



Technical InterChange 2026

THE PREMIER EVENT FOR
RESONANTACOUSTIC® PROCESSING INNOVATION

Explore the latest advancements in mixing, mechanochemistry, materials science, pharmaceutical processing, and additive manufacturing.



‘From Research & Development to Real Life Case Studies- Resonant Acoustic Mixing at AWE’ **Professor Nicholas Bazin**

The Importance of What We Do...

Maintain confidence in the performance and safety of nuclear deterrent
Capability to design, manufacture and certify a successor
Support for National Nuclear Security

Continuous At Sea Deterrence

Coulport, Scotland



Burghfield



Aldermaston



AWE Sites



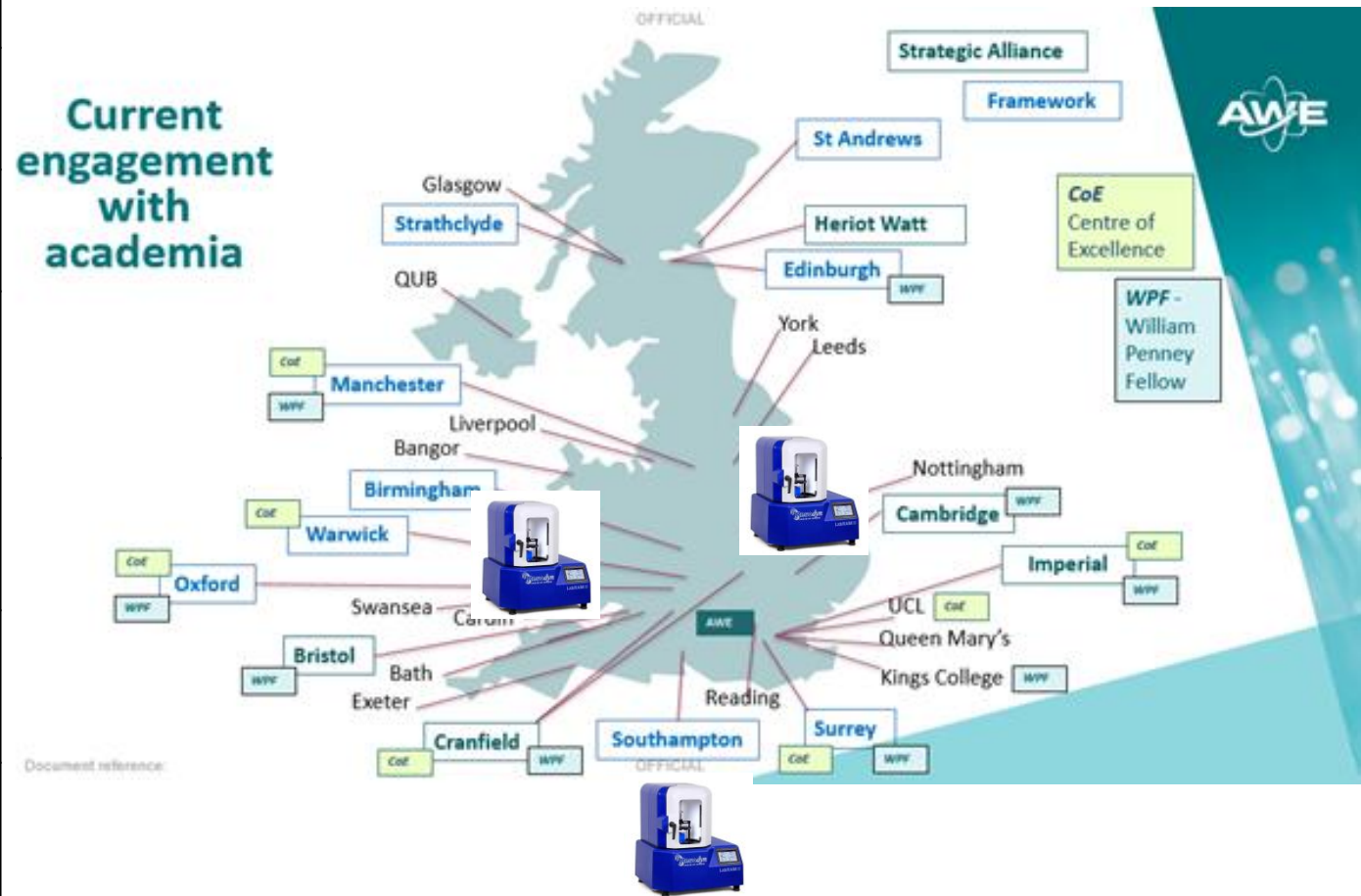
Blacknest





Centres of Excellence		
CCMS	Centre for Computational Materials Science	University College London
CCPP	Centre for Computational Plasma Physics	University of Warwick
CNSD	Centre for Nuclear Security Detection	University of Surrey
CoE in MAP-Life	Centre of Excellence in Materials Ageing, Performance and Lifetime Prediction	University of Surrey
CoEEM	Centre of Excellence in Energetic Materials	Cranfield University + Dstl & DE&S
MHMS M	Manchester Hub for Materials System Modelling	University of Manchester
OxCHEDS	Oxford Centre for High Energy Density Studies	University of Oxford

Academic Engagements



RAM Interests for AWE Energetic Simulants

- Adopt RAM for highly filled near net shape hemispherical, cup/bowl and high aspect ratio plate molding.
- Maximise filler loading.

