XRF Scientific Fusion Equipment

xrFuse2

xrFuse6

SC142BMP- 6CSKR

Phoenix II

Phoenix P2/VFD

Phoenix M/VFD

Phoenix R/VFD

Phoenix S/VFD

Phoenix M/ICP

xrf scientific

RJM Systems (Pty) Ltd
Reg. No 2003/001571/07

xrFuse electric fusion

6 place

2 place

XRF, ICP and Alkali fusions

Fused Glass Discs for XRF

Solutions for ICP

Calcination, …

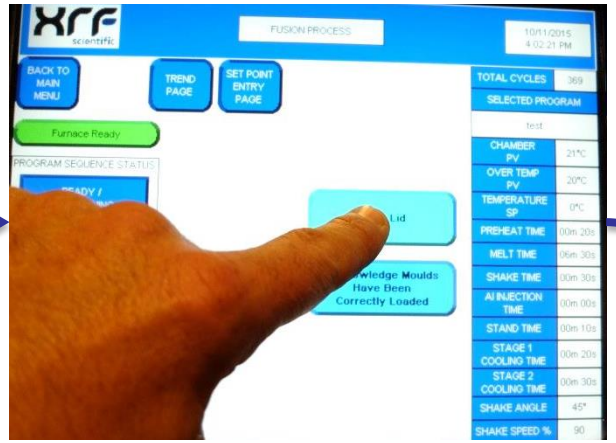
Easy to Install

Electrical Requirements:

- xrFuse 6: 380-415V, 3 phase - Frequency: (50/60Hz) - Current: 20 Amps
- xrFuse2: 208 - 220V, 1 phase - Frequency: (50/60Hz) - Current: 20 Amps

No Gas
No water
No External power supply

Easy to Use

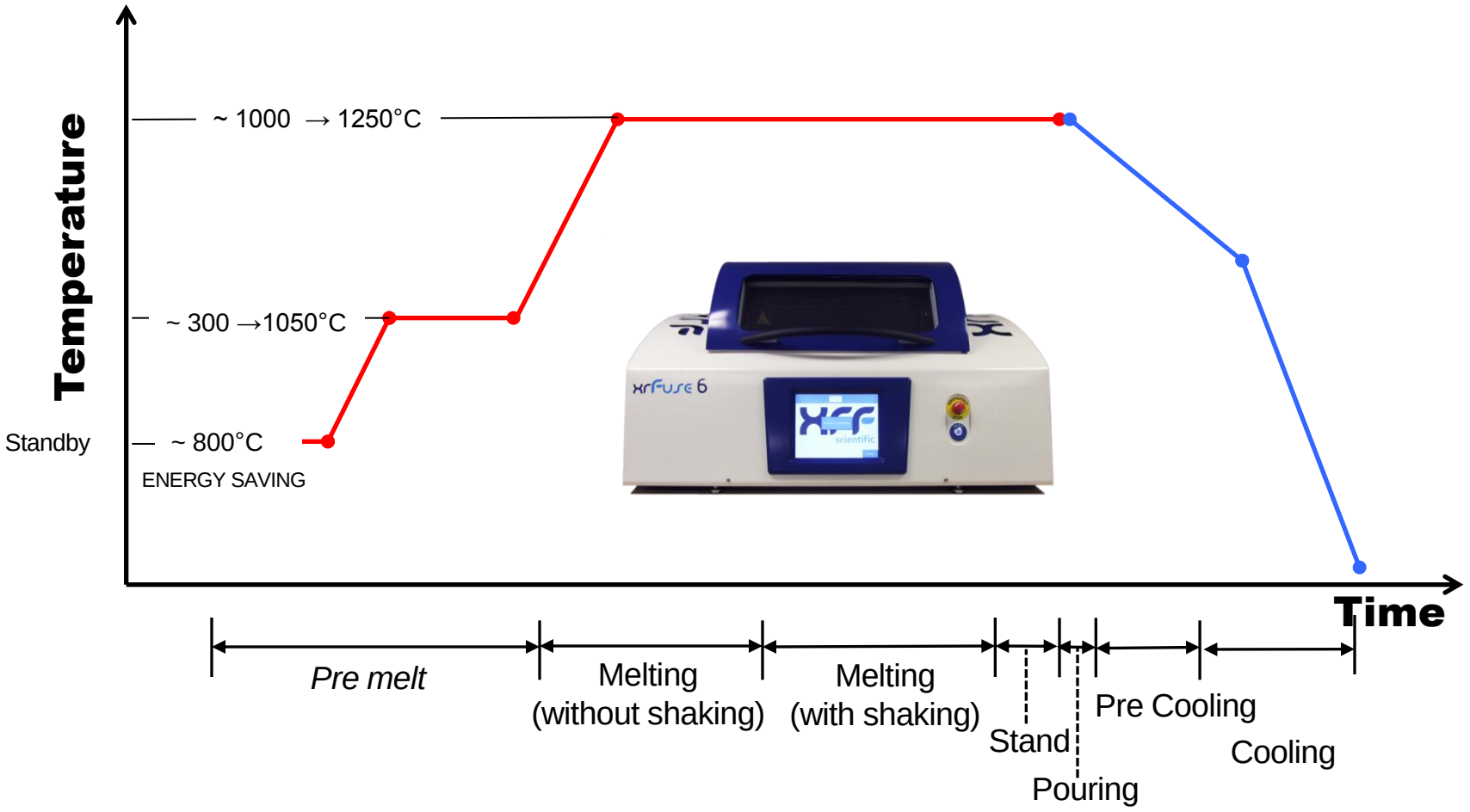


Cold to Cold

- 12 Fusion programs
- Touch screen PLC controls
- Perfect monitoring of the fusion cycle

Fusion Process

A bead-making fusion process with **xrFUSE** consists of 6 (7) phases.

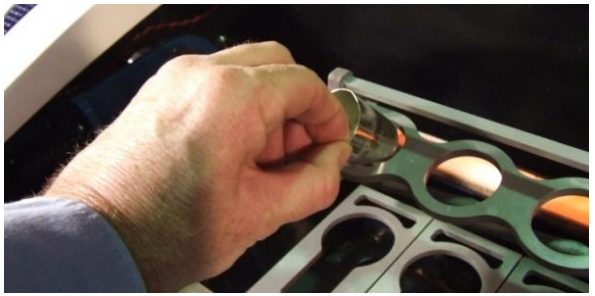


Fusion Process in XRF mode

- *Pre melt (preheating step)*
  Loaded crucibles are held stationary in the furnace at lower temperature (150 - 950°C) to allow the gas dissipation or for an oxidation purpose.

- Melting (without shaking)
  The first fusion stage is **‘melt’**. Loaded crucibles are held stationary in the furnace at fusion temperature to allow the flux to begin to melt.

- Shaking
  During the **‘shake’** phase, the crucibles are agitated by rocking continuously at the selected shake speed and angle. The molten flux is able to roll back and forth across any undissolved sample ensuring rapid and complete fusion



Fusion Process in XRF mode

- Stand

  The **‘stand’** phase holds the crucibles stationary and may be just a few seconds. This allows the molten sample to release any entrapped air bubbles. At the end of the stand phase, the fusion process is complete.

- Pouring

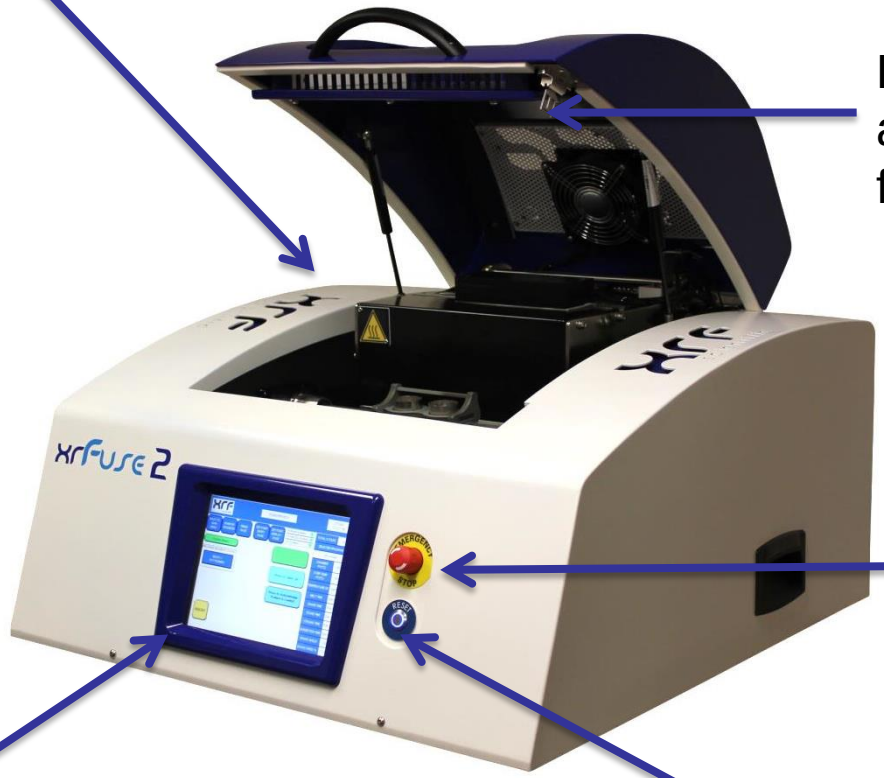
  The fused samples are then removed from the furnace and poured into their pre-heated moulds so the pour function can be viewed by the operator. Once this is complete both the Mould and Crucibles are now in the correct position for the cooling phase to begin.

