Battery Business Overview

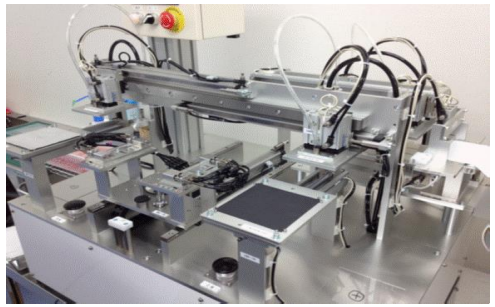
TK WORKS
Trading 1963

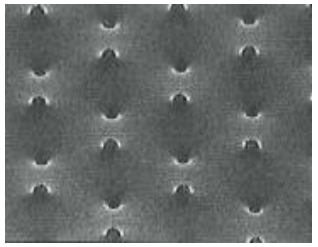
Kohan Shoji Co., Ltd.

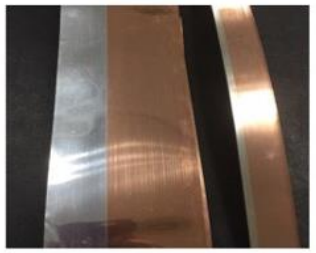
Introduction

■ **Proposal Summary**	Tab Lead Lithium Metal Anode Film Current Collector / Resin-Type Collector Carbon-Coated Foil (Anode / Cathode) High-Strength Current Collector (Cathode) Processed Current Collector (Punched / Metal Foil) Busbar Parallel Clad (Copper / Aluminum) Production Equipment Introduction Small Electrode Stacking Machine Electrode Laser Punching Machine Processing / Prototyping Services

Our Proposal

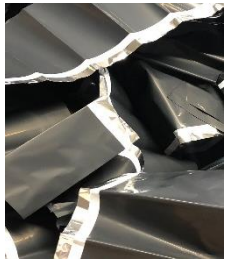




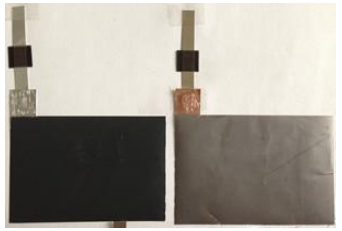


Recycling

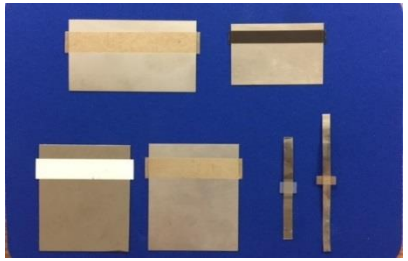
Processing

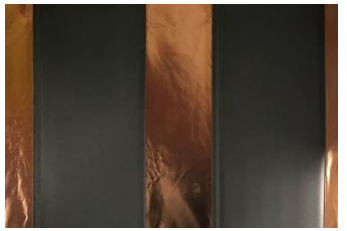


Materials



Components



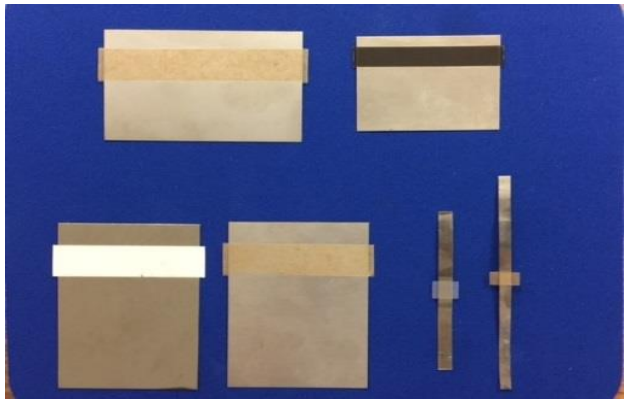


Equipment

Tab Lead

We provide integrated manufacturing that includes metal material procurement, surface treatment, and film lamination.
We work with leading Chinese tab-lead manufacturers to support prototyping, development, and mass production for automotive and residential batteries.

Electrode	Base Material	Surface Treatment	Base Thickness	Base Width	Base Length	Burr	PP Film Thickness
Cathode	A1050-O A1230-O	-	0.05-2.0	1.5-300	3-300	≤0.015	0.08 0.10 0.15
Anode	C1020-O C1100-O Pure Ni	Ni Plating	0.05-2.0	1.5-300	3-300	≤0.015	0.08 0.10 0.15



- Additional specifications are available upon request.
- Ni plating options: Bright / Semi-bright / Matte.
- PP film thickness may be adjusted based on sealing and adhesion needs.

Lithium Metal Anode

We supply lithium metal foil and lithium composite foil for use in all-solid-state battery anodes.

