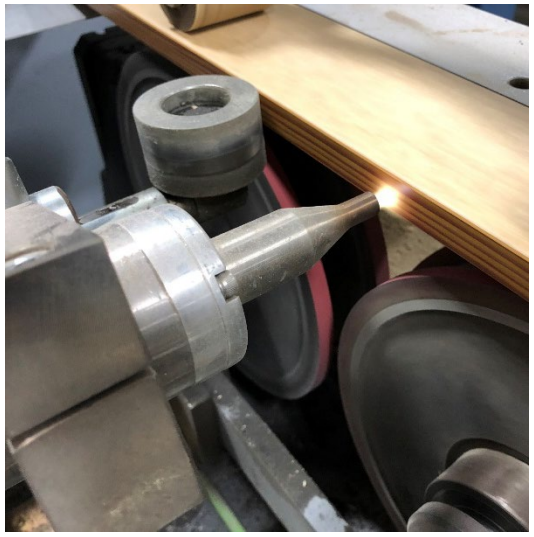
Improving Adhesion with Plasma or Flame

Which is best for your application?

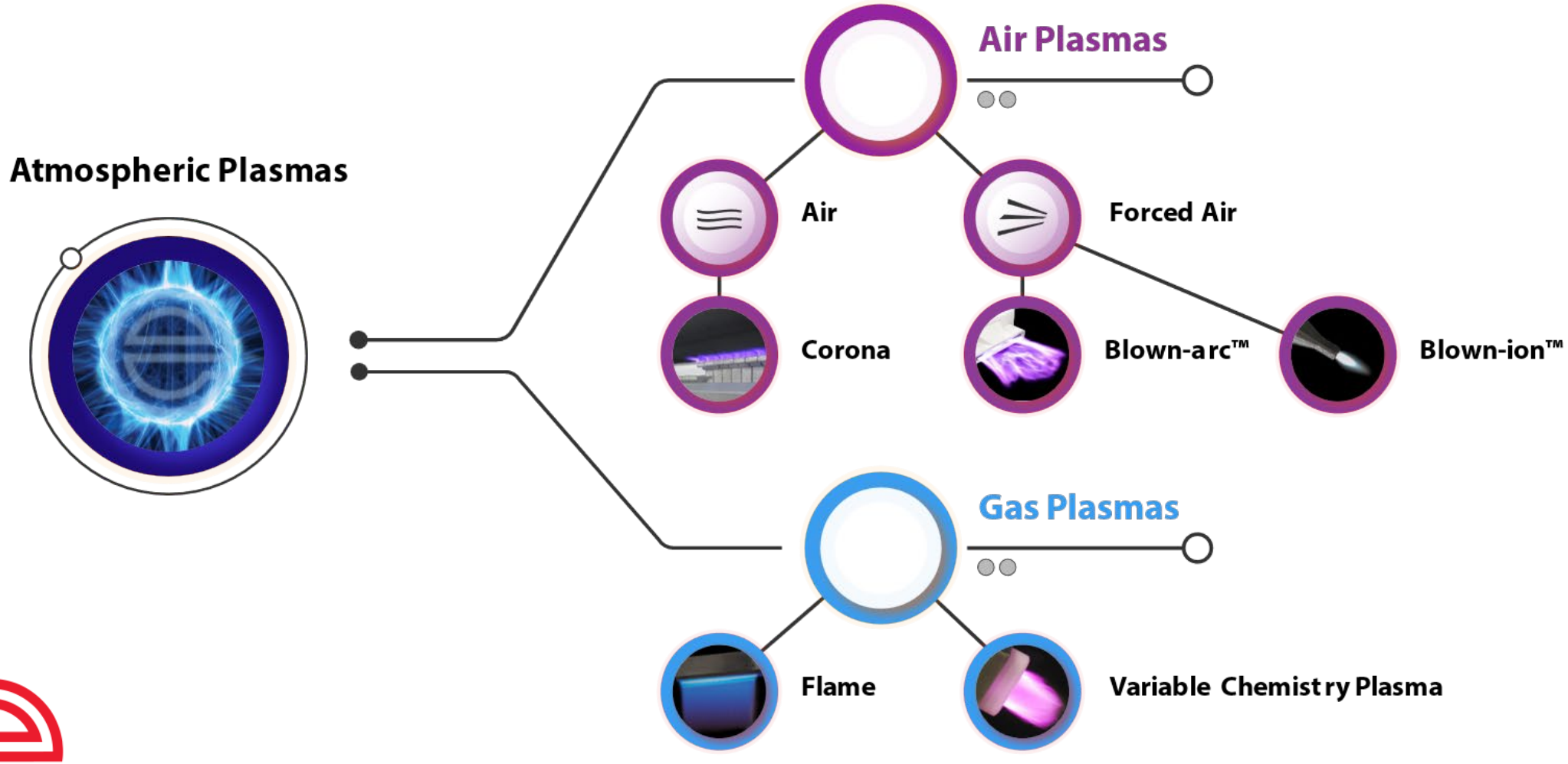
What surface treating can do for you.

