

# RAPID MANUFACTURING SERVICES FOR CERAMIC COMPONENTS (FRMS)

## *Custom ceramic components in half the time*

Procuring custom advanced ceramic components is a complex, precision-driven process where lead times of two months or more are common. Long manufacturing periods are caused by several technical and logistical factors including material selection and qualification, tooling and mold fabrication, green machining and forming, post sintering hard grinding, metrology and quality control.

**Fralock's Rapid Manufacturing Services (FRMS)** significantly shortens lead times, enabling you to procure products significantly faster than with traditional manufacturing methods.

## FRALOCK'S QUICK-TURN PROCESS

### Expedited Manufacturing

We maintain an inventory of several shapes of fired and pre-fired structural blanks, near-net-shape pressed blanks, and square heaters - allowing us to significantly shorten production timelines to as little as two weeks.

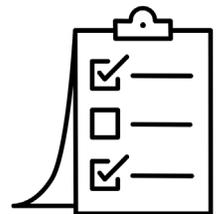
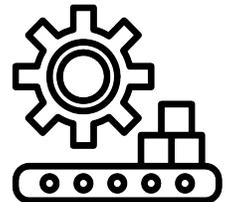
### Quick Quote Turnaround

With 8 hour response and 24 hour quote time, we expedite the first step, accelerating the entire manufacturing timeline.

### High Precision and Top-Quality Finished Parts

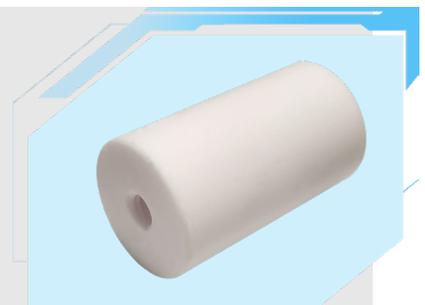
Our commitment to precision and quality is upheld throughout the entire Rapid Manufacturing Service.

We work closely with customers on design and engineering, utilizing high-performance materials to meet exacting requirements. Our capabilities include achieving extreme flatness on disk-shaped parts (less than 5 microns), near-net shape alumina machining, advanced silicon carbide (SiC) grinding, lapping, and precision hole drilling.



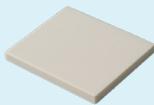
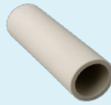
## FRMS Structural Capabilities

- Near net shape in 4 to 8 weeks
- Complex alumina parts > 0.75" ( 1.9 cm) diameter in 2 to 4 weeks
- Customer-supplied material: parts in 1 to 4 weeks
- Bisque fired Alumina parts
- Glass frit bonding for creating internal channels for Alumina ceramics
- High aspect ratio hole drilling >25:1, as small as 1.5mm diameter in SiC and Alumina.
- 3-D ceramics printing for rapid production of low volume AlN and Alumina parts with wall thickness less than 4mm; 4 weeks delivery.
- Lapping and polishing capability down to 0.1  $\mu$  Ra, flatness as low as 3  $\mu$  for 350mm (disk) with SiC, Quartz, and FR ceramic materials.



## Aluminum Oxide (Alumina) and Aluminum Nitride (AlN) FRMS Ceramics Manufactured Sizes and Shapes

Finished parts in 4 to 6 weeks when using a Standard Blank, Near Net Shaped Parts\* Available 6 to 8 weeks

	Square Plates	Disks	Tubes	Domes	Rings	Rods	Pins
Dimensions	20 to 355mm	40 to 625mm diameter	60 to 300mm diameter	300 to 500mm** diameter	40 to 625mm** diameter	20 to 100mm diameter	1.5 to 7mm diameter
Thickness/Length	3 to 25mm	Up to 75mm	Up to 150mm long	Up to 200mm	Up to 75mm	Up to 100mm long	Up to 200mm long
							

\* Near net shape manufacturing may reduce cost but can increase lead time by two weeks.

\*\* AlN: Maximum diameter = 400mm, thickness = 25mm, height = 200mm"

All other Materials: Finished parts in 4 to 6 weeks when using a Standard Blank

## FRMS Silicon Carbide (SiC) Ceramics Manufactured Sizes and Shapes

	Square Plates	Disks	Rods
Dimensions	Up to 200mm	Up to 400mm diameter	5-10mm diameter
Thickness/Length	Up to 15mm	Up to 20mm	Up to 100mm

## FRMS Sapphire Ceramics Manufactured Sizes and Shapes

	Pins	Rods	Square Plates
Diameter	Up to 5mm	Up to 10mm	100mm
Thickness/Length	Up to 100mm	Up to 150mm	Up to 15mm

## FRMS Quartz Ceramics Manufactured Sizes and Shapes

	Tubes	Disks
Diameter (mm)	300mm to 400mm	50 to 350mm
Thickness/Length	100mm	5 to 25mm

# FRMS Aluminum Nitride (AlN) Heaters

If you need a small robust heater with rapid thermal cycling, high watt density, and long life with quick-turn delivery, our FRMS square AlN heaters fit the bill.

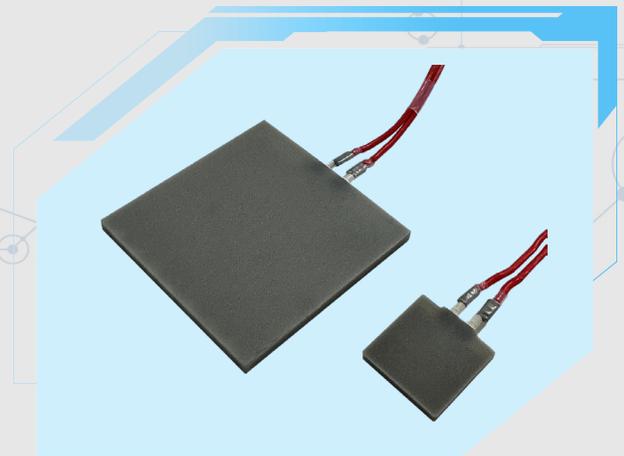
Made with internal tungsten resistance heating traces that provide ultra-rapid temperature transition, these heaters are used for demanding applications in many industries.

Fralock Rapid Manufacturing Service heaters are one layer only for expedited delivery.

Customized multi-layer heaters providing high-precision thermal control and uniformity are also available in different sizes and shapes with longer production times.

## FRMS AlN Heater Specifications

- Single layer construction
- Three sizes available
- Sizes:
  - 19mm x 19mm
  - 25mm x 25mm
  - 50mm x 50mm
- Temperature range: Up to 400°C
- Watt density: Approximately 1,000W/in<sup>2</sup>, voltage dependent
- Voltage: 120V, alternate voltage/powers available
- Drawings available from engineering
- With or without wire connections



**Call or email to order**

800.372.5625 • [Sales@fralock.com](mailto:Sales@fralock.com)

