SCIPlasma

Plasma and Vacuum Specialists

UEN & GST REG NO. 200610018W

SCI Automation

Company Profile

SCI Automation

- A leading manufacturer of **Plasma cleaning equipment operation with global footprint across 350+ Hi-tech Global Manufacturing facilities**
- We provide effective solutions to the **Semiconductor, Electronic, Automotive** industries since the year 2000.

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A brief history

2000 Founded as Structural Coatings International in Italy Operates with Trademark

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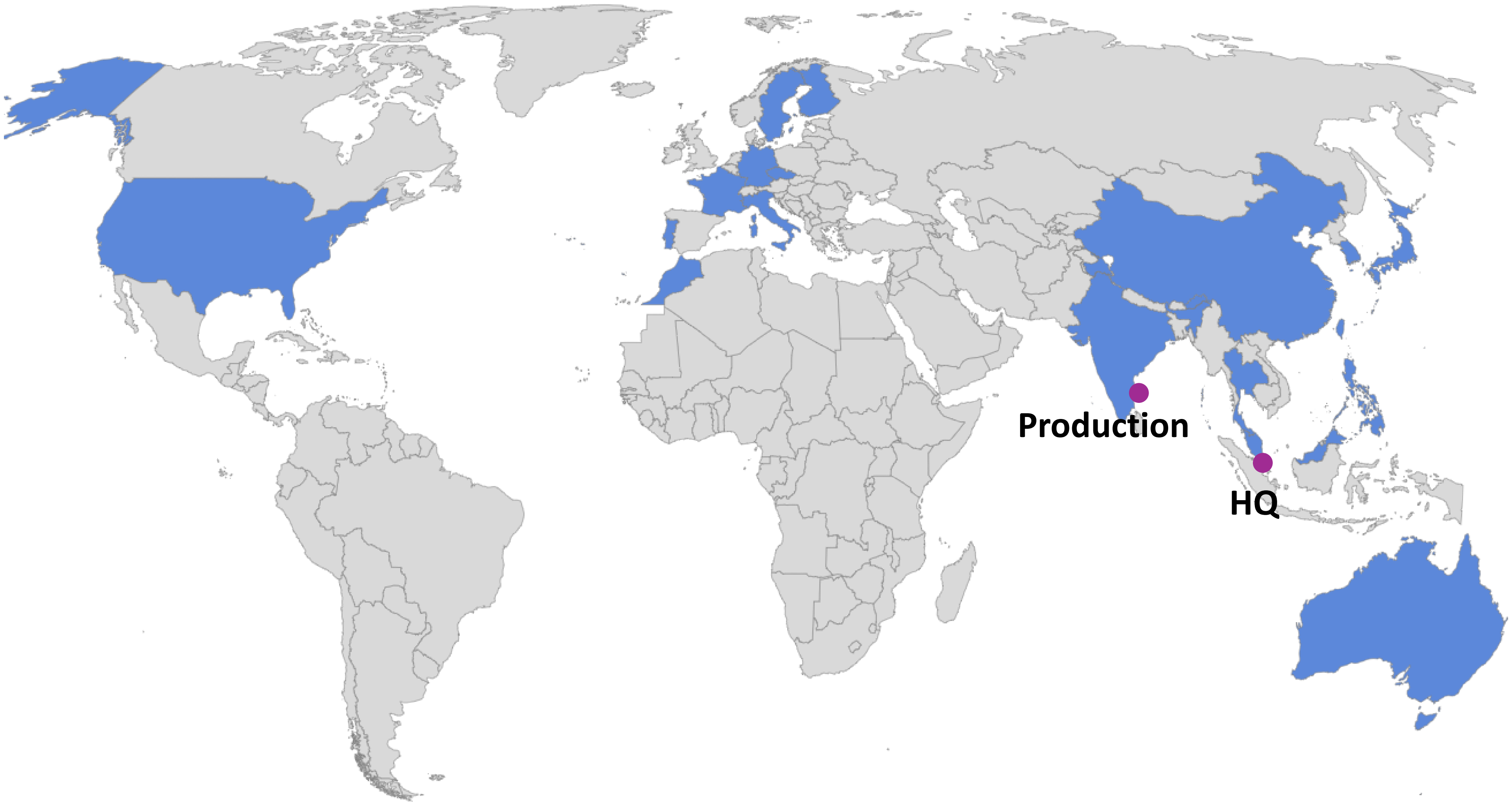
2004 In 2004, chosen as solutions provider for a major European semiconductor company