- Cooling

  During the ‘cool’ phase, fan-forced air is applied to accelerate the solidification of the beads.

Operating controls

Main power Isolator switch delivers main power to the unit.



Lid key-lock will not allow access to the inside of the furnace unless safe to do so

Emergency stop

Touch screen PLC controls

Safety Reset Pushbutton

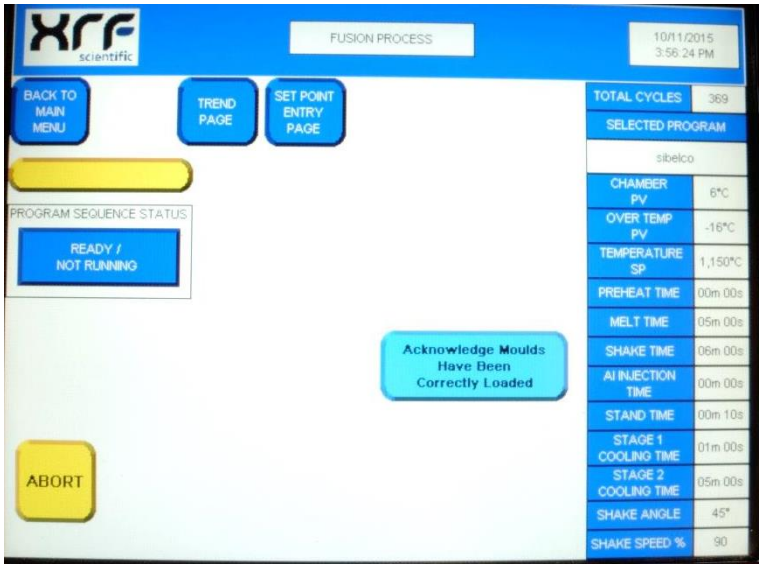
Touch screen PLC controls

Most user commands are driven through the touch screen PLC.

The PLC is programmed with all the information required to run the bead-making fusion process automatically.

4 function keys:

- Fusion Process
  Starting a fusion program
- Set Point Entry (password protected)
  Loading or Modifying fusion programs
- Engineering (password protected)
  Auxiliary settings, Manual Operation, Diagnostics, PID tuning and Security
- Alarm page
  Alarm log



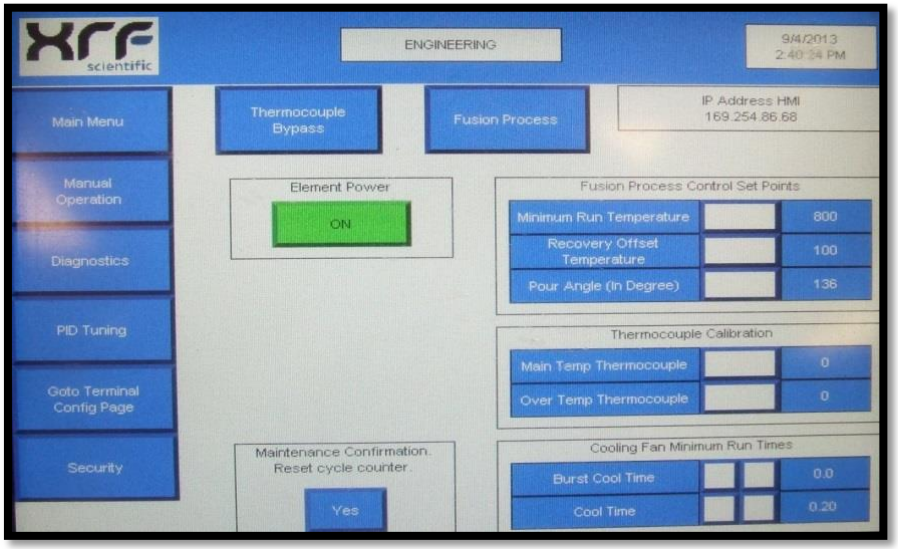
Set Point Entry

Modifying fusion program settings

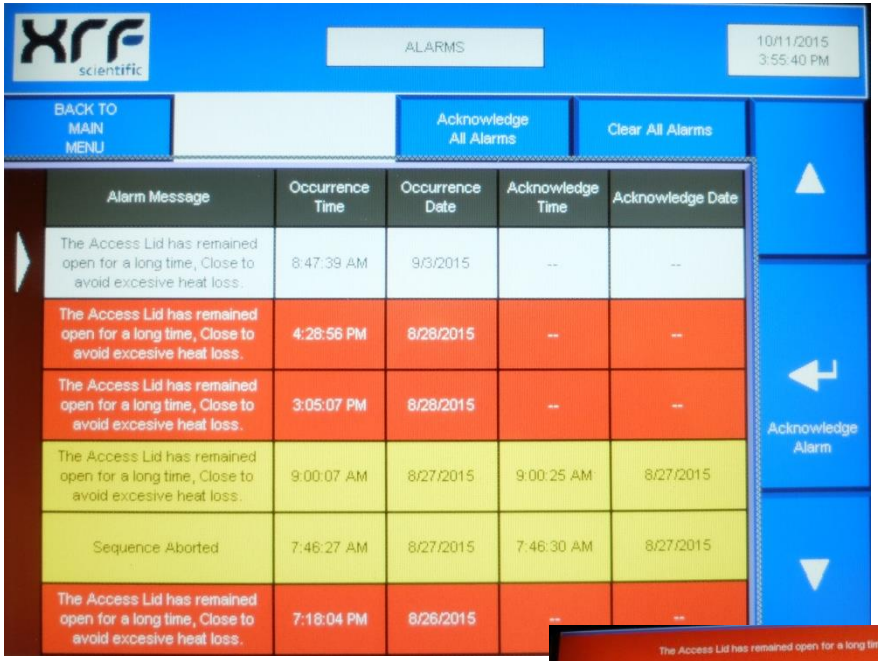
After switch ON, the last edited program will be loaded as the current fusion program.

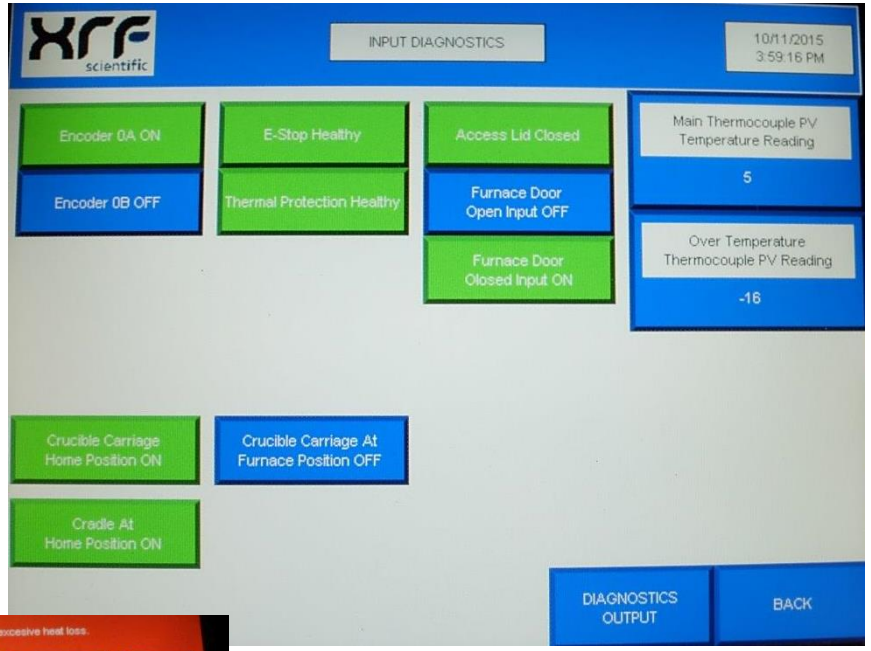
Engineering

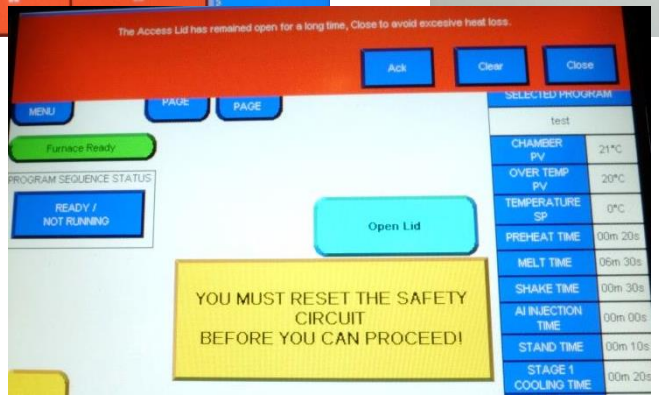
- Times for the cooling fans
- Maintenance counter reset
- Minimum run Temperature for fusion process
- Recovery Offset temperature – this is the temperature that the Fusion process will pause at, below the desired set temperature.
- Pour Angle for the cradle
- Thermocouple calibration of both main and over temperature thermocouples



