

Plasma Torches

APT, RPT & MINIGUN



 **PYROGENESIS**
ENERGY FROM INNOVATION

20 YEARS OF EXPERIENCE WITH PLASMA TORCHES

For nearly 20 years, PyroGenesis has been manufacturing plasma torch systems for some of the most demanding applications in the world. Waste treatment, advanced material production, metallurgical processes, thermal treatment and nanotechnology are but a few of the diverse applications for PyroGenesis torches.

A lot of advantages

At PyroGenesis Canada Inc., we are not content with just supplying our customers with a plasma torch. Our customers receive turnkey systems, which include all of the elements necessary for the safe and reliable operation and maintenance of their plasma system.

With its ease of operation, as well as its high level of safety, reliability and service life of wear components, PyroGenesis systems have been selected by a renowned list of satisfied customers, including the US Department of Defense as well as other reputed nanomaterial production firms. Customer satisfaction is important to us; hence we provide customized solutions to meet client requirements, as well as to provide versatile systems.



Features of Our Services

- ISO 9001 registered
- Turnkey solutions adapted to customer needs and requirements
- Automated systems which are easy to operate
- Start-up and overhaul services available
- Full integration with process control software, as per customer specifications
- Intrinsically safe design
- After sales service available, including remote monitoring
- 1 year guarantee on all the supplied components



WHY PYROGENESIS?

Proven Products

With more than 15 years of research and development in the US defense industry, PyroGenesis has developed a series of plasma solutions capable of operating in the most severe conditions under a variety of demanding applications.

Light weight, Compact Torches

PyroGenesis offers the lightest, most compact torches in the marketplace. The use of a mechanical vortex in our torches reduces the bulky equipment normally associated with a plasma torch and allows for easy handling without the use of heavy lifting devices.

Solutions Adaptable to Customer Needs

With our wide range of products, we are pleased to offer a solution tailored to customer application, whether its for waste treatment, for advanced material production or for any new application. Effectively, our team can work with the customer to design reactors and plasma furnaces, as well as multiple axis robotic lifting and handling mechanisms which might be required.

Turnkey Systems

Our multidisciplinary team at PyroGenesis offers a turnkey solution which includes all of the necessary elements to meet customer needs. Our automated systems provide one-touch start-up and shutdown of the plasma torch system.

World Class Service

Whether it is for an on-site installation, system add-ons, or for torch maintenance, our technical team is at your service 24 hours a day, 7 days a week. If required, our engineers can access the torch control system at all times via a remote monitoring system.

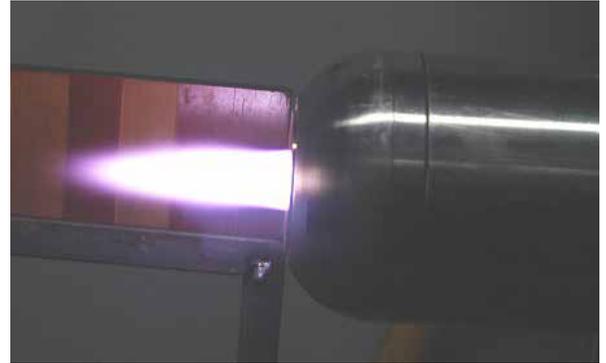
Safe Products

All our systems are conceived for maximum protection with intrinsically-safe designs, our automatic surveillance of critical parameters employ the most stable and reliable controllers in the industry. This high level of safety allows our products to be used by operators with minimal training or in contrast by leading researchers in thermal plasma applications.



