

Plasma clean
Improved wettability and adhesion
Functional nano-coatings

Plasma Surface Treatment

Altus Multi-Nozzle Atmospheric Plasma



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Altus is Henniker's highest-capacity atmospheric plasma system, built for the parts and lines that single- and dual-nozzle systems cannot cover efficiently. An array of four to eight nozzles, each fed from a single controller, treats across widths of up to 100mm in a single pass rather than in multiple sequential passes. That reach extends beyond standard large-width panels: because every nozzle is individually controllable, **Altus** treats intricate larger parts and components with tight radii just as readily as flat panels, using a single nozzle for a small or awkward area and the full array for wide ones. The same system can treat one part or as many as eight different parts at once.

Altus is a component system, designed to be integrated directly into a customer's existing production line rather than supplied as a stand-alone cell. The controller mounts alongside the line, and the nozzle array can be fixed over a moving substrate or indexing parts, or mounted on a robot arm for three-dimensional or multi-position treatment. The whole system is driven by the line's own PLC through dedicated I/O, with no enclosure to design around. **Altus** becomes a plasma stage within a process the customer already controls.

Operating on compressed air, **Altus** replaces slower or more involved pre-treatment methods with a single in-line plasma step. The compressed air plasma microscopically cleans the surface and activates it at an atomic level at the same time, raising surface energy for reliable bonding, coating, printing and sealing.

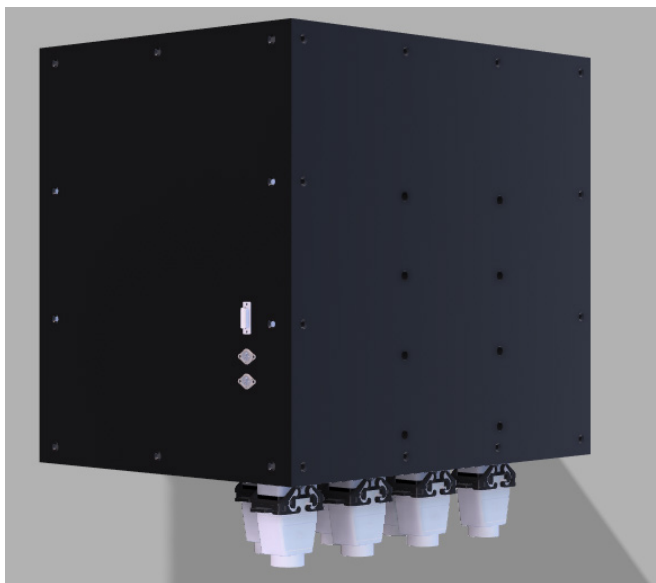
Markets & Applications:

- Battery, EV & Energy
- Aerospace & Composites
- Electronics & PCB
- Automotive
- Medical Device & Diagnostics

Key Benefits

- **Wide-area coverage in a single pass:** four to eight nozzles treat across widths of up to 100mm simultaneously, removing the throughput penalty of multiple sequential passes.
- **Individually controllable nozzles:** treat a small area with a single nozzle, a wider panel, intricate parts with tight radii, or up to eight separate parts at once — all from the same system.
- **Built for line integration:** PLC and external-input control, with error, plasma on/off and interlock signals exposed for direct connection to existing line control.
- **Production-scale power:** 300 W per nozzle, up to 3.2 kW total, delivered by Henniker's proprietary high-stability plasma generator for consistent treatment across every nozzle.
- **Compressed air operation:** a clean, repeatable, low-running-cost in-line step, with minimal consumables, that replaces solvents and chemical primers.
- **Multi-material capability:** treats engineering polymers, metals, composites, glass and ceramics on the same line.

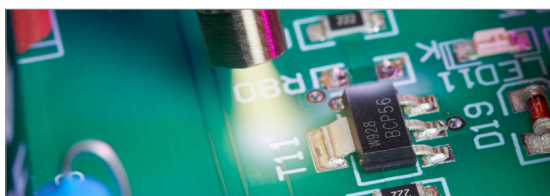
Plasma Integration



Plasma Environment

Each **Altus** nozzle delivers a focused atmospheric plasma plume directly to the surface, approximately 10–12 mm wide with the standard “mode” nozzle, or 8–10 mm with the “finite” nozzle for narrow channels. The compressed air plasma has the effect of microscopically “sandblasting” the surface while simultaneously activating it at an atomic level, introducing the polar functional groups that drive a sharp rise in surface energy.

