



The Solution
alp

VIM

Vacuum Induction Melting and Casting Furnaces

VIM 02 to VIM 100

Vacuum Induction Melting and Casting:

Vacuum induction melting is one of the most common processes in secondary metallurgy. It makes possible the effective degassing of the melt and precise adjustment of alloy composition.

The application of vacuum in the induction melting process is indispensable for the production of high purity metals that react with atmospheric oxygen. The vacuum melting process limits the formation of non-metallic oxide inclusions that are responsible for premature part failure.

Particularly critical applications such as jet engine parts demand the production of alloys with a very low concentration of undesired volatile trace elements.

VIM Process Characteristics:

- High flexibility and versatility
- Fast change of programs
- High efficiency due to desoxidation
- Close compositional tolerances
- Precise temperature control
- Low dust output
- Removal of undesired elements

Vacuum induction melting enables an extremely precise adjustment of the alloy composition

and melt homogenization since

- melt temperature,
- vacuum,
- gas atmosphere,
- pressure and
- kinetics

can be adjusted independently.

Several casting and mold treatment processes can be combined with the VIM technology.

Applications:

- Semi-finished products, like:
 - Strips and rods
 - Ingots and electrodes
 - Targets and flakes

by the following procedures:

- Mold casting
- Continuous casting
- Vacuum induction distillation
- Flake casting

in:

- Research & development
- Electronic industry
- Dental application
- Automotive and aerospace industry
- Ferrous applications
- Non-ferrous applications
- Precious metal industry

Standard VIM Furnaces

ALD's vacuum induction melting and casting furnaces of the VIM 02 to VIM 100 product line are modular, universal standard systems endowed with a broad range of accessories to tailor them to customers' individual production needs.

Available for all furnaces, for example, are

- Additional coils to be used for different melt materials and crucible sizes
- Ingot mold turntable for pouring into several molds under identical conditions
- Facilities for charging
- Temperature measurement
- Sampling
- Mold treatment

Add-ons The VIM-line is based on a modular design



Observation of vacuum induction melting and casting process via sight glass



Melting and degassing under vacuum



The revolver on the furnace lid enables charging, temperature measurement, sampling without interrupting the furnace atmosphere

VIM 02 to VIM 100

The nomenclature of different furnace designs:

VIM 02-100	V acuum I nduction M elting in range of 0.2 to 100 litres crucible volume, basic equipment
VIM-MT	with M old T reatment
VIM-VCC	with V ertical C ontinuous C asting
VIM-HCC	with H orizontal C ontinuous C asting
VIM-DS	with D irectional S olidification
VIM-FC	with F lake C asting
VIM-HMC/ VIM-VMC	with separate H orizontal or alternatively V ertical M old C hamber
VIM-P	with O ver- P ressure- O peration
VIDIST	V acuum I nduction D istillation

VIM 02 VIM furnace with diffusion pump and cell charger for laboratory use



VIM 02
Laboratory furnace with 0.2 ltr. melt volume

concept. A large number of add-on components allow to adapt or retrofit any furnace model to meet special process requirements.



**Charging with bulk charging
basket for coarse material**



Alloying with fine charger

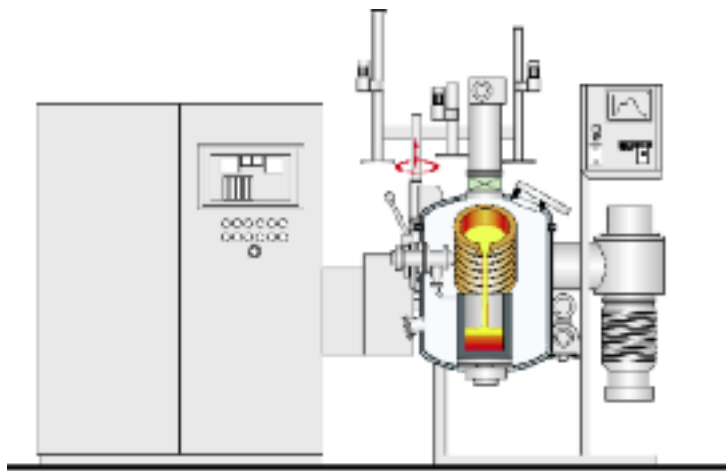


**Temperature measurement
with thermocouple and
reusable protection tube**

Vacuum Induction Melting and Casting:

Basic system can be easily modified with special devices to produce a system tailored to individual production needs like „Vacuum Induction Distillation furnace“ or „Vacuum Induction Melting furnace“ with separate mold chamber for inserting molds into the melt chamber shortly before casting.

