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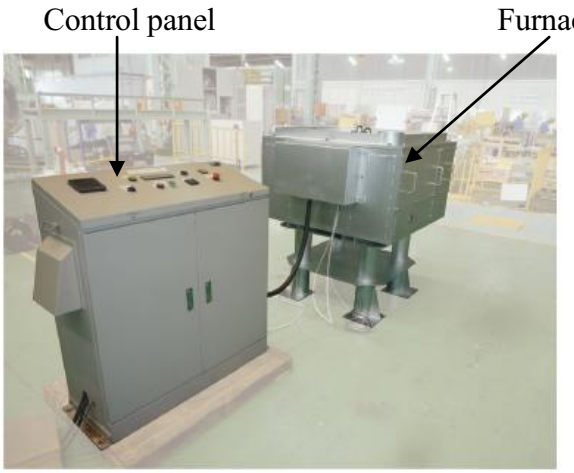
Overview of Development of IH Aluminum Melting and Holding Furnace

1. Specifications

Table 1 Specifications of developed product

Heating method		IH
Aluminum holding capacity		200 kg
Holding temperature		660 - 720°C
Control method		PID control (proportional control of temperature of molten metal)
Rated voltage and output		AC 220 V・20 kW
Power when melting		20 kW
Power when holding		12 kW
Dimensions of furnace (mm)	Width × Depth	1200 × 1200
	Height	1360
Dimensions of control panel (mm)	Width × Depth	1100 × 400
	Height	1100
Weight (kg)	Furnace	1200
	Control panel	150



Photograph 1 External view of IH aluminum melting and holding furnace

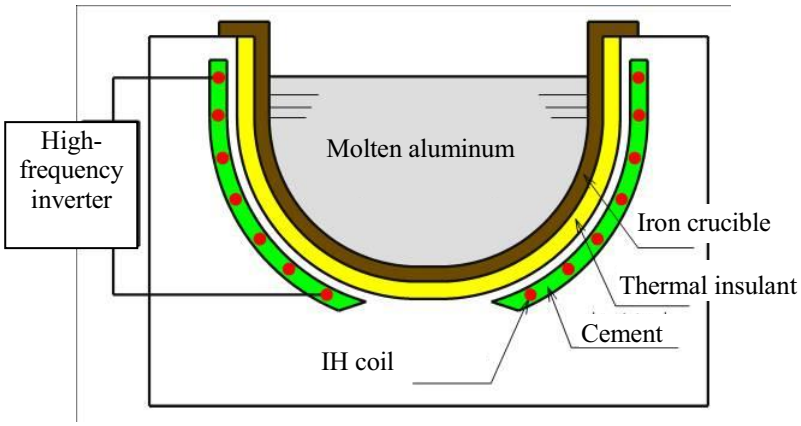


Figure 1 Configuration of IH aluminum melting and holding furnace

2. Characteristics

(1) High level of energy conservation

The use of IH eliminates the heat loss due to exhaust gas associated with the gas combustion heating method and enables direct transmission of heat to the crucible, resulting in efficient heating that realizes a reduction of approximately 20% in energy consumption on a primary energy basis and a reduction of approximately 50% in CO_2 emissions.

(2) Superior temperature control

Using the gas combustion method, temperature can only be controlled in units of ±5.0°C, while the IH aluminum melting and holding furnace enables temperature control in units of ±1.0°C.

(3) Significant improvement in work environment

The IH aluminum melting and holding furnace does not produce high-temperature (600ºC – 1,000ºC) exhaust gas like the gas combustion method. As a consequence, since the temperature in the vicinity of the furnace does not increase, there is a significant improvement in the working environment.

Table 2 Comparison of aluminum melting and holding performance

	IH	Gas combustion
Aluminum holding capacity	200 kg	
Holding temperature	670ºC	
Control method	PID control	On/off control
Power consumption	12 kW	—
Gas consumption	—	1.3 Nm^3 (Butane)
Primary energy consumption*1)	117 MJ (78%)	151 MJ (100%)
CO_2 emissions per hour*2)	5.00 kg (46%)	10.92 kg (100%)

*1) Equivalent primary energy

9.76 MJ for 1 kWh; 113.2 MJ for 1 Nm^3 of gas (butane mixed with 10% propane)

*2) CO_2 emissions basic units

0.417 kg-CO_2 (Chubu Electric Power CO_2 emissions basic units for fiscal 2009, following application of Kyoto mechanism credits) for 1 kWh

8.13 kg-CO_2 for 1 Nm^3 of gas (mixed gas) (Calculated from Japan LP Gas Association website)