- Create Stronger Bonds
- Reduce Material Costs
- Increase Throughput
- Improve Product Quality
- Repeatability



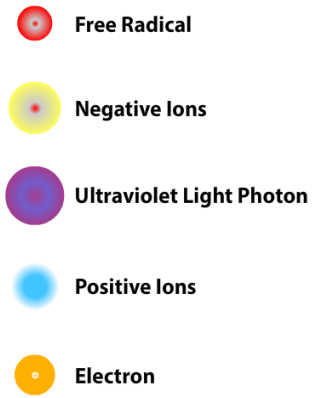
Improving Adhesion with Plasma or Flame

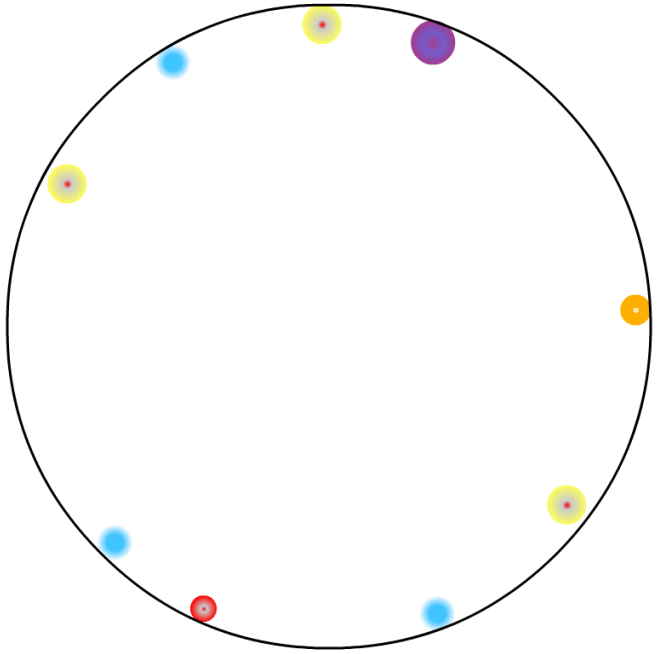
Types of Treatment Technologies



What is Plasma?

plasma : *n* ; "Fourth state of matter", (Solid, Liquid, Gas, Plasma.)
Mixture of charged ions & energetic electrons generally in equilibrium.





What does plasma treatment do?

CLEAN

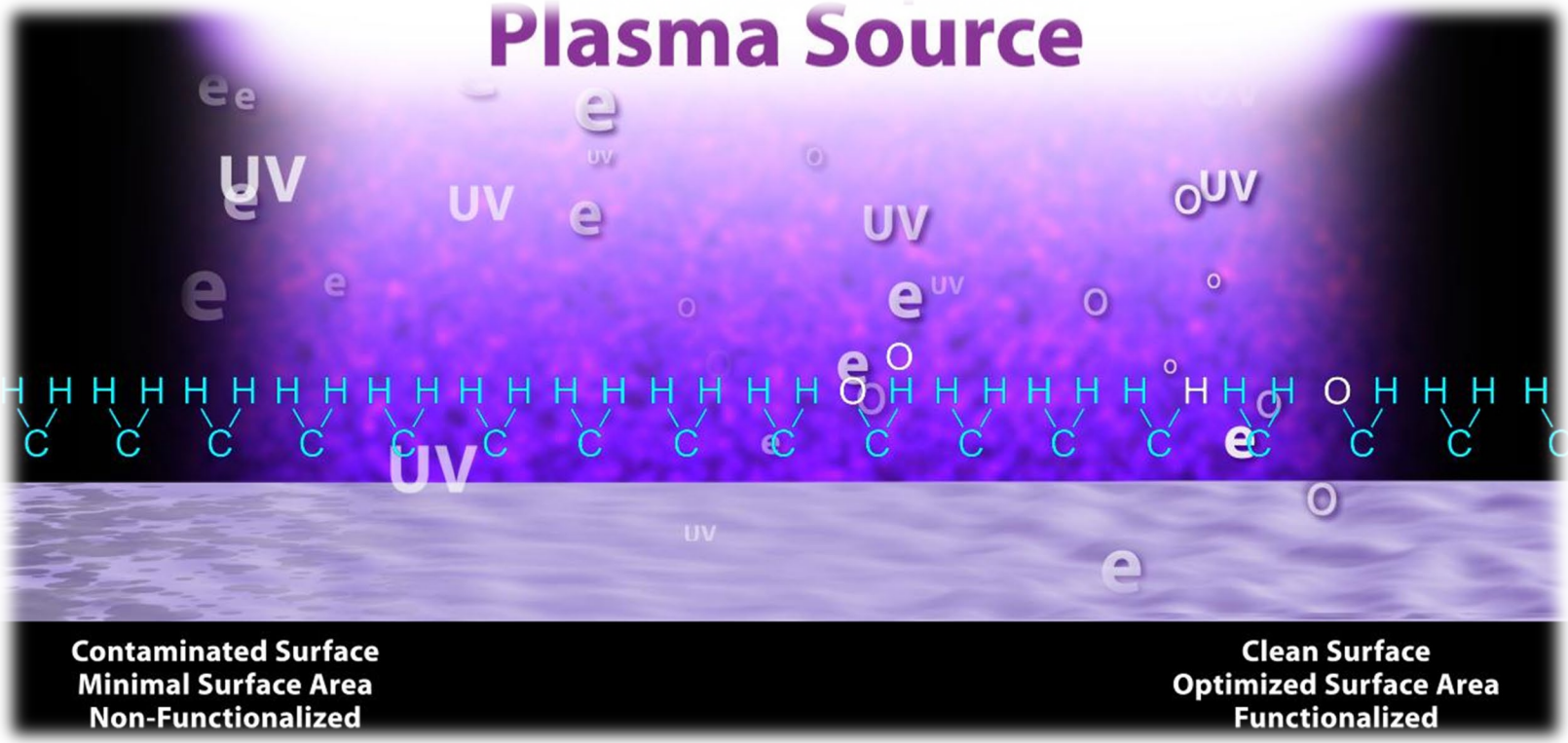
Plasma treatment removes organic and inorganic impurities & contaminants from the surface.