2006 By 2006, established presence in Asia, Asia-Pacific, Europe, Japan and the United States

2007 In 2007, SCI moved its HQ in Singapore

2026 HQ in Singapore; Production in Chennai, India and local presence in the Philippines and Thailand, Installation over 350+ Global sites

Global Presence



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Customer Base

BorgWarner
ROHM SEMICONDUCTOR
NXP
ST life.augmented

Valeo
imi
VISHAY
unisem

MAGNA
BROADCOM
Inari Amertron
atec AUTOMATED TECHNOLOGY (PHIL.) INC.

Ontinental The Future in Motion
vitesco TECHNOLOGIES
MICRO-MECHANICS®
onsemi
PALOMAR TECHNOLOGIES

MILITARY DEFENCE EQUIPMENT MANUFACTURER
华天科技 HUA TIAN
LINGSEN
AWAK

Western Digital.
SEAGATE
arQana
CANATU

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The Manufacturing Problem (Why Plasma?)

Surface Contamination

In modern manufacturing, even the smallest microscopic contaminants can lead to catastrophic failures, Whether it is poor adhesion, delamination due to material incompatibility, or unstable wire bonding, Organic contamination, mold residues are the root cause of many unwanted phenomena in the manufacturing process Semicon, Electronic PCB's, Sensors, Lens

Semiconductor

- **Delamination**
- **Week Wire bonds**
- **Underfill Voids**
- **High Contact angle**

Electronic PCB's

(Automotive/ Industrial/ Consumer)

- **Delamination**
- **Week Wire bonds**
- **Poor Adhesion**
- **High Contact angle**

Healthcare / Lens

- **Coating Pealing**
- **Trapped Bio Contaminants**
- **Haptic bond Failures**
- **High Contact angle**

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Baseline Metrics

Key metrics indicating low yields without a plasma process step

CONTACT ANGLE

High Contact Angle

Water contact angle values above 50° indicate poor surface state.
This means poor wettability; low surface energy generate weak adhesion.

WIRE BONDING

Low pull force
Low shear strength

Low pull test force and low shear strength results indicate unreliable bonds.
This means premature failure in end products.

TRANSFER MOLDING

Delamination

Delaminated surfaces, highlighted by CSAM analysis, indicate reject products.
These defects can generate hot spots and early failures in end products.

UNDERFILL

Voids

Voids presence after epoxy curing indicate bad adhesion.
These defects may mean an immediate reject leading to a low production yield

⚠ These baseline conditions lead to field failures, rework, and yield loss in production

Plasma Process - Steps

PREPARATION

1

LOAD

The products are loaded into the plasma chamber

2

PUMP DOWN

The air is evacuated to reach the target vacuum pressure

3

PROCESS GAS

The process gas lines are opened to reach the target flow rate and target process pressure

PROCESS

4

PLASMA ON

The RF signal is turned ON,
plasma is ignited.
Cleaning and activation in progress

COMPLETION

5

VENT

Air or nitrogen is introduced in the plasma chamber to vent it and reach atmospheric pressure

6

UNLOAD

The plasma treated clean products are removed from the plasma chamber

Plasma Process - Parameters

PROCESS GAS

Range: Ar, O_2, H_2, CF_4, SF_6

Typical: Ar (physical) or O_2 (chemical)

