Unique Low Mass Sintering Accessories for MIM and CIM Applications

Presented By : David P. Hamling

ZIRCAR Ceramics, Inc.

MIM 2019

Lake Buena Vista, FL


Zircar
CERAMICS
Unique Low Mass Sintering Accessories for
MIM and CIM Applications
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ZIRCAR Ceramics, Inc.
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History

- 100 N. Main Street, Florida, New York 10921 USA
- Successor in Interest to ZIRCAR Products, Inc.
- ZPI Founded 1974 by Bernie Hamling
- ZIRCAR Ceramics, Inc., Incorporated June 2000
- Current Owners: David Hamling and Phil Hamling

Assets - Sales - Employees

Manufacturing:

Original ZIRCAR Products, Inc. Factory

Recently Expanded to 30,000 sq.ft.

Recent Acquisition of 20,000 sq.ft factory space - BMR

Recent 10,000 sq.ft expansion - BMR

Admin:

Original “150 year old Victorian Mansion” Offices.

Warehouse: 6000 sq. ft.

Tool Shop: 1500 sq.ft.

Total Area = 75,000 sq. ft.

Sales: USD 10 Million

Employees: 50 Full-Time

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Zircar® CERAMICS

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Knowledge Through Experience

- Executive Management –
  75+ Man Years Combined Experience.

- Department Managers & Supervisors
  10+ years Individual Experience

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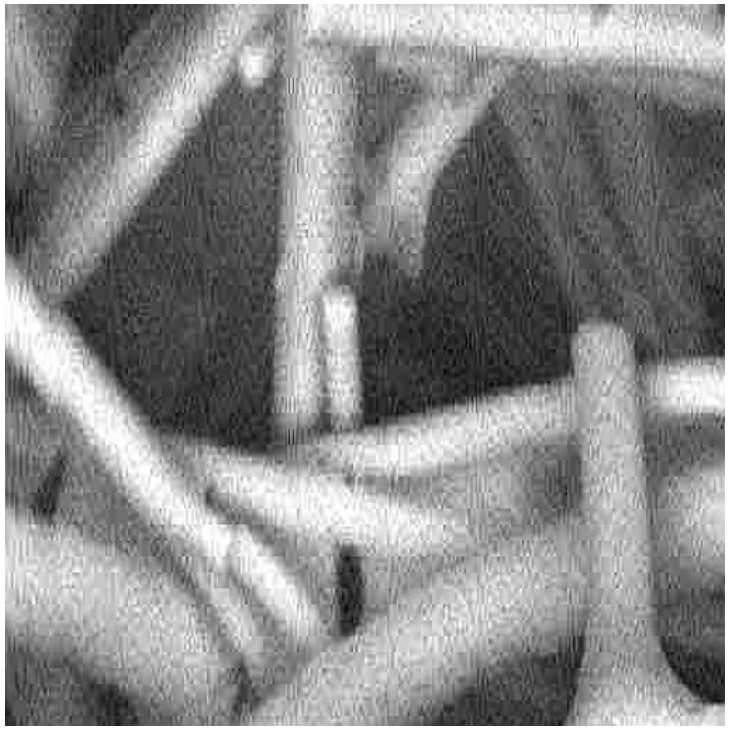
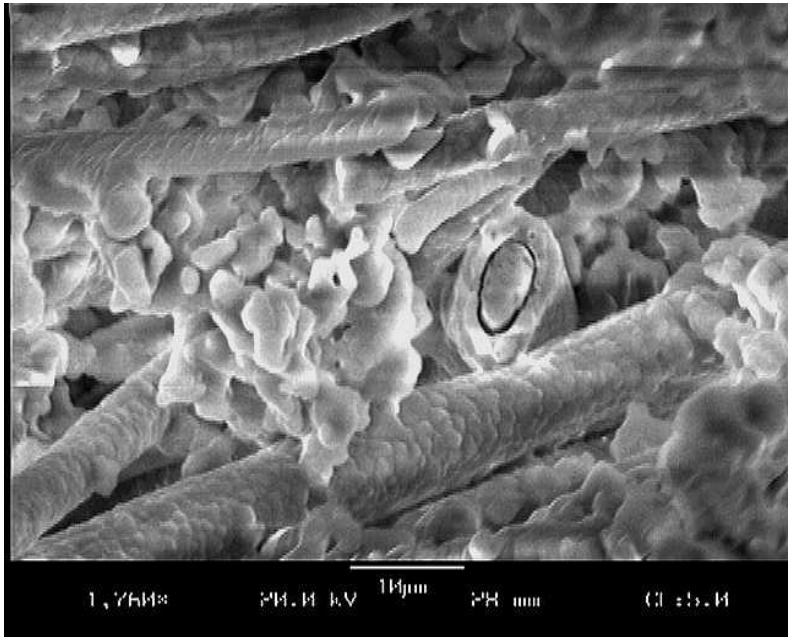
It’s a family affair!

