

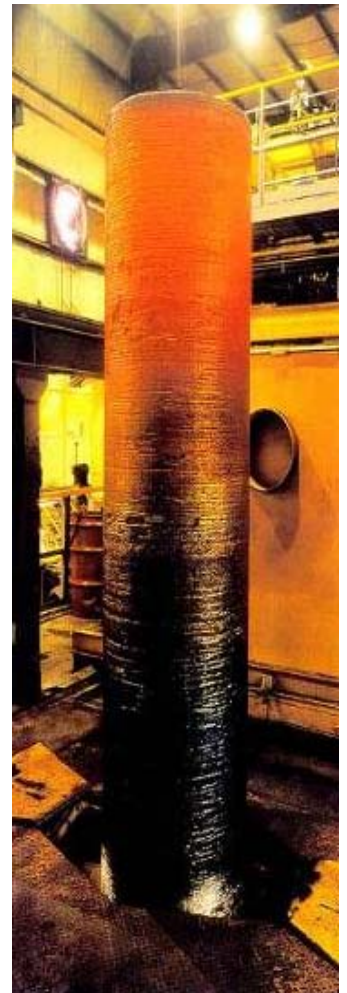
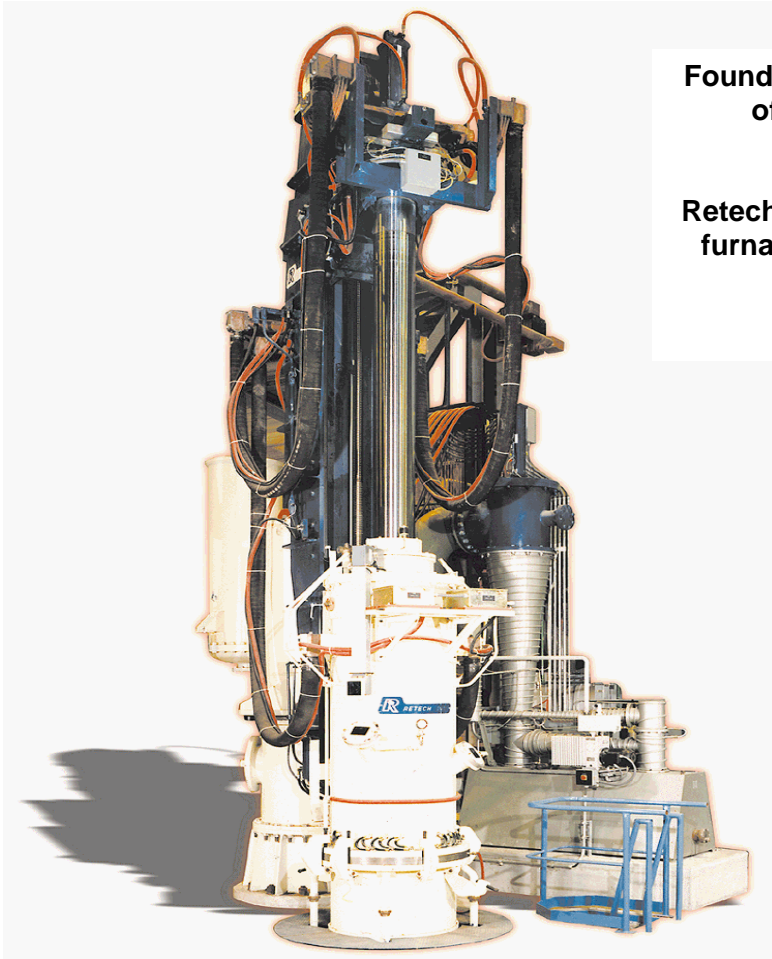


VACUUM ARC REMELTING (VAR) FURNACES

- *Model VAR-T...Titanium, Zirconium and Other Reactive Metals*
- *Model VAR-S...Stainless Steels, Tool Steels and Superalloys*

Founded in 1963, Retech has more than 40 years of experience melting specialty metals.

Retech's advanced Vacuum Arc Remelting (VAR) furnaces are designed to meet a wide range of melt specifications.



- ***Ingot Quality & Reliability***
 - *Homogeneity*
 - *Repeatability*
 - *Cleanliness*
- ***Precise Ram Drive with Speed & Position Regulation***
- ***Precise Load Cell Weighing System***
- ***Advanced Melt Process Control***

RETECH'S ADVANCED VAR DESIGNS

EXCEEDING THE DEMANDS OF LEADING SPECIALTY METALS PRODUCERS

As demand increases for VAR processed materials in aerospace, power generation, chemical process, oil and gas, medical, consumer, automotive, and other emerging industries...