RF POWER

Range: 100 – 600 W

Typical: 300–400 W at 13.56 MHz

PROCESS TIME

Range: 15 – 60 sec

Typical: 20 sec

PRESSURE

Range: 0.05 – 1.9 mbar

Typical: < 0.15 (physical), 0.15–0.9 (chemical)

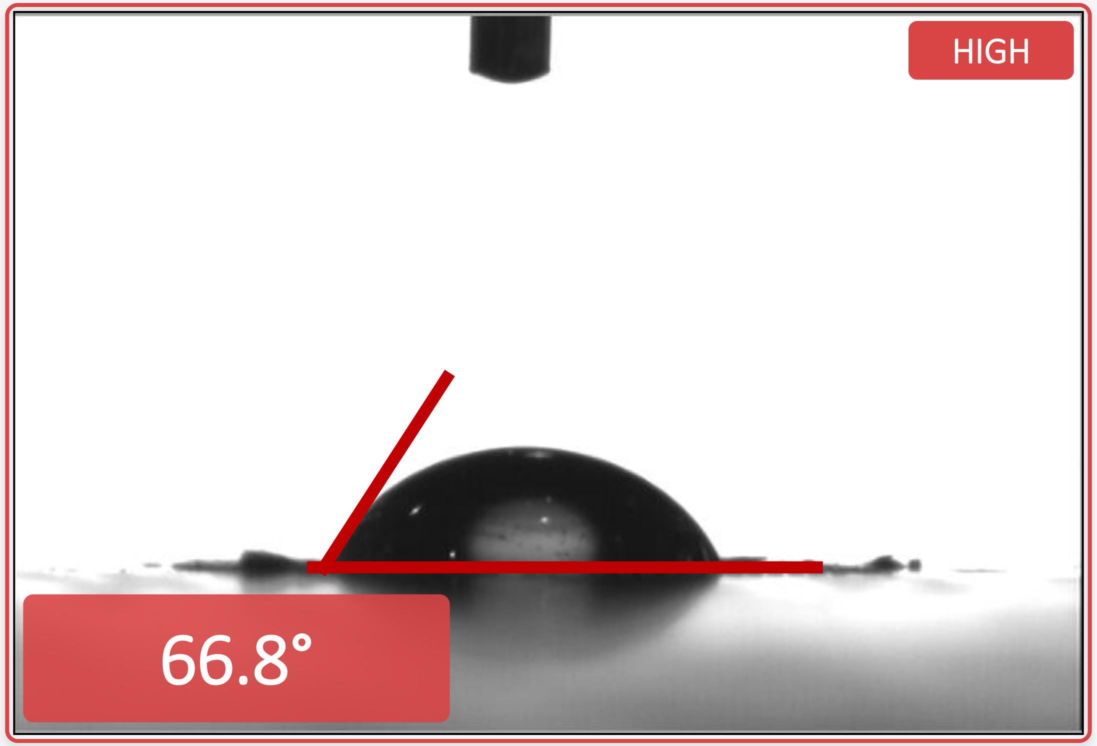
CONFIGURATION

Range: PE / RIE / Downstream

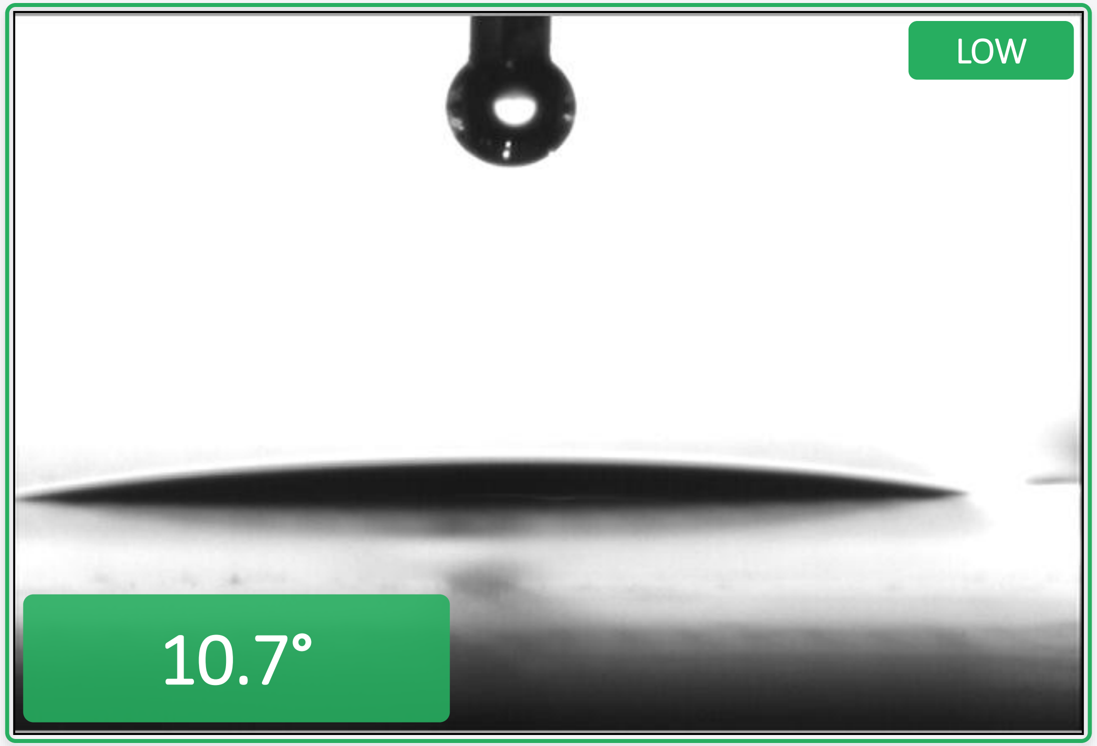
Typical: RIE for high etch rate, PE for milder conditions

Contact Angle – Before / After Plasma

BEFORE PLASMA



AFTER PLASMA



84% Reduction in Contact Angle | Surface Energy Dramatically Increased

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Lower contact angle = higher surface energy = better adhesion for bonding and molding

Final Outcomes - Plasma cleaning

Cleans Organic Contamination , Activate Surface

Improves Quality & PPM levels

Eliminate rejects

Reduce Cost of Poor Quality