Resins

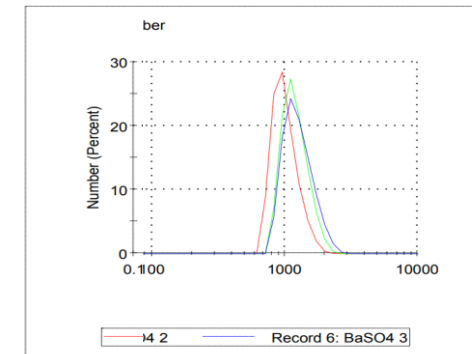
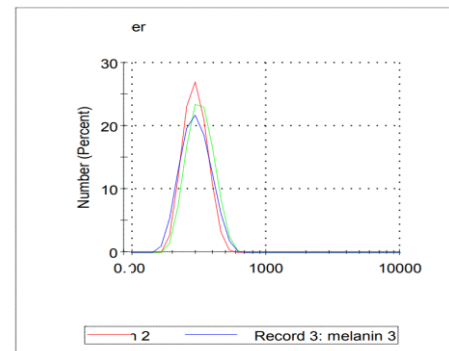
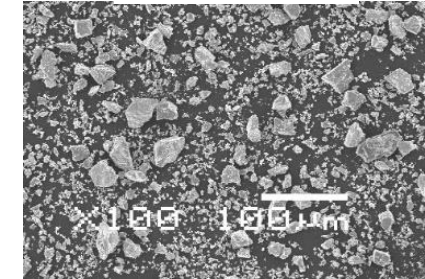
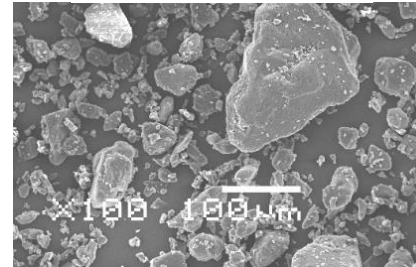
Hardener

Inhibitor

Fillers

Melamine

BaSO₄



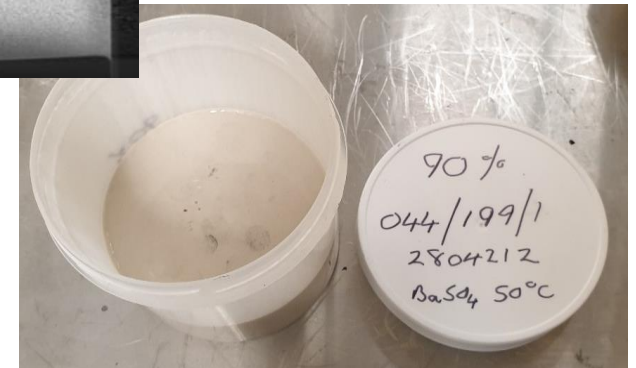
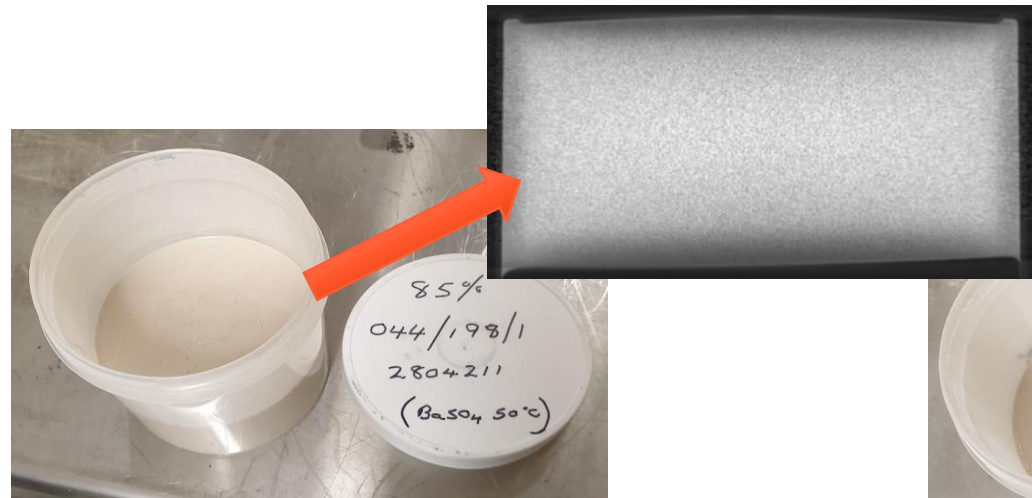
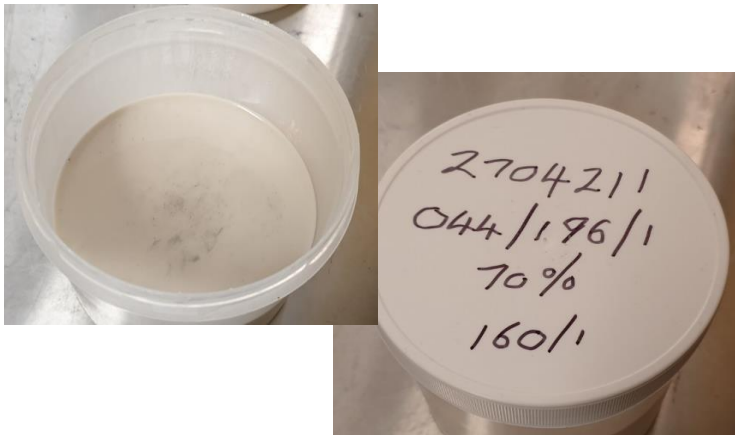
Initial trials using BaSO₄

70% mass loading achieved full cure (16hrs 60°C)

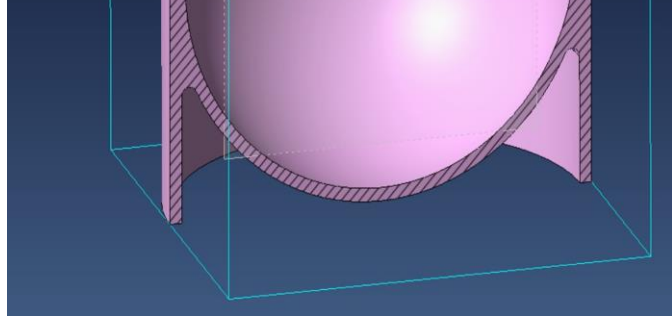
85% mass loading filler preheated to 50°C

90% failed to fully cure via RAM but successful with conventional blade mixing.