Alarms & Diagnostics



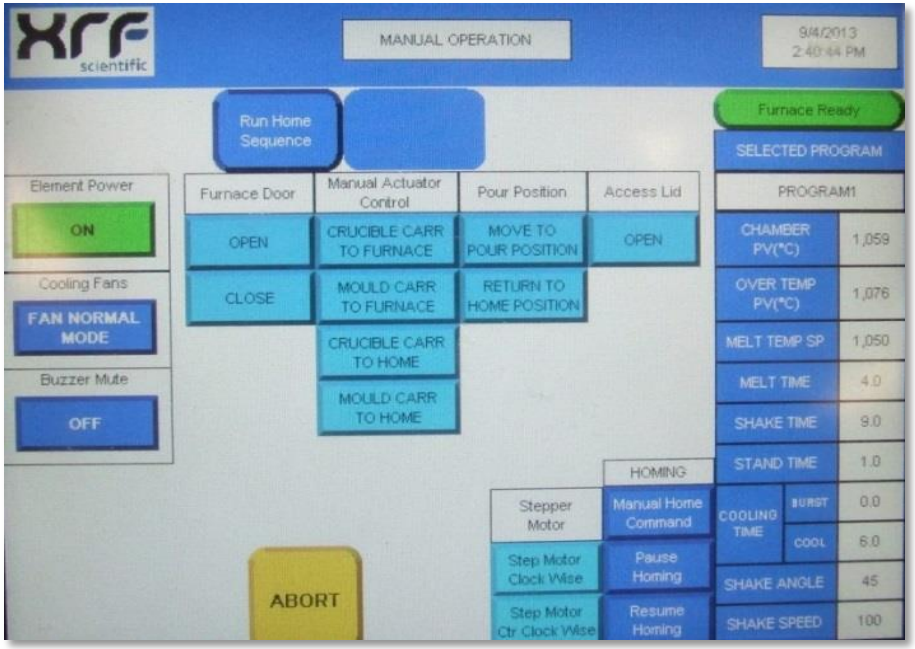




Manual Operation

From this protected screen you can manually operate each actuator

- For motion purposes
- Fusion development

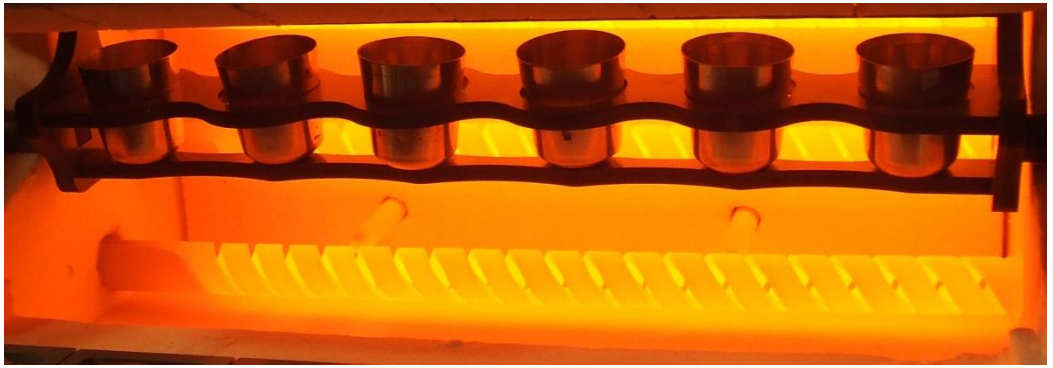


Maintenance Notification

An indicator will pop up on the main screen when the unit has completed 5000 cycles with **‘Please Service Me.’**

Heating system

Powerful heating system

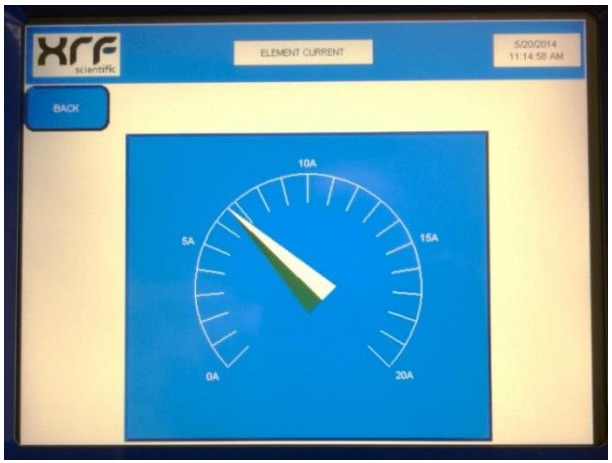


- Temperature: up to 1250°C

- Elements: 2 or 3 Silicon Carbide rods
  - Quick heating (no need of Pre heat timer)
  - Quick recovering
  - Perfect t° uniformity

- Electrical Requirements:
  - xrFuse 6: 380-415V, 3 phase
  - xrFuse2: 208 - 220V, 1 phase
  - Frequency: (50/60Hz)
  - Current: 20 Amps

No External power supply

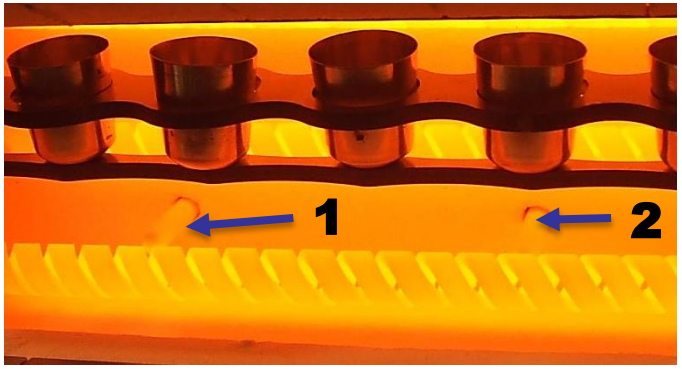


Element current is monitored all time

Temperature control

Precise temperature control and monitoring

1. Temperature monitored by R type thermocouple located inside the furnace.
2. Second dedicated thermocouple for Over temperature protection