Base Material	Single Layer	Double Layer (Li/Substrate)	Triple Layer (Li/Substrate/Li)	Blade Type (Li/PET)
Li Purity	≥99.9%	≥99.9%	≥99.9%	≥99.9%
Li Thickness	20μ～100μ	6.5μ～100μ	6.5μ～100μ	≥5 μ
Li Width	～300mm	～300mm	～300mm	～300mm
Li Adhesion Area	-	Full / One Side / Stripe / Defect	Full / One Side / Stripe / Defect	Full / One Side / Stripe /Defect
Defect Correspondence	-	One Side / Both Sides	One Side / Both Sides	One Side / Both Sides
Defect Offset	-	±2mm	±2mm	±2mm
Substrate Options	-	Cu 6μ-10μ/SUS 6μ-10μ/PET (under development)	Cu 6μ-10μ/SUS 6μ-10μ/PET (under development)	PET
Substrate Width	-	～350mm	～350mm	～350mm
Separator Film	PET	PET	PET	-
Special				Li perforation: several μm / Approx. 5% opening rate

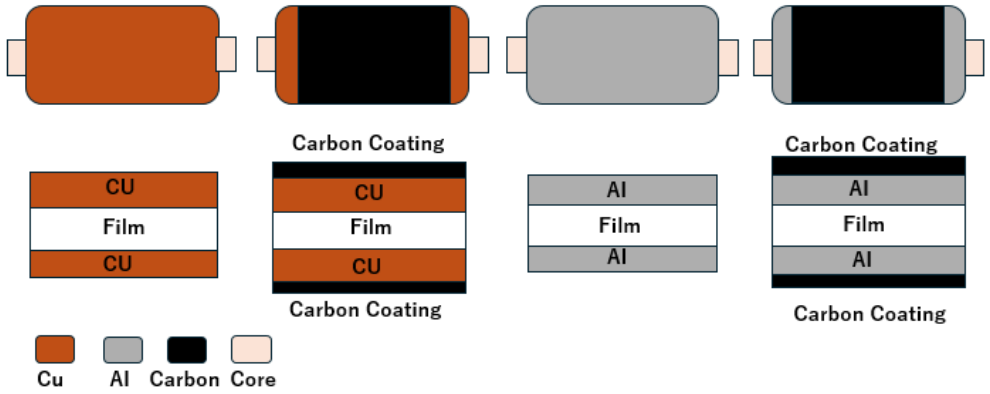
- Minimum lot: From 1 meter
- Packaging: Aluminum-laminate bag / Argon-filled / UN-certified container
- We also support lithium alloy foils (In / Sn / Mg / Al)

Film Current Collector (Resin Foil) / Carbon-Coated Film Current Collector

We supply lightweight, safe, and conductive film-type current collectors for both anode and cathode applications.

Electrode	Anode		Cathode	
Film Type	PET	PET Nonwoven	PET	PET Nonwoven
Film Thickness	≥4.5 μ	≥7 μ	≥4.5 μ	≥7 μ
Conductive Coating/ Thickness	Cu1μ	Cu1μ	AL1μ	AL1μ
Product Width	～1,350mm	～600mm	～1,600mm	～600mm
Carbon Coating/ Thickness	Available/1μ	Under Evaluation	Available/1μ	Under Evaluation
Coating Area	Both Sides / Stripe / Intermittent	Under Evaluation	Both Sides / Stripe / Intermittent	Under Evaluation

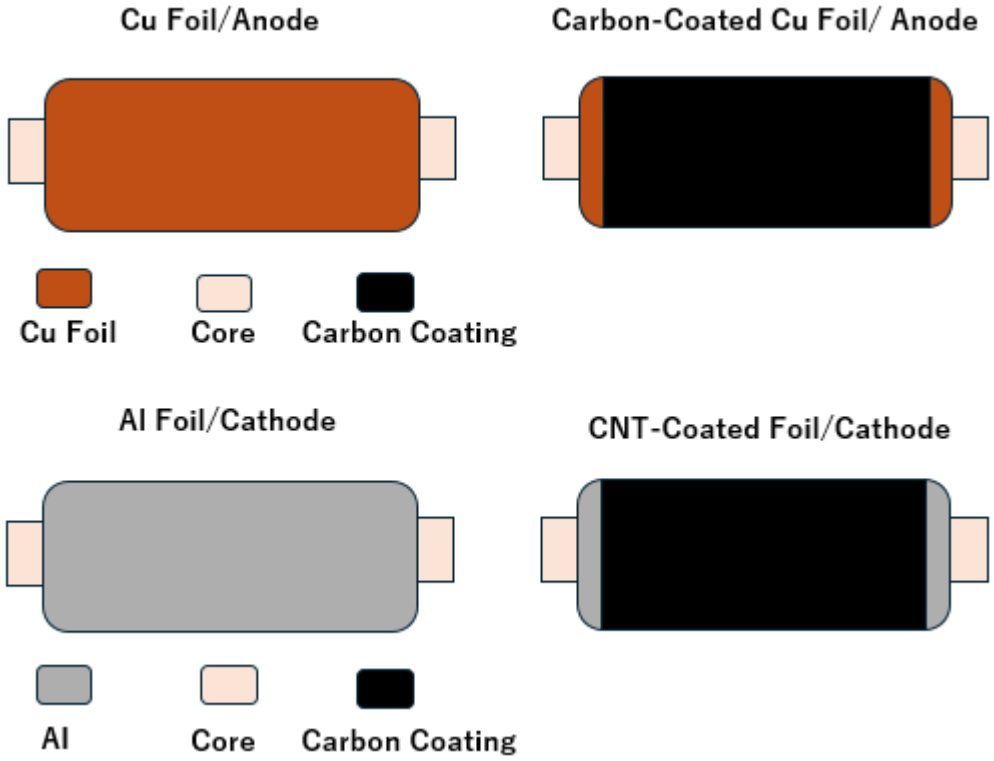
- Compared to copper foil, a weight reduction of approximately 30–40% is achievable.
  Compared to aluminum foil, a weight reduction of approximately 20% is expected.
- By using an insulating layer as the intermediate layer, safety can be improved during high-voltage current flow.



