

PowerSno™ Pilot-to-Scale Program

FEATURES

The **PowerSno™ Pilot-to-Scale Program** gives manufacturers a low-risk, staged path to adopt advanced CO₂ surface cleaning as well as adjunct processes such as atmospheric plasma treatment and robotics without committing to a capital purchase up front. Customers rent configured, ready-to-run PowerSno™ (production-capable) hardware to develop proprietary cleaning processes in-house, satisfy short-term or small-batch parts-cleaning needs, or trial-test advanced CO₂ and plasma (Particle-Plasma™) treatment before buying.

The program moves customers through four connected stages – Pilot/Test, Validate/Qualify, Automate/Integrate, and Contract/Supply – so that process training, settings, and reporting carry forward directly into production use. Customers start small, prove value on their own cleaning application, and scale rental equipment, support, and terms as requirements grow.

- **Trial Advanced CO₂ Composite Spray Cleaning Technology Before You Buy**
- **Rent Configured, Ready-to-Run PowerSno™ Equipment: On-the-Floor, On-the-Bench, On-the-Line, On-the-Robot, or In-the-Tool**
- **Structured, Four-Stage Path from First Trial to Full-Scale Production Deployment**
- **Available Rental Systems: PowerSno™ CO₂ Composite Spray, Atmospheric Plasma Treatment, and Robotic Cleaning Cells**
- **Pilot Support Options Including Expert Consulting, Application Validation, and Process-Parameter Tuning**
- **Flexible Terms – Extend, Scale Up, or Convert Rental Fees Toward a Purchase or Service Contract**
- **Proven With Aerospace, Medical Device, Microelectronics, Optics, and Precision Manufacturing Customers**



PowerSno™ Pilot-to-Scale Program Services

Available rental spray cleaning systems use the same production-capable **CO₂ Composite Spray™** technology and include the PowerSno™ Universal CO₂ Spray Treatment System (USTS) and the PowerSno™ ELITE CO₂ Spray Treatment System (with LightSPEC SQM), so rental performance and process windows transfer directly to a future purchase.

Each rental includes pilot support options such as consulting, application validation, and process-parameter tuning, drawing on 40+ years of CO₂ cleaning and surface-treatment process experience.

MARKETS AND APPLICATIONS

A pilot program can be implemented in many different markets and applications, ranging from critical cleaning during precision device fabrication (so-called build-clean protocols) to preventive maintenance applications such as electrical control panel cleaning for NFPA 70B compliance.



PowerSno™ Pilot-to-Scale Program Markets

PROGRAM STRUCTURE

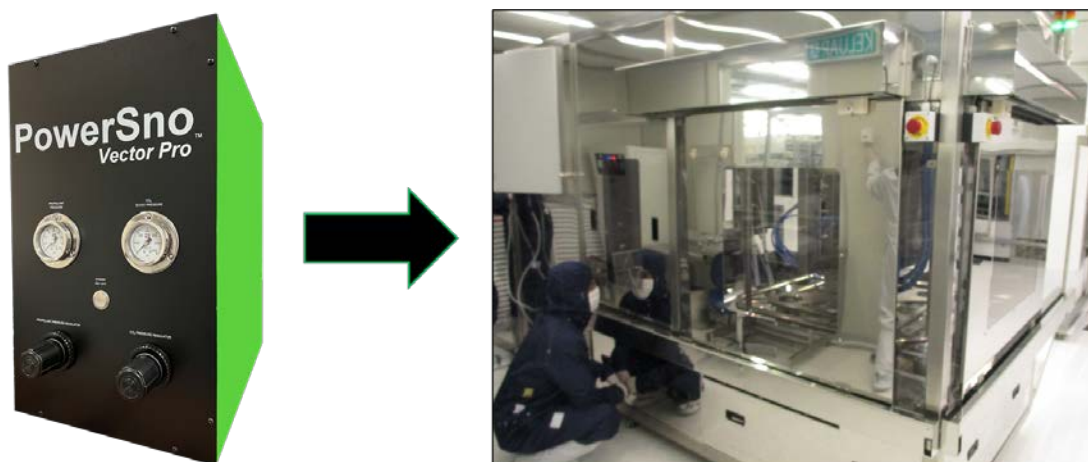
Pilot-to-Scale Implementation

A pilot program is a limited, learning-focused deployment used to prove that a CO₂ Powered solution can work in a particular application. A scale program is the structured expansion of that validated solution into a manufacturing operation. In simple terms, a pilot asks whether the solution works under real conditions, while scaling asks whether it can be delivered reliably, economically, and repeatedly at a larger production capacity. This implementation strategy is summarized in the table below.