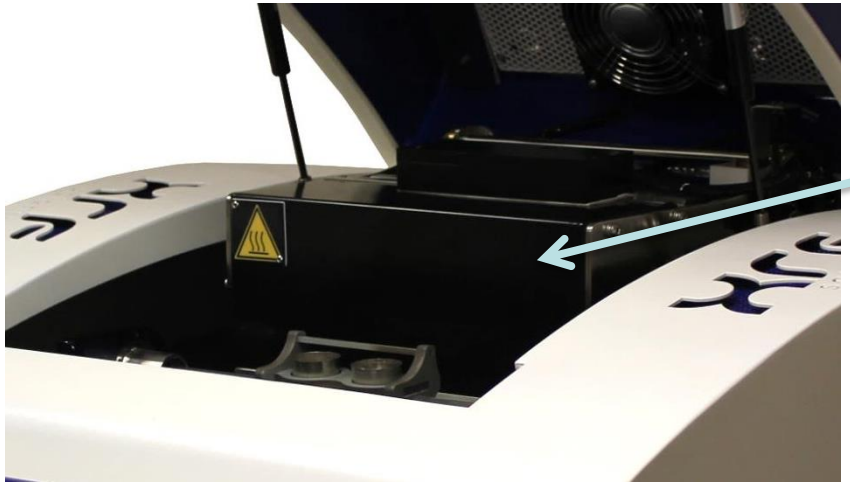


Precise temperature reading: +/- 1°C

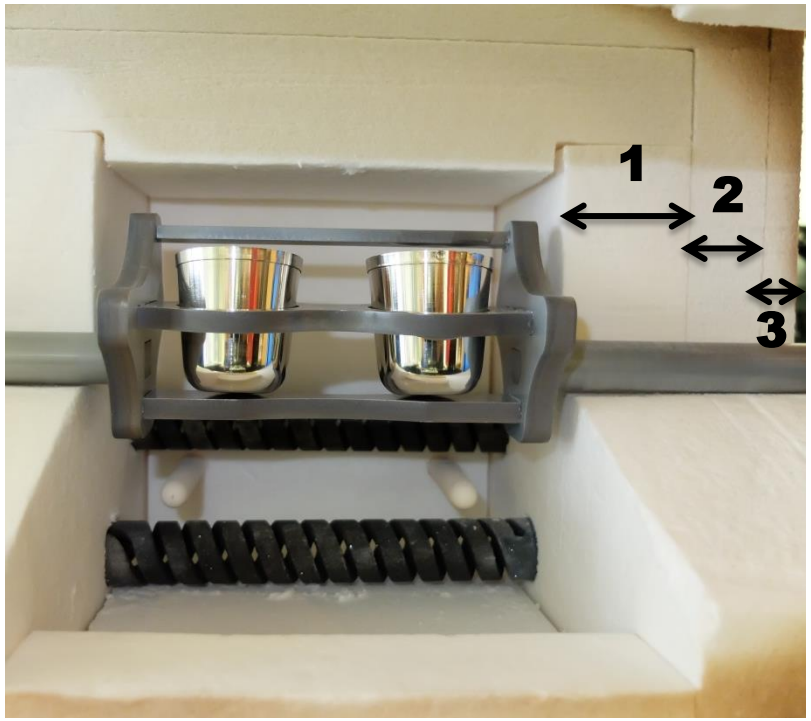
Temperature is monitored all time

The recovering time after opening and closing furnace door are reduce to a minimum

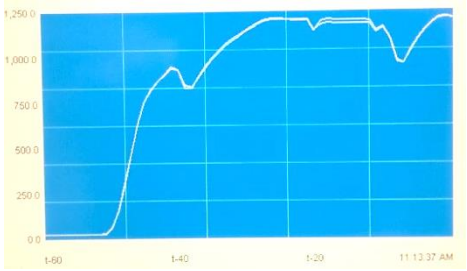
Construction



High Quality Furnace



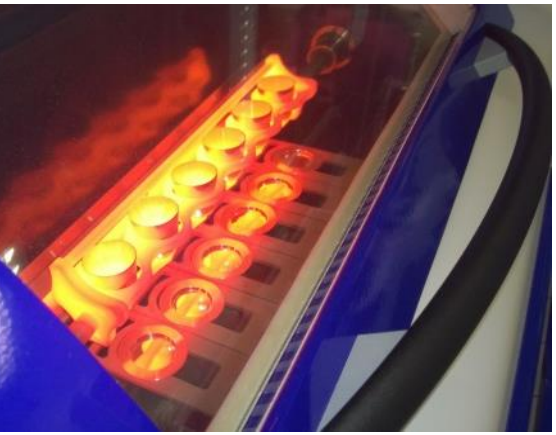
- 4 protective layers:
  3 ceramics layers + 1 refractory cover
  - Perfect t° uniformity
  - Maximum heat retention (energy saving)



Construction

Process Visibilty

- Integrated safety door
- Door is safety-interlocked during fusion and in standby mode
- Cool touch glass viewing window



Construction

Fully Ventilated

- Cooling and extraction fans are fitted inside the casing to guarantee a flow of cooling air and minimise casing temperatures.
- The atmosphere is constantly renewed

Fitted with
Extractor/ventilator

Construction

Fully Ventilated

- Cooling and extraction fans are fitted inside the casing to guarantee a flow of cooling air and minimise casing temperatures.

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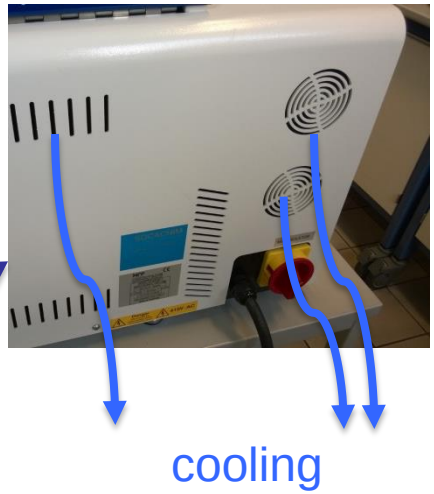
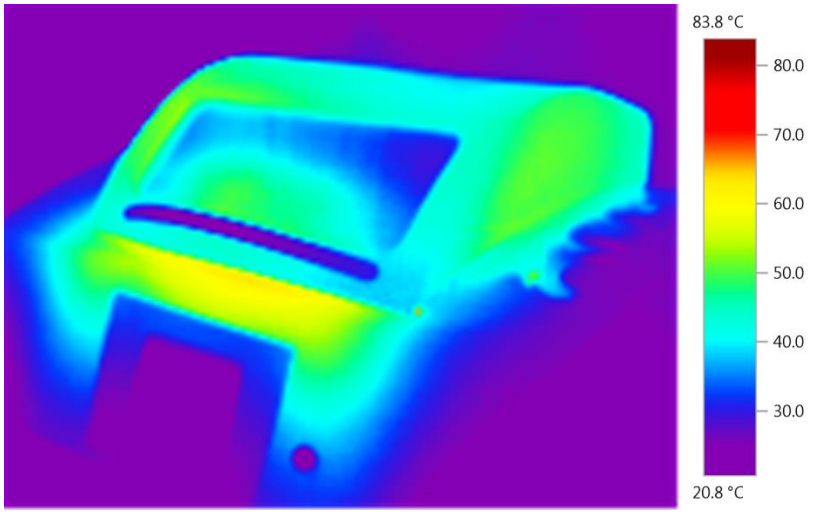
Rear View