Carbon-Coated Foil (Anode / Cathode)

We supply carbon-coated foils to enhance safety for both anode and cathode applications.

Electrode	Anode	Cathode
Base Material	Electrolytic Copper Foil	Aluminum Foil
Base Thickness	≥5 μ	≥12 μ
Product Width	～1,350mm	～1,600mm
Carbon Coating Thickness	1μ	1μ
Coating Area	Both Sides / Intermittent / Stripe	Both Sides / Intermittent / Stripe
Misalignment	±1mm	±1mm



- Slitting to specified widths is available.
- Carbon coating can be applied to customer-supplied base materials.
- Development of carbon coating on 9 μ aluminum foil is in progress.

High-Strength Current Collector (Cathode)

We supply high-strength cathode current collector foil designed to improve production yield.

(The values shown below represent typical characteristics.)

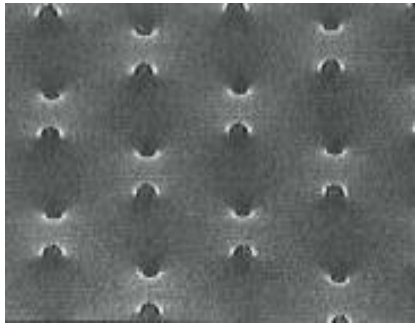
Base Material	Alloy Series	Base Thickness (t)	Tensile Strength (MPa)	Yield Strength (MPa)	Elongation(%)	Conductivity (%IACS)
1085-H18	Pure Aluminum	0.015	175	163	4.7	60.1
1230-H18	Pure Aluminum	0.015	194	175	4.5	58.4
Proposed Material	Pure Aluminum	0.015	250	-	2.0	55.5
3003-H18	Al–Mn Alloy	0.015	275	243	3.2	47.2

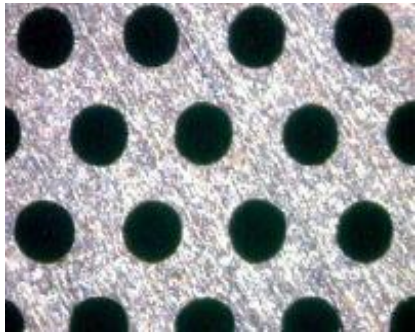
- Prototype samples are available. Please feel free to contact us..

Processed Current Collector Foil

We offer processed current collector foils that are customized with surface treatments to meet specific performance requirements.

Process Type	Production Range	Features
Press-Punched Foil	Thickness/0.01t~0.05t Width/~300mm	Thick active material coating possible Low cost
Etched Foil	Thickness/0.02t~0.05t Width/~300mm	High precision Higher cost
Roughened Foil	Thickness/0.01t~0.05t Width/~200mm	Improved adhesion Higher cost
Metal Foil with Surface Treatment	Thickness/0.01t~0.05t Width/~120mm	Custom surface processing support





- Prototype samples are available. Please feel free to contact us.

Metal Current Collector (Metal Foils)

We supply current collector materials selected according to required performance characteristics.

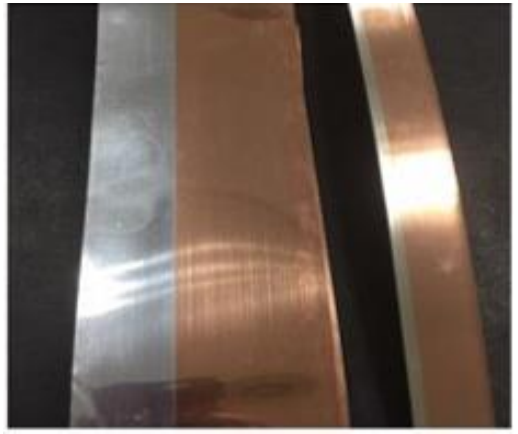
Material	Manufacturing Range	Remarks
Copper Foil (Electrolytic / Rolled)	Thickness 0.004t～ Width up to approx. 600mm	High-strength copper foil available
Aluminum Foil	Thickness 0.010t～ Width up to approx. 1050mm	High-strength aluminum foil available
Nickel Foil((Electrolytic, Rolled)	Thickness. 0.004t～ Width up to approx. 1050mm	Roughened nickel foil available
Titanium / Stainless Steel Foil	Thickness. 0.006t～ Width up to approx. 650mm	-

・We also supply materials whose current collector surfaces are chemically or mechanically roughened (processed foils).

Busbar Parallel Clad (Copper / Aluminum)

We supply copper and aluminum parallel clad materials as busbar materials for lithium-ion batteries.

Item		Specification	Remarks
Material	Copper	C1100 / C1020, etc.	Please specify the grade separately
	Aluminum	A1100 / A1050, etc.	
Thickness		Total thickness: 0.6t–2.5t	Other thicknesses available upon request
Width		～150mm	Wider widths available upon request
Surface Treatment		Ni Plating or Sn Plating	Supports full plating and stripe plating
Production Area		China (plating in China or Japan)	Cladding is manufactured in China; plating is available in both China and Japan
Track Record		Chinese and European EV manufacturers	Samples are currently under evaluation in Japan



・The bonding strength of the copper–aluminum interface can be evaluated within the manufacturer according to your requirements.