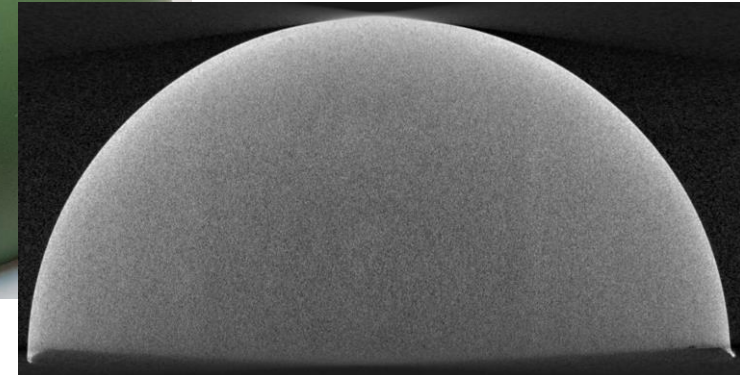
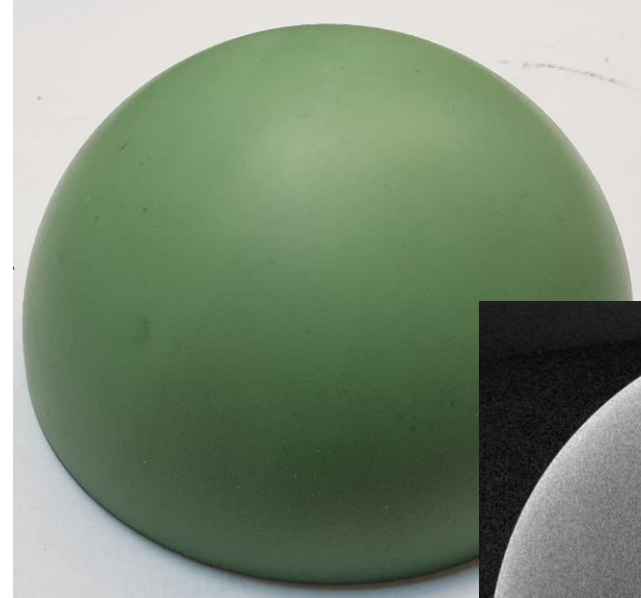
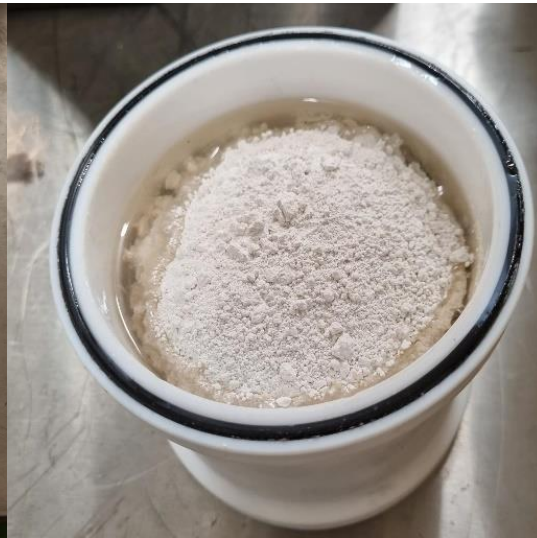
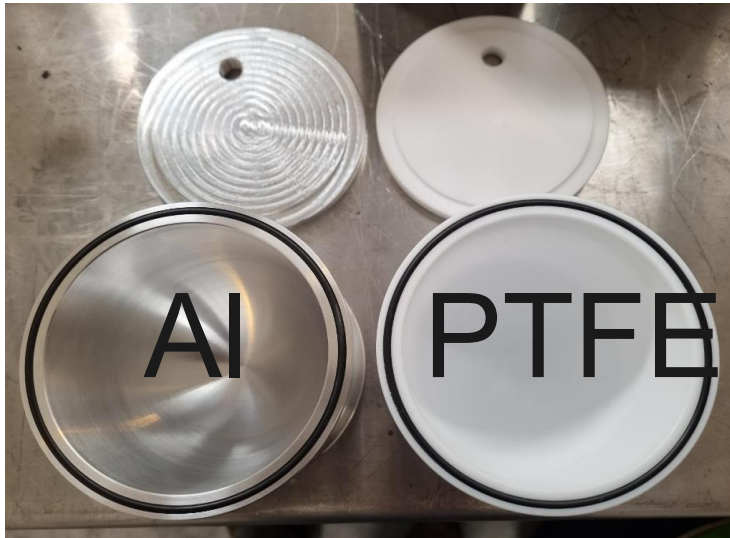
90% successfully RAM mixed if premix resin system.



Shaped Mixing

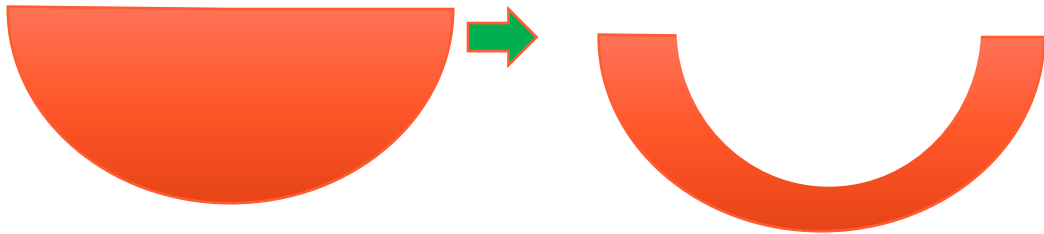


- Aluminium and PTFE.
- Both tools vacuum compatible and head space for mixing.
- Melamine/BaSO₄ premix filler



Cup Mold tool

- New insert for cup molding.
- Much more challenging as:
 - Smaller mixing volume.
 - Reduced mixing line of sight.
 - Greater tooling contact area.



