

STAR BURST

Intellectual Property Information



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SUPER! TECHNOLOGY

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Wet Pulverization and
Dispersion Device
STAR BURST™



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STAR BURST/P2218E 102501 AS

MINIMUM CONTAMINATION is achieved with ultra-high pressure technology



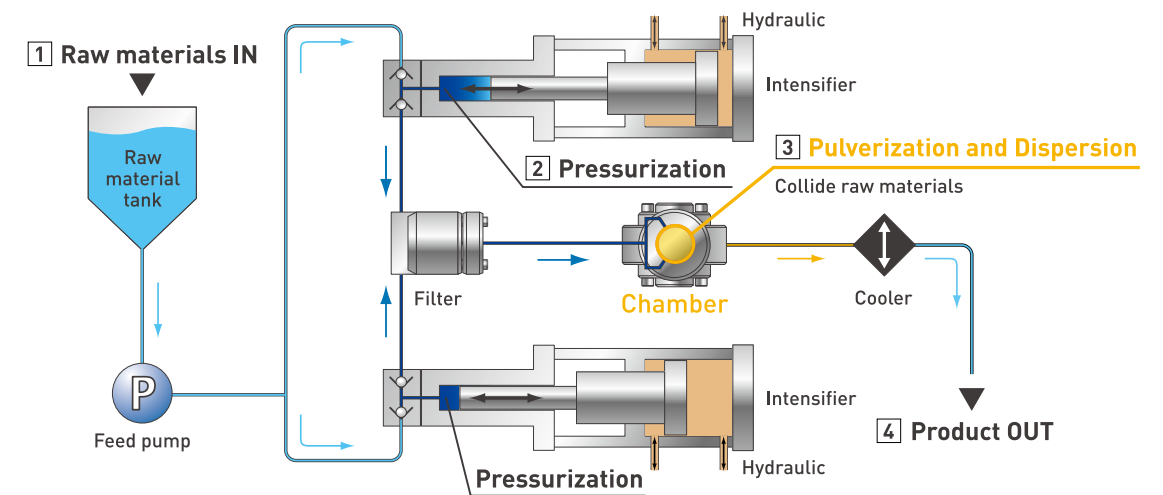
STAR BURST is a wet jet milling device capable of facilitating dispersion, emulsification, pulverization and surface modification of raw materials. Among many chamber configurations STAR BURST system can provide, the key highlighted chamber "Oblique collision chamber" enables effective collision of pressurized particles up to 245MPa (2,450 bar/35,525 psi) with Mach 4 relative speed.

We provide innovations in the field of nanotechnology and stride to pioneer a new world in this field through inventions of various unprecedented techniques using liquid and raw materials.

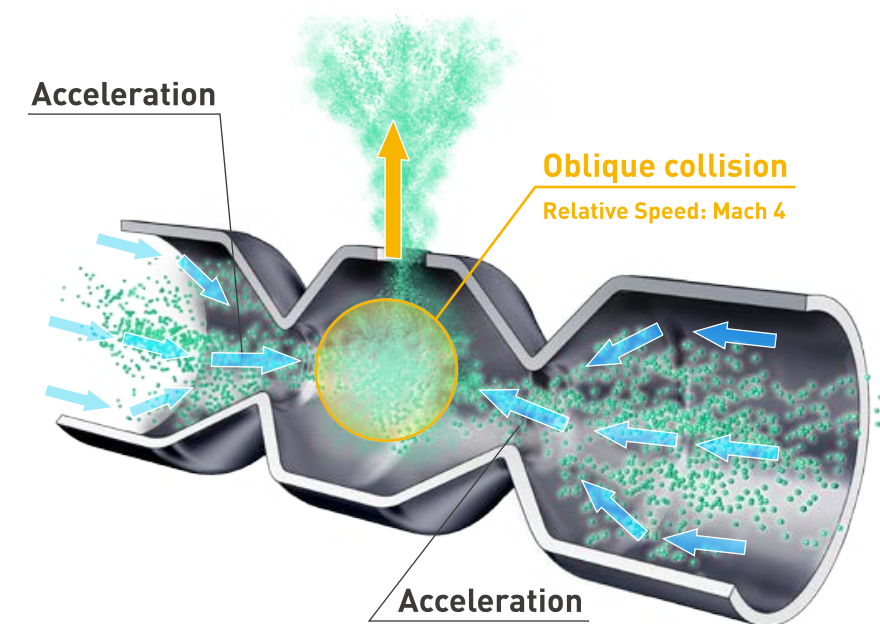
STAR BURST's capacity, durability, and reliability are feats only achievable through incorporation of our Sugino Pump. STAR BURST is the product of Sugino's extensive experience and collective knowledge attained over 70 years in the field of water jet technology.



