Quantitative Addition System

Super capacity filtration system

Water rinsing with cotton core filtration system

Pipe design to prevent copper deposits

Quantitative Addition System
Introduction

LPR Global provides fully automated horizontal and vertical electroplating lines for surface treatment of integrated circuits, consumer electronics, home appliances, automotive components, and medical parts. With over 50 years of experience in designing and manufacturing plating solutions, our electroplating and electroless plating lines achieve uniform plating thickness that minimizes chemical solution waste and post-process grinding work.

We introduced our first automated plating equipment to PCB and electronics manufacturers in 1992 and won South Korea’s President Award that year for this innovative technology. Today our plating lines are installed worldwide at plants making PCBs, automotive parts, and consumer electronics.

Industry Applications

- PCB & Semiconductor
- Consumer Electronics
- Automotive
- Optical Film
- Renewable Energy
- Medical
## Our Capabilities

<table>
<thead>
<tr>
<th>Surface Materials</th>
<th>Applications</th>
<th>Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plating on Plastic</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| ABS | • Home appliance parts: refrigerator and washing machine exterior parts such as trims, door grills, handles and buttons  
• Automotive exterior and interior parts: trim, handles, emblems  
• Electronics parts  
• TV frames | • Ni-Cr ABS Coating,  
• Ni-3 - Cr Plating,  
• Ni-Au Plating,  
• ABS Plating with Direct Trivalent + Hexavalent |
| PCB | • Semiconductors  
• PCBs | • ENEPIG: Electroless Nickel, Electroless Palladium, Immersion Gold  
• Soft ENIG Process  
• Tin Process  
• Electroless Copper Process  
• ENEPIG Ni-Au  
• PATTERN Cu  
• ENAG Ni-Au  
• Electro Ni-Au  
• Pattern Copper Plating  
• Plate-Thru-Hole (PTH) Plating |
| **Plating on Metals** | | |
| Steel  
Stainless Steel  
Aluminum  
Metal Alloys | Automotive shafts, piston pins, shock absorbers, cylinders, brake pistons and gears  
Motorcycle brake calipers and wheels  
Engine components, transmission parts, turbochargers, and fuel systems  
Razor blades | Hard chrome anodizing  
Electrolytic Zinc-Nickel  
Electroless Nickel Plating: Nickel Chloride Base and Nickel Sulfate Base  
Cu - Cu - Ni - Cr Plating |
| **Other Surface Treatments** | | |
| De-smearing | PCB | |
| Plating on rubber | Automotive components such as wipers | Hard chrome plating on rubber |
Automated Electroplating Lines

We have designed, built and installed various automated electroplating lines over 50 years in the industry. Our systems are equipped with an intuitive PLC touchscreen that allows the user to initiate and manage several processes such as dip time per tank or transferring carrier control. Below are some examples of electroplating projects we have successfully completed in the past.
PCB Plating Lines

**Electroplating Line**

*Vertical Continuous Plating Line*

**Electroless Plating Line**

*ENEPIG Line*

*ENIG Line*  
*Electroless Copper Plating Line*  
*Electroless Tin Plating Line*
Vertical Continuous Plating Lines

Vertical Continuous Plating Lines for copper and nickel electroplating are used for mass production of integrated circuits, microprocessors, and connectors. They maintain a high degree of uniform coating thickness and can be used with both soluble and insoluble anodes.

**Plating Conditions**

<table>
<thead>
<tr>
<th>Plating Conditions</th>
<th>Blind Via Hole</th>
<th>Through Hole</th>
<th>Hole Filling Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plating Density</td>
<td>26ASF×38min</td>
<td>15ASF×38min</td>
<td>15ASF×80min</td>
</tr>
<tr>
<td>Linear Velocity</td>
<td>0.585m/min</td>
<td>0.28m/min</td>
<td>0.28m/min</td>
</tr>
<tr>
<td>H2SO4</td>
<td>100 ml/Li</td>
<td>100 ml/Li</td>
<td>100 ml/Li</td>
</tr>
<tr>
<td>CuSO4</td>
<td>117 g/Li</td>
<td>198 g/Li</td>
<td>198g /Li</td>
</tr>
<tr>
<td>Cl</td>
<td>75 ppm</td>
<td>75 ppm</td>
<td></td>
</tr>
<tr>
<td>Details</td>
<td>Hole Diameter: 0.3mm</td>
<td>Surface Thickness: 28.7 micron</td>
<td>Fill Rate: 100%</td>
</tr>
</tbody>
</table>

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Horizontal Plating Lines

- Plating line with sliding transfer system for 0.036 mm PCB panels
- Sweller and permanganate tanks made of 316L stainless steel
- Automatic cleaning system for chemical residue left in the permanganate tank.
- Energy-efficient process: 4 filters to prevent nozzle clogging, double layer cover over the drying zone that conserves 20% power, and automatic switch-off of the power and water supply when the line is idle for a set period of time.
Horizontal Plating Lines

- Plating line with sliding transfer system for 0.036 mm PCB panels
- Designed to minimize copper deposit build-up on the plating tank and pipes
- Contains a circulation system that conserves palladium in the activation process at the pre-treatment stage
- Energy-efficient process: 4 filters to prevent nozzle clogging, double layer cover over the drying zone that conserves 20% power, and automatic switch-off of the power and water supply when the line is idle for a set period of time.