X-ray compatible RAM

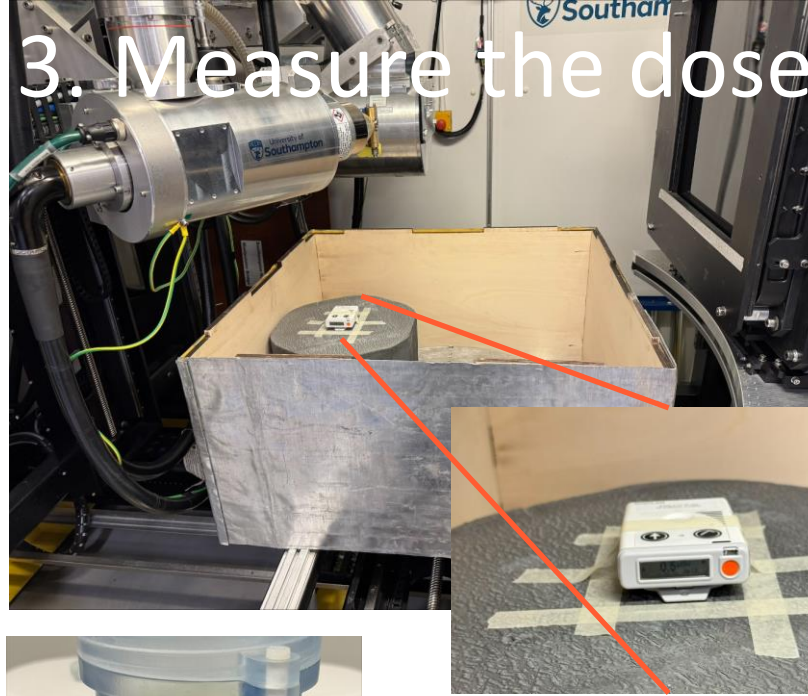
1. Make a box



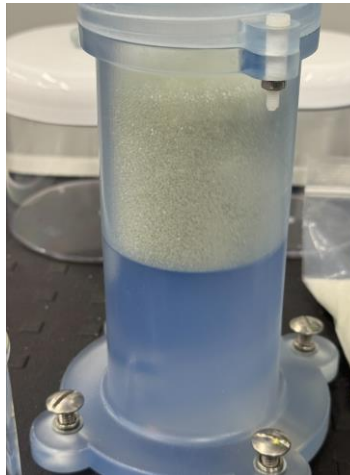
2. Lead Line it



3. Measure the dose



4. Design
pseudo
2D and
3D mixing
vessels

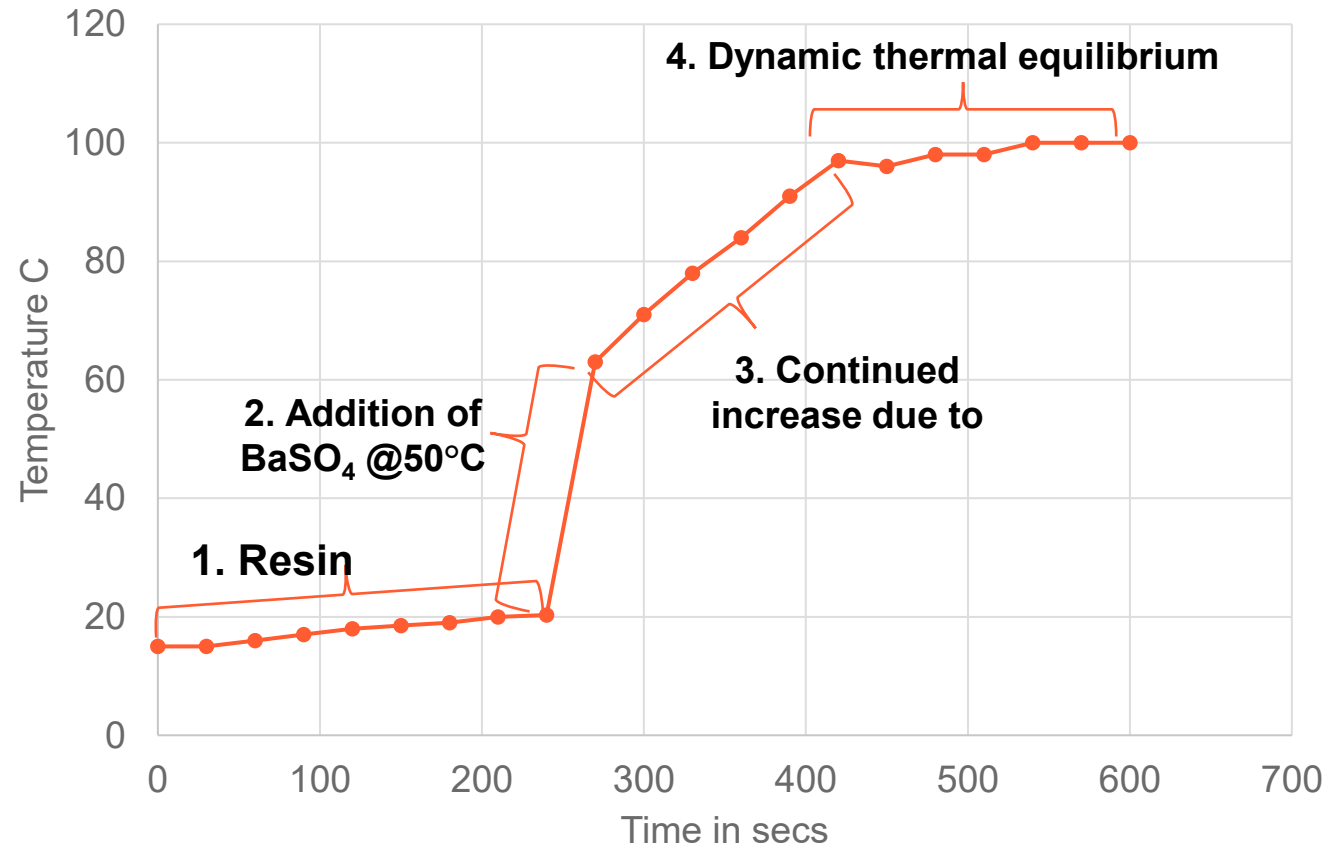


