

Spark Plasma Sintering Systems

General Catalogue

Spark Plasma Sintering System for Research & Development

LABOX™ Series

Spark Plasma Sintering System for Production

JPX™ Series



New Materials & Sintering


SINTER LAND INC.

From Material Development to Mass Production


SINTER LAND designs, manufactures and delivers Advanced SPS System Machines for an advanced new material processing and a new “manufacturing” products utilizing a novel SPS technologies!!

“The World’s Largest Tunnel-type Continuous SPS Production System” with Three-chambers and Automatic Materials Handling Conveyor

The 1st Step
Material Development




Small Desktop Type LABOX
Supporting Tool for Basic Experiments of Research & Development




Small size samples of various materials

The 2nd Step
Trial Manufacture of Products




Medium Size LABOX
General-purpose SPS system for Research & Development to Trial Manufacture of Products

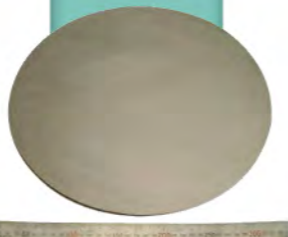


Φ70mm Sintered compact
Trial Manufacture of Products

The 3rd Step
Production (Middle/Small Quantity)



Production Use JPX
Production System for Middle/Small Quantity with manufacturing capability of Large Sintered Compacts



Φ300mm Al₂O₃ (RD:98%)

The 4th Step
Mass Production

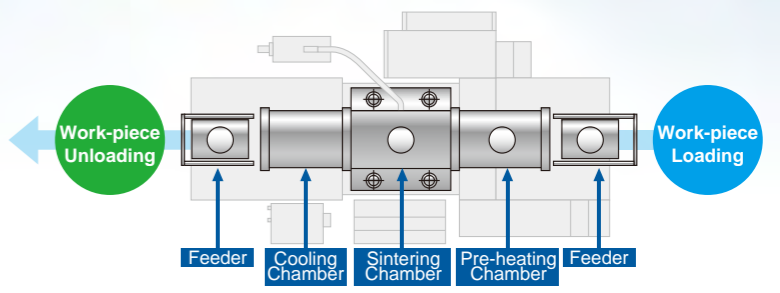
JPX
for Production System

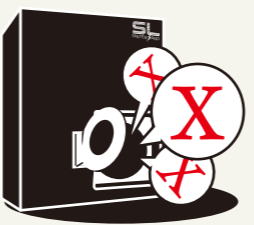


Main Specifications

- Max. Pressure : 6MN
- Max. Puls Current Output : 40,000A
- Three-chamber Style : Pre-heating, Sintering and Cooling (equipped with the inverter power supply)

Diagram of Three-chamber Style & Tunnel Type SPS Production System (top view)





“JPX” and “LABOX” are filled with “X” of Infinite possibility.

Sinter Land Inc., the pioneer of the Spark Plasma Sintering Processing, was established in 1999 as the first SPS processing center in Japan. “JPX” and “LABOX” are newly developed SPS system for the research & development and production, based on the SPS processing know-how and application technologies produced from various kinds of research & development and processing in addition to abundant experiences and know-how of manufacturing of SPS system which our machine manufacturing department has accumulated for 24 years. JPX and LABOX are suitable for production and development of advanced new materials such as electric/electronic materials, functionally graded materials, fine ceramics, and various electric materials. Sinter Land will continue to search for “the creation world” based on the SPS technology with the corporate philosophy that we consider customer satisfaction first, treasure the relationship of mutual trust, and grow with customers.

“The Fifth Generation SPS System” based on New Concept

From R&D to Production!! Wide Range of SPS Machines and Systems

Spark Plasma Sintering System for Research & Development

LABOX™ Series

- Originally Developed High-efficiency and Energy-saving Type Power Supply

Originally developed Inverter type DC pulse generator greatly reduces electric power consumption compared with the SPS systems. It enables the making of higher quality sintered compacts in less energy.

- Pressurizing Mechanism with Superior Control Performance

The pressurizing mechanism equipped with the fast-responding AC servo motor realizes the precise control and low noise design of pressurizing force that are difficult to realize by the conventional hydraulic system.

- High Precision Process Control

Freely setting of parameters, such as temperature, up-and-down speed of temperature, pressurizing force and holding time, permits the high-repeatable and precise control.