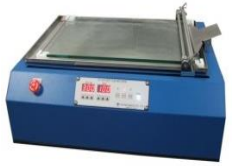
・ Small-quantity sample production is available; please feel free to contact us.

Introduction of Equipment

We provide manufacturing equipment for lithium-ion batteries, especially equipment for the front-end processes.

Item	Overview	Equipment Name
1	Mix active materials to prepare the electrode slurry	Mixer
2	Coat the slurry onto the current collector	Coater
3	Roll-press the electrodes	Roll Press
4	Punch the electrodes into the required shape	Electrode Punching Machine, Laser Cutting Machine (P6)
5	Slit the electrodes and separators	Slitter, Cutter
6	stack the positive/negative electrodes and separator in order	Stacking Machine (P8)
7	weld the tab lead to the positive and negative electrodes	Ultrasonic Welding Machine
8	heat-seal the exterior material and tab lead	Heat Sealer
9	inject electrolyte using a vacuum injection machine	Vacuum Electrolyte Injection Machine

Kneader

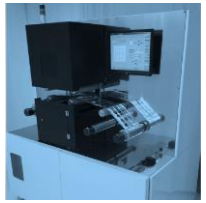


Coater

Coater

Roll Press

Electrode Punching Machine



Laser Cutting Machine

Stacking Machine

Stacking Machine

Heat Sealer

Ultrasonic Welding Machine

Electrolyte Injection Machine

Electrode Laser Punching and Cutting Machine

Machine continuously punches and laser-cuts electrodes from roll materials in any desired size.

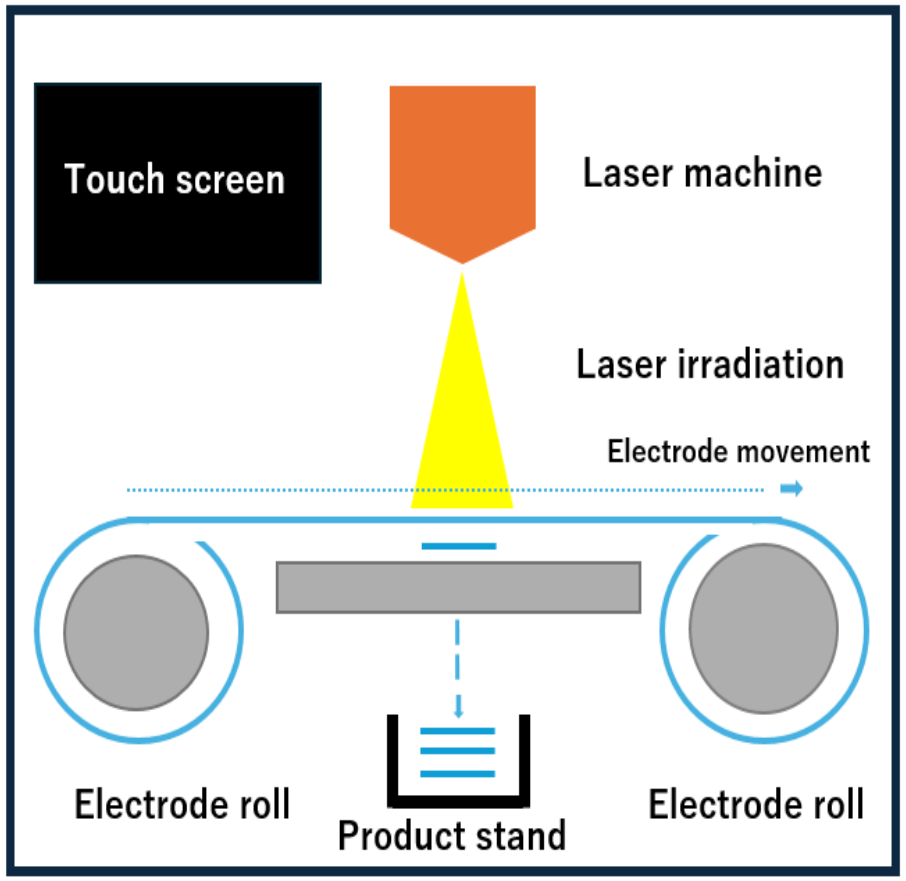
By using this equipment, flexible electrode design and quality improvement (burr reduction) can be achieved, earning high customer satisfaction.