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Horizontal Plating Lines

- Plating line with sliding transfer system for 0.036 mm PCB panels
- Performs vacuum etching process with 97% or higher uniformity, due to embedded sprays with horizontal swivel movements
- Spray nozzle service life: 2 years
- Rolls used to remove film up to 70%
- Knife type nozzle removes residue and air dries at high pressure
- Energy-efficient process: 4 filters to prevent nozzle clogging and automatic switch-off of the power and water supply when the line is idle for a set period.

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Horizontal Plating Lines

- Plating line with sliding transfer system for 0.036 mm PCB panels
- Grinding grease spray system for quick and easy maintenance, with anti-wear UPE spray pump heads and specially designed sidewalls that prevent leaks
- 5 stage separation of water and grinding grease to conserve silicon carbide
- Contains transfer gear cleaner to extend gear life and transfer rolling wheel made of NBR
- Energy-efficient process: 4 filters to prevent nozzle clogging, double layer cover over the drying zone that conserves 20% power, and automatic switch-off of the power and water supply when the line is idle for a set period of time.

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Horizontal Plating Lines

- Plating line with sliding transfer system for 0.036 mm PCB panels
- Spraying tray moves horizontally to create uniformity using a fan-shaped spray nozzle with a 5-year service life
- Knife type nozzle removes residue and air dries at high pressure
- Energy-efficient process: 4 filters to prevent nozzle clogging, double layer cover over the drying zone that conserves 20% power, and automatic switch-off of the power and water supply when the line is idle for a set period of time.
Horizontal Plating Lines

- Plating line with sliding transfer system for 0.036 mm PCB panels
- Dip zones designed to extend chemical solution life
- Quick assemble and disassemble design of spray nozzles for easy maintenance
- Knife type nozzle removes residue and air dries at high pressure
- Energy-efficient process: 4 filters to prevent nozzle clogging, double layer cover over the drying zone that conserves 20% power, and automatic switch-off of the power and water supply when the line is idle for a set period of time.
Surface Treatment Lines for PCBs & Metals

Our Surface Treatment lines for PCBs include Black (Brown) Oxide and Desmearing. We also offer anodizing equipment for Soft and Hard Anodizing for surface coloring, decorative purposes, and corrosion resistance.
Plating on Plastic or Metal

We offer Cr3, Cr6, Black, White, and Pearl Nickel plating solutions for plating on plastic, and hard chrome anodizing for crucial automotive parts like shafts and piston rods. Our solutions achieve precise and uniform chrome thickness that extends service life even in harsh environments.
Carrier Types

Our range of electroplating equipment includes rack, barrel, and reel-to-reel plating lines. The automated barrel electroplating lines contain carriers and barrel moving solutions that increase process efficiency and productivity.

Barrel Moving Solutions

Titanium Barrel  Solution Carrier  Tank

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Control & Safety Systems

Our machines are equipped with safety monitoring systems including sensors and programmed alarms that detect abnormalities in temperature, rectifier, recipes, and more. This information is analyzed in order to prevent future issues and schedule maintenance in advance.

Benefits

▪ Remote monitoring and controlling with real-time data.
▪ Easily integrated with existing Manufacturing Execution Systems.
▪ Wireless data transmission from the plating line to the control center.
▪ Quality control on monitored items such as temperature, rectifier, recipes, etc.

Real-Time Control Monitoring Data
Quality Measures

Automatic Hanger Replacement

RFID technology is implemented to monitor hangers and transferring systems. When malfunctioning hangers are detected, the system automatically unloads and ejects the bad hanger and replaces it with a good one.

RFID Error Detection

Hanger Direction

Automatic Hanger Replacement System
Quality Measures

The filter housing is specially designed for easy clean-up of sludge and increased filtration efficiency using a combined residual sludge drain system with an Outlet-Inlet-Drain process. While the filter cartridge is replaced, the housing can be easily cleaned with water, leaving no residual sludge.
Control & Safety Systems

Double Piping
Solution Leak Prevention
Auto Solution Dispensing System
Enclosed Cover
Load/Unload Auto Door
Exhaust Pressure Management
Safety Locks
One Tank for Entire Rinsing Processes

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Testing & Analysis Equipment

Our testing facilities are equipped with state-of-the-art testing machines and devices to ensure plating quality and chemical uniformity.

**Plating Quality Testing Equipment**

- X-ray Plating Thickness Meter
- Film Thickness Meter
- Salt Spray Testing Machine
- Gloss Meter
- Contact Angle Meter
- Mechanical Polisher
- Ion Beam Polisher
- MIT Bending Tester
- Reflow Machine (Belt-type)
- Reflow Oven (Box-type)
- Wire Bonder
- Dage-4000

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Testing & Analysis Equipment

Plating Chemical Analysis Equipment

- SEM / EDX
- 3D Microscope
- Copper Plating Chemical Analysis
- UV-Vis (Ultraviolet Spectrometer)
- Ion Chromatography
- Inductively Coupled Plasma
- High Performance Liquid Chromatography
- Atomic Absorption Spectrophotometer

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Pilot Testing Lines

We have several pilot testing lines at our facility that implement the 3D-modeled line structure in order to optimize line production lead time and line set up time.
Our Clients

PCB and Semiconductor Manufacturers

Samsung  
LG Innotek  
Daeduck

Smartphone and Automotive Manufacturers

Luminus  
Geumgang  
Sin Shin Chemical Ind

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Your connection to Korean manufacturing and industrial equipment

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