Material Agnostic. Performance Driven

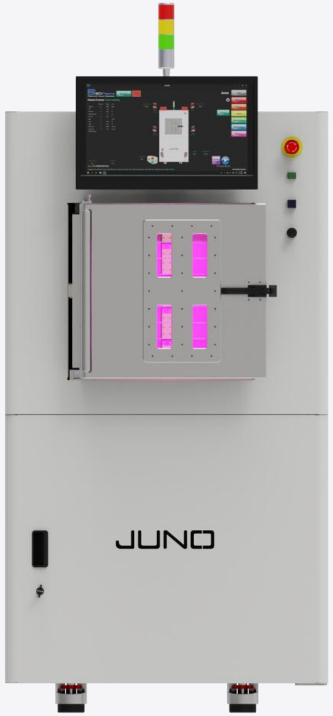
State-of-the-art plasma solutions

Plasma for Lead Frames

Standalone

Inline Plasma

Inline



Batch Plasma

Standalone

High Power Plasma

Standalone

Plasma for lead frames in magazines

TITAN

QUADRIO ALPHA

Inline Plasma

QML-B

QML-CI

Batch Plasma

AEON

JUNO

ATLAS

High-Power Plasma

AEON-HP

ARES

Surface Activation Excellence- The SCIPlasma Edge

- Proven System with 25+ years in Market
- Proprietary Windows based software to ease of Operation store recipes for multiple products
- Uniform Plasma distribution
- High efficiency by achieving Low contact angle
- Designed for Semi, Cleanroom Standards and Compatible with CE Mark
- Application specific machines to suit your production flow & Throughput
- Low cost of ownership