Process Diagram of STAR BURST



- 1 Raw materials IN** : Pour the raw material (slurry or emulsion).
2 Pressurization : Pressurizing the raw material up to 245MPa in the intensifier.
3 Pulverization and Dispersion : Each intensified raw material are accelerated through the cavity of the diamond nozzles. The projected materials meet at the center of the chamber where the oblique collisions occur, facilitating pulverization and dispersion.
4 Product OUT : Material is cooled by the heat exchanger and subsequently discharged.



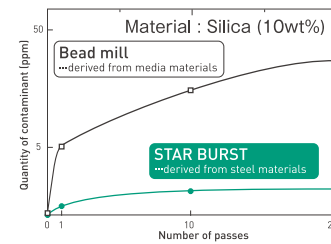
3 Image of Pulverization / Dispersion (Oblique collision type chamber)

*Applicable to STAR BURST 100 / 10

FEATURES of STAR BURST

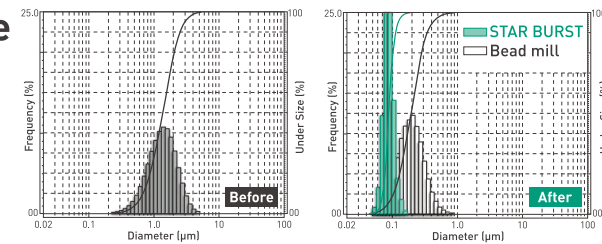
Minimum Contamination

STAR BURST does not use any grinding media and provides products with the minimum amount of contamination.



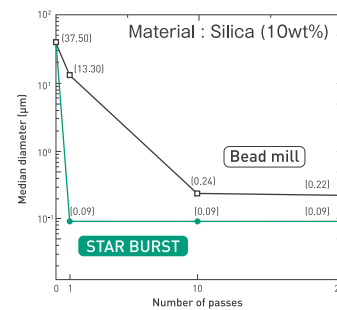
Homogenized Particle Size

Uniform particle with narrow particle size distribution can be achieved by controlling the injection speed of raw material.



High Pulverizing Capability

Effective nano-level pulverization and dispersion can be achieved in a short duration of time.



Pulverization of various materials

1. Works with High Viscosity and High Concentration
Capable of pulverizing raw materials with viscosity over 5,000mPa·s and solid content over 50wt%.
2. Capable of operation even with organic solvents



Titanium oxide
(viscosity: 5,300mPa·s, 50wt%)

We highly recommend using STAR BURST for:

Materials used on highly clean condition

Ceramics and additives for electronic components, Medicines, Cosmetics

Scaly or easily deformable materials

Conductive polymers, Nickel particles, Copper particles

Fine materials without coarse particles

CMP slurry, Toner for copy machines, Pigment

Abrasive materials

Alumina, Silica, Cerium oxide

Application Examples

Material	Before	After
Alumina Number of passes : 10 Pressure : 98MPa 20μm → 0.2μm		
Silicon Carbide Number of passes : 3 Pressure : 245MPa 20μm → 1μm		
Carbon Black Number of passes : 10 Pressure : 200MPa 10μm → 0.1μm		
Pigment Blue Number of passes : 10 Pressure : 200MPa 10μm → 0.1μm		
Carbon Nanotube 3wt% Number of passes : 3 Pressure : 245MPa		
Silica 10wt% Number of passes : 3 Pressure : 245MPa		
Squalane 5wt% Number of passes : 5 Pressure : 150MPa		



Before ▶ **After**
Precipitated Dispersed



Before ▶ **After**
36.15μm 0.082μm



Before ▶ **After**
82.12μm 0.091μm

* The particle size before and after the process shown is median diameter.