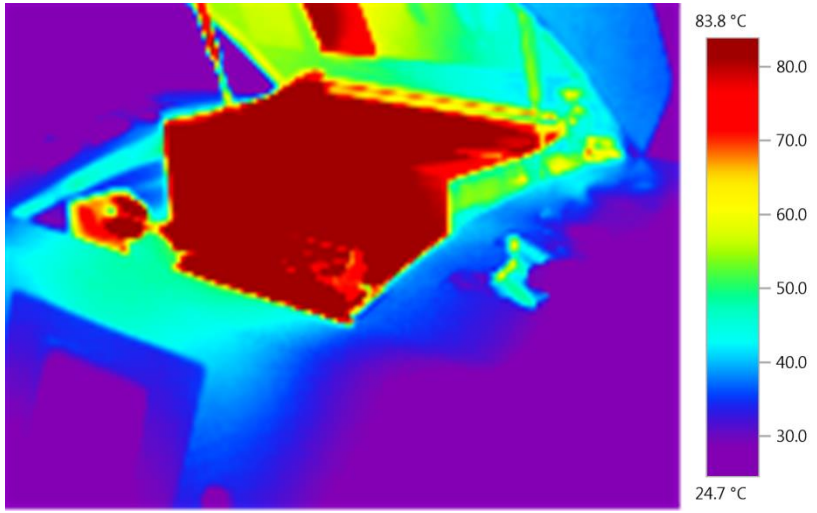
Construction

Safe operation

- All surfaces are safe to touch < 50°C



IR with door closed

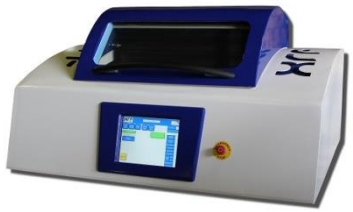


IR with door open

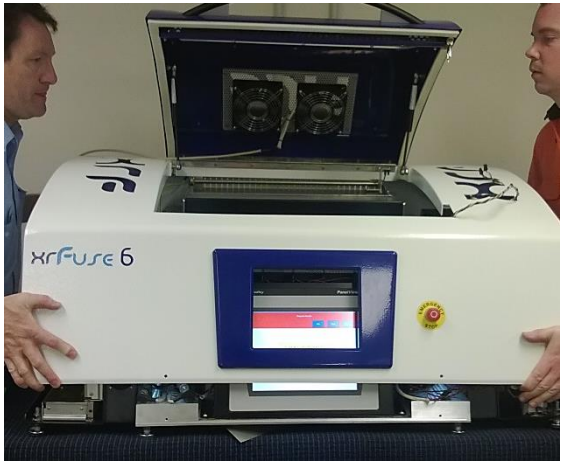
Construction

Strong

- Single external aluminum case

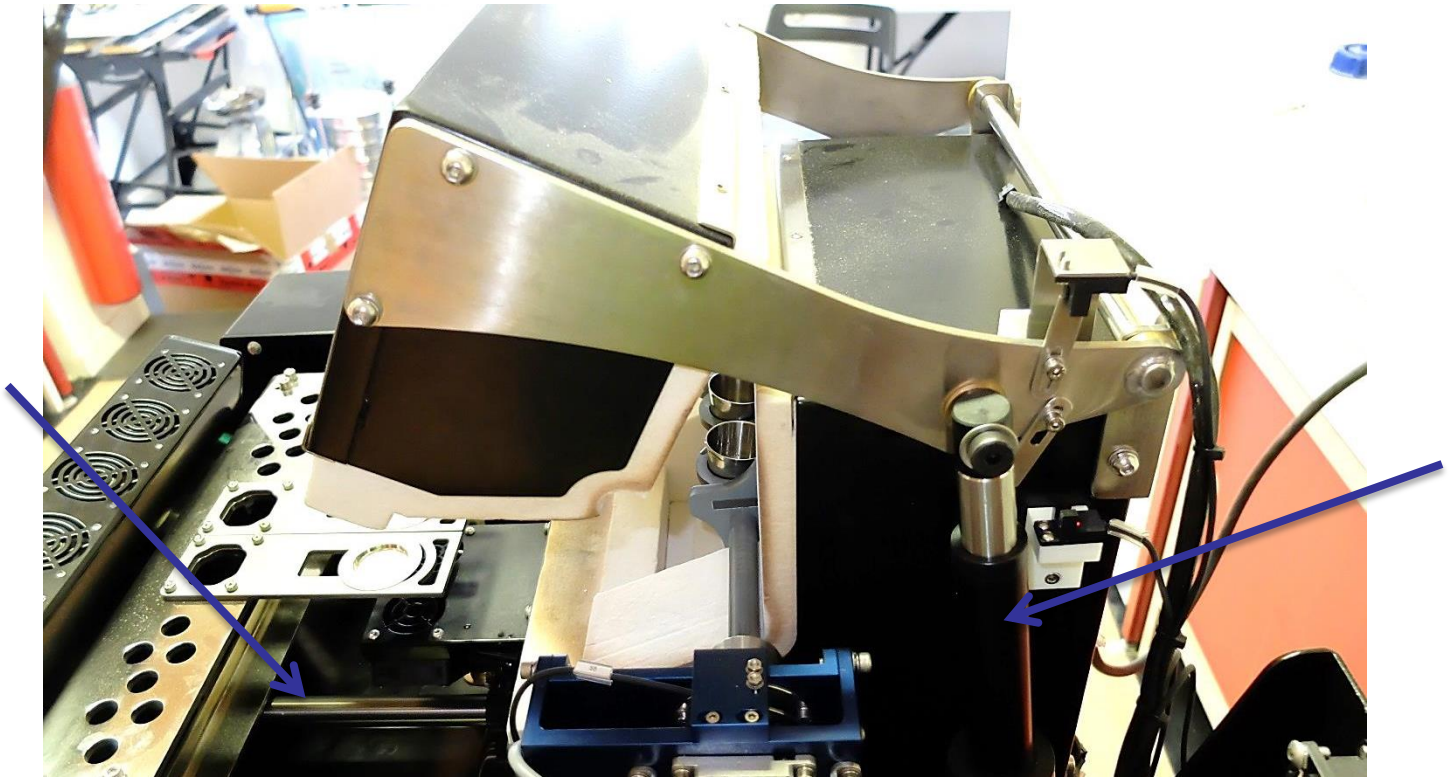


- Easy access for service



Construction

Simple actuator based motion



No fragile belts or springs

High-tech ceramic

High-tech ceramic material for crucible cradle and mould holders

- high-temperature material ~ 1900°C
- capable of surviving severe thermal shock and thermal gradients
- chemically inert
- Zero contaminations beads

No metal inside the furnace

- Ceramic crucible cradle
- Ceramic rod
- Ceramic mould holders

High-tech ceramic

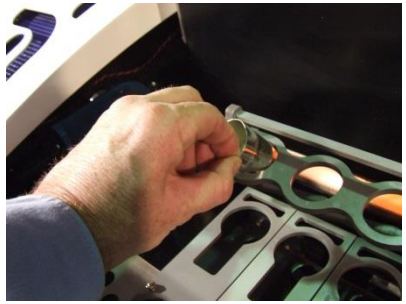
Crucible cradle (carriage)

Crucible cradle do not bend over time

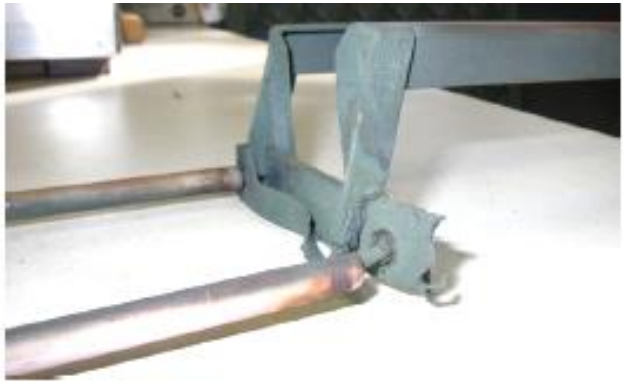
- No need to level regularly the crucible cradle
- No regular replacement needed

The crucible securing rod is fixed

- No contact with hot materials for loading or unloading



Problem with Metallic Holders!



Deformation and Contamination

CE – Declaration of Conformity

xrFuse 6 Electric Fusion Machine: 13138-1402
is in conformance with the following standard(s) or other normative document(s)

EN ISO 12100-1: 2003
Safety of Machinery – Basic concepts, general principles for design Part 1: Basic Terminology, methodology.

EN ISO 12100-2: 2003
Safety of Machinery – Basic concepts, general principles for design Part 2: Technical Principles

EN ISO 13849-1: 2008
Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2006)

EN 60204-1: 2006
Safety of Machinery – Electrical equipment of machines – Part 1: General Requirements

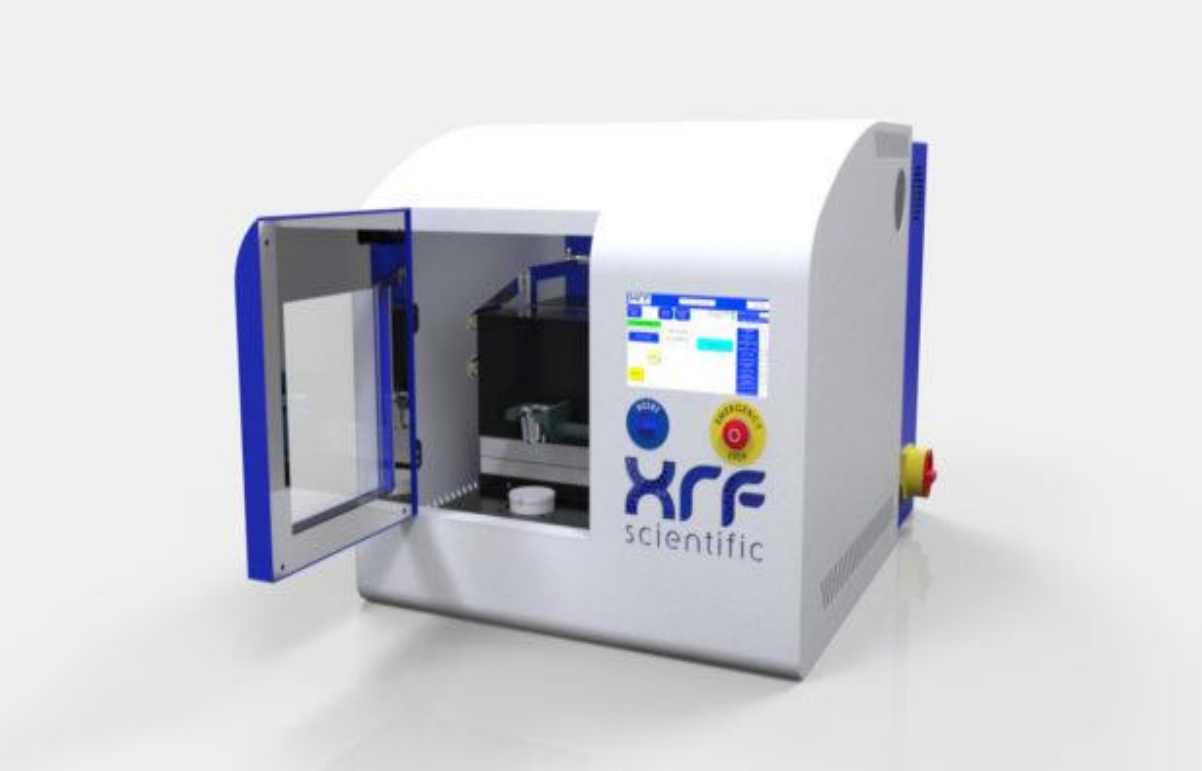
The described machine corresponds with the following European Directives:

2004/108/EC The Electromagnetic Compatibility Directive
2006/42/EC The Machinery Directive

Video Demonstration : XRFuse

XRF_Movie 9th Aug 2013.wmv

XRFuse 1 : LAUNCH 2017



Modutemp: 5 or 6 station

KEY FEATURES:

- Electric. Melting, Shaking and cooling.
- No pouring
- 6 station cradle OR
- 5 station – mouldable cradle
- Cooling – 1 stage
- High productivity: allows fusion of new samples while precedent beads are cooling
- Up to 7 user-defined recipes
- Crucible/mould holders: Inconel or hi-purity ceramic

Modutemp: 5 or 6 station

TECHNICAL SPECIFICATIONS:

- **Al injection available as with all other XRF Scientific models**
- Maximum temp: 1250°C
- Function control: allows up to 7 pre-programmable fusion processes
- Silicon carbide elements
- Type R thermocouple
- Over temperature protection: provides 3 levels of over temperature control for complete safety.
- Weight: 95kg
- Robust

Phoenix II and Phoenix VFD

XRF, ICP and Alkali fusions

High productivity
6 samples produced simultaneously

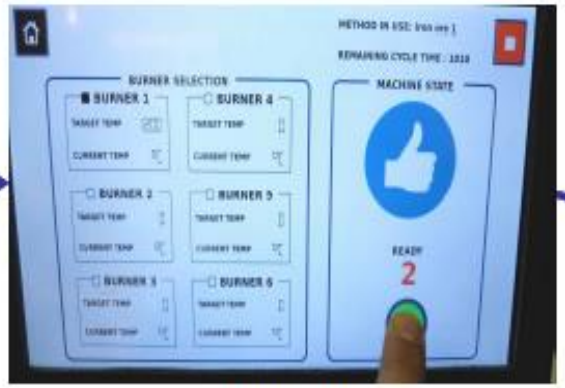
Fused Glass Discs for XRF

Solutions for ICP, AAs, ..

Ease of use

Cold to Cold

Load



Start Fusion

- Up to 20 user-defined recipes
- Touch screen PLC controls
- Perfect monitoring of the fusion cycle:
  - constant control of the T°
- Perfect Homogenization

Unload

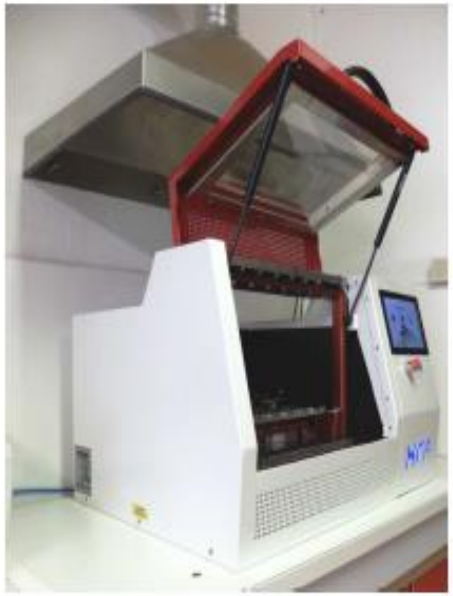
How to install

Electrical Requirements:

- 208 - 220V, 1 phase - Frequency: (50/60Hz) - Current: 15 Amps

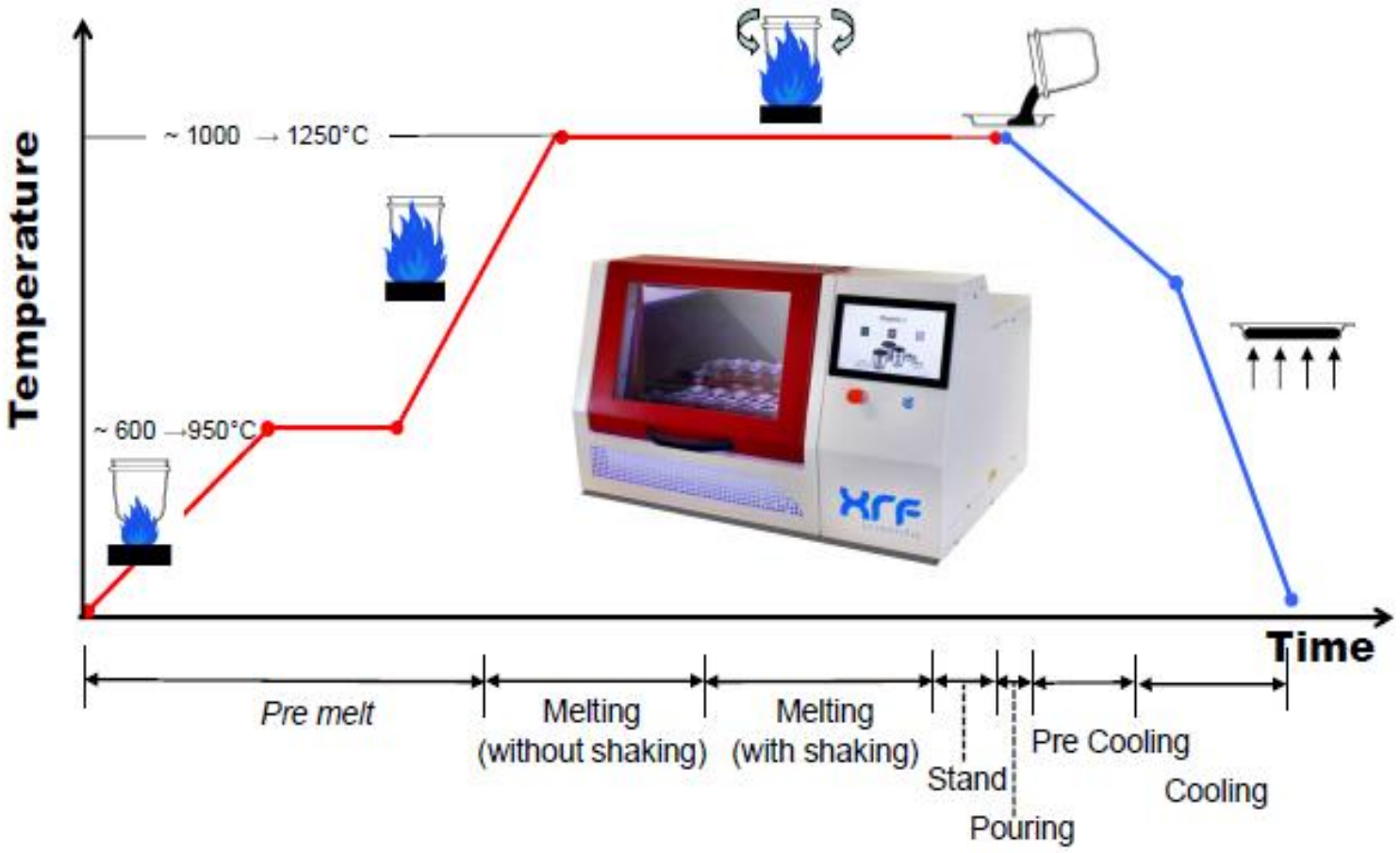
Gas Requirements:

- Propane/LPG : 0;5 - 1bar (30mbar inside); Air: 5bar, Oxygen: 5bar



Fusion process

A bead-making fusion process with **PHOENIX** consists of 6 (7) phases.

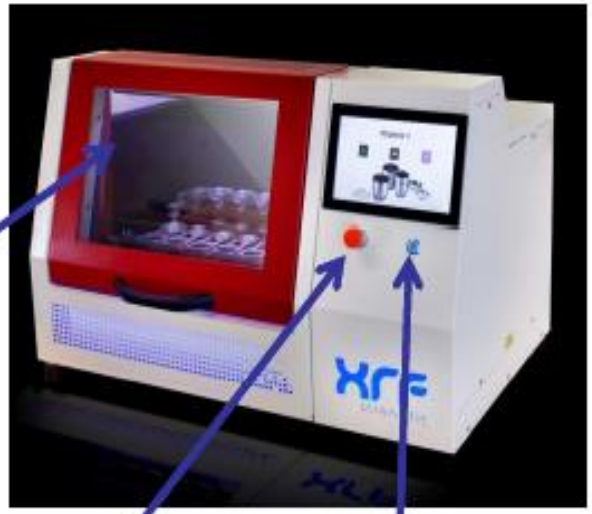


Machine design

- Surfaces are safe to touch.
- Cool touch glass viewing window

Integrated safety door

Interlocked during fusion and in standby mode



Emergency stop

Safety Reset Pushbutton

Pre-installation for an external stop button.

Machine design

Granite pads for temporary placement of platinum labware.

