



MODEL VDS FURNACE

*Vacuum Debind and Sinter
in one cycle*



Vacuum Debind And Sinter In One Cycle, One Furnace For Ultimate Component Purity



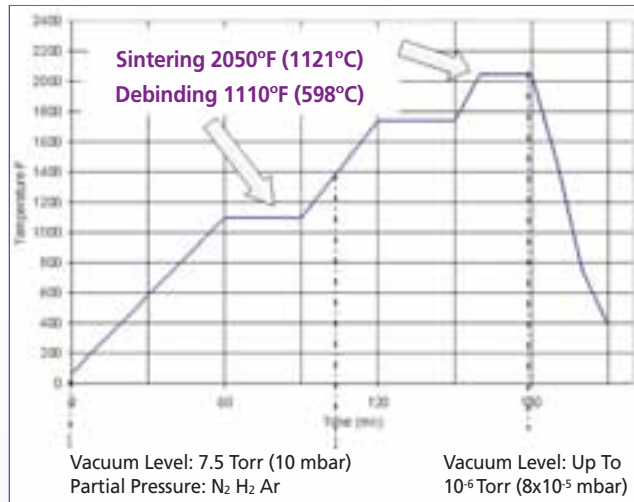
A unique dual vacuum pump design combines two steps – debinding and sintering – into one cycle, one furnace, without contamination of the components or hot zone.

During the debinding process, all binders must be completely removed from components, and contaminants that could foul the furnace or pumping system must be evacuated. These contaminants will affect furnace performance and quality during the sintering process. The design of the VFS Model VDS (Vacuum Debind/Sinter) solves this problem by utilizing not one, but two vacuum pumping lines.

One vacuum pumping line removes binders and carries them out through the bottom of the furnace. The pumping line incorporates an optically dense, water cooled baffle trap with a removable insert for ease of maintenance. The design also utilizes an additional water cooled trap in front of the vacuum booster to collect residual binder materials.

A second vacuum pumping line is connected to the high vacuum diffusion pump's main poppet valve. The high vacuum level is required for the sintering processes.

Process Description



Sintering is a process required for many different parts and applications, including powdered metal parts and metal-injected molding (MIM) components, 3-D metal printing components of various types, and beading applications including abrasives.

Binders are generally used in all of these applications to create the pre-heat treated parts. The parts are then heated to the binding agent's vaporization temperature. The temperature is held at this level until all outgassing of the binding agent is complete. Debinding segment control is provided

through the application of a suitable partial gas pressure that is above the vapor pressure temperature of the other elements in the alloy base material. The partial pressure is normally between 1 and 10 Torr.

The temperature is increased up to the sintering temperature of the base alloy and held to ensure that solid state diffusion of the part occurs. The furnace and parts are then cooled. Depending upon the application or component metallurgical requirements, cooling rates can be controlled to meet hardness and material density requirements. The chart shown above is an example of a typical debinding/sintering cycle, which includes the use of a partial pressure gas during the debinding phase, and rapid gas quenching to meet specific material hardness requirements.

Customer Benefits

Vacuum debinding and sintering in one process cycle not only saves heat treaters time and money, but also results in superior and more consistent part quality. The main benefits of the VFS vacuum debind and sinter furnace are:

- Quicker processing turnaround. The VFS vacuum debind and sinter furnace system permits virtually unlimited design flexibility.
- Higher process quality (vacuum versus atmospheric).
- Minimization of contaminants to the furnace and components.
- Production of clean and bright components – a requirement of the medical industry.
- Furnace reliability and component repeatability.
- Maintenance "friendly" for cleaning and contaminant removal.