- In 20011 the third generation of the Hamling family joined the company.
- **Phil B Hamling** - Key Account / OEM Sales
- **Cole Hamling** - Production Manager

Products

- Wide range of application solutions based upon high temperature ceramic fiber technology
- High temperature stability & refractoriness
- Possible through the properly engineered combination of raw materials





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Top Markets Served

- Injection-Molded Metal and Ceramic Powders MIM / CIM
- Electro / Technical Ceramics
- Secondary Aluminum - Sheet and Die Casting
- Electro-Mechanical Devices
- Gov't & Corp. R&D
- OEM Rapid-Cycle Furnace Builders
- OEM Analytical Device Manufacturer
- Sputtering Target Makers
- High-Temperature Fuel Cells
- Oxide Crystal Growers
- Fiber Optic Fiber Producers
- Many More!!!!!!

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Composition Al_2O_3 / SiO_2	Fiber Type ***	Binder System	Continuous Operating Temp. C
80% / 20%	ALBF	SiO_2	1700 to 1825
85% / 15%	ALBF	SiO_2	1650
59% / 41%	ASBF	SiO_2	1420
35% / 65%	ASBF	SiO_2	1260
Composition Al_2O_3 / SiO_2	**Fiber Type *** **	**Binder System**	**Continuous Operating Temp. C**
98.4% / 1.6%	ALBF	Al2O3	1700
97% / 3%	ALBF	Al2O3	1600
68% / 32%	ASBF	Al2O3	1063
***ALBF = Polycrystalline Alumina, 96% Al_2O_3 4% SiO_2, > 50% Alpha Al_2O_3			
***ASBF = Vitreous Alumina Silica, 50% Al_2O_3 50% SiO_2			

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Rigid Products

Standard Boards:

Densities: 0.26 to 0.80 g/cc

(16 - 50 pcf)

Sizes: Thickness:

6 - 100 mm

(1/8 to 4 in.)

Width x Length:

305 x 457 L to 610 x 1220mm

(12 x 18 to 24 x 48 in.)