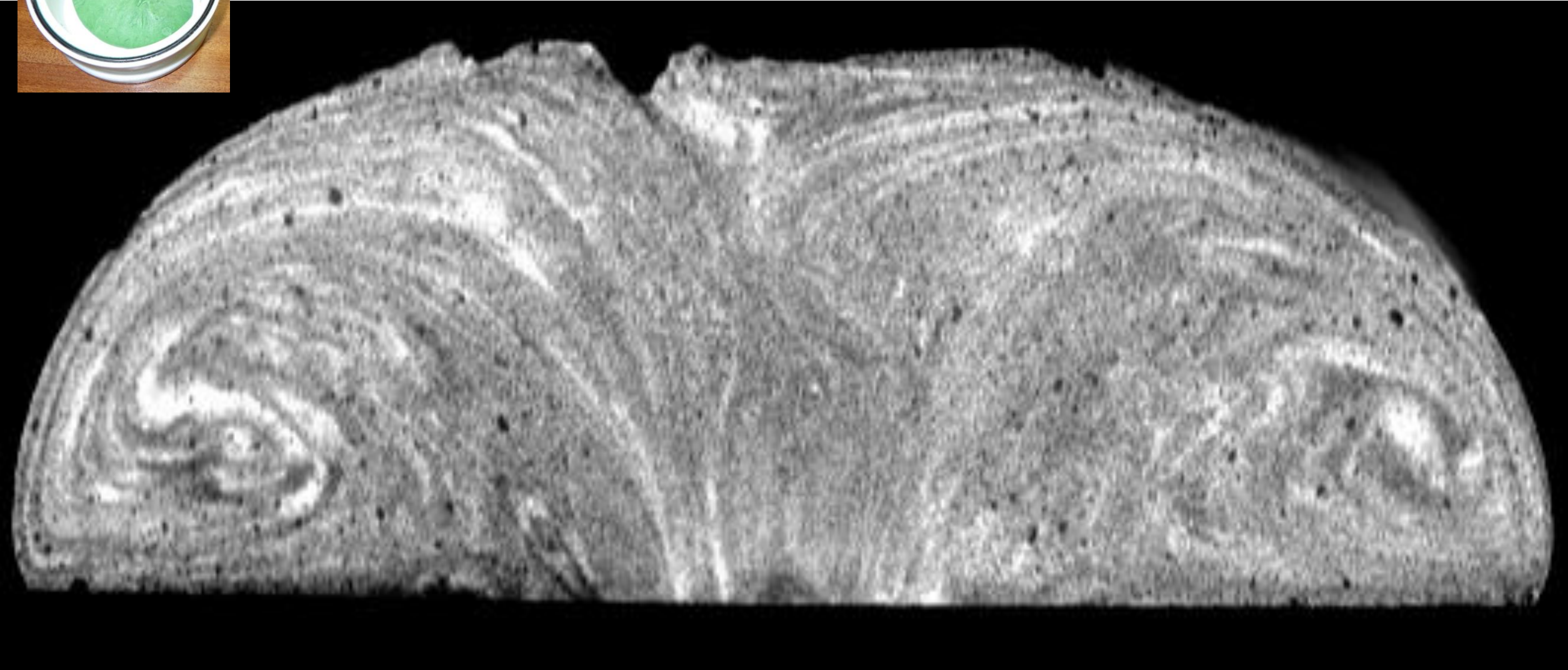
Thermal Studies



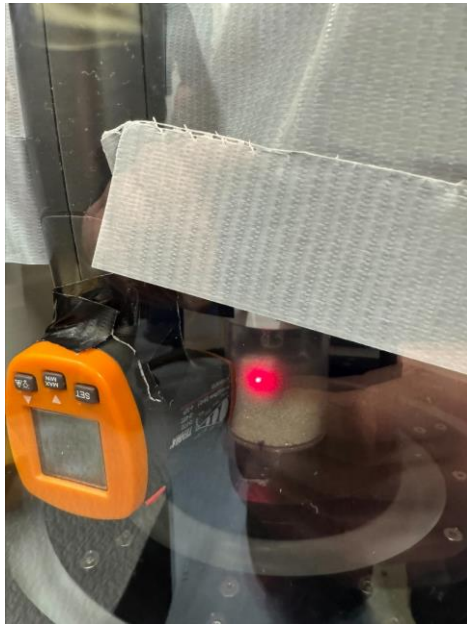
Mixing Time v Temperature Rise

- 1. Resin system premixed at RTP.
- 2. At 4 min filler added @ 50°C.
- 3. Temp increase continues to 100°C due to mixing friction.