Sintering Part Applications

Several industries rely on sintered parts and components including:

- Medical parts, particularly implants
- Automotive – Power transmissions, gears & sprockets, camshafts, diesel particulate filter and valve seats
- Tools – Screwdrivers, drills, cutting/grinding tools



Standard Furnace Features

The VFS vacuum debind and sinter furnace is packed with features for fast and effective debinding and sintering applications. These include:

- Choice of graphite or metallic hot zone
- Operation at temperatures of up to 3000°F (1648°C)
- Vacuum levels to 10^{-6} Torr (8×10^{-5} mbar)
- Partial pressure with argon, nitrogen or hydrogen
- Partial pressure ranges of 50 to 1000 microns (to 650 Torr, 866 mbar, with Argon/Nitrogen)
- Fast cooling of up to 2 bar
- Binder removal system
- Burn-off system provided for safe handling of any flammable by-products

Standard Work Zone Size:

- 10" (254mm) high x 10" wide (254mm) x 18" (457mm) deep up to 300 lbs (136 kg)
- 36" (914mm) high x 36" (914mm) wide x 48" (1219mm) deep up to 3,500 lbs (1,590 kg)

Special sizes available on request.



*Graphite hot zone, left
Metallic hot zone, right*



Water-cooled binder trap assembly

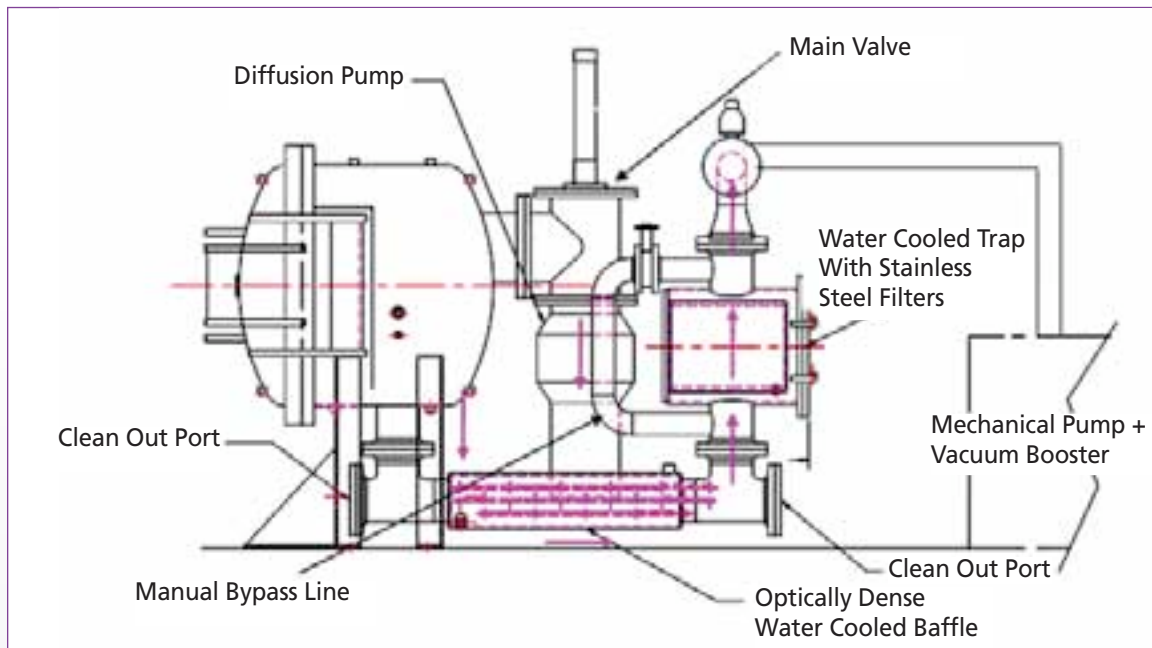


Binder collection trap



Pumping ports in hot zone stay closed during debinding and sintering

VDS Furnace Configuration



Compuvac® Control System

Our advanced Compuvac Control System allows you the flexibility to perform many functions including:

- Process variable monitoring
- Alarm display and annunciation
- Recipe development and storage
- In-process recipe editing programmable heating and cooling events
- Preventive maintenance and diagnostics
- DIGITRIM® heat zone control
- Real-time and historical trending
- Process cycle reporting





Ipsen, Inc. • www.ipsenusa.com

984 Ipsen Road, Cherry Valley, IL 61016 • Ph: 815.332.4941/800.727.7625 • Email: sales@ipsenusa.com