MICROETCH

Increases surface area creating more bonding sites, which promotes adhesion.

FUNCTIONALIZE

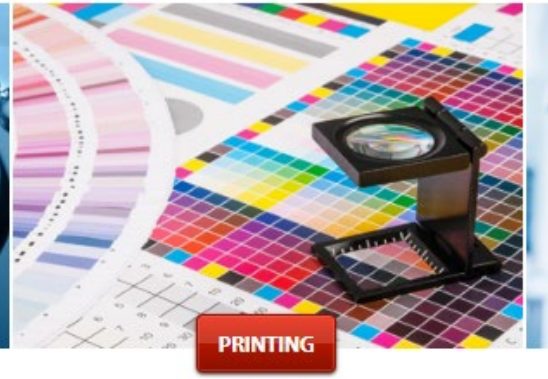
Increases polar groups, which directly contributes to the surface's adhesion properties.



Who uses surface treatment?

ADHESIVES

Get insights on plasma and flame for improving adhesive bonding.



PRINTING

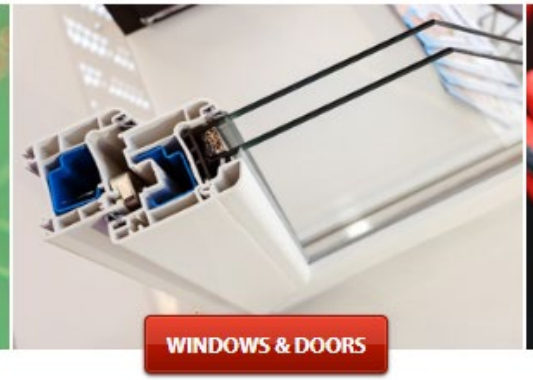
Discover better ink adhesion with plasma & flame treaters.

AUTOMOTIVE

See how automotive manufacturers use plasma & flame treatment.

ELECTRICAL POTTING

Find out how pretreatment improves adhesion for electrical potting.



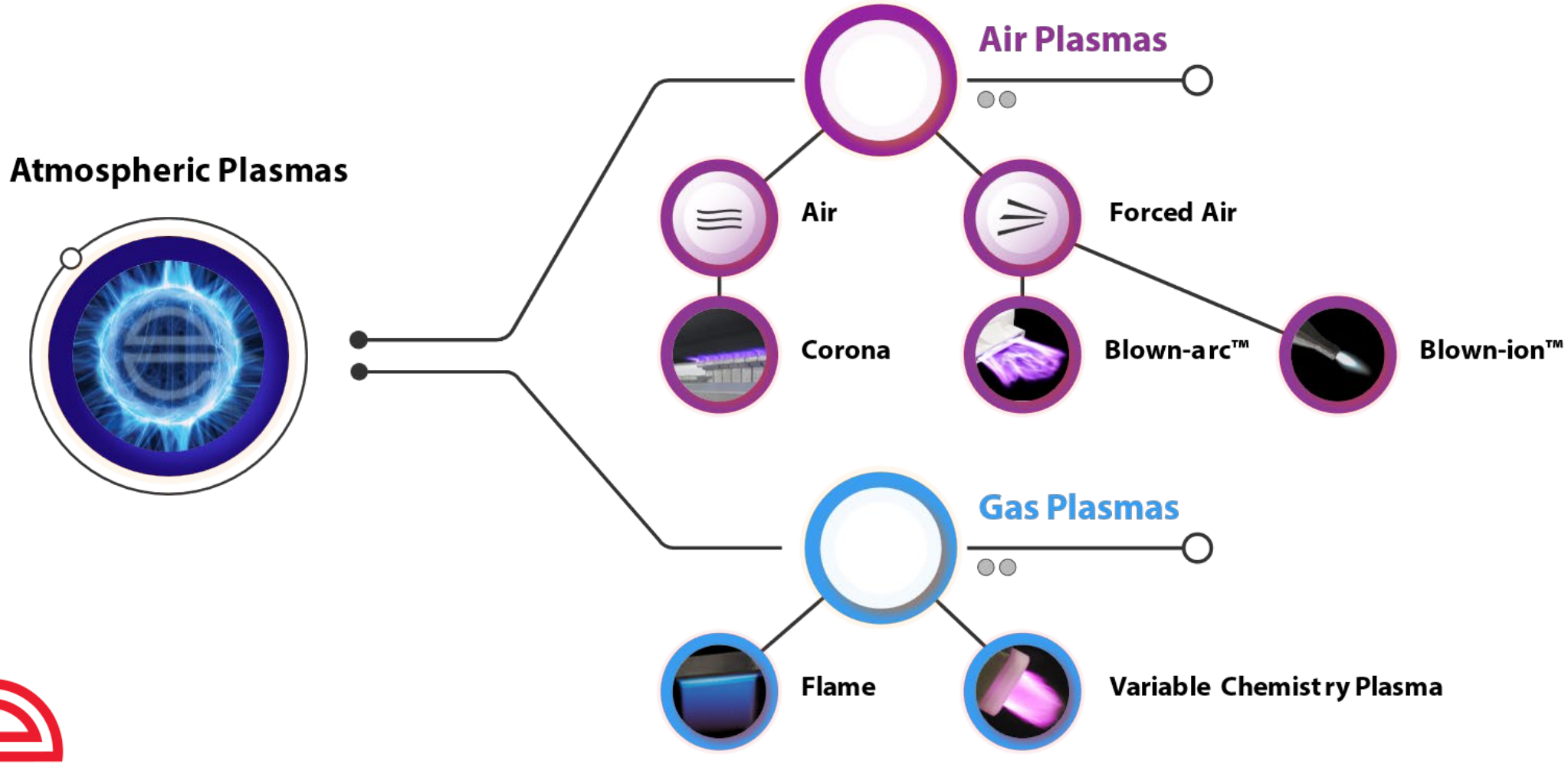
WINDOWS & DOORS

Get insights Plasma & flame for assembly, painting & decorating.