STAR BURST 100/10

Dispersion	Emulsification	Pulverization	Exfoliation
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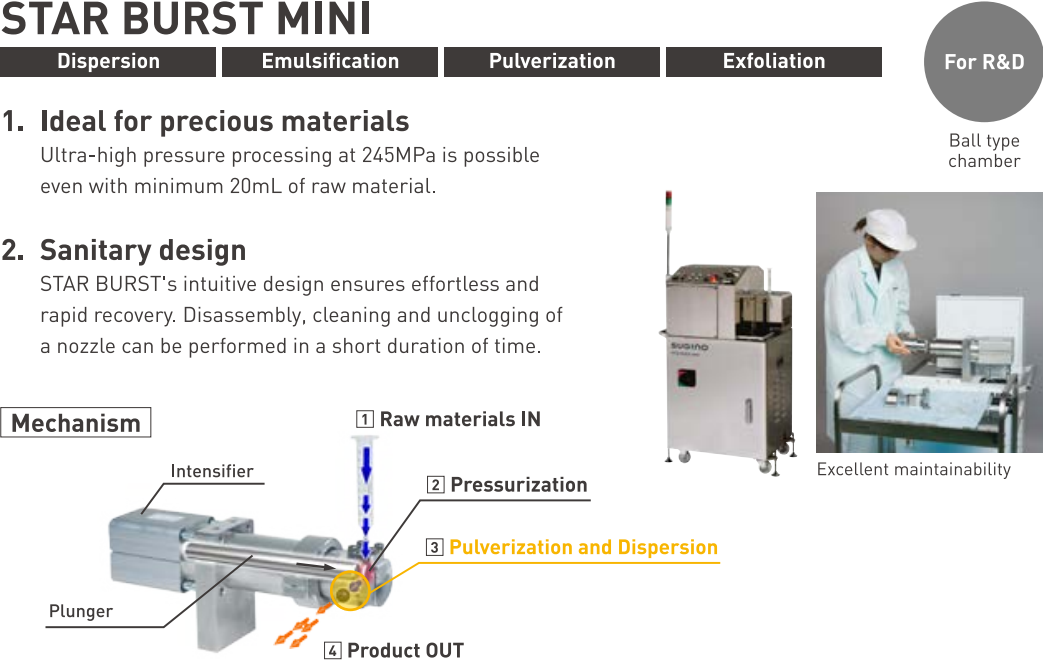
1. **Exceptional scalability**
The processing results attained by small scale machines are replicated on larger scale machines.
STAR BURST is scalable to meet your production needs.
2. **Tremendous throughput**
Production scale machines can achieve maximum throughput volume of 1,056L/h.
3. **Extensive variety of options to meet your application needs**
We offer a variety of options that are useful to our customers including, Automatic Pass Management System, Safety Monitoring System, and Explosion-Proof Specifications.



STAR BURST MINI

Dispersion	Emulsification	Pulverization	Exfoliation
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1. **Ideal for precious materials**
Ultra-high pressure processing at 245MPa is possible even with minimum 20mL of raw material.
2. **Sanitary design**
STAR BURST's intuitive design ensures effortless and rapid recovery. Disassembly, cleaning and unclogging of a nozzle can be performed in a short duration of time.