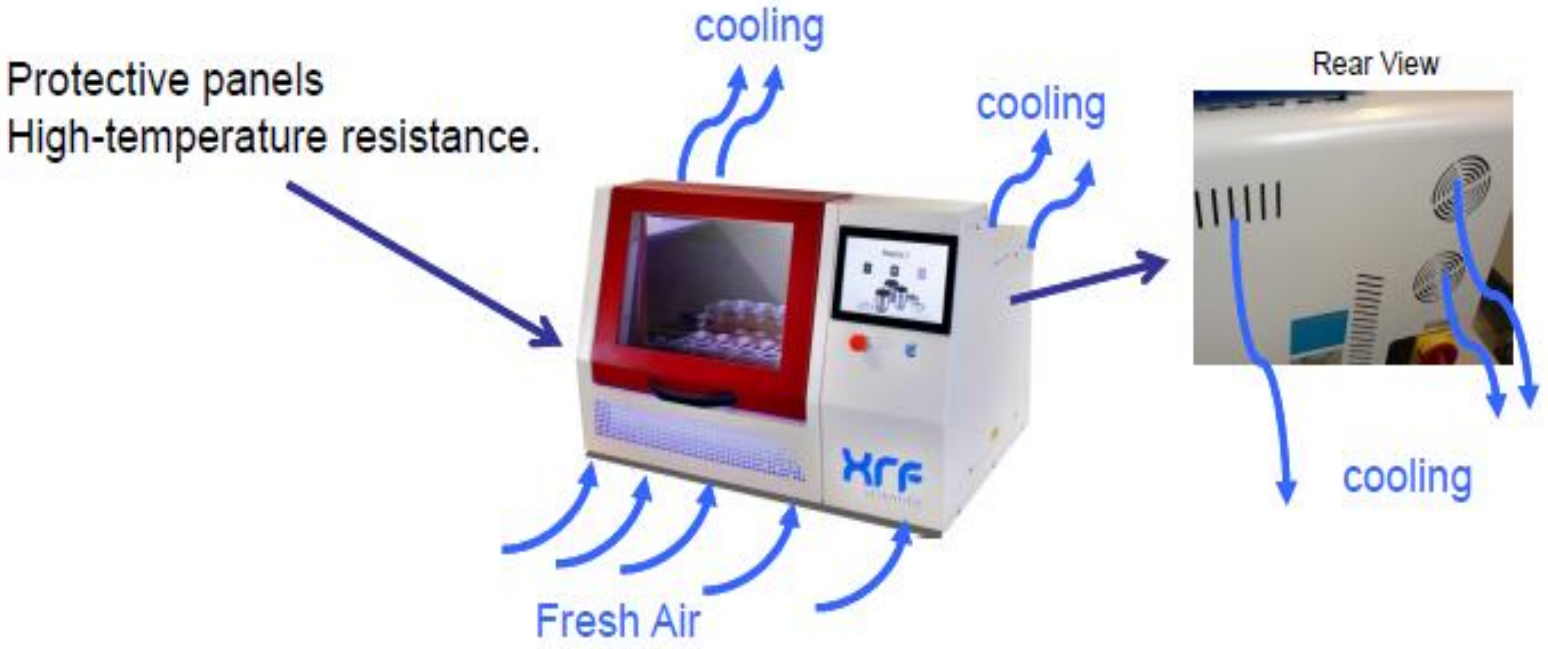
Perfect levelling of the mould position

Moulds retract & cool over separate cooling turbine

Individual burners for crucible and mould

Machine design

Fully Ventilated : Cooling fans are fitted inside the casing to guarantee a flow of cooling air and minimise casing temperatures.



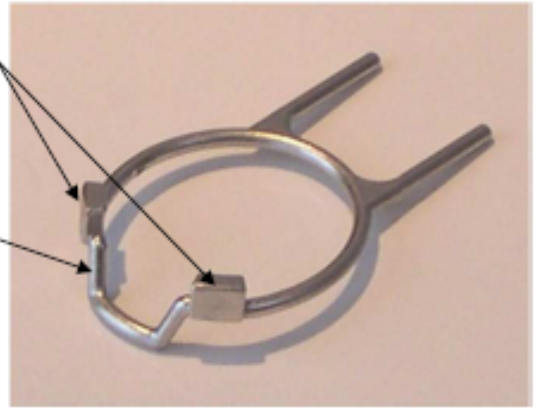
Machine design

Auto Locking Crucible Holders

The crucible holders are made in INCONEL - alloy with an exceptional combination of high-temperature strength and oxidation resistance.

Auto locking system
no mechanis, no pneumatics

This design eliminate the possibility of cross contamination, which was always a concern with the old style crucible clamps.

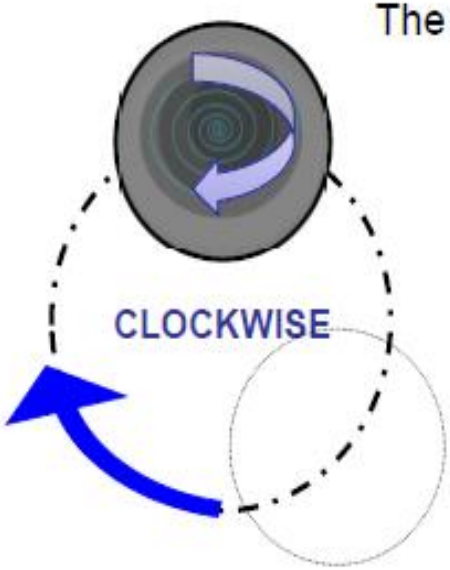


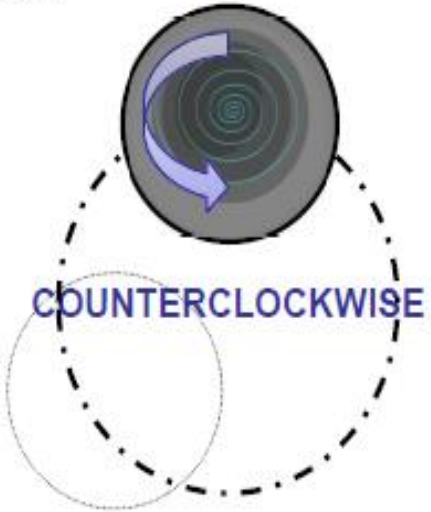
Note: The crucibles incorporate a ridge that when used in conjunction with Auto Lock Crucible Holders, will not become dislodged during the molten sample pouring procedure.