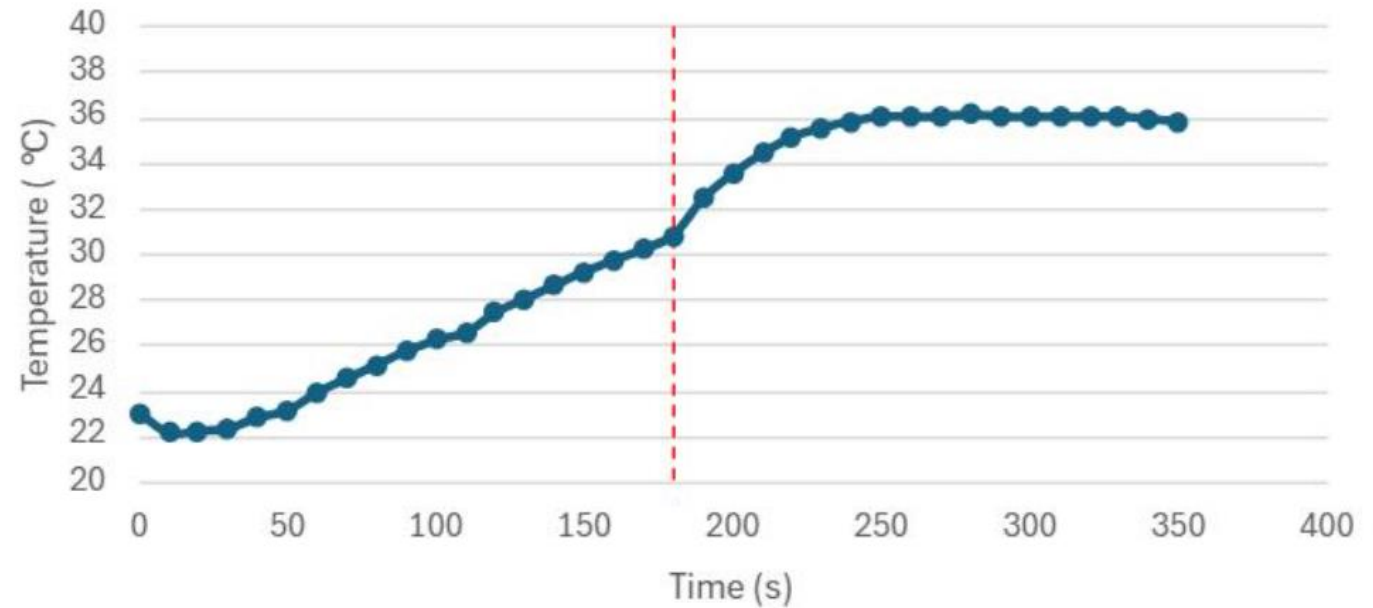




Thermal Studies using glass beads

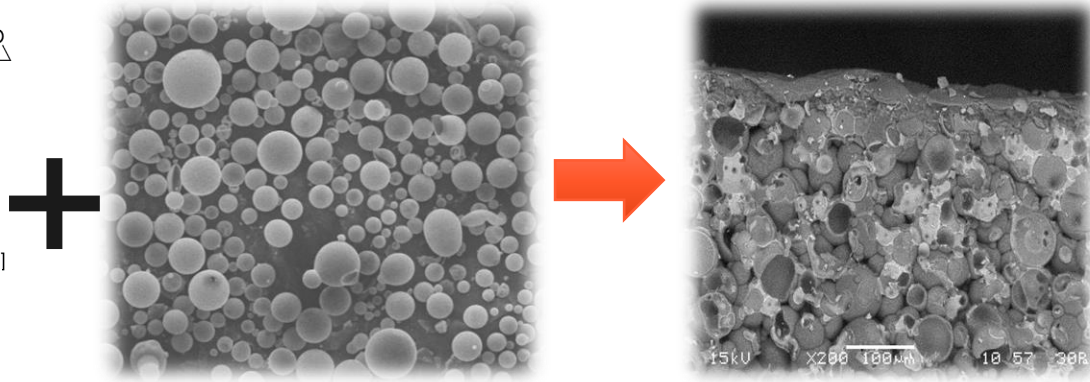
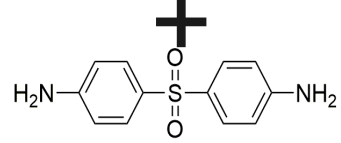
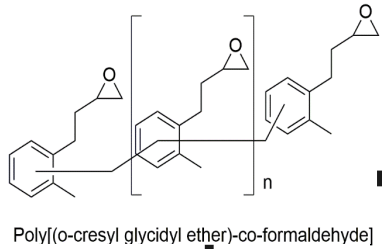


Temperature overtime at 90g, 70% fill equal numbers of beads.