VIM 12 VIM basic equipment furnace single chamber design with melt chamber, induction coil, vacuum pump set, melt power supply, controls and accessories

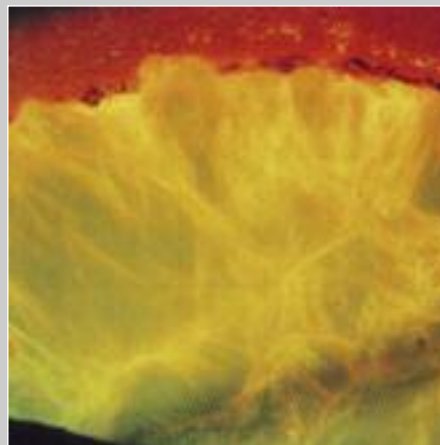


VIM basic single chamber design

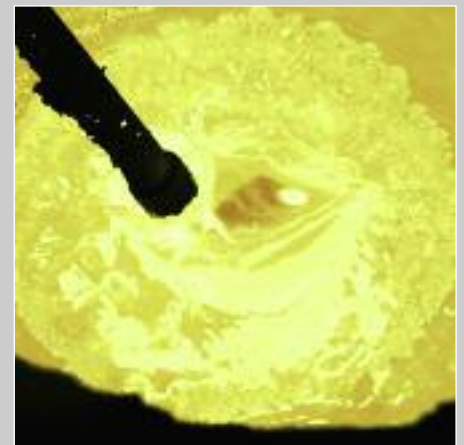
Add-ons The VIM-line is based on a modular design concept. A large number of add-on components allow



Gas purging with pivotable gas inlet into the melt

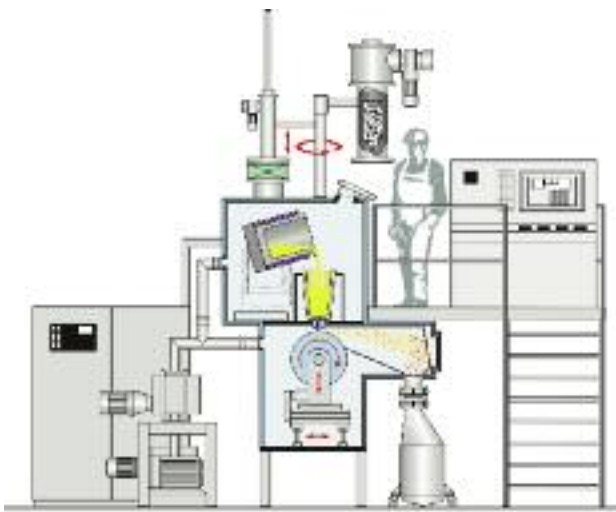


Homogenization of melt



Sampling and temperature measurement

Various Applications



VIM FC with Flake Caster for producing metallic flakes



VIM 50

VIM furnace with tundish heater and oxygen resp. inertgas blowing device for research and development



VIM HMC Two Chamber Design with Horizontal Mold Chamber allows to lock in molds prior to casting without interrupting the furnace atmosphere - this avoids excessive temperature losses of preheated molds



VIM with bottom purging, tundish heating and rotary mold table

to adapt or retrofit any furnace model to meet special process requirements.



Casting via tundish with heater enables filtering of undesired inclusions and precise pouring stream into e.g. barstick molds



Mold heater keeps the cast liquid and allows subsequent controlled solidification