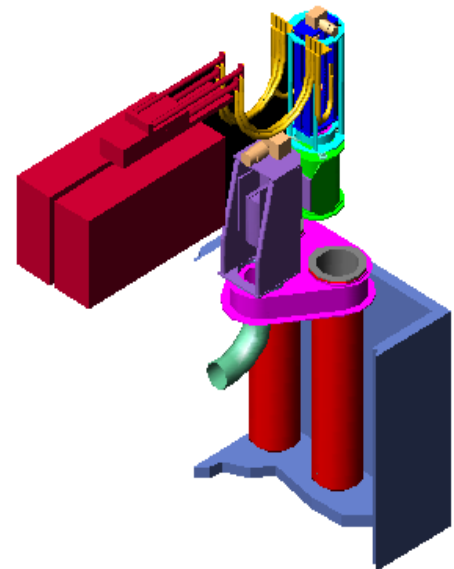
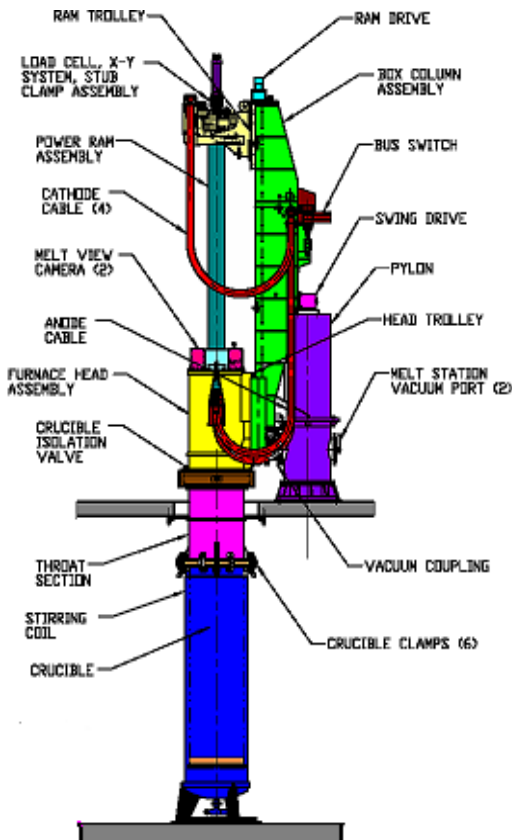
As customers relentlessly press for increased quality, consistency, higher volumes and lower prices from their producers...

Retech responds with intelligent VAR furnaces arrangements that exceed expectations: efficient, reliable and robust, offering lower net investments and reduced cost of ownership.

- VAR-T**
- **Traditional design for titanium, zirconium and reactive metals.**
 - **Standard Heavy (1100mm/43" ingots) and Light (910mm/36") sizes.**

- VAR-S**
- **Optimized for non-reactive specialty steel and superalloy processing**
 - **Next-generation accessible, compact, electromechanical design.**
 - **Heavy (1000mm/40") and Light (800mm/32") sizes.**

- Clean, stable DC power supply with excellent drip short control.
- Precise ram drive positioning and speed regulation.
- Precise shear beam load cell system to 0.01% accuracy.
- Accommodates all industry-standard stubs and crucibles.
- Maximized throughput with smooth stainless steel head interior, high speed changeover, improved pumpdown times, redesign of wear parts for ease of maintenance and 98% projected uptime.
- Free-standing design independent from building structure.
- Hydraulics are eliminated to reduce cost and complexity.
- Intuitive multi-segment recipes, and a variety of melt modes.
- Raised crucible flange split line prevents contamination and improves safety.
- Improved clarity and detail of melt view with a 360° view system and optional High Definition view of melt pool.



Traditional VAR-T designs are continually updated to maximize productivity, minimize net total investment, and improve operator safety.

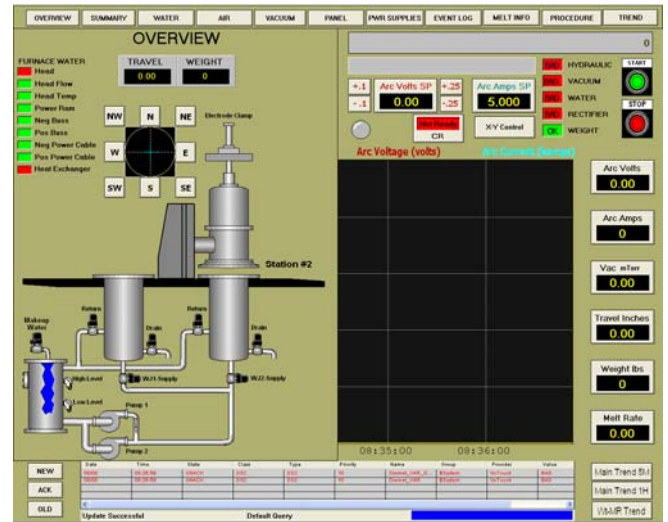
Next-generation VAR-S furnaces include advanced process controls, and an accessible, compact, all-electromechanical design.