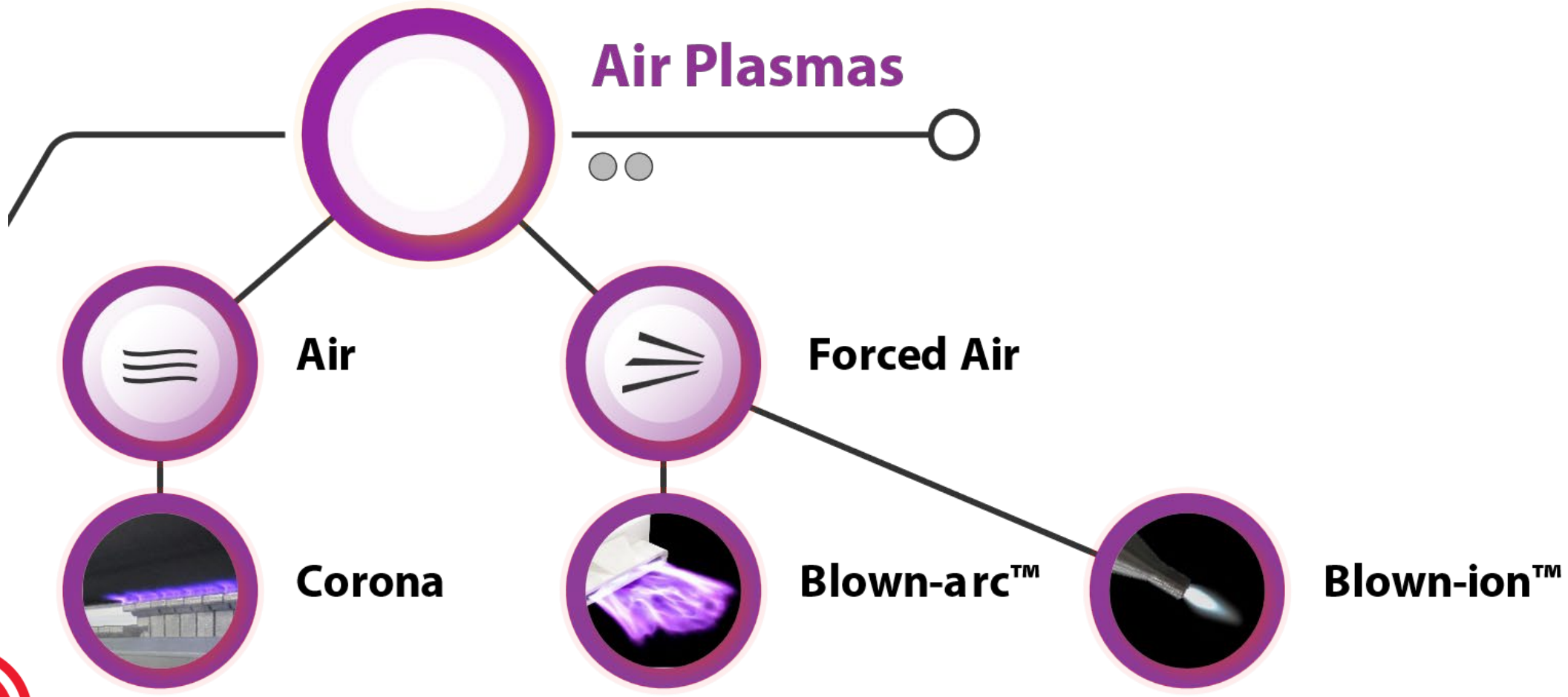
WIRE & CABLE

Learn how plasma is enabling ink jet printing on wires & cables.