SEMICONDUCTOR

Wire-bonding - Performance

Leads may be oxidized without plasma treatment

WITHOUT PLASMA

NON-STICK ON LEAD

20/64

AVG PULL TEST FORCE

27.5 mN

AFTER PLASMA

NON-STICK ON LEAD

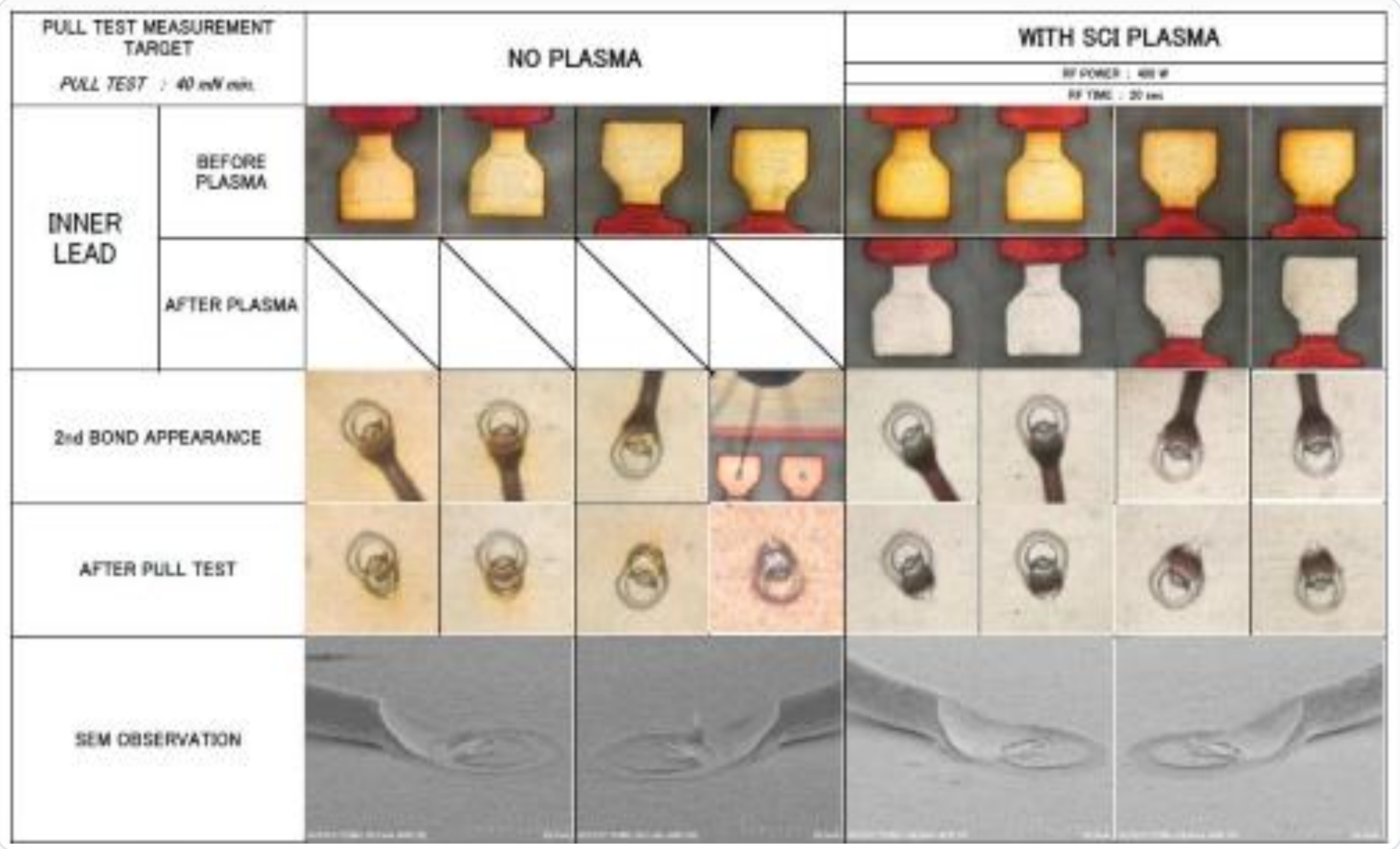
0/64

AVG PULL TEST FORCE

93.3 mN

✓ NSOL completely solved
✓ Bonds are 3.4x stronger after plasm

PROCESS: Quadrio Alpha, Strip Plasma, Argon RIE
SETTINGS: RF 13.56MHz 400W, 20 sec | CA: <20°



Experimental data: Wire bond pull test results — before (left) vs after (right) plasma treatment

Electronic PCB’s

(Automotive/ Industrial/ Consumer)

Yield - Performance

Global Automotive and Electronics Manufacturer* Achieves 80-90% Increase In Yield Using Custom Plasma Cleaning Solutions.

Before	AFTER
Low Yields	Yield Increase **80-90%**
Micro Gaps	Automated Machine **Increase in efficiency**

✓ **Yield Increase**
✓ **High Efficiency**

PROCESS: QML-CI, Inline Plasma, Argon / Oxygen
SETTINGS: RF 13.56MHz 220W, 200 sec | CA: <20

SCIPlasma Approach

- Evaluation and testing to prove the recipe and treatment would be effective. Lab-based testing by measuring contact angle displacement.
- Customization of hardware to meet the technical requirements.
- Single lane single chamber in-line automatic system installed and process fully automated (2019).
- Subsequently, the customer wanted to further increase output. So SCI supplied a dual-lane plasma cleaning system to boost efficiency as well as a degassing machine which automated the manual process of degassing.
- Installed a quad-lane, dual-chamber automated plasma system, which unlocked a further level of efficiency and yield.

Healthcare

Yield - Performance

Medical Device Manufacturer* Achieves (nearly) 100% Yield In Their Assembly Process and Moves to Mass Production Thanks to Plasma Cleaning Solution

Before Plasma	AFTER PLASMA
Low Glueing	Achieved 100% Yield