Arrayed side by side, the nozzles treat across widths of up to 100mm at once. For a wide web, a large moulded panel, or a row of parts on an indexing line, this turns a job that would otherwise need multiple passes, or a slow robot raster, into a single, parallel operation. Because each nozzle is individually controllable, the same system treats intricate parts with tight radii, small localised areas, or up to eight separate parts at the same time. Henniker’s proprietary high-stability plasma generator drives every nozzle consistently, so coverage is uniform from the first nozzle to the last.



Built for Integration

Altus is controlled by the production line, not by an operator at a front panel. Process control is via PLC or external input, with a defined I/O set: a 9-pin DIN error output, an 8-pin DIN plasma on/off input, and a 15-pin D-Sub interlock trigger. This level of control allows Altus to start, stop and report alongside the rest of the line, synchronised to conveyor motion, part indexing or web speed. Engineers integrating Altus gain a plasma stage that behaves like any other controlled station on the line.

The nozzle array connects to the controller by flexible umbilical of 1 to 10 metres, so the controller can sit wherever space allows while the nozzles reach the treatment point. Treatment width, standoff and line speed are matched to the application during process development.

Repeatable & Reliable

Altus runs on a dry, oil-free compressed air supply at 8–10 bar, with a flow rate up to approximately 14,000 l/hr at full array.

With fixed process settings and Henniker’s high-stability plasma generator driving every nozzle, the system delivers the same result pass after pass. Electrical and compressed-air safety interlocks ensure long-term, trouble-free operation as part of a continuous process.

Engineered for the Production Line

Atmospheric plasma is already established as a pre-treatment for bonding, coating and printing across industry. Altus extends that capability to the parts and lines that single- and dual-nozzle systems cannot cover efficiently: wide substrates, continuous webs, intricate larger parts, and high-throughput assembly lines where a larger area must be addressed at once.



Battery, EV & Energy

Battery pack assembly depends on reliable structural bonding across mixed materials, aluminium housings and busbars, cell surfaces, polyimide thermal films and engineering-polymer structural parts. A single Altus plasma stage prepares the full material set in one in-line step, replacing solvent wiping that performs inconsistently across different surfaces. Stamped tabs and busbars on continuous strip are a natural fit for multi-nozzle coverage.



Aerospace & Composites

Carbon-fibre and glass-fibre composite parts carry mould-release residue that undermines paint and adhesive adhesion. Atmospheric plasma cleans the residue and raises surface energy in a single step. For the large panels typical of aerospace and wind-energy structures, the Altus array treats up widths of up to 100mm without the queue time of a slow robot raster, important given that activated composite surfaces have a limited window before bonding or painting.



Medical Device & Diagnostics

Device assembly and bonding require clean, activated surfaces prepared to a repeatable standard. Altus brings wide-area, line-integrated activation to higher-throughput medical manufacturing, with a clean compressed-air process that suits a regulated production environment.



Electronics & PCB

Board and component surfaces are activated prior to soldering, wire bonding, conformal coating and encapsulation. For panel and continuous-format electronics manufacture, the Altus array covers widths of up to 100mm in line.

Some of Our Clients



“Whether you’re processing small batches or continuous production lines, Henniker systems deliver precise, reliable, and efficient plasma treatment every time.” Representative from Robafoam.