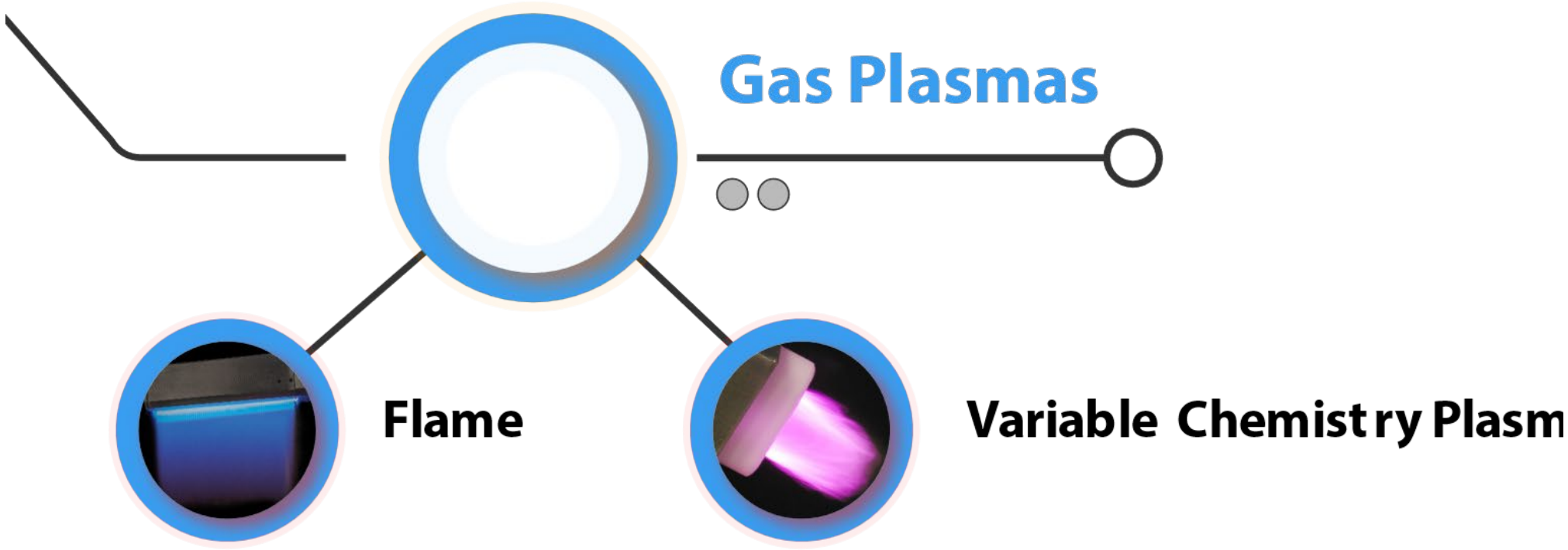
Types of Treatment Technologies



Types of Treatment Technologies

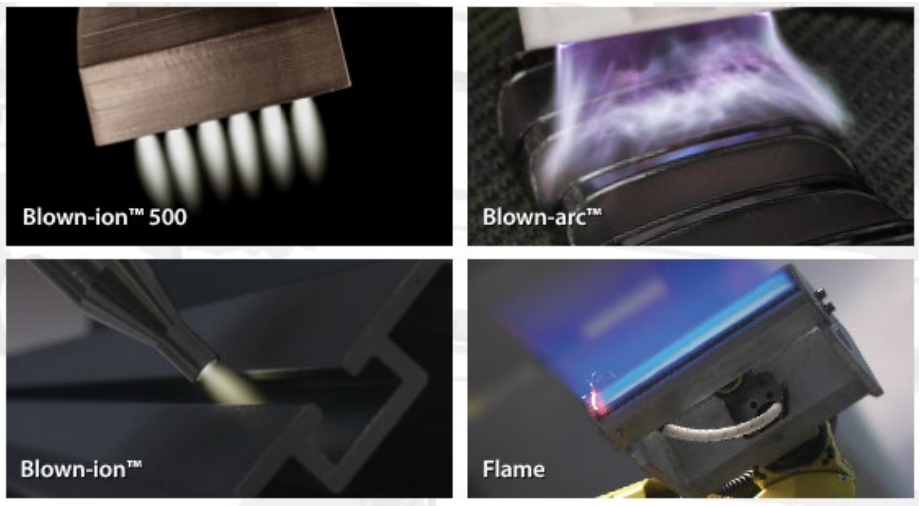


Types of Treatment Technologies



Technology Comparison Overview

	Compressed Air	Uses Gas	Single Pass Treat Width	Treat Conductive Surfaces	Cost
Blown-arc™ Plasma	Yes	Yes	Up to 3.5″	No	Low
Blown-ion™ 125 Plasma	Yes	Yes	Up to 0.75″	Yes	Moderate
Blown-ion™ 500 Plasma	Yes	Yes	Up to 2.25″	Yes	Moderate
Flame	Yes	Yes	Unlimited	Yes	Moderate
Variable Chemistry Plasma		Yes	Custom	Yes	High
Corona (film treating)	No	No	Films up to 10m wide	Yes	Moderate



Effectiveness of Treatment Material Versus Technology

	Untreated				Blown-ion				Flame			
	Dyne	Ca	Polarity	Sfe	Dyne	Ca	Polarity	Sfe	Dyne	Ca	Polarity	Sfe
PP	**>30**	**94.35**	**1.55**	**29.62**	**58**	**47.83**	**20.6**	**57.6**	**70**	**38.59**	**9.5**	**44.64**
PE	>30	114.9	0.28	28.69	60	45.28	21.41	59.9	56	52.22	16.94	56.34
PS	31	91.5	0.62	41.37	70	24.75	32.37	70.48	48	69.08	7.69	47.87
PA6	34	74.21	6.92	41.66	66	41.81	21.89	63.5	54	55.45	15.75	53.54
PA66	36	67.63	8.08	49.24	70	35.79	27.67	64.57	70	31.7	17.78	55.95
PET	>30	114.9	0.28	28.69	70	38.17	27.65	62.26	44	80.99	5.15	35.91

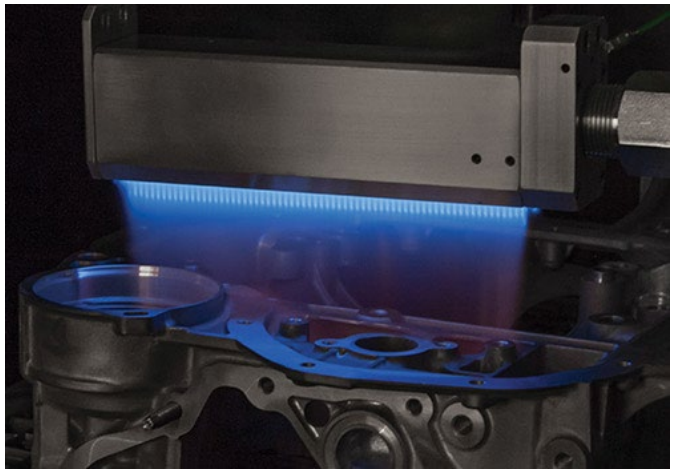
These technologies can be used on plastics, composites, metals & glass.