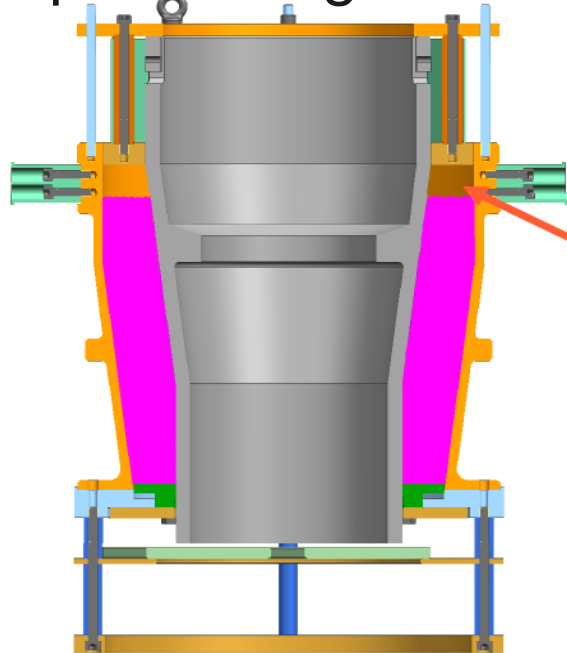


A Case Study Syntactic Composites

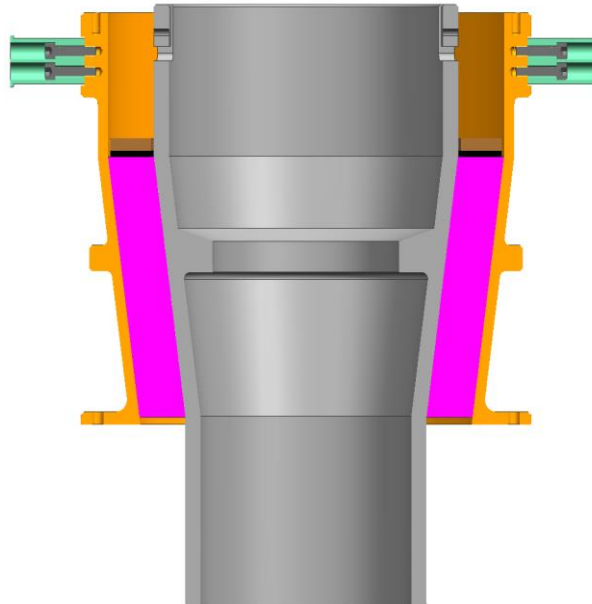
Established: V Blending



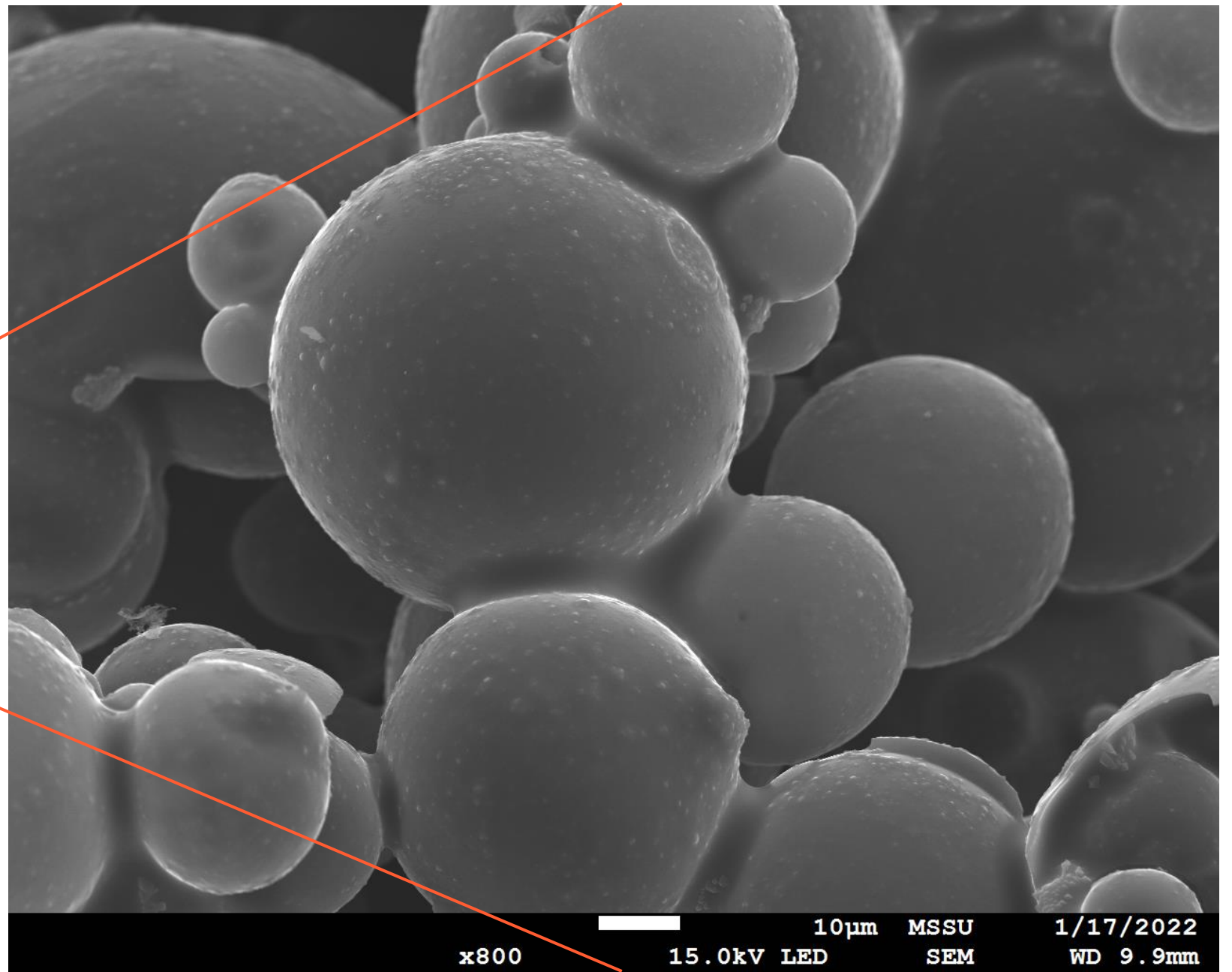
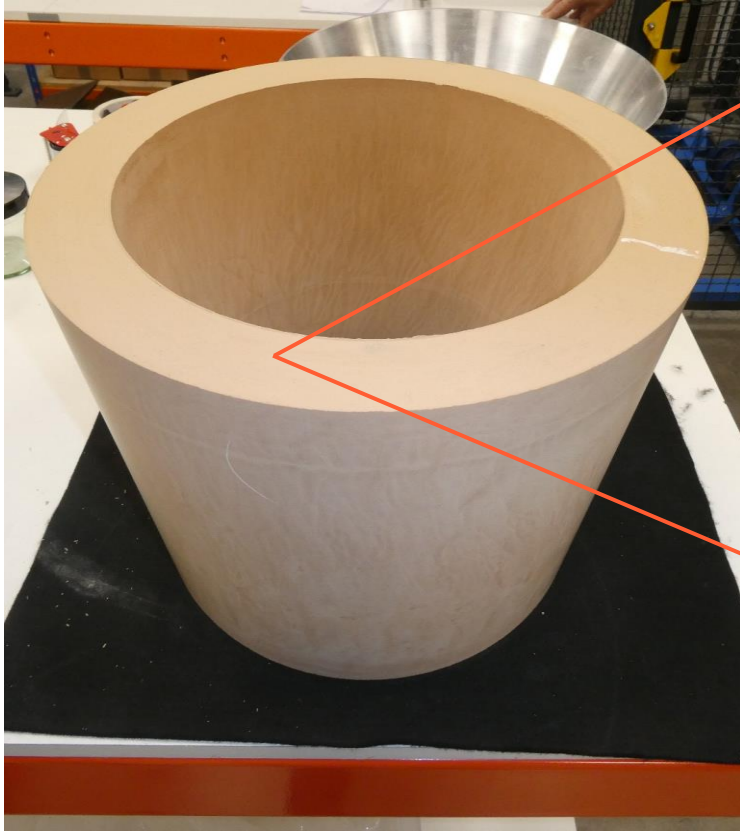
Open Configuration



