Surface Technology –
Overview of Electrostatic Painting and Coating Technologies

Technical Overview

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**Introduction**

OTSON focus on liquid (solvent and waterbase) electrostatic technologies, we provide many liquid (solvent and waterbase) electrostatic spray types of equipment for worldwide customers. We also provide various electrostatic spray systems. Surface Treatment and High AERO Technologies for Liquid (solvent and waterbase) electrostatic spray can significantly improve the finishing quality and production while reducing the paint consumption, the waste discharge, and the maintenance cost.

Our products are in below list
<table>
<thead>
<tr>
<th>System</th>
<th>Fix Stand or by reciprocator</th>
<th>Spray Booth Style</th>
<th>Atomizing Performance</th>
<th>Consumption</th>
<th>Spray Pattern</th>
<th>Productive Rate</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTS-5000 Disk Electrostatic Automatic Coating System</td>
<td>Good</td>
<td>Disk Electrostatic</td>
<td>Excellent</td>
<td>High atomizing performance is achieved by OTSON precision structure.</td>
<td>Good</td>
<td>60,000 RPM</td>
<td>For mass production works and disk coating system.</td>
</tr>
<tr>
<td>OMEGA Booth OTS-8000 Auto Electrostatic Spray Gun System</td>
<td>Acceptable</td>
<td>Reciprocator &amp; rails conveyor (60,000 RPM)</td>
<td>Good</td>
<td>Acceptable (Auto spray gun is driven by air. Its paintings consumption will be more than high atomizing Bell Cup System. Conveyor speed: 7 Mtrs/min - 9 Mtrs/min. Around Disk atomizer strike distance could be used.)</td>
<td>Fix stand or by reciprocator</td>
<td>4 Mtrs/min</td>
<td>By up to down reciprocator &amp; rails conveyor</td>
</tr>
<tr>
<td>OMEGA Booth OTS-9000 Auto Electrostatic Spray Bell System</td>
<td>Good</td>
<td>Electrostatic spray bell system</td>
<td>Excellent (Bell Cup atomizer stroke from down to up)</td>
<td>High atomizing Bell Cup, spray pattern is around 25 cm (Diameter). Conveyor speed: between 1.8 Mtrs/min - 2.0 Mtrs/min</td>
<td>Good</td>
<td>1.8 Mtrs/min - 2.0 Mtrs/min</td>
<td>Note: by Bell system, it is not suitable for rotate hangers.</td>
</tr>
</tbody>
</table>
Dual Coating for Solvent and Waterborne Paint

- Disk (Rotary Atomizer)
- Reciprocator
- Air / Paint Tube / H.V. Cable
- Axial Flow Fan
- Spray Booth
- Paint Dosing Pump
- Insulating Table
- Microcomputer Control Panel
- Electrostatic Power Supply
- Air & Oil Filter
- Track

MAX 60000rpm
(no loading spray disk)

Innovative Technology of Liquid Electrostatic Spray Coating Systems
Liquid Electrostatic Coating Application

- Small parts
- Bicycle
- Application
- Small parts
- Bicycle
- Computer Housing
- Stationeries
- Wooden Furniture
- Hardware
- Lockers
- Freezers
- Iron Railing
- Display Cases
- Office Partitions
- Medical Equipment
- Restroom Partitions
- Roller Bars
- Metal Doors
- Decorative Lamps
- Electrical Home Appliances
- Car Accessories, Teflon Pot
- Sports Equipment
- Handcraft
- Files
- Desks
- Sports Equipment
- Handcraft Computer
- Housing
- Stationeries
- Wooden Furniture
- Hardware
- Lockers
- Freezers
- Iron Railing
- Display Cases
- Refrigerators
- Heavy Machinery
- Office Equipment

Electrostatic Spray Coating and Painting

Liquid Coating, Waterborne Coating, Metal Coating, Wood Coating, Plastic Coating

Advantages of Electrostatic Coating

Improvements in transfer efficiency can lead to less paint waste and lower emissions of VOCs. Transfer efficiency depends on a large number of parameters. Some of these parameters are under the control of the operator, while others are not. For example, the Spray technology. We can see the chart that why electrostatic is better than others.
The principles of electrostatic charging apply equally to liquid (solvent and waterbase) coatings. In electrostatic coating, the fluid is atomized, then negatively charged to the object, thus having a less negative charge than the paint. Increased transfer efficiency is achieved, up to 95%. For instance, it is possible to spray paint a cyclone fence electrostatically with fair transfer efficiency. Both sides of the fence can be painted from only one side due to the electrostatic attraction.

Atomized paint droplets are charged at the tip of the spray gun by a charged electrode; the electrode runs 30 to 140 kV through the paint at 0 to 225 microamperes. So, it is mean that the electrical force needed to guide paint particles to the work piece is 8,000 to 10,000 volts per inch of air.