- Short Cycle Time

It has the special energization mechanism enabling high-speed temperature rise-100 to more than 500°C per minute and high cooling performance. These features realize more speedy specimen making than conventional methods, such as hot press, HIP and atmospheric sintering.

- Skill-free Easy Operation

The design considering operationability, workability and safety including usage of touch panel, various interlock functions, easy maintenance and so on allows even beginners also to operate, to prepare high quality samples.

LABOX™-100 Series

Type-M Type-H

Concept is “High Performance & Simple Operation”

Refined requisite functions

- High cost performance
- Suitable for Specimen making tool
- Compact and light weight design (movable with casters)



Type-M [Standard Model] AC Servo Motor Type

Type-H Manual Hydraulic Type

Model Name	LABOX-110	LABOX-125	LABOX-110 Type-H
Maximum Sintering Pressure	10kN[1.02tonf]		
Z-Axis Stroke	50mm(Open height;150mm)		
Pressurizing Control System	Vertically Single Axis Press with AC Servo Motor	Vertically Single Axis Press with Manual Hydraulic	
Table Size	φ70mm		
Maximum Temperature	2500°C(2,200°C for normal use) ※		
Vacuum Pumping System	Rotary Pump(Ultimate Vacuum;6Pa)		
Maximum Pulse Current Output	1000A	2500A	1000A

※Maximum temperature is limited by the conditions, such as material composition, sintering die & punch dimensions and holding time.

LABOX™-300 Series

Upgrading of Pulse Generator Source and Pressurizing Mechanism
Upper Grade Model of Small Desktop Equipment

- Refined the requisite functions for development of the advanced materials
- Enough capacity of power supply for high temperature sintering and rapid temperature rising
- Inherits the futures of the 100 Series



LABOX-350(with optional unit)

Model Name	LABOX-315	LABOX-325	LABOX-350
Maximum Sintering Pressure	30kN[3.06tonf]		
Z-Axis Stroke	80mm(Open height;200mm)		
Pressurizing Control System	Vertically Single Axis Press with AC Servo Motor		
Table Size	φ90mm		
Maximum Temperature	2500°C(2,200°C for normal use) ※		
Vacuum Pumping System	Rotary Pump(Ultimate Vacuum;6Pa)		
Maximum Pulse Current Output	1500A	2500A	5000A

※Maximum temperature is limited by the conditions, such as material composition, sintering die & punch dimensions and holding time.

LABOX™-600 Series

Type-S Type-F

“All-in-One” One-box Type SPS System Packed with Unique Ideas

- Semicircle cylinder shaped chamber results in high workability
- Touch panel screen based on the new ideas
- Pulser dial enables speedy adjustment of height of sintering table for specimen

Innovative LABOX Touch Panel Screen



Vertical Semicircle Cylinder-shaped Chamber (type-S)



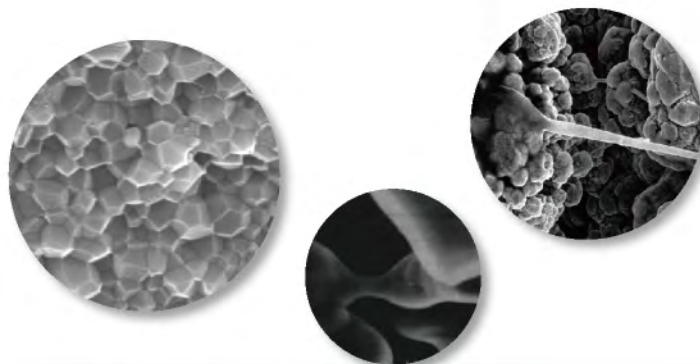
LABOX-625(with optional unit)

Type-S [Standard Model] Vertical Semicircle Cylinder-shaped Chamber

Type-F Horizontal Cylinder and Forward Door Type Chamber

Model Name	LABOX-625	LABOX-650	LABOX-675
Maximum Sintering Pressure	60kN[6.12tonf]		
Z-Axis Stroke	150mm(Open height; 250mm)		
Pressurizing Control System	Vertically Single Axis Press with AC Servo Motor		
Table Size	φ90mm		
Maximum Temperature	2500°C(2,200°C for normal use) ※		
Vacuum Pumping System	Rotary Pump(Ultimate Vacuum;6Pa)		
Maximum Pulse Current Output	2500A	5000A	7500A

※Maximum temperature is limited by the conditions, such as material composition, sintering die & punch dimensions and holding time.



