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 1st Step**
Material Development

**The 2nd Step**
Trial Manufacture of Products

**The 3rd Step**
Production (Middle/Small Quantity)

**The 4th Step**
Mass Production

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

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

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

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**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)**

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"JPX" and "LABOX" are filled with "X" of Infinite possibility.

Sinter Land Inc., the pioneer of the Spark Plasma Sintering Processing, was established in 1998 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 ceramic, 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 relation ship 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°C to 500°C per minute) and high cooling performance. These features realize even 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**

*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)

**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™-600 Series**

*“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

**Type-M [Standard Model] AC Servo Motor Type Manual Hydraulic Type**

<table>
<thead>
<tr>
<th>Model Name</th>
<th>LABOX-110</th>
<th>LABOX-125</th>
<th>LABOX 112 Type-M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Shaft Power</td>
<td>10kW(12kW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z-Axis Stroke</td>
<td>50mm(Open height:150mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressurizing Control System</td>
<td>Vertically Single Axis Press with AC Servo Motor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table Size</td>
<td>g70mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Temperature</td>
<td>2500°C(2500°C for normal use)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vacuum Pumping System</td>
<td>Rotary Pump/Ultimate Vacuum(6Pa)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Pulse Current Output</td>
<td>1000A</td>
<td>2500A</td>
<td>1000A</td>
</tr>
</tbody>
</table>

**Type-H [Standard Model] AC Servo Motor Type Manual Hydraulic Type**

<table>
<thead>
<tr>
<th>Model Name</th>
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<th>LABOX-125</th>
<th>LABOX 112 Type-H</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td>2500A</td>
<td>5000A</td>
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**LABOX-110 (with optional unit)**

**LABOX-125 (with optional unit)**

**LABOX-350 (with optional unit)**

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**Innovative LABOX Touch Panel Screen**

**Vertical Semicircle Cylinder-shaped Chamber (Type-S)**

**LABOX-625 (with optional unit)**
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 to products trial
- High performance system, with energy saving and compactness

Cylindrical Water-cooled Vacuum Chamber

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

Flexible System!!
Modular Structure of SPS Ensures Expandable and Flexible System!!

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.

LABOX-1575 (with optional unit)

LABOX-1575 (with optional unit)

JFJX™ Series

Custom-made SPS System

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.

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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 effects 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℃ over)

Suitable Materials

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

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Distributor

[Graphic of SPS Process Diagram]

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