	Model	Motor	Theoretical maximum throughput	Pressure	Diameter of chamber nozzle	Explosion proof	External dimensions W×D×H	Weight
		kW	L/h	MPa	mm	-	mm	kg
STAR BURST 100	HJP-25080	75	441	100~245	ø0.35	Option	1,330×3,150×1,900	5,800
	HJP-16140		727	70~160	ø0.50			
	HJP-10180		1,056	50~100	ø0.48 Dual-Chamber			
STAR BURST 10	HJP-25008	7.5	52	100~245	ø0.12	Option	1,250×950×1,295	780
	HJP-17011		67	70~170	ø0.15			
STAR BURST MINI	HJP-25001	2.2	6	100~245	ø0.10	N/A	600×500×1,145	180

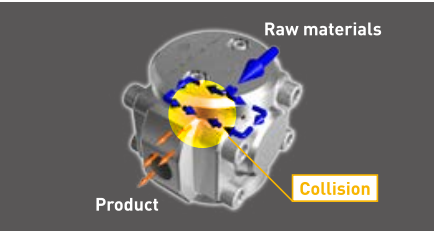
* We advise to limit maximum operating pressure when organic solvents are used.

SUGINO's Original Chamber

Oblique collision type chamber

Dispersion	Emulsification
Pulverization	Exfoliation

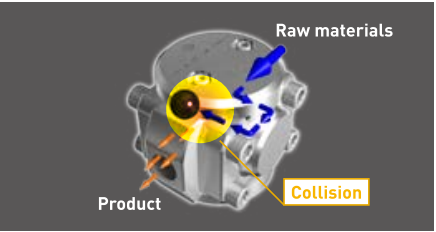
Pressurized particles collide obliquely with each other to achieve powerful pulverization and minimal contamination.
Effective materials (e.g.,highly abrasive materials)



Ball type chamber

Dispersion	Emulsification
Pulverization	Exfoliation

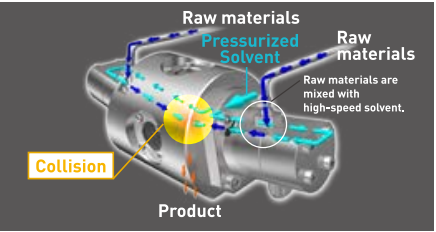
Achieves powerful pulverization by colliding pressurized particles with decentered ceramic ball.
Effective materials (e.g., emulsions, materials containing coarse particles)



Separate type chamber

Dispersion	Emulsification
Pulverization	Exfoliation

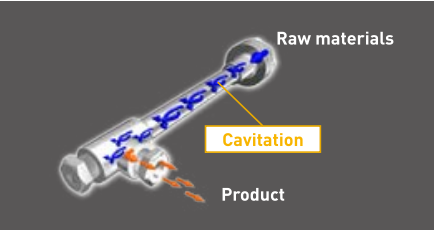
Raw materials are mixed and collided immediately after the pressurized solvent is injected.
Effective materials (e.g., ductile materials such as metals and high-density materials)



Single nozzle chamber

Dispersion	Emulsification
Pulverization	Exfoliation

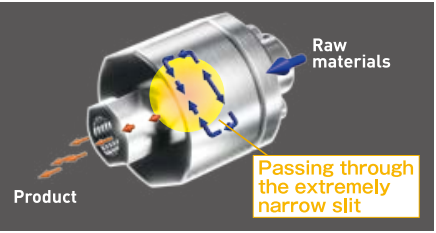
Raw materials are dispersed or exfoliated by the cavitation force generated during the injection of pressurized slurry.
Effective materials (e.g., high aspect ratio materials such as graphite, mica, and montmorillonite)



Ultrafine slit chamber

Dispersion	Emulsification
Pulverization	Exfoliation

Pressurized materials are passed through a diamond slit, where the resulting immense shear force achieves powerful emulsification and dispersion.
Effective materials (e.g., emulsions, nano-dispersions)



Global Testing Facilities

Japan		Europe		North America	
Location	Toyama, Japan	Location	Stuttgart, Germany	Location	Illinois, USA
Test Device	HJP-25001 HJP-25008 HJP-25080	Test Device	HJP-25001CE HJP-25008CE	Test Device	HJP-25001US HJP-25005 HJP-25080
Measuring Device	Particle size analyzer Zeta potential meter Digital microscope SEM	Measuring Device	Particle size analyzer	Measuring Device	Particle size analyzer Digital microscope Viscometer