Spark Plasma Sintering System for Production

JPX™ Series

Newly Developed Large-sized Model!!, based on our SPS Processing Know-how and 24 years Experiences on SPS Machine Manufacturing Techniques with a highly reliable quality

Modular Structure of SPS Ensures Expandable and Flexible System!!

- Flexible System enables upgrading of production capacity with throughput by extension of additional multi-chamber
- Reasonable initial cost facilitates effective industrialization
- Specially designed ON-OFF DC Pulse Generator for High efficiency and Energy-saving
- High safety and easy maintenance structure
- Precise processing control results in high repeatability
- Special energization mechanism enables rapid temperature rise and high cooling capacity results in enhanced throughput



JPX-300GIII (with optional unit)

Model Name	JPX-120G	JPX-300G	JPX-600G
Maximum Sintering Pressure	1.2MN 122.4tonf	3MN 305.9tonf	6MN 611.9tonf
Z-Axis Stroke	150mm to 600mm (Open height; 600mm to 1,000mm)		
Sintering Stage Size	φ300~φ900mm		
Maximum Temperature	2,200°C (2,000°C for normal use)※		
Maximum Pulse Current Output	15,000A / 20,000A / 30,000A / 40,000A There are four(4) types depend on different output.		

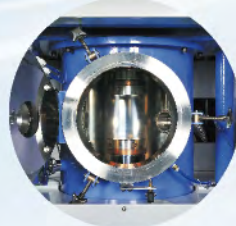
※Maximum temperature is limited by the conditions, such as material composition, sintering die & punch dimensions and holding time.

LABOX™-1500 LABOX™-3000 Series

One-box Type High-end Machine for Wide Variety of Experiments

- Equipped with the largest pulse generator of maximum 10,000A in this class
- Remarkable flexibility shows the applications from small specimen making to products trial
- High performance system, with energy saving and compactness

Cylindrical Water-cooled Vacuum Chamber



LABOX-1575 (with optional unit)

Model Name	LABOX-1550	LABOX-1575	LABOX-1510K
Maximum Sintering Pressure	150kN 15.3tonf		
Z-Axis Stroke	150mm (Open height; 250mm)		
Pressurizing Control System	Vertically Single Axis Press with AC Servo Motor		
Table Size	φ150mm		
Maximum Temperature	2,500°C (2,200°C for normal use) ※		
Vacuum Pumping System	Rotary Pump & Mechanical booster pumps (Ultimate Vacuum:6Pa)		
Maximum Pulse Current Output	5000A	7500A	10000A

Model Name	LABOX-3050	LABOX-3075	LABOX-3010K
Maximum Sintering Pressure	300kN 30.6tonf		
Z-Axis Stroke	180mm (Open height; 280mm)		
Pressurizing Control System	Vertically Single Axis Press with AC Servo Motor		
Table Size	φ200mm		
Maximum Temperature	2,500°C (2,200°C for normal use) ※		
Vacuum Pumping System	Rotary Pump & Mechanical booster pumps (Ultimate Vacuum:6Pa)		
Maximum Pulse Current Output	5000A	7500A	10000A

※Maximum temperature is limited by the conditions, such as material composition, sintering die & punch dimensions and holding time.

Custom-made SPS System



SPS System with Glove Box LABOX-125GH

Customization of System for Your Needs

We are glad to get your consultation of custom-made system to meet your requests and applications.

We will meet any request such as improvement to higher vacuum equipment, addition of unit (glove box, transfer mechanism, mold releasing mechanism and so on), modification of R&D system into production system, the SPS system specialized for bonding and original system with your specification.

Provided at reasonable price, SPS System with glove box (equipped with diffusion pump) is the most suitable for research and development work for nano-phase materials, thermoelectric conversion materials, magnetic materials, etc. This equipment can be operated from the charging of powdered materials to the sintering without exposure into atmosphere (sample materials can be transported from the glove box to the sintering chamber).