VAR PROCESS CONTROL AND ACCESSORIES

Advanced Melt Process Control

Retech provides the most advanced process control and data acquisition technology to repeatedly produce high quality products, featuring:

- PLC Based Control System
- Precise and Accurate X-Y Electrode Drive Positioning
- Precise and Accurate Load Cell System
- Operator Interface Station
- Melt Recipes
- Melt Rate Control
 - Voltage
 - Current
 - Drip Short
- Data Acquisition
- Remote Ethernet/modem interface
- Optional Programmable Bi-Directional Stirring
- Optional Helium Gas Cooling and Partial Pressure Control

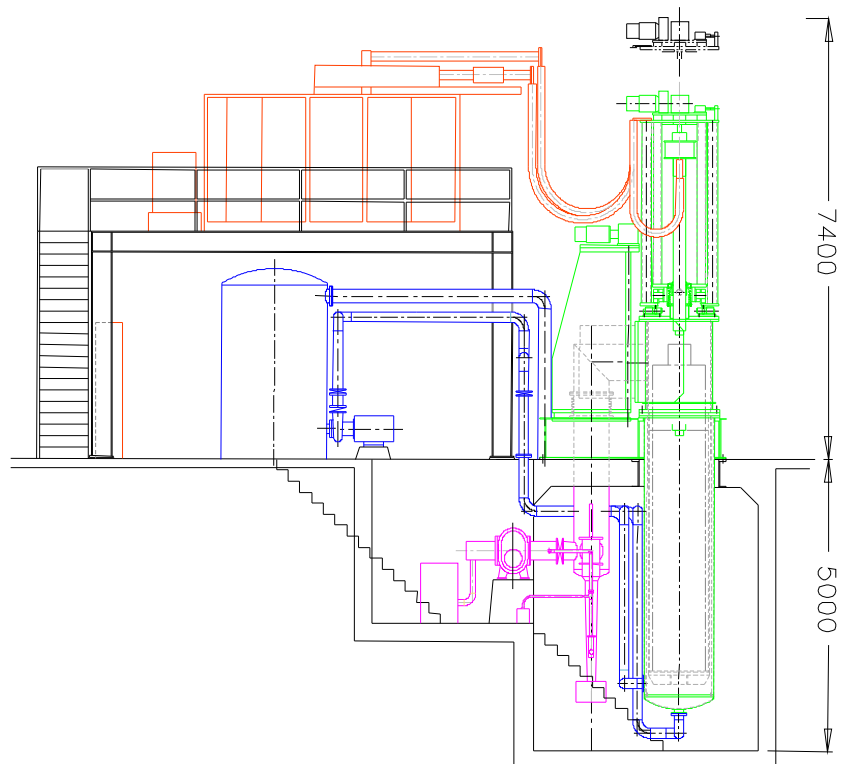
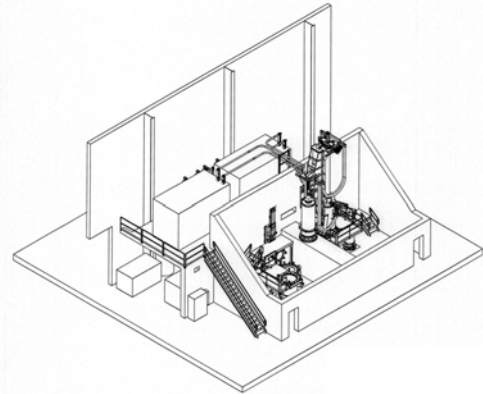


Retech Engineering

Headquartered in Ukiah, California, Retech is an international manufacturer with operations worldwide. Its Ukiah operation is the most highly integrated vacuum metallurgical processing equipment facility in the world, bringing together an exceptional team with thousands of man-years of experience in furnace design, manufacture, start-up and support in a 130,000 square foot (12,000 m²) state-of-the-art, ISO9001 Certified facility.