Homogenisation

Swirling, real eccentric rotation

The swirling speed can be adjusted for each fusion programs





Touch screen PLC controls

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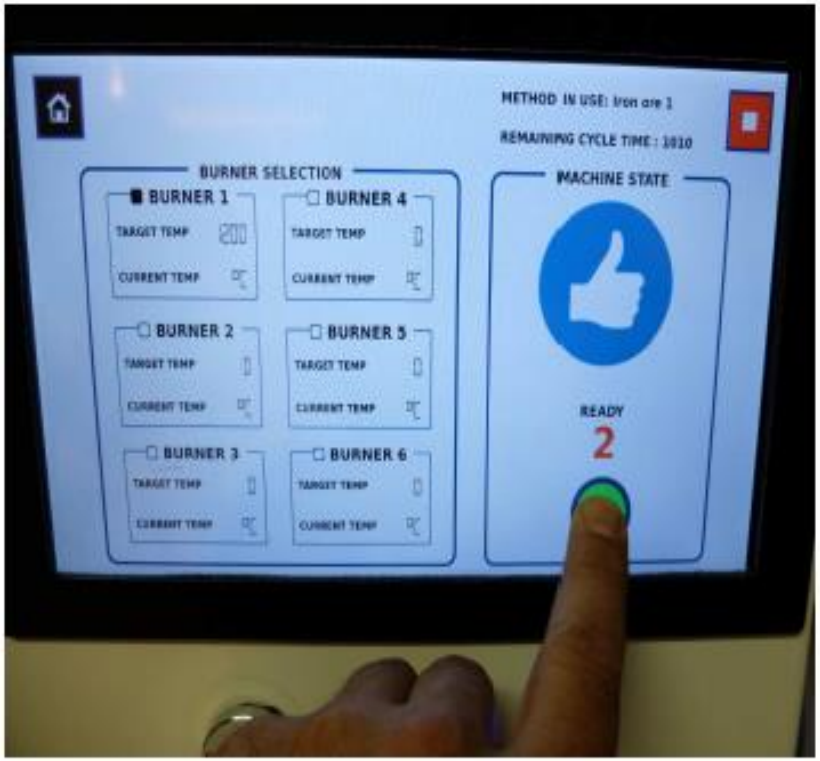
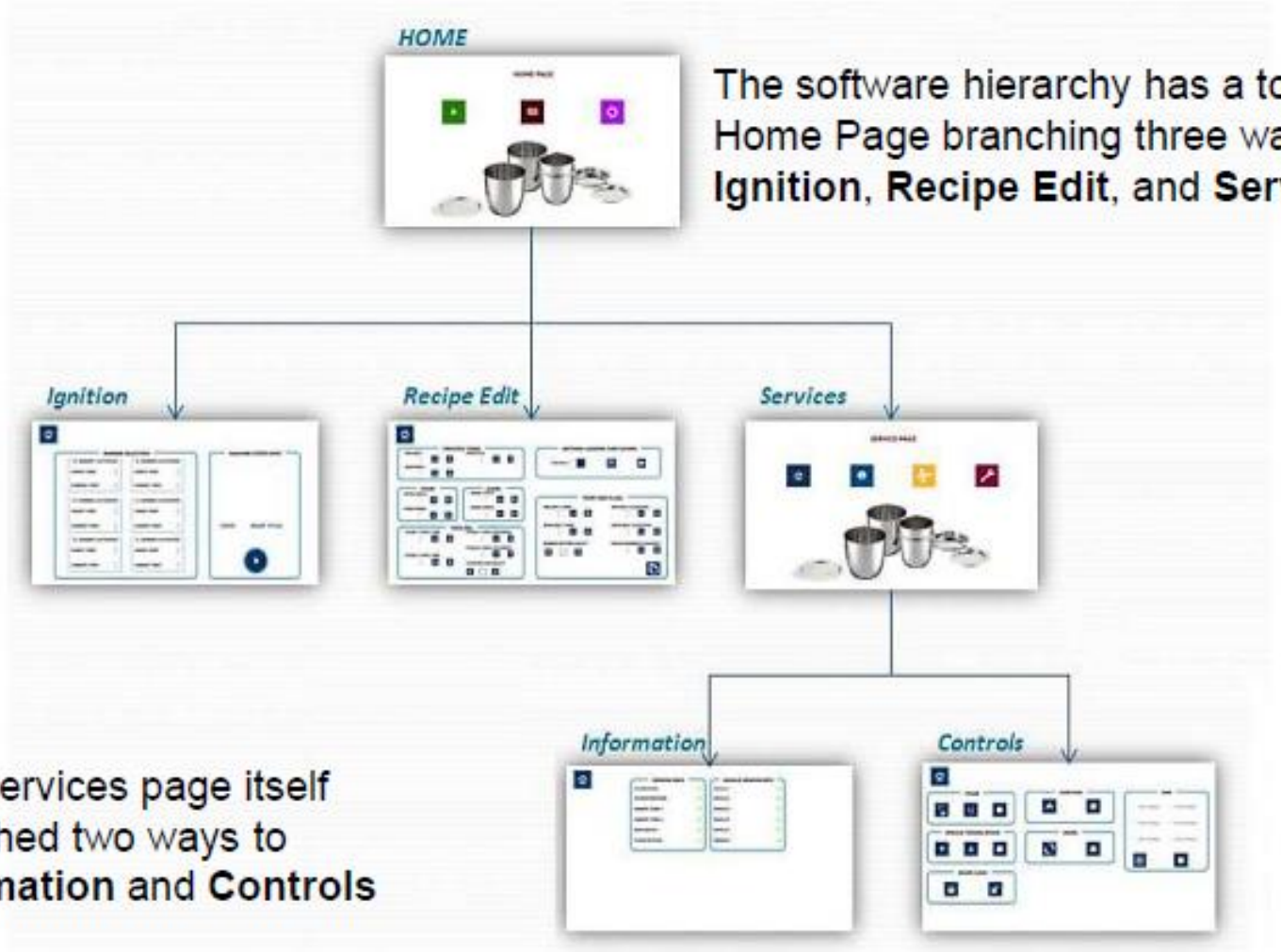
The PLC is programmed with all the information required to run the bead-making fusion process automatically.



Software hierarchy



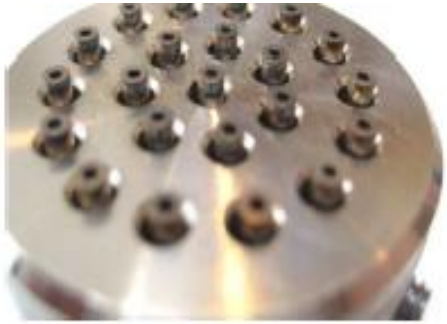
The software hierarchy has a top Home Page branching three ways to **Ignition**, **Recipe Edit**, and **Services**

The Services page itself branched two ways to **Information** and **Controls**

Heating system

Powerful heating system

- Temperature: up to 1250°C (1600°C flame temperature)
- Specially designed burners with oxygen injectors
  - Quick heating
  - Quick recovering
  - Perfect control



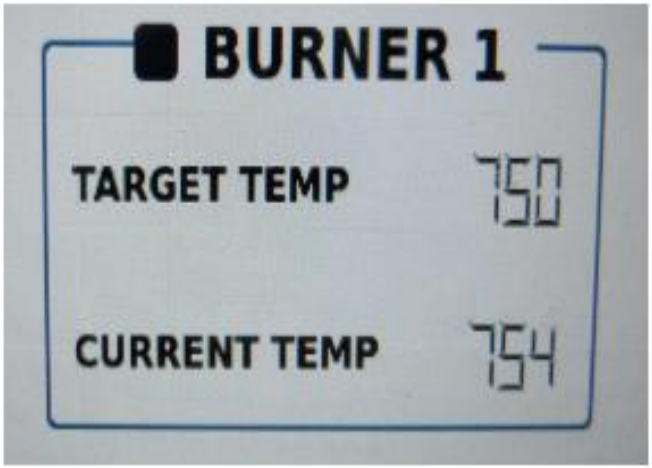
Temperature control

Precise temperature control and monitoring

1. Temperature monitored by the latest IR technology.

2. **ABCS**: Adaptive Burner Control System: Automatically modifies the flow parameters to ensure the T°C is achieved

Temperature is monitored all time



Precise temperature reading: +/- 1°C

Phoenix II and Phoenix VFD

Phoenix II

Phoenix P2/VFD

Phoenix M/VFD

Phoenix R/VFD

Phoenix S/VFD

Phoenix M/ICP

Phoenix II and Phoenix VFD

Type	Frame	Stations	Screen
Phoenix II	P2	3 or 6	Touch screen user interface
Phoenix II/VFD	P2	3 or 6	VFD blue screen with touch buttons
Phoenix M/VFD	M	3, 4 or 6	VFD blue screen with touch buttons
Phoenix R/VFD	R	2 or 3	VFD blue screen with touch buttons
Phoenix S/VFD	S	1	VFD blue screen with touch buttons
Phoenix M ICP/VFD	M	10	VFD blue screen with touch buttons
Phoenix R ICP/VFD	R	4 or 6	VFD blue screen with touch buttons

Phoenix M ICP/VFD: 10 stations

Key features

- 10 fusion stations
- Fully Automatic: PILOT BURNING, PREHEATING, MELTING, SWIRLING & and COOLING
- Individual station selection
- Maximum Temperature 1250^0 C (1600°C flame temperature)
- VFD Blue Screen with Touch Buttons
- Up to 6 user-defined recipes
- Homogenization by Swirling, variable frequency and speed
- No pouring
- Crucible holders: Inconel
- Emergency stop button; Automatic gas cut-off safety system
- Cold-to-cold operation
- USB communication link

Phoenix M/VFD: 3, 4 or 6 stations

Key features

- 3; 4 or 6 fusion stations
- Fully Automatic: PREMELTING, MELTING, SWIRLING, POURING and Bi-Level COOLING
- Individual station selection
- Maximum Temperature 1250^0 C (1600°C flame temperature)
- VFD Blue Screen with Touch Buttons
- Up to 6 user-defined recipes
- Homogenization by Swirling, variable frequency and speed
- Adjustable speed pouring and angle
- Separate mould preheating
- Mould retraction for precise control of cooling
- Cooling: 2 stages mould cooling
- Crucible/mould holders: Inconel
- Emergency stop button; Automatic gas cut-off safety system
- Cold-to-cold operation
- USB communication link

Additional features

- AI injection: Ammonium Iodide (NH4I) injection
- Automatic oxygen injection – inside the crucible
- Rugged design
- VFD frame suitable for high temperature fusions/difficult samples
- 30 beads per hour / 6 station

Ongoing Support

We see the purchase of a XRF Scientific fusion machine as the beginning of an ongoing relationship where we provide our customers with the opportunity to access a range of support and technical services to meet their fusion needs. Whether you are new to fusion or an experienced user we have a range of services to increase the productivity and throughput of your application.

- Advice on appropriate selection of flux and standards
- Organization of Platinum remake processes
- Technical advice/training on difficult fusion issues
- On-site support and preventative maintenance programs