Closed Configuration



Why Mixing is Important



x800

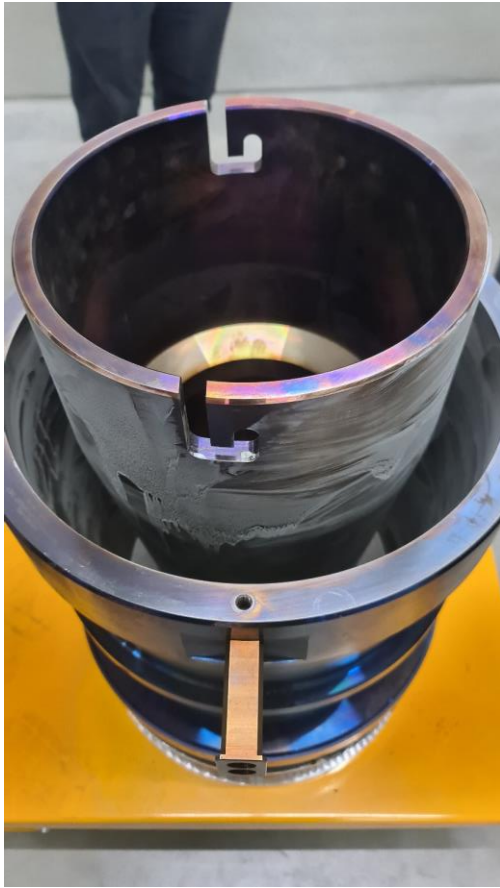
15.0kV LED

10µm

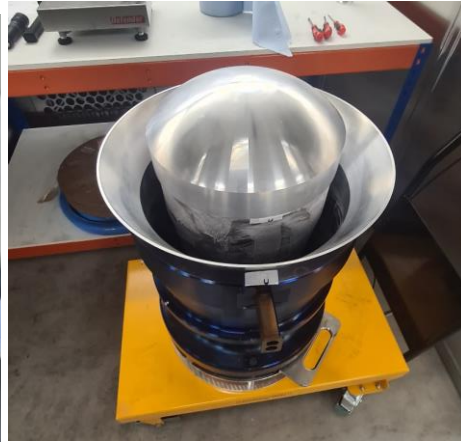
MSSU
SEM

1/17/2022
WD 9.9mm

1, Prepare Tool



2, Fill Tool



3. Pop it in the Oven



4. Close the Tool

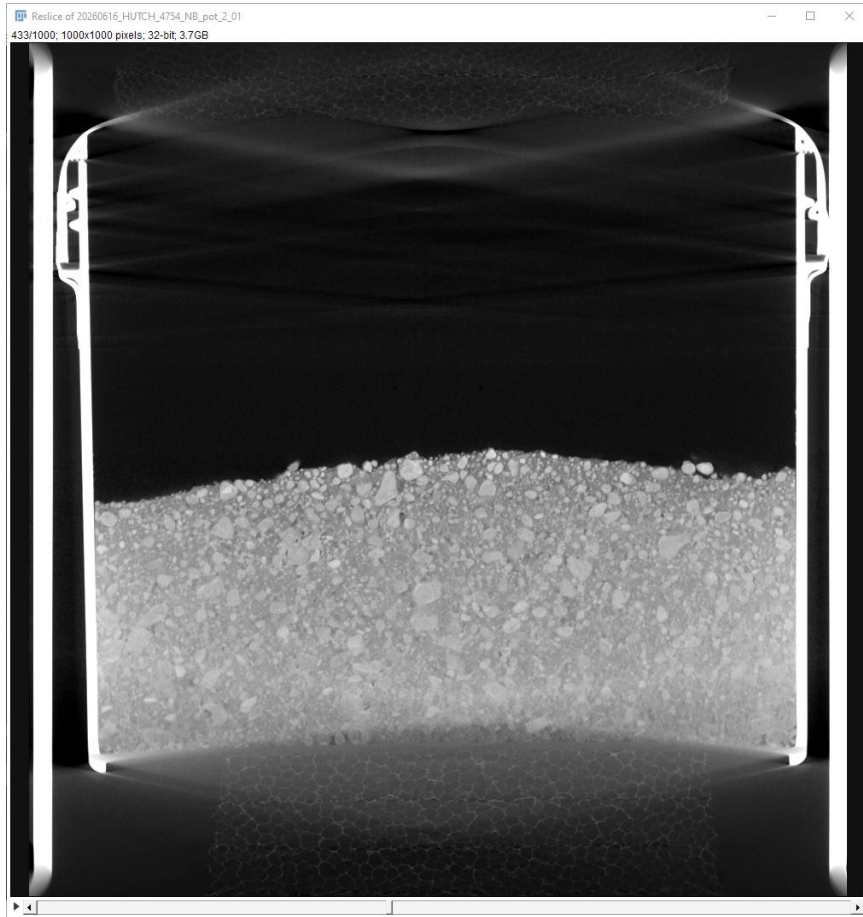


5. De-mold



Easy Peezy!

Ultrasonic Sieve in a down flow Booth



1.1 Sieve Materials



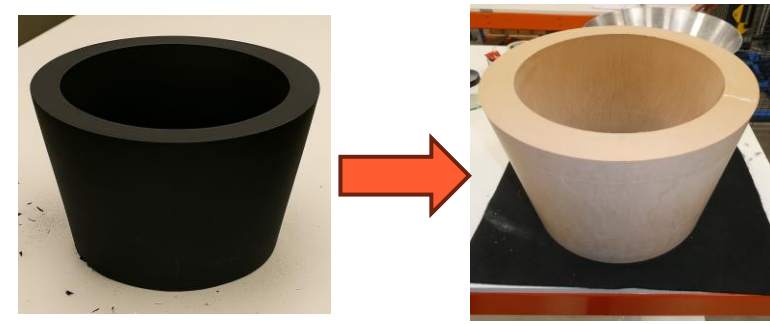
Cone Blender



1.2 Fill the Blender



1.3 Blend The Materials for 90 minutes in an interlocked down flow Booth



1.4 Empty The Blender



1.5 Clean Blender for Different Materials!



RAM Mixing (2-4 Minutes @90g)

90 Minutes Cone Blending



No Down Flow Booths



No Sieving



No Filling



No Emptying



No Cleaning





Thank you
and
questions