

Ultrasonic Spraying Coating Nozzle System

1. Theory principle

Ultrasound spraying utilizes the capillary wave atomization function produced by ultrasonic vibration to atomize the liquid flowing through the working end of the ultrasonic transducer to produce micron-sized droplets; adding compressed gas under appropriate pressure to make the droplets smarter and more uniform under the action of airflow, and at the same time to guide the direction of the operation of the droplets and increase the droplets. Adding atomized particles to run the power, so as to achieve the purpose of precision spraying on the surface of coated objects.

◆Characteristics:

Ultrasound spraying is suitable for liquid or liquid-solid mixtures with slightly lower viscosity. Generally speaking, the higher the vibration frequency, the smaller the atomized particles, the smaller the electric power and the amount of atomization. By adjusting the concentration and viscosity of spraying liquid, the amount of liquid supplied, the diversion pressure, the running speed of spraying nozzle and the frequency of ultrasonic wave, the film thickness of sub-nanometer to micro-meter can be achieved.

◆Advantage

Ultrasound atomization has fine particles, high surface activity, and can be well adsorbed on the surface of the sprayed object by adjusting the appropriate diversion pressure. The spraying uniformity and material utilization rate are ensured (95%-99%).

◆Classification;

Fluid through: suitable for small and medium area uniform spraying occasions.

Surface drain type: suitable for large area rapid spraying.

Mesh extrusion: suitable for small range linear spraying.

2 Products Show



3 Technical parameters

Type	Resonance frequency (KHz)	Power (W)	Maximum spray (ml/min)	Spray particle size D50 (Microns)	Liquid viscosity < CPS	Material	Atomization mode
GPSN-3020-TS	30	20	160	65	80	Titanium alloy	Throughout hole

GPSN-3615-DS	36	15	220	60	100	Titanium alloy	Surface
GPSN-4520-DS	45	20	220	50	100	Titanium alloy	Surface
GPSN-4510-TS	45	10	120	50	65	Titanium alloy	Throughout hole
GPSN-5010-TS	50	10	120	45	65	Titanium alloy	Throughout hole
GPSN-6010-TN	60	10	80	40	60	Titanium alloy	Throughout hole
GPSN-8010-TS	80	10	60	35	50	Titanium alloy	Throughout hole
GPSN-10010-TT	100	10	50	30	65	Titanium alloy	Throughout hole
GPSN-12010-TT	120	10	20	25	65	Titanium alloy	Throughout hole
GPSN-15010-TT	150	10	15	23	50	Titanium alloy	Throughout hole
GPSN-18010-TT	180	10	10	20	40	Titanium alloy	Throughout hole
GPSN-20010-TT	200	10	5	18	40	Titanium alloy	Throughout hole
GPSN-100010-T (Developing)	1000	20	1	5	25	Titanium alloy	Throughout hole

Note:

1) The particle size in the table only refers to the atomized particle size of pure water. Different liquids are different. For example, ethanol is only 65% of water at the same frequency.

2) The company can provide automation products using the system in the table, such as fuel cell equipment, heart stent, coating of drug-loaded balloon surface, etc

4 Application

4.1 Application of Ultrasonic Spray

● **Electronics:** Electrode coating (FPD and TFT) of imaging display equipment, deposition of photoresist, and flux spraying of printed circuit board;

● **Energy:** fuel cell C-Pt electrode surface spraying, photovoltaic cell acidification treatment and electrode spraying, lithium battery deposition process;

● **Medical treatment:** biological preparation coating, medical antimicrobial disinfection, implantation device biological coating, vascular stent and microencapsulated coating, medical textiles and vascular harvesting coating;

● **Nanotechnology:** spray drying.

● **Energy-saving and environmental protection:** nano-coating on glass surface, biocidal coating on filter paper, food and food packaging, etc.

● **Others:** high-precision lens coating, metal surface heat treatment process spraying, etc. need to be used for precision coating occasions.

4.2 Expanding application of ultrasonic spraying

● **Medical disinfection:** Ultrasound spray nozzle, often made of high corrosion-resistant titanium alloy material, can effectively resist various strong acid (alkali) liquid corrosion. With the help of compressed gas diffusion, it can be used for medical vaporization and disinfection. In particular, some oxidizing or corrosive disinfectants, such as hydrogen peroxide, peracetic acid and formaldehyde, are highly corrosive to traditional atomizing equipment and affect the service life of the equipment.

Preparation of nanoparticle powder (spray drying): materials dissolved in specific solvents (such as organisms, herbs, etc.) are produced by ultrasonic atomization to produce micron sized particles, and then quickly evaporate the solvent in a certain volume cavity, and dissolve nano solid particles (such as nano powder).

4.3 Ultrasonic spraying can be used in below liquid

The parameters such as the viscosity of the liquid itself, the binding force between molecules, or the mixing ratio of the mixed liquid (liquid-solid mixture) have a great influence on the ultrasonic atomization, and some of them can not even be atomized. At present, there is no clear rule to describe it. It is necessary to compare the parameters of different frequencies, concentrations, temperatures and flow rates for specific solutions.

Experiments show that the following solutions can be atomized:

● **Pure single-component liquids,** such as pure water, ethanol, acetone, bromine and so on, mainly affect the atomization of viscosity, viscosity below 100 CPS is the best.

● **A variety of liquid mixtures of solutions:** such as water solvents (dilute acids, alkalis, halogens, low-concentration salts), oligomeric alcohols, ketones, aldehydes as solvents for polymers (intermediate polymers), etc. Especially, ethanol, acetone and butanone as the solvent have the best atomization effect. The parameters affecting the atomization of this type of liquid include viscosity, solubility property and concentration.

● **Liquid-solid mixture solution:** such as nano-scale C-Pt/alcohol mixture, Beaded polymer/water, low concentration coal slurry/water, silica gel/ethanol, suspension, etc. The parameters affecting the liquid atomization include solvent composition, solid concentration (<40%), solid particle size (<1/10 of the particle size of ultrasonic atomization at this frequency), affinity between solid particles and solvents (such as suspension state), etc.

4.4 Ultrasonic spraying can't be used in below liquid .

High concentration of liquid-solid mixture (solid content > 40%), polymeric type, such as lipids (such as epoxy resin, polyamine and polyene). Especially epoxy-like solutions are difficult to be atomized, and the effect of uniform atomization cannot be achieved basically.