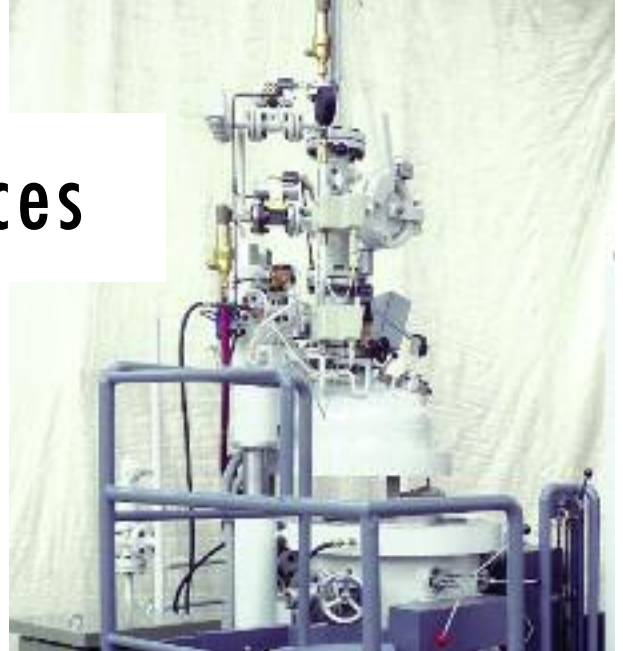
Customized VIM Furnaces

Continuous casting for strips and wires under inert gas atmosphere minimizes surface oxidation of the cast metal.

Therefore, vacuum melting technology combined with modern continuous casting technology in one system results in high quality end products. Consistent high quality at low operating costs yield cost effective production.

Vacuum provides an extremely low gas content in the melt and avoids oxidation of sensitive alloy elements. Backfilling with inert gas after melting-in guarantees that the purity of the melt which is a result of the vacuum treatment is preserved. Continuous casting allows intensive cooling of the poured metal and an exact range of solidification. That prevents segregation.

VIM P Vacuum induction melting furnace designed for melt treatment in the overpressure range up to 100 bar



VIM 12 VCC

Vacuum induction melting with vertical continuous casting for precious metal application



VIM VCC Vacuum induction melting with vertical continuous casting



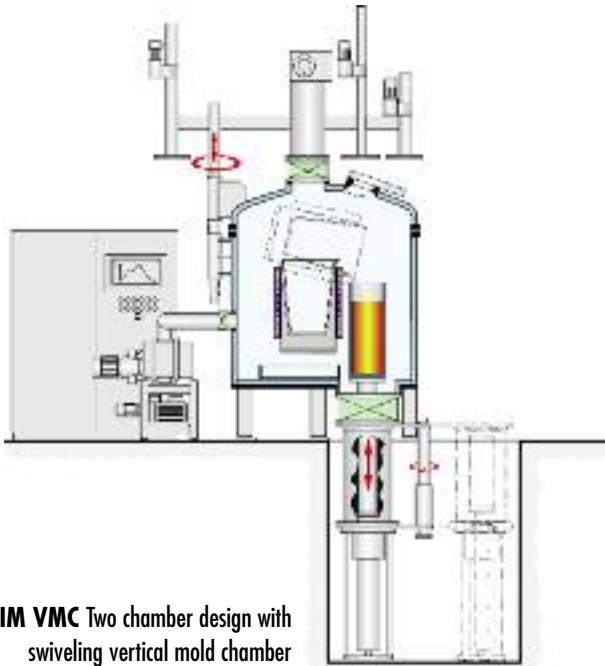
Add-ons The VIM-line is based on a modular design concept. A large number of add-on components allow



Vacuum system - a wide range of pumping systems tailored to every need, including dust filters, enables processing under vacuum



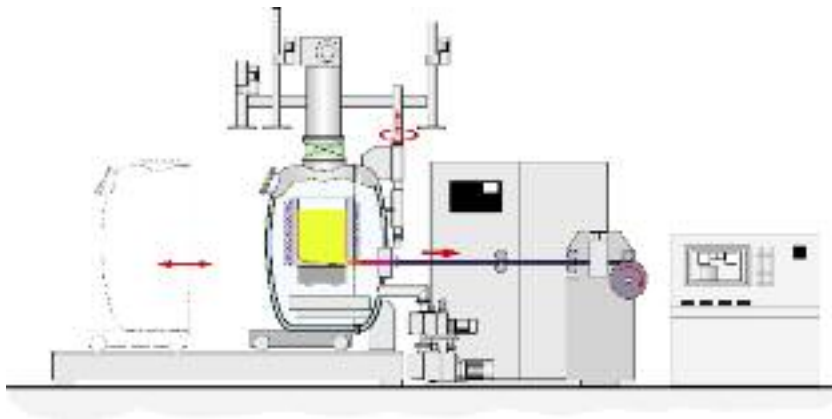
Induction melting and casting need melt power supply, coaxial power leadthrough and tiltable coil



VIM VMC Two chamber design with swiveling vertical mold chamber

VIM 70 VMC

Furnace with separate vertical mold chamber for ferrous and nonferrous alloys
(In combination with mold treatment directional solidification is possible)



VIM HCC Vacuum induction melting with horizontal continuous casting

... to adapt or retrofit any furnace model to meet special process requirements.