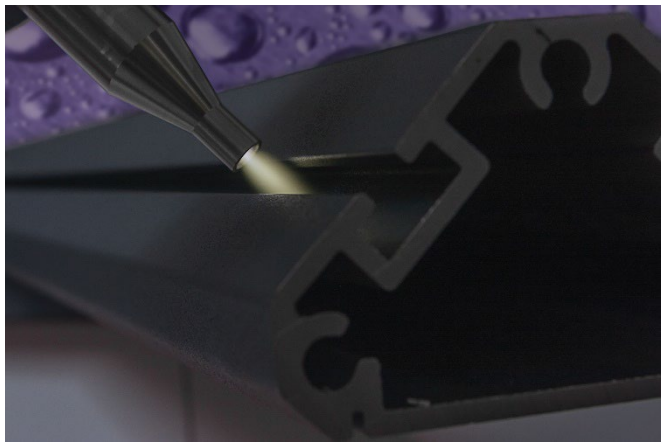
How defining your application determines technology.

- **Material being treated**
  - Conductive or non-conductive
  - Sensitivity to heat
- **Area to be treated**
  - Large or small
  - Crevices & contours
- **Line speed**
  - Dwell time required
- **Product Handling**
  - How will the product be presented to the treatment?
    - Existing line/New line
    - Work cell/Continuous throughput

Area To Be Treated

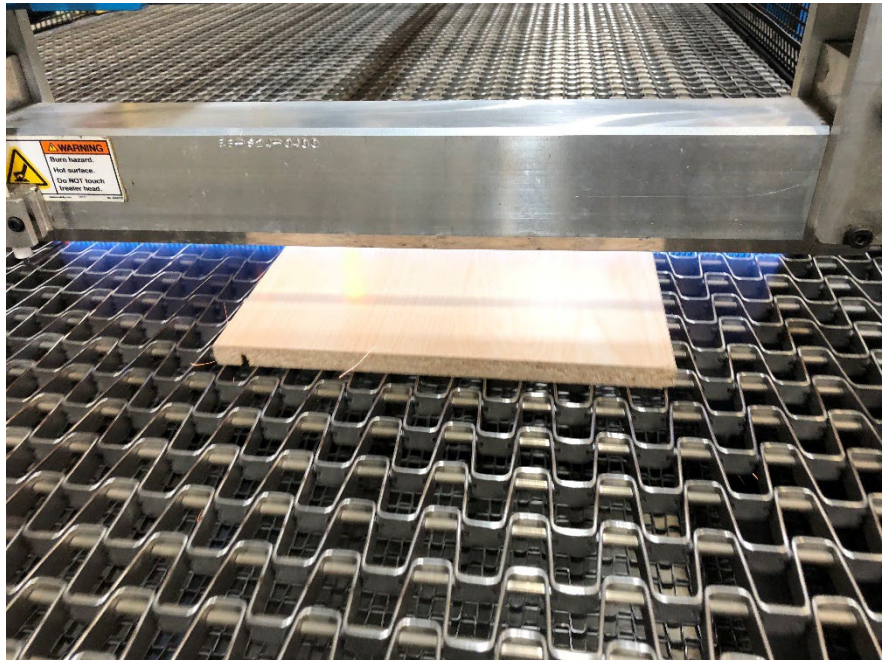
- Crevices or contours
  - Flame
  - Blown-Ion™ 500
  - Multiple heads or passes with other systems

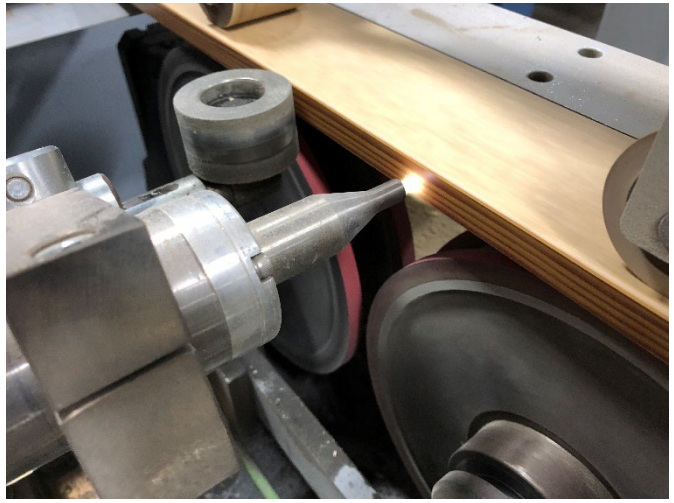




Area To Be Treated

- Large
  - Flame,
  - Blown-arc™ & Blown-Ion™ 500
  - Multiple heads or passes with others
- Small
  - Blown-ion™ 125