Retech Engineering will work with you to specify, supply, install and commission your entire furnace system:

- Furnace Head
- Melt Stations
- Crucibles
- Vacuum System
- Power Supply
- Power Bus & Cables
- Water Cooling System
- Pneumatics & Utility Manifolds
- Motor Control Center
- Control System
- Options & Accessories

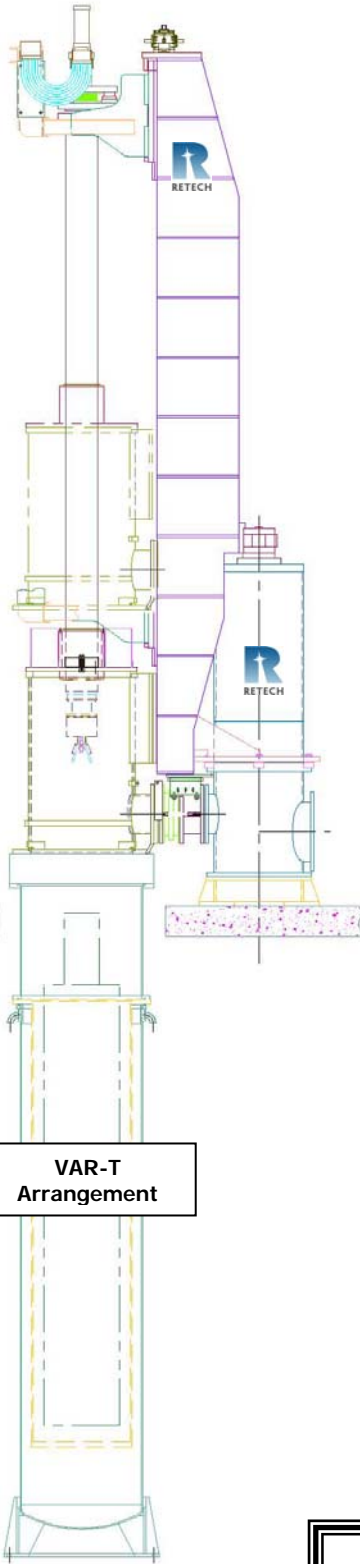


Retech is ISO 9001 Certified

VAR FURNACE DESIGN PARAMETERS

The Retech VAR is designed to accommodate existing stubs, electrodes, and crucibles.

Standard rated parameters are shown.
Contact Retech Engineering to modify designs for custom requirements.



Stainless Steel, Tool Steels and Superalloys

Titanium, Zirconium, and Other Reactive Metals

VAR-S 40"/1000 mm	VAR-S 32"/800 mm	VAR-T 42"/1100 mm	VAR-T 36"/900 mm
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	55,000 lbs. 25 MT	33,000 lbs. 15 MT	50,000 lbs. 23 MT	25,000 lbs. 12 MT
Furnace Capacity				
Max Ingot/Crucible Diameter	40" / 1000 mm	32" / 800 mm	42" / 1050 mm	36" / 910 mm
Crucible Flange Diameter	55" / 1400 mm	50" / 1270 mm	60" / 1500 mm	54" / 1375 mm
Max Ingot Length	160" / 4050 mm	160" / 4050 mm	194" / 4925 mm	184" / 4675 mm
Max Electrode Diameter	38" / 965 mm	30" / 760 mm	39" / 990 mm	32" / 812 mm
Max Electrode Length	195" / 4950 mm		236" / 6000 mm	

Weight and length assumptions:

Steel, 80% fill ratio, 485 #/ft³ (7780 kg/m³)

Titanium, 60% fill ratio, 281 #/ft³ (4506 kg/m³)

Ram Design

Ram travel (standard *):
Maximum Stub Length
Ram drive type:
Position accuracy:
Speed control range:
Current path:
Load cell system accuracy:
X-Y positioning

68" / 1725 mm	120"/3050mm to 200"/5080mm
22' / 570 mm	brushless servo w/ encoder
brushless servo w/ encoder	brushless servo w/ encoder
0.001 inch	0.001 inch
<0.01 to 30" (760mm) / min	<0.01 to 30" (760mm) / min
Fully coaxial to top of ram	Fully coaxial to top of head
0.01%, high repeatability	0.01%, high repeatability
1.5" / 3.8 cm (nom) @ electrode tip, DC actuated	2" / 5.0 cm (nom) @ electrode tip, DC actuated

Furnace Head

Furnace head lift (standard *):
Lift Method
Head swing:

48" / 1220 mm	90" / 2290 mm
electromechanical @ ~1 meter/min	electromechanical @ ~1 meter/min
74" / 1880 mm radius	66" / 1676 mm radius

Power rating:

25 kA	15 kA	50 kA	35 kA
@ 40V (load) x 70V (open circuit)	@ 40V (load) x 70V (open circuit)	@ 40V (load) x 70V (open circuit)	@ 40V (load) x 70V (open circuit)

Envelope

Length x Width
Height above shop floor
(120" / 3050 mm ram travel)

20' x 40' 6.1m x 12.2m	20' x 40' 6.1m x 12.2m	32' x 50' 9.8m x 15.2m	32' x 50' 9.8m x 15.2m
24' / 7.3m	24' / 7.3m	34' / 10.4m	34' / 10.4m

* Other head lift and ram travels available.

Thank you for your interest in Retech VAR equipment.

We appreciate the opportunity to support your melting operations.



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