The microscope picture (500X) of atomization droplet which is done by OTSON atomizer, the droplet diameter between 1.0-5.0 µm.
OTS-7800 Auto Electrostatic Spray Bell –Robot ARM

Multi Bell Cup for different application

OTS-7900 Auto Electrostatic Spray Gun – Robot ARM

Round Tin Nozzle(A)  Round Tin Nozzle(B)  Round (FRP) Nozzle  Flat (FRP) Nozzle
Features

- **Dual Coating** - Solvent and Waterborne Paint
- **Improving Coating Quality** - Uniform Film Thickness
- **Good Edge Cover** - High quality atomisation and coating finish
- **Reducing Coatings Cost** - High Transfer Efficiency
- **Good Wraparound** - Very little over spray and no bounce back
- **Low VOC** (volatile organic compounds) **Emissions** - Reducing Air Pollutions
- **Reducing Water Pollutions**
- **High Production Rates**
- **Long Life Operation**
- **Low Failure Rate**
- **Easy Maintenance**

Application - Bicycle

Primer Coating
● Dual Coating - Solvent and Waterborne Paint

● Improving Coating Quality - Uniform Film Thickness

● Good Edge Cover - High quality atomisation and coating finish

● Reducing Coatings Cost - High Transfer Efficiency

● Good Wraparound - Very little over spray and no bounce back

● Low VOC (volatile organic compounds) Emissions - Reducing Air Pollutions

● Reducing Water Pollutions

● High Production Rates.

● Long Life Operation

● Low Failure Rate

● Easy Maintenance

Primer Coating

Round FRP Nozzle

Flat FRP Nozzle

Round Tin Nozzle

Atomization Point (air + lacquer + electrostatic)

Electrostatic Power (20 Kv ~ 100 Kv)

Flat FRP Nozzle

Spiral Spray Pattern

Lacquer-Particle (negative iron)

Positive iron

Grounded

Object

High Electrostatic Voltage Cable 100Kv

Air Tube

Paints Tube

ATEX
The Spray Direction of High Atomized Nozzle

Special Design Bell Cup for all Spray Object

Twin Turbine
OTS-3000 Plus - Manual Liquid Electrostatic Spray System

HYBRID

WATERBASE COATING

Spray Booth

High Voltage Cable

Air Hose

Air Compressor

Air Dryer

Electrostatic Power Supply

Earthing Cable

Air Supply Line

Paint Supply Line

Spray Booth

Conveyor

Spray Gun

Small Particle Atomization

Object

Ground

Spray Booth

Conveyor

Small Particle Atomization

Spray Gun

Object

Ground

Paint Tank

OTS-10 Air Powered Double Diaphragm Pump

Air Dryer

Air Compressor

Electrostatic Power Supply

Earthing Cable

Air Supply Line

Paint Supply Line

Air Heater

30 cm Isolation Table
Before

After

Flat Nozzle - Air Fan Pattern Control

Paints Output Flow Control

Round / Flat Nozzle - Air Flow Control

High Electrostatic Voltage Cable 70Kv

Paints Tube

Air Tube

Flat FRP Nozzle

Electrostatic Power (20 Kv ~ 70Kv)

Object

Grounded

Lacquer-Particle (negative iron)

Positive iron

Spiral Spray Pattern

Atomization Point (air + lacquer + electrostatic)
Benefits of Electrostatic Spray Technologies

- Improve Finishing Quality
- Reduce Refinishing Work
- Time Savings
- Reduce Paint Wastage
- Material Savings

Reduce Paints Costs

Return-on-Investment (ROI)

By replacing Conventional Air Spray gun with Auto Electrostatic Spray Bell, DISK and Gun Systems

<table>
<thead>
<tr>
<th></th>
<th>Typical</th>
<th>Calculate Your Own Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint price per litre</td>
<td>USD 10</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Litre Used per Day</td>
<td>100 litres</td>
<td>X</td>
</tr>
<tr>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Days per Year</td>
<td>220 days</td>
<td>X</td>
</tr>
<tr>
<td>Electrostastic Transfer Efficiency</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>Annual Savings</td>
<td>USD 209,000.00</td>
<td></td>
</tr>
</tbody>
</table>
Electrostatic spray of 1 layer liquid coating

Metal Material

14 µm thickness

Electrostatic spray of 4 layers liquid coating

Aluminium Material

94 µm thickness
In the case, our products transfer efficiencies range from 85% to 95% (normal case), it means that you can save your money in paint cost. Meanwhile, Excellent edge coverage is achieved because electrons are attracted more strongly to edges than to flat surfaces, the attractive forces of electrostatics will to some extent draw paint droplets around to the back side of the parts, a phenomenon called wraparound or wrap. As for coating thickness issue, it forms an electrically insulating layer. Additional paint droplets are attracted most strongly to areas on the part where grounding is best, that is, the spots where paint is thinnest, result in a more even film thickness.

Conclusion

The cost spent on buying one set of electrostatic Coating Machine. With some investment, you can cut off huge costs required for paint and the technician while increasing your production and improving product quality. Abiding by human-based spirit, the ultimate goal of manufacturing the Electrostatic Automatic Coating Machine is to efficiently use the energy, improve the quality and protect the environment.
For more information, go to www.otson.com

For further information on OTSON’s electrostatic products, please contact:

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