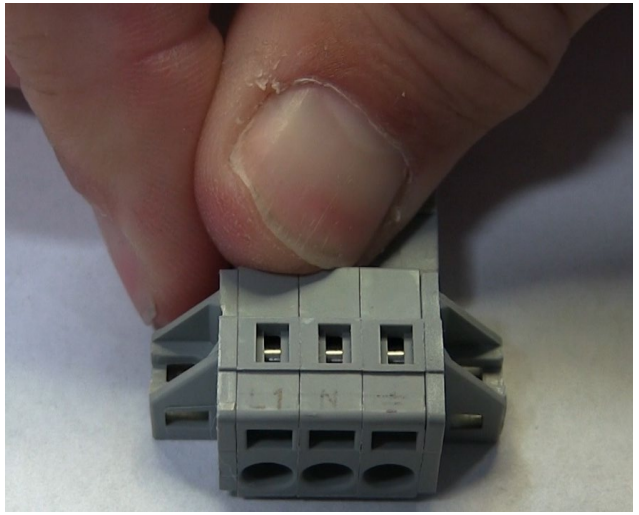
Line Speed & Dwell Time

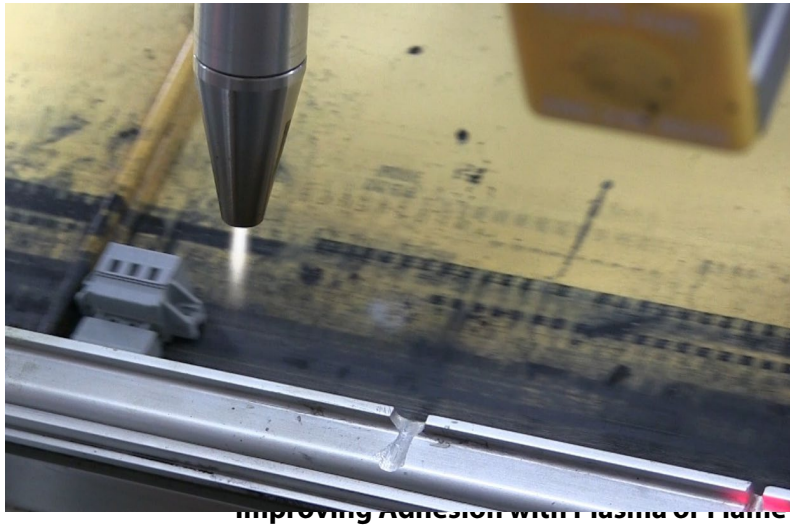
- Fast
  - Flame
  - Blown-Ion™
  - Multiple heads or passes with others
- Slow
  - Blown-arc™
  - Blown-ion™

Case study: Inkjet Printing on Nylon 66 Terminal Blocks

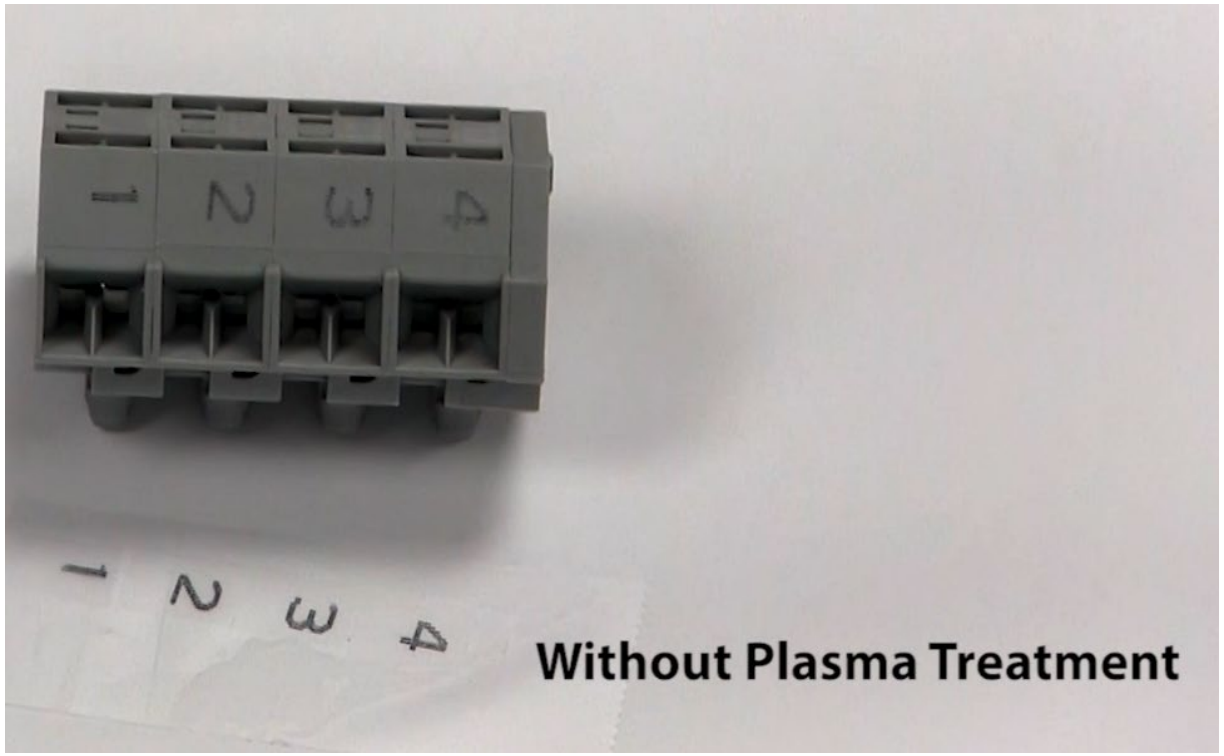
Promote ink adhesion for WAGO -Wisconsin

