TECHNICAL SPECIFICATIONS FOR COMBINATORIAL ALLOY DESIGN (CAD) FACILITY SUITABLE TO SYNTHESIS 5 DIFFERENT COMPOSITIONS UNDER VACUUM FROM A SINGLE MASTER MELT

The CAD facility must be able to:

A. Synthesize high purity master melt compositions of minimum 5 kg capacity (steel) and possibility to use the same setup for 10 kg melting.

B. Provision to add 2-3 different elements independently, in varied proportions to the master melt at any given stage of the synthesis process.

C. Cast 5 different compositions in separate molds inside the same vacuum chamber with controlled (inert gas) atmosphere as that is used for melting master alloy in a single operation.

D. Enclose portable compound (atleast 5 Cu or cast iron) mold module, with movement in atleast 2 different directions to facilitate combinatorial gradient synthesis.

Detailed Specifications

PART	SPECIFICATIONS
Melting and casting chamber – Basic requirements	Minimum Two – sight glass ports (100 mm diameter). Minimum One - Inert gas connection port. Minimum One - Admittance valve (Air, N_2) connection port. Power feed through port. Vacuum pumping port. Bridge breaker port. Optical pyrometer port. Over melt charger port.
Hinged door	It should be a horizontal working assembly with the front opening hinged door of the same construction as the melt chamber and would be clamped to the melt chamber with manual hand clamp.
Common support frame	The melting chamber and vacuum pumps are fully assembled on a common support frame to ease installation.

Inert gas admittance valve	Minimum One Manually operated inert gas admittance valve complete with a by-pass needle valve.
Powder feed through port	A stainless steel powder feed through port
Combinatorial casting module	Interchangeable, water cooled mould (made of stainless steel or copper) 3 – 5 in number, with the capacity to hold 10 kg liquid metal in total as well as individually.
Over melt charger	Small charger with up-down arrangement for maneuvering.
Mould turn table	Manual or pneumatic type, rotating or sliding on wheels type table (preferably stainless steel) to accommodate 3 - 5 interchangeable moulds with the capacity to hold 10 kg melts. It should have atleast forward-reverse movement to enabling pouring of molten metal in 3-5 different moulds.
Melting capacity	5 kg (steel) melting capacity with the possibility to melt 10 kg without major modifications to the setup.
Induction melting coil	One – 5 kg capacity melting coil. One – 10 kg capacity melting coil interchangeable with the 5kg coil assembly.
Vacuum pumping system	Appropriate vacuum pump module to enable high quality melt synthesis without pick-up of Oxygen and other gases.
Ultimate vacuum desired	Minimum 10^{-4} to 10^{-5} mbar under clean, dry, empty condition.
Expected working pressure	Minimum 10^{-2} to 10^{-3} mbar range with a fully refined and degassed charge.
Furnace design	Double wall, water cooled vacuum chamber (preferably made of steel).
Furnace system	Interconnecting water lines, air lines, gas lines and electrical cables.
Furnace type	Induction melting
Furnace tilt	Manual (Maximum 90°)
Instrument controls	Appropriate control panels, instrumentation including button controls, switches etc are to be provided as required for standard, uninterrupted operation.
Temperature measurement	Appropriate thermocouple and pyrometer assembly for accurate (± 20 °C variation acceptable) temperature determination of the molten liquid.
Cooling water requirements and other necessary accessories	All necessary cooling systems and other required accessories are to be indicated for the uninterrupted working of the system.
Partial pressure	Inert gas (Ar, He etc.) backfill controllable to 1000 mbar max.
Power supply (Melting)	Appropriate, fast melting rate, in-house produced solid state power supply setup (capacity 30 - 40 kW) for the above-mentioned requirements.

Installation and training	Complete installation of the CAD system to be borne by the supplier along with required operator training to produce atleast 2 repeatable test melts at the customer site.

Mandatory requirement:

Melt testing of atleast 2 sample compositions (with provided raw materials) supplied by the end user (IIT Madras) to validate the specifications with respect to combinatorial gradient melting capability. The above testing process is to be made accessible for the end user in person or through online or similar web based application. It may be noted that the decision to open the financial bids will be based on the test results. The entire exercise of melt testing to be completed within 15 days of notification from the end user.

Essential Conditions:

A) Basic equipment offered must be a model from the current serial production range of the manufacturer. Offer should be supported with printed catalogue / depiction on company website.

B) The local vendor of OEM must have supplied at least 10 such basic equipment modules (Induction coil assembly, vacuum system and power supply) to IITs, IISERs and other Govt. of India organizations. Please attach a reference list of supplies in last 3 years with contact details (Name, Phone, email address) of users.

C) The company or companies (for combined quotations) should be original equipment manufacturers (OEMs) of the basic melting systems. Please attach exclusive authorization certificate(s) specific for this tender with quote without which bid will be rejected.