Options, Consumables

- SPS Data Logging System
For SPS data control, this system can draw the graph on PC display at real time.
- SPS Data Analyzer
The host system of the data acquisition system
- Infrared Radiation Thermometer (with Bracket)
Non-contact type and needed to measure the temperature of 1,000°C or over
- Thermocouple for High-temperature Region
Contact type and needed to measure directly the temperature of 1,000°C or over
- Chiller Unit
Keeps cooling water at a constant temperature and effective for stabilization of cooling performance
- High-vacuum Pump (Diffusion Pump)
About 5x10⁻³ Pa, degree of vacuum, available
- Pressure Program Controller
- Temperature Program Controller (Standard accessory except for LABOX-110)
- Hand Press
Workability of filling powder into mold, pressuring and releasing is greatly improved.
- Various Dies & Punches and Jigs
Various kinds of dies & punches, such as different dimensions, specifications and materials as well as standard dies & punches are available.
- As we will respond to any equipment and consumables from you, please contact us.



SPS Data Logging System



Infrared Radiation Thermometer



Various Graphite made Die & Punch

Look to SPS Technology for Innovation and Flexibility

About SPS

Spark Plasma Sintering (SPS), also called the pressure-assisted pulse energizing process or the Pulsed Electric Current Sintering (PECS) process, is a promising technology for innovative processing in the field of new materials fabrication in the 21st century.

Principle of SPS

In addition to the thermal and mechanical energy to be used in general sintering Process, the magnetic energy by means of pulse current, the heat generated from the processing materials themselves and the spark plasma energy between particles are utilized as the driving force for sintering. These are the major characteristics of SPS process.

Suitability for All Kinds of Materials

All kinds of materials, such as metals, ceramics, polymers and composite materials are available.

As its characteristics, SPS will produce high quality sintered compacts with little effect of starting material properties (such as particle size, composition and purity).

Wide Applications (Applicable Processes)

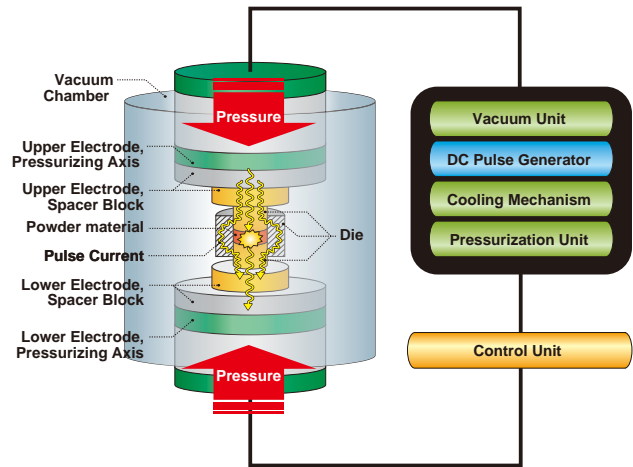
SPS shows its capabilities in the fields of "Bonding&Joining", "Forming", "Surface Modification" and "Synthesizing" as well as "Sintering"

Overwhelming Superiority in Research & Development of Advanced Materials

SPS shows remarkable effect in the fields that conventional methods could not approach.

- Easy sintering of hard-to sinter materials and multi-element compounds
- Under inhibition of grain growth and preservation of micro structure, sintering is also available (high adaptability for nano-particle)
- Temperature gradient inside of specimen (several hundred degrees per mm) can be controlled
- Activation and cleaning effect of powder particle surface (removal of adsorbed gases and oxide films)
- Homogeneous sintered compacts with no uneven distribution in density and compositions are available
- Easy density control (from porous body to dense body)
- Capable to make high quality materials without high-vacuum and reduction atmospheres
- Rapid sintering at lower temperature and shorter time than Conventional methods
- Wide temperature range for processing (from low temperature to high temperature region of 2,000°C over)

Basic Configuration Diagram of SPS Process



Suitable Materials

Amorphous materials, Multi-element compounds, Refractory materials, Metallic glass, Translucent materials, Nano-phase materials, Functionally graded materials, Porous materials, Intermetallic compounds, Fine ceramics, Cermets, Metals, Alloys, Advanced composite materials (Carbon nano-tube/Carbon nano-fiber, FRC/FRM)

Examples of Applicable Fields

Thermoelectric materials, Target materials (for Sputtering and deposition, etc), Super thermal conductive composite materials, Magnetic materials, Translucent Materials, Electric devices (Piezoelectric, Dielectric, etc.), Hard alloy, Hard tool (Diamond/CBN), Mold & Die materials, Resource recovery (Rare metals, Rare earths, etc.), Re-sintering, Biomaterials (Artificial bones, Dental materials, etc.), Abrasion resistance materials, Heat-resistant materials, Alternate materials for rare metals, Superconductive materials

producing and selling



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New Materials & Sintering

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