Items			Details		
Applicable Materials			All Metal Foils (recommended for 0.2mm or less))		
Material Width	Max Diameter	Width Shaft Diameter	30mm-250mm	φ200mm	φ38mm～φ76mm
Cutting Width	Max Coil Diameter	Coil Shaft Diameter	0mm-250mm	φ250mm	φ38mm～φ76mm
Table Motion Range	Laser Motion Range		X-axis 250mm	Y-axis 200mm	
Cutting Speed			0.1m/min-5m/min		
Cutting Position Accuracy			0.01mm		
Dimensions			1,600mm×1,000×1,860mm(excluding tower light)		
Power Source			AC200V 50/60Hz Compressed Air (0.5Mpa)		

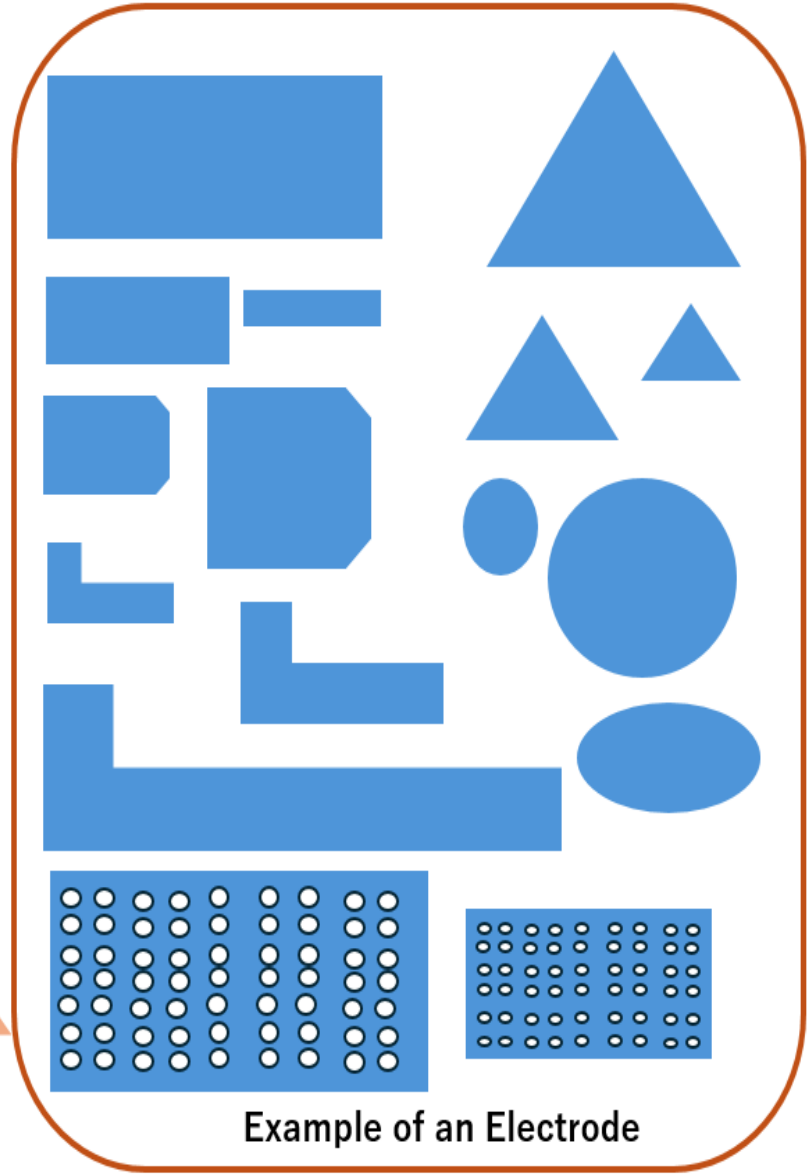
Advantages	○No size limitations, enabling greater design flexibility for electrodes ○When only a ±1mm size adjustment is needed, immediate modification is possible, making this suitable for development themes or verification ○Even with multilayer electrodes that are difficult to punch, burr-less cutting is achievable ○No molds are required, eliminating mold costs and reducing lead time
Disadvantages	○Compared to press punching, mass productivity is lower (best suited for prototyping, small lots, and medium-volume production) ○Slight burrs may occur depending on the laser output ○Initial investment is required (consider equipment size, mold cost savings, speed, and delivery time)

Electrode Laser Punching and Cutting Machine

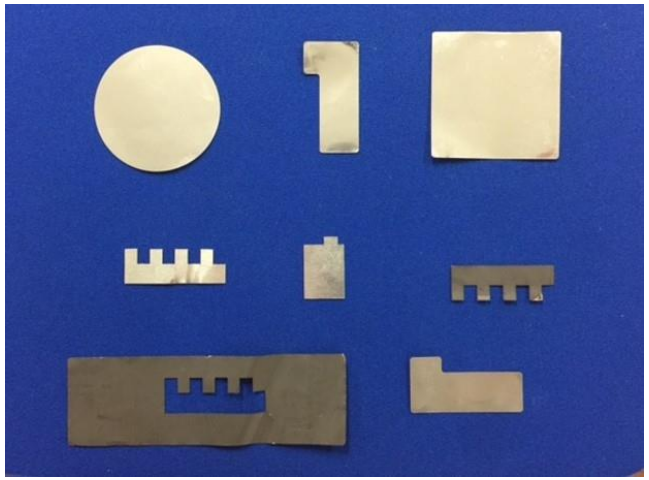
Image of Equipment

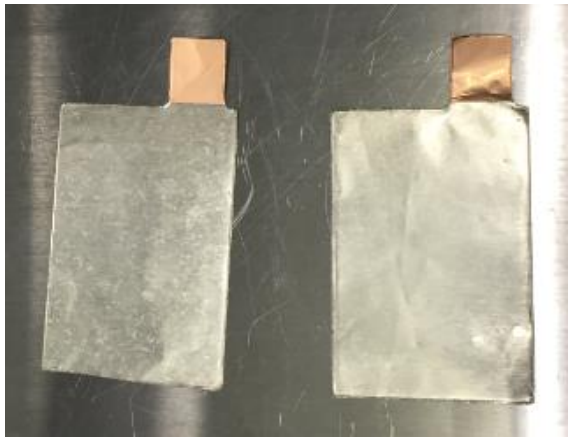


This equipment allows full flexibility in designing electrode dimensions with just one unit.



