

SYNTE SYSTEM SELECTION GUIDE

Vacuum Sintering Furnace Systems

Selection guide for pressureless, debinding, additive, bottom-loading, tube-atmosphere and hot-press routes.

Compare process routes before selecting a chamber, model or quotation basis.



VTS

Multipurpose batch

MIM

Integrated debinding

VTSL

Bottom loading

VMPE

Hot pressing

Use this document to

Screen the application, compare reference configurations, identify the engineering variables that change the proposal, and define measurable quotation and acceptance inputs.

Current online reference

<https://syn-v2.com/vacuum-furnace-systems/vacuum-sintering-furnace/>

All published values are reference data for preliminary selection. Final configuration, supply scope and acceptance conditions are controlled by the project proposal and technical agreement.

01 / ROUTE COMPARISON

Choose the process route first

The route should be selected from the required material result and production logic. Nominal temperature or chamber size alone cannot distinguish a suitable system.

Route	Best fit	Published reference	Key configuration input
VTSL	Pressureless batch sintering	1300°C Mo / 2200°C graphite	Material, hot zone, load and gas
MIM	Binder removal + sintering	1600°C; five models	Binder fraction and vapor load
HVF	Binder-based metal AM	1550°C; 400×250×250 mm	Feedstock, setter and qualified curve
VTSL	Tall/heavy vertical loads	Ø350 to Ø2300 mm examples	Carrier, lift and site geometry
HQH	Controlled tube gas flow	1100°C; H ₂ /N ₂ /Ar	Gas purity, flow, exhaust and safety
VMPE	Pressure-assisted densification	1600°C; 100 T	Die, force, stroke and thermal cycle

Route-by-route decision map

Route	Best-fit objective	Production logic	Critical input
VTSL	General pressureless sintering	Graphite or molybdenum platform	Chemistry, temperature, atmosphere and load
MIM	Integrated debinding and sintering	Trap/condensation plus production models	Binder fraction, release curve and cleaning duty
HVF	Binder-based metal additive parts	Metal hot zone and recipe control	Feedstock, setter, shrinkage and chemistry
VTSL	Tall, heavy or large-diameter load	Vertical bottom loading	Carrier, lift, floor/pit and overhead clearance
HQH	Controlled tube gas processing	H ₂ /N ₂ /Ar flow route	Gas purity, purge, exhaust and safety basis
VMPE	Pressure-assisted densification	100 T reference hot press	Die, force, displacement and acceptance

Decision rule

Select the route that meets the result with the simplest controllable process boundary. Add pressure, binder management, high-pressure quenching or continuous handling only when the application evidence requires it.

02 / INPUT DEFINITION

Define the load, cycle and result

A useful selection worksheet separates part data, process data, production demand and the acceptance method.

Input block	What to define	Evidence to attach
Material / starting state	Exact grade, feedstock, binder, filler or prior heat treatment	Chemistry and incoming-state evidence
Part / assembly	Drawing, critical surfaces, section thickness and orientation	2D/3D drawing and marked inspection points
Complete load	Parts + trays/setters/fixtures/carrier; gross mass and center of gravity	Loaded arrangement drawing and bill of mass
Thermal route	Ramp, equalization, soak, cooling and unload target	Existing qualified curve or required result
Vacuum / gas	Pressure stages, gas purity, flow, dew point, exhaust and backfill	Utility data and contamination limits
Production	Good parts/batch or hour, shifts, yield, changeover and uptime	Capacity calculation assumptions
Acceptance	Test method, sample location, pass limit, records and witness points	Standard, control plan or signed method

Usable-zone rule

Size the furnace from the complete loaded envelope, not the largest loose part. Include tooling, gas-flow or radiation clearance, transfer clearances and the planned sensor arrangement.

03 / ARCHITECTURE

Connect the subsystems to one cycle

Vacuum, heating, gas, cooling, handling and controls must be evaluated against the same load and acceptance cases.

Subsystem	Configuration decision	Required project input
Chamber & loading	Orientation, usable zone, door, transfer and service access	Load drawing, handling method and site geometry
Hot zone	Heater/shielding material, zones, sensors and insulation	Peak/use temperature, chemistry and uniformity basis
Vacuum train	Pump stages, valves, gauges, isolation and pressure-rise test	Working pressure, outgassing and pump-down target
Process gas	Purge/backfill, flow/pressure control, exhaust and safety	Gas type, purity, dew point, consumption and site rules
Cooling / quench	Gas, oil, water or programmed furnace cooling	Metallurgical result, load density and cycle target
Controls / records	Recipes, interlocks, alarms, roles, trends and export	Traceability fields, protocols and retention
Utilities	Power, water, gas, air, exhaust, floor and environment	Confirmed site data at the installation point

Engineering notes

Note 01

Binder vapor management is a primary system-sizing input

Note 02

Hot-zone material follows chemistry, temperature and contamination limits

Note 03

The usable zone includes trays, setters, fixtures and clearance

Note 04

Gas, exhaust, cooling, interlocks and records must be defined before acceptance

04 / PROCUREMENT

Make quotations technically comparable

Request the same boundaries and acceptance evidence from every supplier. This prevents a low initial price from hiding missing auxiliaries, interfaces or test scope.

Comparison block	What the proposal should state
Performance basis	Empty or loaded condition, sensors, duration and allowable deviation
Supplied scope	Main furnace, pumps, chiller, gas train, tooling, loading, spares and commissioning
Utilities	Installed power, connected load, water duty, gas demand, exhaust and air
Controls	Recipe count, records, protocols, user levels, remote support and data export
Factory acceptance	Inspection points, dry run, vacuum/thermal tests, witness load and report format
Site acceptance	Installation boundary, utility responsibility, SAT, training and open-item closure
Lifecycle	Consumables, maintenance access, recommended spares and service response route

Send with the enquiry

RFQ 01 material/feedstock and binder	RFQ 02 part + setter drawing
RFQ 03 load mass	RFQ 04 temperature/vacuum/gas curve
RFQ 05 throughput	RFQ 06 density/shrinkage acceptance

SYNHTE engineering review

Email info@synthe-corp.com or WhatsApp +86 155 3785 7393. Current system page: <https://syn-v2.com/vacuum-furnace-systems/vacuum-sintering-furnace/>