Altus Specifications

ALTUS MULTI-NOZZLE ATMOSPHERIC PLASMA

CONTROLLER

Dimensions W 700mm x H 600mm x L 500mm

Weight ~75kg, including plasma heads

PLASMA NOZZLE

Number of Nozzles 4-8 nozzles, individually controllable

Connection 1 - 10m flexible umbilical to controller rear

Weight ~ 0.5kg

Dimensions Ø 32mm x L 210mm

Gas / HV umbilical PVC-protection conduit, Ø 19mm, length 1-10m, bend radius min. 100mm

Options ~10-12mm with standard "mode" nozzle; ~8-10mm with "finite" nozzle for narrow channels

PLASMA POWER SUPPLY

Power 300W nominal (per nozzle); 3.2 kW total (max)

Frequency 40 kHz

PROCESS CONTROL

Outputs 9-pin DIN error output

Inputs 8-pin DIN plasma on/off; 15-pin D-Sub interlock trigger

SERVICES

Electrical 3AC 400V / 50Hz / 16A / 11kVA or 3AC 208V / 60Hz / 16A / 5.8kVA

Gas Compressed air - dry, oil-free, 8-10 bar, 10mm push fit. Flow rate ~ 14,000 l/hr (max)

Power cord Suited to region

Compliance CE – UKCA - ROHS - WEEE

Henniker strive for continuous improvement and specifications are subject to change without notice

Benefits

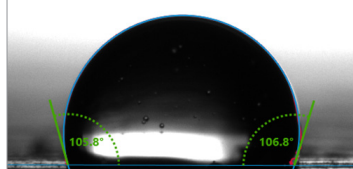
- Up to 100mm width single-pass coverage
- Individually controllable nozzles
- Direct line / PLC integration
- Production-scale multi-nozzle power
- Compressed air operation
- Precise & repeatable



Typical Results

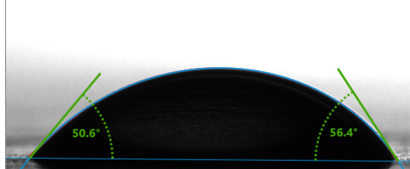
The majority of common engineering polymers, such as polyethylene terephthalate (PET), have inherently low surface energy, which leads to poor adhesion. Plasma treatment increases both surface energy and wettability. The result is significantly enhanced adhesion performance.

PET Before plasma treatment



Contact Angle $83.76 \pm 0.73^\circ$
Surface Energy $43.22 \pm 1.19 \text{ mN/m}$

PET After plasma treatment



Contact Angle $20.61 \pm 1.2^\circ$
Surface Energy $74.53 \pm 2.16 \text{ mN/m}$



Products & Services

- vacuum plasma systems
- atmospheric plasma systems
- robot & manufacturing cells systems
- surface test & analysis
- proof of concept trials
- process development

About Henniker

Henniker Plasma are an international leader in the design, development and manufacture of plasma surface treatment systems & advanced plasma processes.

Our products are installed worldwide and trusted to deliver consistent, reliable results in both leading research institutes and in critical manufacturing steps.

We are experts in plasma technology and surface science. We are trusted partners, valued for our courtesy, professionalism and dedication to delivering the correct solution for our clients.

Services

Contract plasma treatment

Our technical staff will be happy to discuss contract treatments, from small one-off batches to regular, large throughput requirements.

Proof of concept treatment

Let's discuss your application and then we will provide a quick, no-nonsense feasibility study.

Surface testing laboratory

With a comprehensive suite of surface analysis equipment, we are able to conduct a wide range of surface property tests, both before and after plasma treatment, in order to provide you with the whole picture.

After sales support

We are proud of our reputation for being approachable, thorough and easy to work with.

"Henniker's after sales support is first class. They have always been extremely responsive if we have ever had need to call on them."

Steve Rackham, Teledyne

Rental plasma systems

We carry a wide range of our standard equipment in stock and available for short or long term hire. This is particularly useful for in-house proof of concept trials or to satisfy short term contract work.

"The low risk option of hiring a plasma unit for evaluation was a key reason that we chose to work with Henniker and one that enabled us to proceed with confidence."

Dr. Chris Nicklin, Reinnervate

Method development

We have invested significantly in laboratory facilities to assess, test and investigate all aspects of plasma surface modification on a wide range of materials. Coupled with extensive in-house and real-world knowledge, we can usually deliver a tailored treatment quickly and efficiently to suit your individual product or production needs.

"The technical team at Henniker are very knowledgeable and supportive and always approachable. I have found it a pleasure to work with them."

Simon Baxter, BAE Systems, AI

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