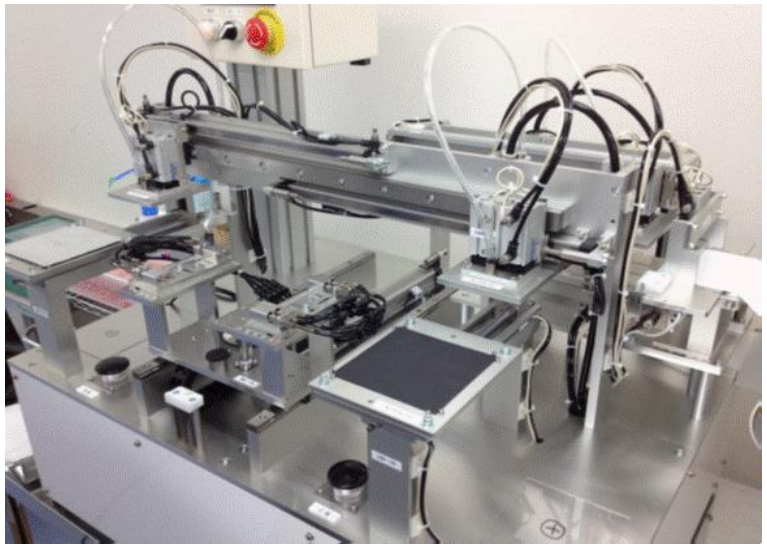
Samples
Aluminum Foil, Cathode,
Copper/Lithium Multilayer Foil





Small Stacking Machine

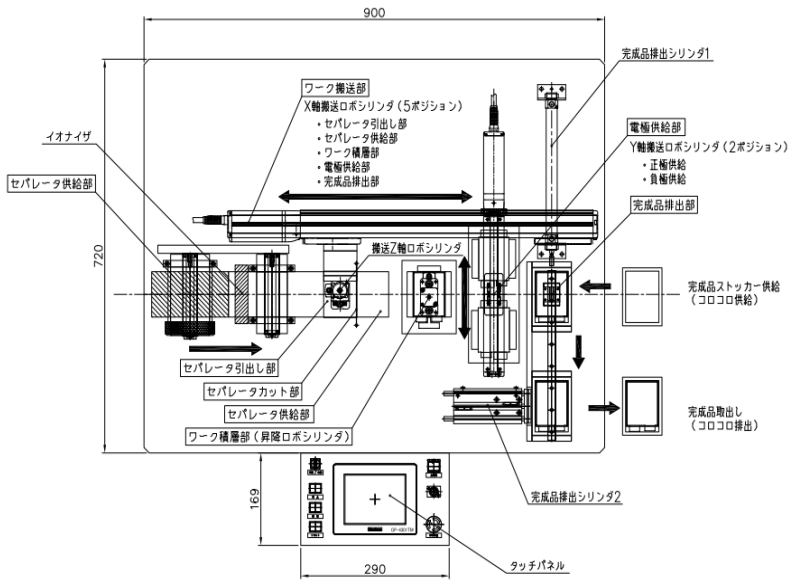
We provide compact (tabletop-type) stacking machines.

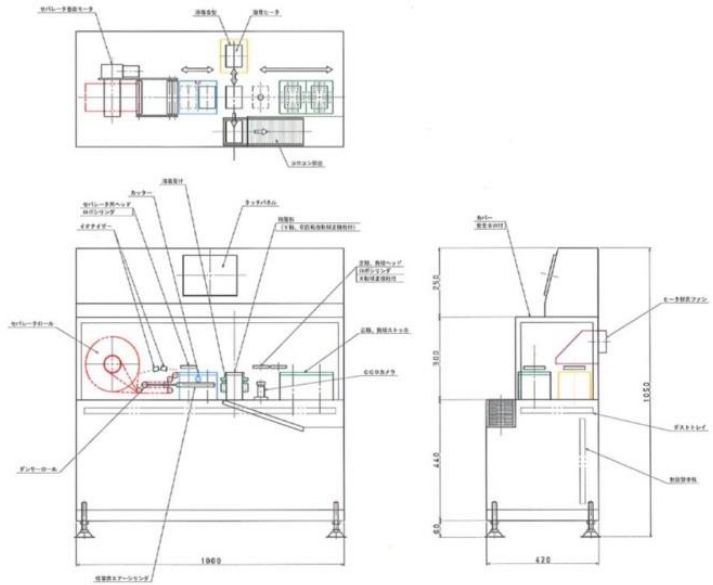


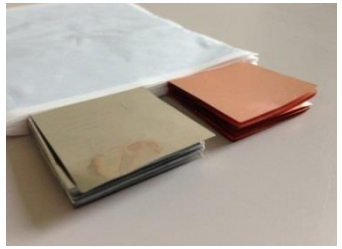
■General Specifications

Stacking Mode	Cathode / Anode / Separator stacking can be freely configured
Workpiece Size	Standard 78×93mm
Separator Size	Standard 80×100mm
Stacking Thickness	Up to 20 mm
Stacking Speed	4.5sec/cell
Stacking Accuracy	Within ±100 μm
Dimensions	983mm×570mm×412mm 80kg

・The machine can be equipped with an original stacking mode, allowing flexible customization of the number of stacked layers.