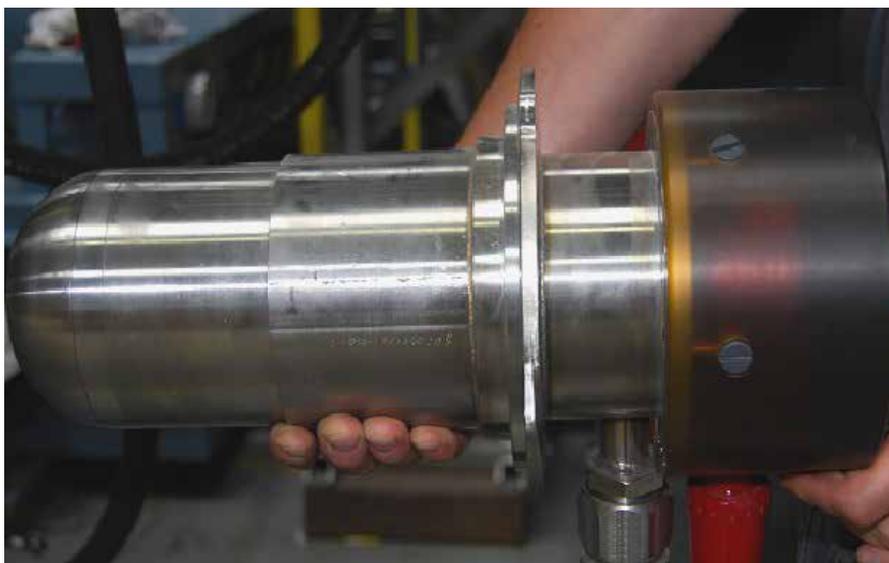
APT MODEL - AIR PLASMA TORCH

The APT torch model is typically used for waste destruction and subsequent energy recovery (via gasification and vitrification). The plume from an APT can reach more than 5000 °C, allowing electricity to be converted directly to a thermal plasma. This torch can be modified for uses with different gases and reach power levels ranging from 50 kW to 500 kW. Available in a light weight, compact configuration ranging, this torch offers an electrode service life which can exceed 1000 hours of continuous operation for a multitude of applications.



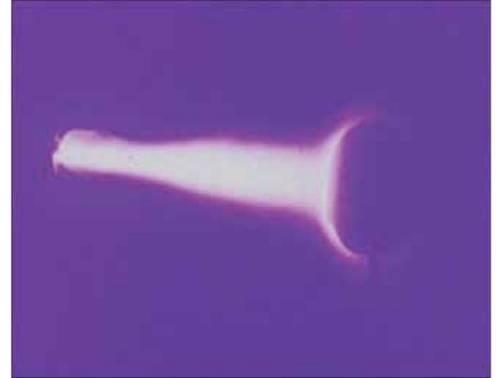
TECHNICAL SPECIFICATIONS

Description	Non-transferred DC Arc, button style, Vortex stabilized
Length	16" to 16 feet (0.4 – 5 m)
Diameter	4.2" to 12" (0.1 – 0.3 m)
Power	50 to 500 kW
Electrode life	Cathode : 1000 hours Anode : 500 hours
Gas	Air, N ₂ , O ₂ , Ar, Ar + CO, Ar+CO ₂ and their mixtures
Safety	Electrically isolated torch cover design, lockout system, completely automated system
Applications	Waste treatment, gas heating, R&D, advanced materials production



MINIGUN MODEL - COAXIAL, COMPACT PLASMA TORCH

In use since 1995 for thermal spray coating systems, this low -powered torch can be fitted for radial injection of powders into the plasma plume. The Minigun is our most compact and inexpensive solution for thermal applications. This torch is ideal for a research and development environment, for thermal spray coating in hard -to-access locations, and even for small -scale waste treatment. The Minigun offers an economical, flexible solution for thermal processing, nanotechnology, and for small -scale high -tech material fabrication. This torch provides a wide range of solutions to address customer requirements in both academic and industrial applications.