Control Systems

Control and process display

- Manually via manual valve
- With buttons for pumps, gas-inlet valves with LED display
- By operator control with recipe management and cleartext display
- Programmability for diverse melt recipes
- Automatic system for melting down and casting
- Display on mosaic mimic diagram or video screen



Control with colour TFT display in swivable operator control box

Technical Data

Features	Unit	VIM 02	VIM 05	VIM 2	VIM 4	VIM 6	VIM 12	VIM 20	VIM 50	VIM 70	VIM 100
Crucible											
Nom. capacity (from...to...)	(l)	0.1–0.2	0.04–0.5	0.5–1.95	1.95–3.5	3.5–5.8	5.5–12	12–21.4	21.4–50	50-70	80–100
Nom. capacity, max. (g St.=7.2g/cm ³) (kg)		1.5	4	14	25	40	85	150	350	500	1200
Hydraulic assisted tilting						X	X	X	X	X	X
Max. Size/Mold Setup											
Diameter	(mm)	100	180	180	220	320	380	500	550	1000	1500
Height	(mm)	180	220	360	400	440	480	750	1000	1100	1100
Vacuum Equipment											
Medium-vacuum pumping system	(mbar)	2x10 ⁻³	2x10 ⁻³	2x10 ⁻³	2x10 ⁻³	2x10 ⁻³	2x10 ⁻³	2x10 ⁻³	2x10 ⁻³	2x10 ⁻³	2x10 ⁻³
Nominal pumping speed	(m ³ /h)	150	150	500	500	1000	1000	2050	5500	5500	7000
High-vacuum pumping system	(mbar)	1x10 ⁻⁵	1x10 ⁻⁵	1x10 ⁻⁵	1x10 ⁻⁵	1x10 ⁻⁵	1x10 ⁻⁵	1x10 ⁻⁵	1x10 ⁻⁵	1x10 ⁻⁵	1x10 ⁻⁵
Nominal pumping speed	(lxs ⁻¹)	1010	1010	3000	3000	6000	6000	12000	12000	17000	20000
Recommended Power Supply for Melting											
MF power at 250 V	(kW)	6	20	40	60	80	120	180	250	450	530
Frequency	(KHz)	20	10	4	4	4	4	2	1	1	0.5
Coil voltage	(V)	250	250	250	250	250	250	250	400	400	400
Electr. connected Loads incl.											
High-Vacuum Pumping Unit	(kVA)	20	40	60	100	120	190	320	460	650	800
Line-voltage data	(V/Hz)	3x400/50	3x400/50	3x400/50	3x400/50	3x400/50	3x400/50	3x400/50	3x400/50	3x400/50	3x400/50
Cooling-Water Consumption											
Cooling-water consumption	(l/min)	20	60	80	120	150	200	290	400	700	1200
Cooling-water pressure, min.	(bar)	4	4	4	4	4	4	4	4	4	4
Compressed Air Pressure											
Compressed Air Pressure	(bar)	6	6	6	6	6	6	6	6	6	6
Space Requirement											
System height, with options	(m x m)	1.1 x 1.1	1 x 2.7	1 x 2.9	1.4 x 3	2.7 x 3.4	3.4 x 3.7	4.8 x 4.8	5.6 x 6.7	8.0 x 9.0	8.0 x 9.0
System height, with options	(m)	2.0	3.0	3.1	3.2	3.5	3.9	5.3	5.9	6.4	6.4
Total Weights (approx.)											
Weight of furnace (approx.)	(kg)	475	1500	1750	1900	3150	4000	7000	11500	15200	39000
Weight of MF power supply (approx.)	(kg)	450	900	1050	1200	2400	2800	5200	9500	13000	35000
Weight of MF power supply (approx.)	(kg)	25	600	700	700	750	1200	1800	2000	2200	4000



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