

SYNTE SYSTEM SELECTION GUIDE

# Vacuum Brazing Furnace Systems

Selection guide for aluminum, high-temperature, continuous and pressure-assisted joining routes.

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



## VTB

Aluminum brazing

## VTHB

High-temperature brazing

## VTM

Pressure-assisted joining

## Continuous

Production lines

### 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-brazing-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 process                              | Published temperature basis | Production fit             |
|------------|-----------------------------------------------|-----------------------------|----------------------------|
| VTB        | Aluminum thermal assemblies                   | 750°C                       | Flexible batch loads       |
| VTHB       | Stainless, titanium, superalloy, carbide      | 1300°C                      | Mixed batch production     |
| Continuous | Stable repeat part families                   | 750 or 1300°C platform      | Takt-driven line           |
| VTM        | Diffusion bonding / pressure-assisted joining | 1200°C / 200 T              | High-value discrete stacks |

## Route-by-route decision map

| Route      | Best-fit objective                             | Production logic                      | Critical input                                       |
|------------|------------------------------------------------|---------------------------------------|------------------------------------------------------|
| VTB        | Flux-free aluminum thermal assemblies          | Flexible batches and large work zones | Alloy/filler, cleanliness, fixture and leak criteria |
| VTHB       | Stainless, titanium, nickel alloy and carbide  | High-temperature batch joining        | Hot-zone chemistry, filler and joint acceptance      |
| VTM        | Diffusion bonding or pressure-assisted brazing | Discrete high-value stacks            | Interface, tooling, force, flatness and displacement |
| Continuous | Stable repeat part families                    | Takt-driven automated line            | Carrier, residence, zone isolation and factory I/O   |

### 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

Joint design, filler or interface route and cleanliness are process inputs

#### Note 02

Work zone includes the part, fixture, clearance and complete hot mass

#### Note 03

Vacuum, partial pressure, cooling and records are selected together

#### Note 04

Acceptance should define leak, strength, dimensions, thermal evidence and batch records

#### 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

|                                                 |                                          |
|-------------------------------------------------|------------------------------------------|
| <b>RFQ 01</b><br><br>material and joint drawing | <b>RFQ 02</b><br><br>filler/interlayer   |
| <b>RFQ 03</b><br><br>part + fixture envelope    | <b>RFQ 04</b><br><br>batch or takt       |
| <b>RFQ 05</b><br><br>vacuum/gas                 | <b>RFQ 06</b><br><br>acceptance evidence |

#### SYNHTE engineering review

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