Processing Services

We provide contract processing and prototyping services for aluminum-laminated lithium-ion batteries. .
Please feel free to consult us regarding any processing difficulties.

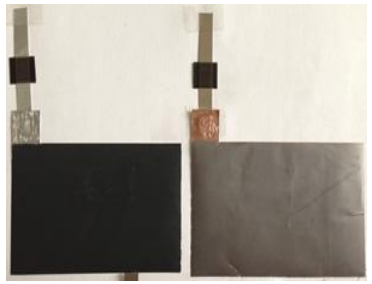
■Processing List

No	Content
1	Battery prototype fabrication (cell production)
2	Slurry coating onto current collectors
3	Electrode pressing process
4	Electrode punching (tab shapes / slot punching)
5	Electrode punching (tab shapes / slot punching)
6	Ultrasonic welding of [Electrode] + [Tab Lead]
7	Outer pouch forming process (up to approx. 10 mm)
8	Welding of [Electrode + Tab Lead] to [Outer Pouch]
9	Electrolyte injection and pouch sealing

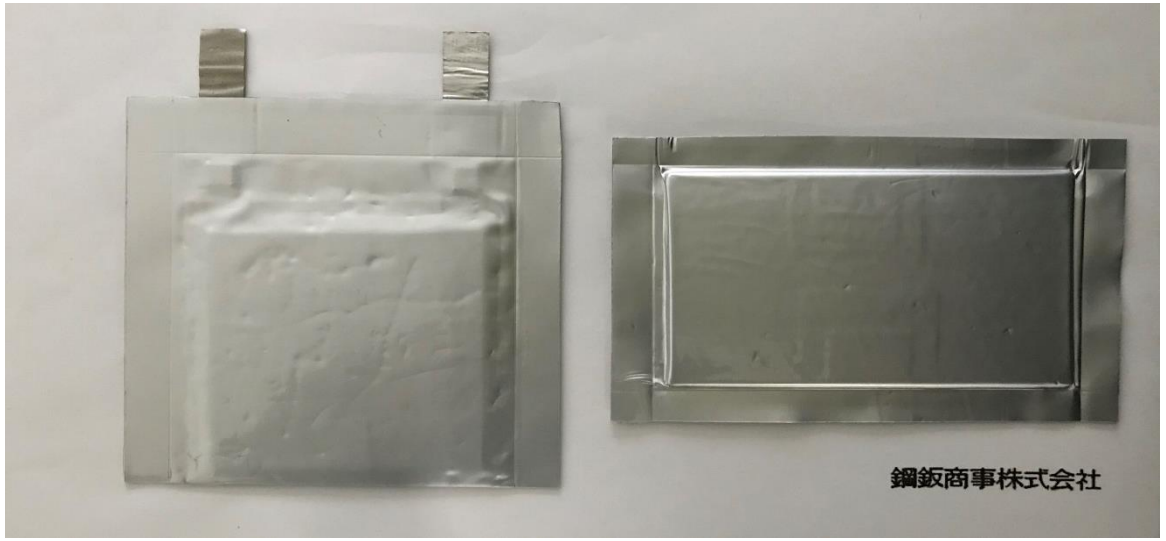
■Past Processing Examples (Extract)

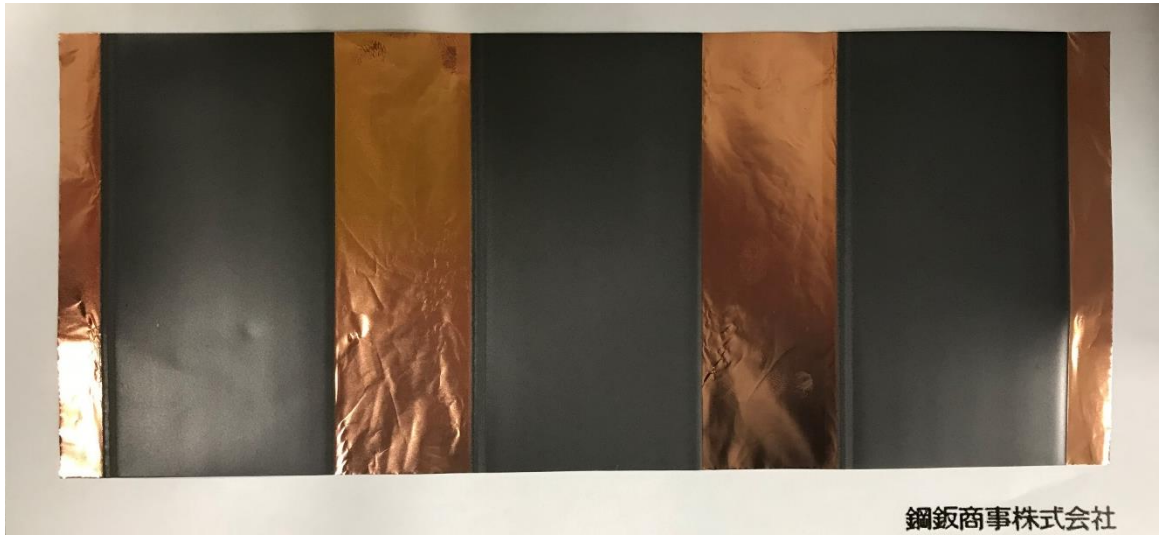
Process Item	Details
Electrode slurry production	Fabrication of cathode / anode slurry
Current collector fabrication	Coating electrode slurry on both sides and defect-area coating
Electrode punching	Laser and tab-shaped punching processing
Slitting process	Electrode slitting processing
Stacking process	Cathode / Separator / Anode stacking processing
Final forming process	Final forming process for outer pouch material
Tab lead fabrication	Fabrication of special tab leads (large tabs, custom designs)
Prototype tab fabrication	Prototype production of tab leads using special metals

