5Pt, Cu-Zn
Silver	Fine Ag	99.95 Ag
	Sterling Ag	92.5 Ag, 7.5 Cu
	Coin Ag	90 Ag, 10 Cu
		75 Ag, 24.5 Cu, 0.5 Ni
	BT	72 Ag, 28 Cu
	AgCdO	90 Ag, 10 CdO
	AgCd AgNi	85 Ag, 15 CdO 99 Ag, 1 Cd 85Ag, 15Ni 90Ag, 10Ni
Palladium	Pd	99.9 Pd
		90 Ag, 10 Pd
	AgPd	70 Ag, 30 Pd 50 Ag, 50 Pd
Solder	Leaded	60Sn, 40Pb 63Sn, 37Pb 62Sn, 36Pb, 2Ag
	Lead-free	96.5Sn, 3.5Ag 96.5Sn, 3Ag, 0.5Cu

► MATERIAL PROPERTIES

Element	Symbol	Density (g/cm ³)	Melting Point (°C)	Heat Conductivity (%)	Electric Conductivity (%)
Silver	Ag	10.49	960.5	100.0	100.0
Copper	Cu	8.96	1,083	94.0	94.0
Gold	Au	19.32	1,063	70.8	67.0
Aluminum	Al	2.69	658.8	53.9	57.0
Tungsten	W	19.24	3,400	39.9	29.5
Magnesium	Mg	1.74	650	38.0	34.0
Molybdenum	Mo	10.22	2,610	35.0	29.0
Zinc	Zn	7.14	419.4	27.0	25.5
Silicon	Si	2.33	1,430	20.0	Na
Nickel	Ni	8.90	1,453	19.8	20.5
Iron	Fe	7.86	1,536	18.0	17.0
Platinum	Pt	21.45	1,769	16.7	13.7
Cobalt	Co	8.85	1,499	16.5	15.0
Chromium	Cr	77.19	1,875	16.0	7.8
Tin	Sn	7.35	231.9	15.4	4.0
Carbon	C	3.52	3,700	5.7	2.2

► BASE METALS

Category	Name	Nominal Composition(%)
Nickel Silver	C7521	65 Cu, 18 Ni, 17 Zn
	C7351	72.5 Cu, 18.0 Ni, Bal. Zn
	C7451	63~67Cu, 8.5~11 Ni, Bal. Zn
	C7701	55 Cu, 18 Ni, 27 Zn
Nickel	NW2200	99.0 Ni, 0.15C
	NW2201	99.5 Ni, 0.02C
Stainless Steel	SUS301	16~18Cr,6~8Ni, Bal Fe
	SUS302	17~19Cr,8~10Ni, Bal Fe
	SUS304	18~20Cr,8~10.5Ni, Bal Fe
	SUS430	16~18Cr, Bal Fe
Copper	C1020	99.96 Cu Min.
	C1100	99.90 Cu Min.
Brass	C2600	70 Cu, 30 Zn
	C2680	66 Cu, 34 Zn
Bronze	C5191	6.25 Sn, 0.03 ~ 0.35 P, Bal. Cu
	C5210	8.0 Sn, 0.03 ~ 0.35 P, Bal. Cu
	C5212	8.0 Sn, 0.03 ~ 0.35 P, Bal. Cu
Beryllium copper	C1700	1.7 Be, 0.2 Co, Bal. Cu
	C1720	1.9 Be, 0.2 Co, Bal. Cu
Aluminum	A1100	99.0 Al
	A5052	94.5 Al, 2.5 Mg 0.25 Cr
Copper Nickel	C7060	90 Cu, 10 Ni
	C7150	70 Cu, 30 Ni
Others	Kovar	29 Ni, 17 Co, Bal. Fe
	A-42	42 Ni, Bal. Fe
	MX96	8~10 Ni, 5.5~6.7 Sn, Bal. Cu
	MX215	20~22Ni, 4~5Sn, Bal. Cu

► THERMAL CONDUCTIVITY (K)

Material	k(W/mk)
Ag	427
Cu	398
Al	237
Si	148
Fe	79
Pb(50Sn)	46.5
SUS	14
AlN	180
SiC	115
Alumina	36
BN	60
Quartz	1.38
Glass	1.0
Epoxy	0.300
Water	0.610
Ethanol	0.166
Hdrogen	0.181
Air	0.026

► METAL CLADDING AVAILABLE

Metals	Gold				Silver					Palladium		Solder				
	24K	18K	16K	12K	F.Ag	Coin Ag	BT	AgCd	AgNi	Pd	AgPd	SnPb	SnPbAg	SnAg	SnAgCu	
Nickel Silver	C7521	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C7351	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C7451	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C7701	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Nickel	NW2200	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	NW2201	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Stainless Steel	SUS301	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	SUS302	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	SUS303	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	SUS304	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Copper	C1020	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C1100	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Brass	C2600	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C2680	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Bronze	C5191	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C5210	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C5212	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Beryllium Copper	C1700	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C1720	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Aluminum	A1100	△	△	△	△	△	△	△	△	△	△	△	X	X	X	X
	A5052	△	△	△	△	△	△	△	△	△	△	△	X	X	X	X
Copper Nickel	C7060	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	C7150	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Others	Kovar	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	A-42	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	MX96	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	MX215	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

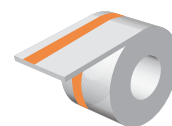
○: GOOD, △: UNDER DEVELOPMENT, X: POOR

► HOW TO ORDER

When ordering clad metals, the following information is required in order to supply the best quality products.

- Dimensions
- Surface conditions
- Temper & hardness
- Chemical compositions
- Clad locations
- Tolerances
- Coiling Instructions

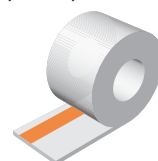
CSC supplies clad metals in coils ready for automatic presses. Please be sure to include the above information when ordering these products.



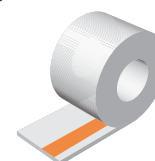
1. Top left
Stripe away from viewer



2. Top Right
Stripe near the viewer



3. Bottom left
Stripe away from viewer



4. Bottom Right
Stripe near the viewer