TECHNICAL SPECIFICATIONS

Description	Non -transferred DC Arc, button style, Vortex stabilized
Length	3" to 12" (0.08 – 0.30 m)
Diameter	2.5 " to 8 " (0.06 – 0.20 m)
Power	5 to 40 kW
Electrode life	800 hours (anode & cathode)
Gas	He, N ₂ , H ₂ , Ar and their mixtures
Safety	Electrically isolated cover design, lockout system, completely automated system
Applications	Production of high purity materials and nonmaterial's, R&D, waste treatment, thermal spray coatings



RPT MODEL - REVERSE POLARITY TORCH

This reverse polarity torch has been used since 1991 for metallic powder production, the fabrication of high purity metal, gas heating, production of carbon nanotubes and more. This plasma torch offers flexibility, as well as a simple and efficient mode of operation for our customers and requiring high enthalpy plasma systems for their applications. With a very low level of erosion, the RPT is ideally suited for the production of high purity advanced materials and nanomaterial.



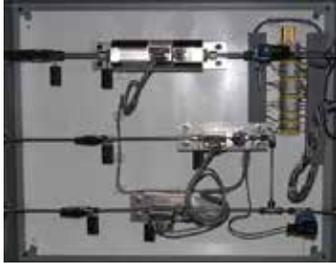
TECHNICAL SPECIFICATIONS

Description	Non -transferred DC Arc, tubular Vortex stabilized
Length	12" to 48" (0.30 – 1.22 m)
Diameter	2.5" to 8" (0.07 – 0.20 m)
Power	5 to 80 kW
Electrode life	800 hours (anode & cathode)
Gas	He, N ₂ , H ₂ , Ar and their mixtures
Safety	Electrically isolated cover design , lockout system, completely automated system
Applications	Production of high purity materials and nanomaterials (alloys, nanotubes & fullerenes), R&D, waste treatment, thermal spray coatings



EXAMPLES OF ANCILLARY EQUIPMENT

CONTROL CABINET



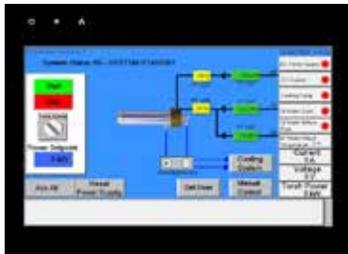
Completely automated, the plasma torch requires accurate gas flows for optimal operation. Also, the cables powering the plasma torch are water-cooled.

COOLING SKID



Mounted on a support structure, this skid is used to cool down the plasma torch with de-ionized water in a closed loop circuit.

OPERATOR INTERFACE



With a fully automated PLC along with a local touch screen for operating the torch (HMI), the operator can control the power and/or enthalpy, and other torch parameters.

POWER SUPPLY



Our energy efficient, stable and robust transformer converts AC to DC power for plasma torch applications, while providing low and medium voltage connections.

SELECTED CLIENTS

CLIENT PYROGENESIS	MODEL	POWER	APPLICATIONS
Battelle Memorial Research	APT	150 kW	Research and development- new plasma
Carnival Cruise Lines	APT	150 kW	Shipboard waste destruction technology (PAWDS)
EER	APT	600 kW	4 x 150 kW integrated plasma system for propriety waste-to-energy process
Northrop Grumman Shipbuilding	APT	150 kW	CVN 78 aircraft carrier plasma waste destruction (PAWDS)
US Air Force	APT	150 kW	Waste-to-energy (PRRS)
US Navy	APT	150 kW	Shipboard waste destruction technology (PAWDS)
CERECO (Greece)	Minigun	50 kW	Vacuum plasma spray (VPS) coating research
Pyrogenesis S.A. (Greece)	Minigun	50 kW	Atmospheric plasma spray (APS) coating
University of Florida	Minigun	25 kW	Waste vitrification research & development
University of Toronto	Minigun	50 kW	Vacuum plasma spray forming research
AP&C	RPT	4 x 30 kW	Plasma atomisation of spherical metal powders
McGill University	RPT	80 kW	Production of carbon nanotubes and R&D



At PyroGenesis, we redefine the box.

Strebl Energy Pte Ltd
316 Tanglin Road # 02-01, GreenHub
Singapore 247978
Phone : +65 6801 0688, Email : info@streblenergy.com
www.streblenergy.com