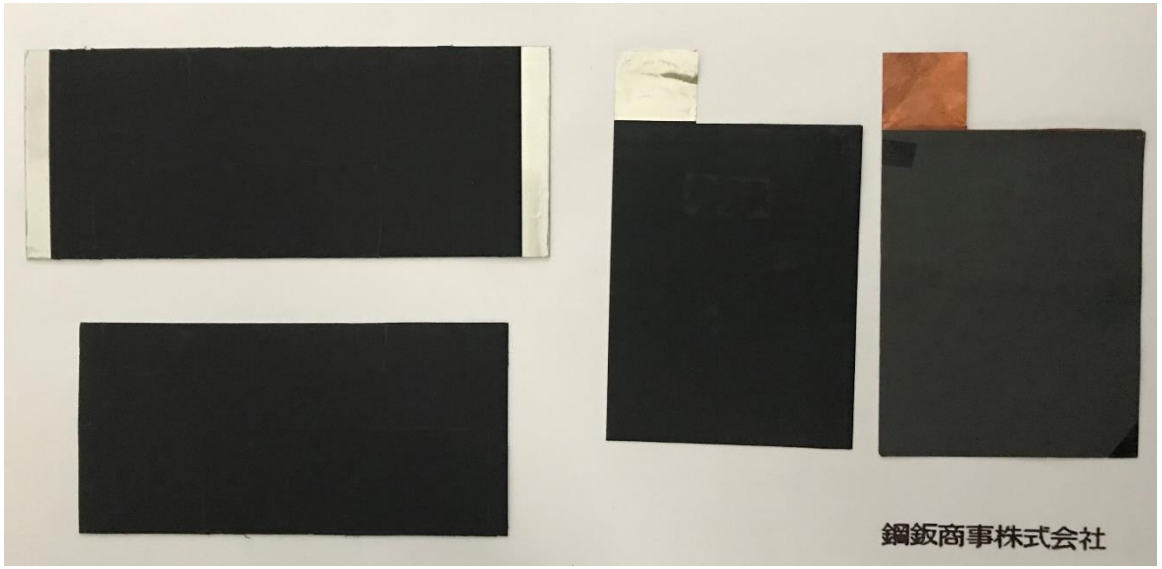


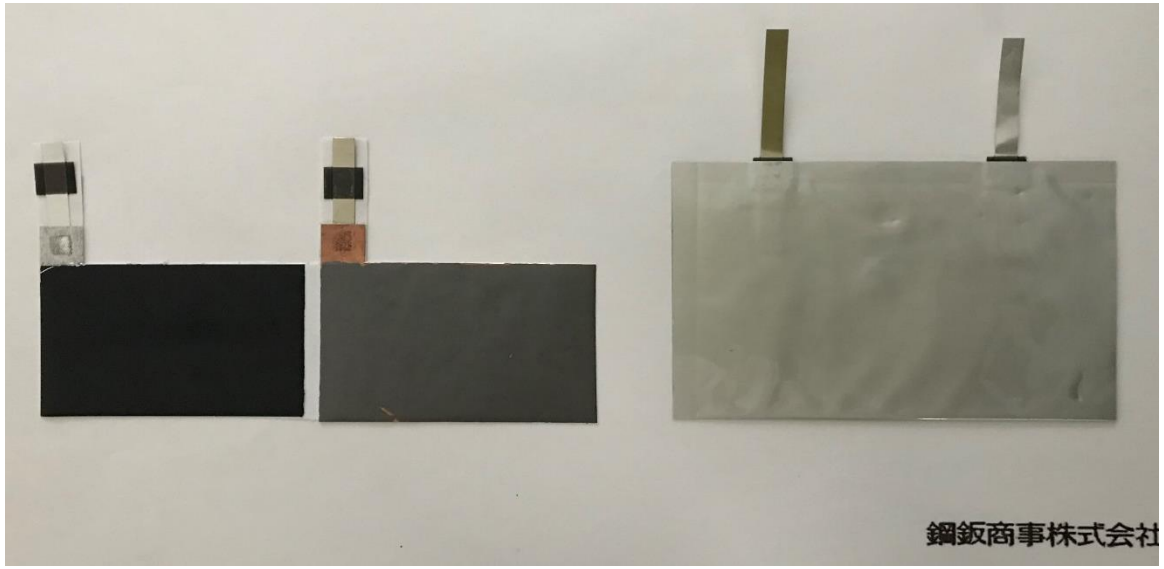



Processed Sample Examples (1)









Processed Sample Examples (2)