PowerSno™ Pilot-to-Scale Program Structure

Dimension	Pilot Program	Scale Program
Primary Purpose	Validate technical feasibility, operating method, safety, and early economics.	Achieve production capacity while maintaining quality, margin, safety, and service.
Scope	One application or controlled use case.	Multiple applications, lines, and use cases.
Commitment	Reversible, time-bounded experiment.	Strategic operating commitment and investment.
Success Metrics	Demonstrated performance against a defined hypothesis.	Repeatable success against standardized KPVs and operating targets.
Process Development	More informal and may rely on expert oversight, custom workarounds, and close engineering support.	Must be documented, trainable, serviceable, and resilient without constant expert involvement.
Economics	Can tolerate special pricing and non-recurring engineering.	Must demonstrate sustainable unit economics, capacity planning, and predictable quality improvement.
Risks Assessed	Technical performance, safety, user acceptance, and operational fit.	Supply chain, staffing, field service, quality control, financing, regulatory compliance, and uptime.
Decision Points	Stop, modify, extend, or proceed.	Expand, optimize, replicate, or pause rollout.

The Pilot-to-Scale Program is organized into four stages. Customers can enter at any stage appropriate to their readiness and can renew, extend, or advance to the next stage as requirements mature.



Pilot Testing to Full-Scale Production Cleaning

PROGRAM PROCESS

The following table describes the PowerSno™ Pilot-to-Scale Process.

PowerSno™ Pilot-to-Scale Process

Stage	Typical Duration	Typical Equipment Included	Technical Support Provided	Best For
1. Pilot / Test	4-8 weeks (extendable)	PowerSno™ USTS (w/ Micronizer™ applicator)	Remote setup guidance; sample/coupon testing consultation	Feasibility studies, early proof-of-concept, design-stage evaluation
2. Validate / Qualify	4-8 weeks (extendable)	PowerSno™ USTS (w/ Micronizer™ applicator)	Application validation, process-window development, structured reporting for internal approvals	Qualification trials, engineering sign-off, documented performance validation
3. Automate / Integrate	8-16 weeks (project-based)	PowerSno™ USTS or ELITE system (w/ Micronizer™ applicator) configured for bench, line, robot, or in-tool integration; benchtop robot accessories available	Integration of engineering assistance, throughput and automation tuning, on-site or remote commissioning support	Moving PowerSno™ cleaning into production; robot, line, or in-tool integration
4. Contract / Supply	Ongoing / long-term	Dedicated PowerSno™ USTS or ELITE system (w/ Micronizer™ applicator)	Ongoing contract-cleaning services, or transition to permanent capital equipment supply	Outsourced cleaning services or organizations needing a defined path to permanent installation

Rental Fee Structure: Rental rates, equipment deposits, and purchase-credit terms are quoted by application, equipment configuration, and rental duration.

IMPLEMENTATION REQUIREMENTS

The following implementation requirements apply to the PowerSno™ USTS rental unit.

PowerSno™ USTS Rental Equipment Implementation Requirements

System Power (Electric and Pneumatic)	110VAC – 50/60 Hz (24VDC Power Supply), Propellant Gas – 75-120 psi
CO ₂ Supply and Usage	Liquid CO ₂ , 830-950 psi, 10-25°C, 4-40 lbs/hr/nozzle (Applicator Dependent)
Propellant Gas Supply and Usage	CA, CDA or GN ₂ , 70-120 psi, 2-27 scfm/nozzle (Applicator Dependent)
Spray Actuation (Contact Closure)	Footswitch, Spray Trigger, or Remote Cable Control
Maximum Operating Temperature	28°C (Liquid CO ₂ Changes to scCO ₂ above 31°C)
Footprint (PowerSno™ Unit)	12" (W) x 18.5" (D) x 20" (H) Console
Rental Site Prerequisites	Compressed air or GN ₂ source and a liquid CO ₂ cylinder or mini-bulk supply (Customer-supplied)