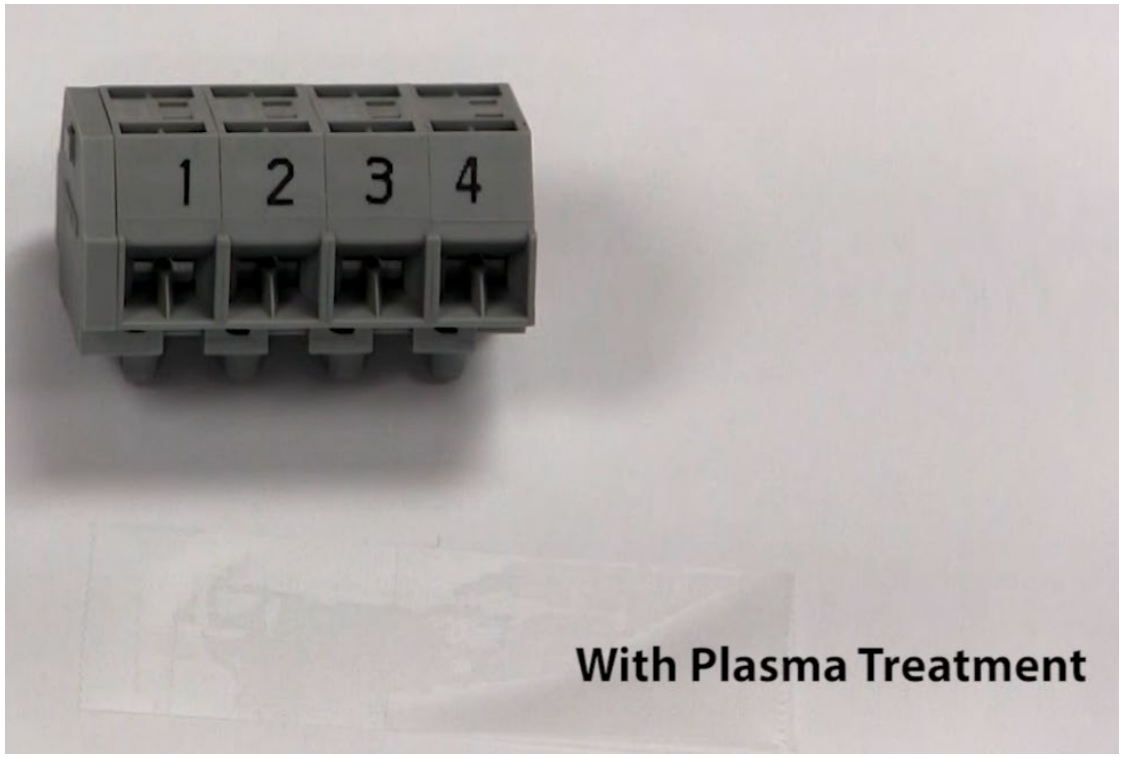
- Markem-Imaje Inkjet Printer on Nylon 66
- Used a manual liquid primer
- Replaced primer with automated solution
    - Blown-ion™ plasma treater





Tape Test with and without Plasma Treatment





Case Study: Spoiler Component

Materials: TPV (thermoplastic vulcanisate) seal

Application:

- Produce an injection molded part for General Motors
- Used to seal a gap in the spoiler of a GM vehicle to improve fuel economy
- Value add: Apply a pressure-sensitive adhesive tape to the seal

Solution:

Blown-ion™ Plasma

Adding the plasma treater and additional automation with tools required a $45,000 CAPEX investment. Reducing labor, adhesion promoter costs, and other operational saved Champion Plastics $850,000 over the duration of the six-year program.

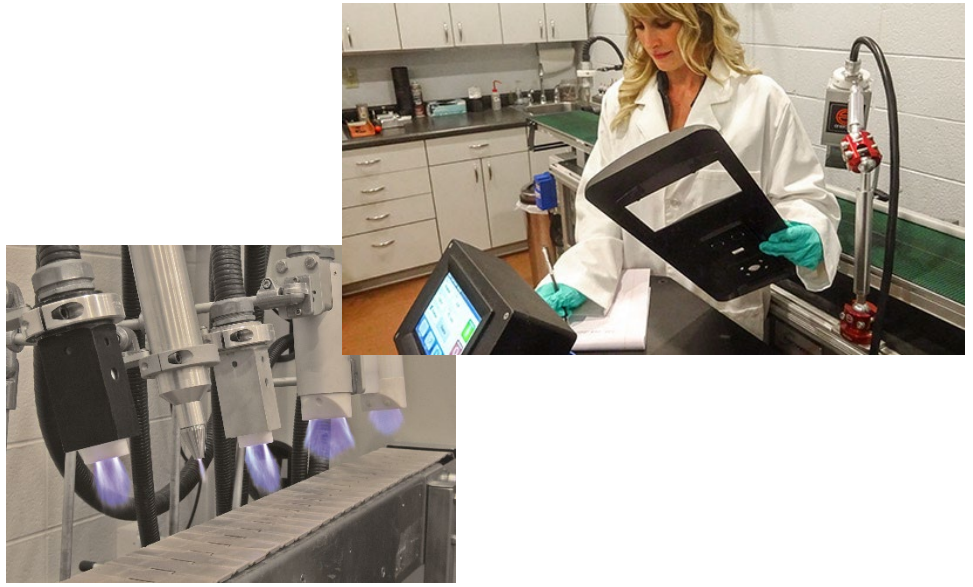
Improving Adhesion with Plasma or Flame

Benefits of Lab & Field Trials

- Every surface and process has small variables that may affect the final product
  - Materials from different manufacturers have different surface energies
  - Materials from the same manufacturers will often vary
  - The next process step may also vary between manufacturers

- We break down your application into two parts:
  - Proof of Concept
  - Optimize for your process

- We do this with free lab and field testing



Questions?

Thank you