Higher Defect rates	Zero Defects
Could Match 100% Yield	Achieve Mass Production

✓ 100% Yield
✓ Zero Defects

PROCESS: Aeon, Batch Plasma, Oxygen
SETTINGS: RF 13.56MHz 300W, 400 sec | CA: <20

SCIPlasma Approach

- Evaluation study to prove the recipe and treatment. This took more than a year of testing and trials to achieve the right recipe.
- Delivered and installed a batch plasma cleaning system which was sufficient for customers' small volume of production.

Production Throughput Impact

BATCH PLASMA

JUNO

Ideal for odd-shaped products

High flexibility

INLINE PLASMA

QML-B

Designed for automotive applications with integrated production lines

Continuous flow | Full line integration

STRIP-TO-STRIP PLASMA

QUADRIO ALPHA

Individual frame processing for optimal plasma treatment results

Per-frame process | Best uniformity

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Choosing the correct plasma system guarantees the target process throughput

ROI Implications

Yield Improvement

~100%

FAILURE ELIMINATION

- Wire bond failure: 31% → 0%
- No delamination after plasma process
- Higher adhesion and better overall finished products
- Lower failures on delivered products thanks to the better manufacturing process

Cost Advantages

Low Cost of Ownership

MINIMAL FACILITY REQUIREMENTS

- Minimal consumable cost vs wet cleaning
- No chemical waste or safety overhead
- Cleanroom compatibility up to ISO5 (100)

Production Value

36–60s

FAST CYCLE TIME

- High throughput with no impact on the manufacturing process
- Multiple solutions: batch, inline, and strip to strip to match productions needs

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PLASMA PROCESS DELIVERS ZERO-DEFECT HIGH YIELD WITH A LOW TOTAL COST OF OWNERSHIP

Contact Us

We look forward to collaborate together

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