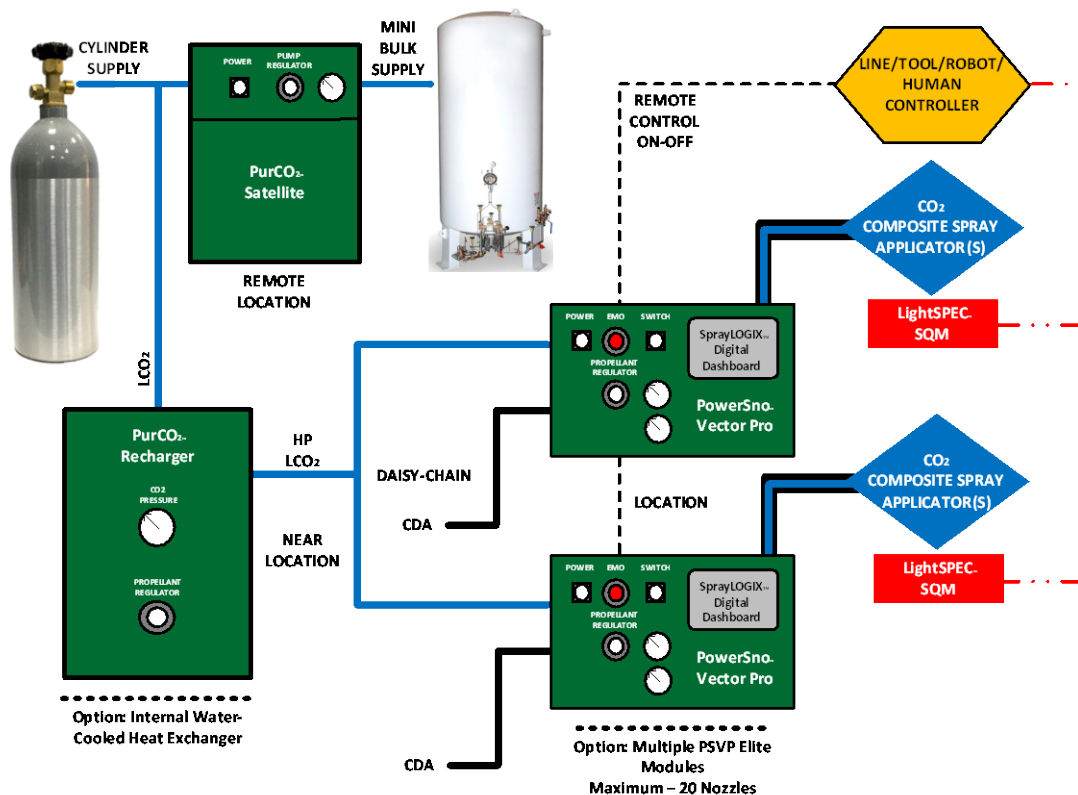
RENTAL PROGRAM OPTIONS

- **PowerSno™ ELITE:** Siemens PLC-based CO₂ Composite Spray System with **LightSPEC™** Spray Quality Monitoring (SQM) System (Scale Program System)
- **Atmospheric Plasma Treatment:** Atmospheric Plasma System for surface energy modification and Particle-Plasma hybrid treatment
- **Benchtop Robot:** Janome Cartesian robot for Automate/Integrate stage rentals
- **Spray Applicators:** Cluster, Wide Spray, and custom Micronizer™ applicators available for rental swap-in
- **Cleaning Cell:** HEPA Push-Pull minienvironment for Class 100 clean environment processing and contaminant capture
- **Mobile Tool Cart:** Portable cart for factory portability across bench and line locations
- **Rent-to-Own Credit:** A portion of paid rental fees may be credited toward a future PowerSno™ capital equipment purchase (subject to quote)



PowerSno™ ELITE
(Scale Program System)

SYSTEM ARCHITECTURE



Full-Scale PowerSno Elite Production Implementation

CO₂ Supply Options: Cylinder (Low Capacity) • Recharger (Medium Capacity) • Satellite (High Capacity)

SUMMARY

The following table summarizes the PowerSno™ Pilot-to-Scale program and process features and benefits.

**PowerSno™ Pilot-to-Scale Program and Process
Features and Benefits**

Feature	Benefit
Trial before purchase	Minimizes capital risk while proving cleaning performance on the customer's own production parts
Configured, ready-to-run PowerSno™ hardware	Faster time-to-trial with less setup burden on customer engineering teams
Four-stage implementation process (Pilot → Validate → Automate → Contract/Supply)	Clear, low-risk pathway from first test to full-scale production adoption
Pilot support options (consulting, validation, tuning)	Access to 40+ years of CO ₂ cleaning and surface-treatment process expertise without hiring specialized staff
Same CO₂ Composite Spray™ platform across all tiers	Rental process settings and learnings carry forward directly into production equipment
Flexible actuation and integration (bench, line, robot, in-tool)	Fits into existing manufacturing workflows without redesigning production processes
Confidential, proprietary methods under NDA	Protects the customer's process intellectual property during trials
Structured customer-driven testing and reporting during Validate/Qualify	Supports customer spec'd-in processes and procedures for internal quality approvals, audits, and qualification requirements
Option to convert rental fees toward purchase or contract-cleaning services	Preserves capital flexibility while providing a clear scale-up path

CUSTOMER TESTIMONIALS

Selected customer experiences with the PowerSno™ Pilot-to-Scale Program:

- GF Machining Solutions – John Taseff**
Incredibly effective for certain (laser machining) applications – the PowerSno™ cleaned fine machining debris in under a minute, versus overnight ultrasonic cleaning with chemicals.
- Sanmina – Pascal Marais**
A 2-month CO₂ Composite Spray rental allowed Sanmina to run process trials and devise a safe, effective cleaning process for a sensitive micro-electronics assembly, supplying only compressed air and a liquid CO₂ tank.
- Tektronix – Rachael Gitnes**
The rental system was provided quickly, was easy to set up, and delivered excellent cleaning effectiveness.
- Evaporated Coatings, Inc. – Quinn McKenna**
The PowerSno™ rental was efficient and cost-effective, enabling successful testing without interruption.



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