www.zircarceramics.com

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Flexible Products

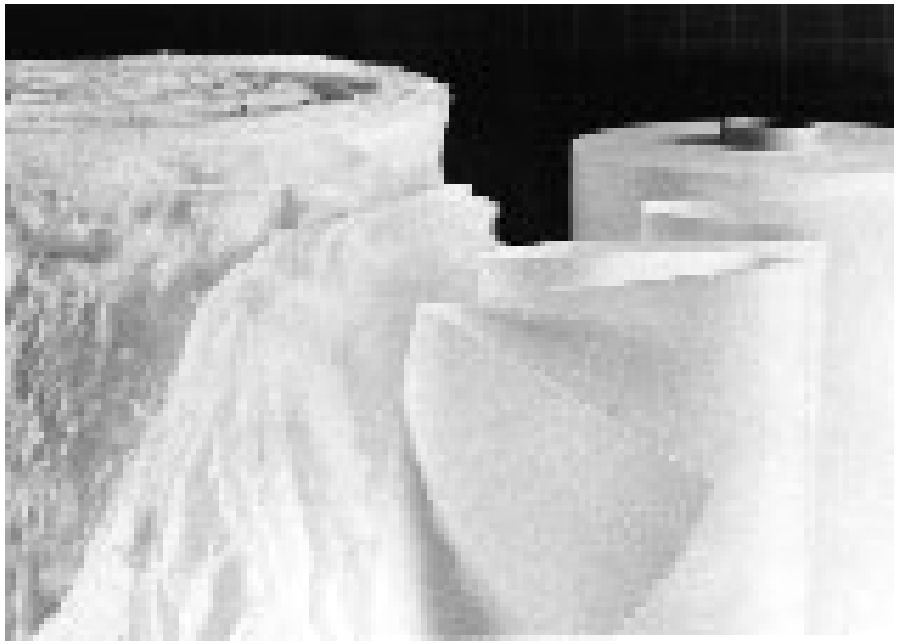
Al_2O_3 Blanket & Papers

- 1650°C Max Temp.
- Al_2O_3 - SiO_2 Blanket

Papers & Textiles

- 1260°C Max Temp.

Die cut firing separators



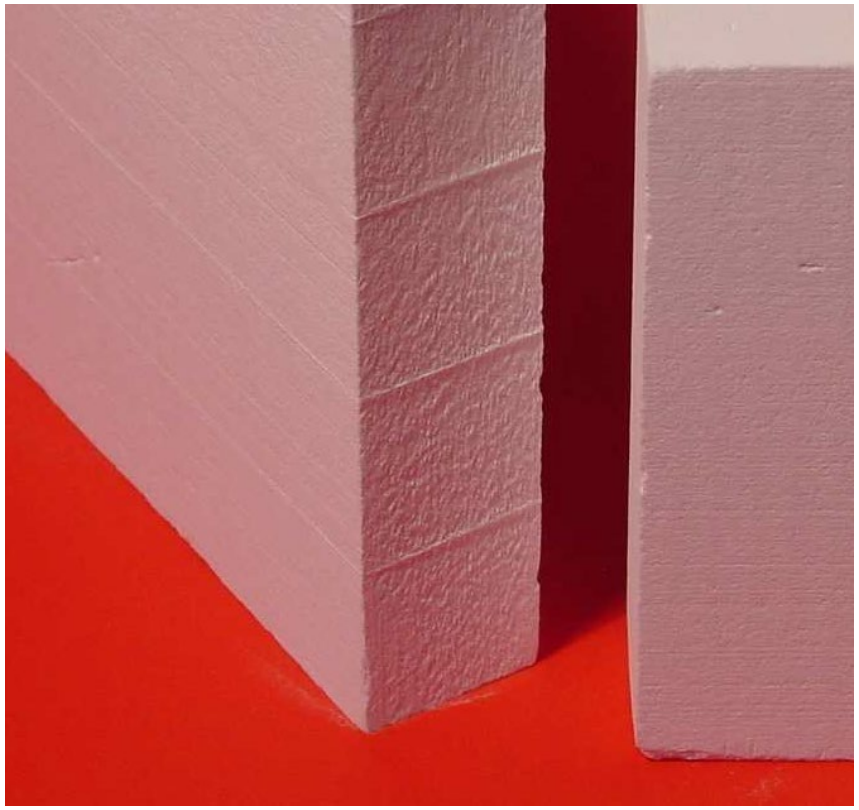
Zircar CERAMICS

Cements & Rigidizers

High Temperature Bonding & Hardening Agents

Compositions:

- 99+% Al_2O_3
- Al_2O_3 – SiO_2
- SiO_2



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MIM Applications

Typical Applications:

- Saggar veneers
- Boat liners
- Firing Setters
- Sintering Fixtures
- Thermal Insulation In H_2 Atmosphere Furnaces with temperatures as high as 1700^{o}C

Challenges:

- Flatness Requirements
- Complex part topographies
- Drag induced distortion
- Contamination issues
- Effective Thermal Insulation

Zircar® CERAMICS

ZAL-45AA

Product Features

- High Purity Al_2O_3
- 70% Open Porosity
- Colloidal Al2O3 particles
- Low Mass
- **Superior Machinability & Re-machinability!**

Benefits

- Stable in Sintering Atmospheres H2 / vacuum
- Enables Production Of High-Density Parts
  - complete binder burnout
  - full sintering
- Low Distortion Of Complex Parts – no sticking
- Eliminates Cross Contamination

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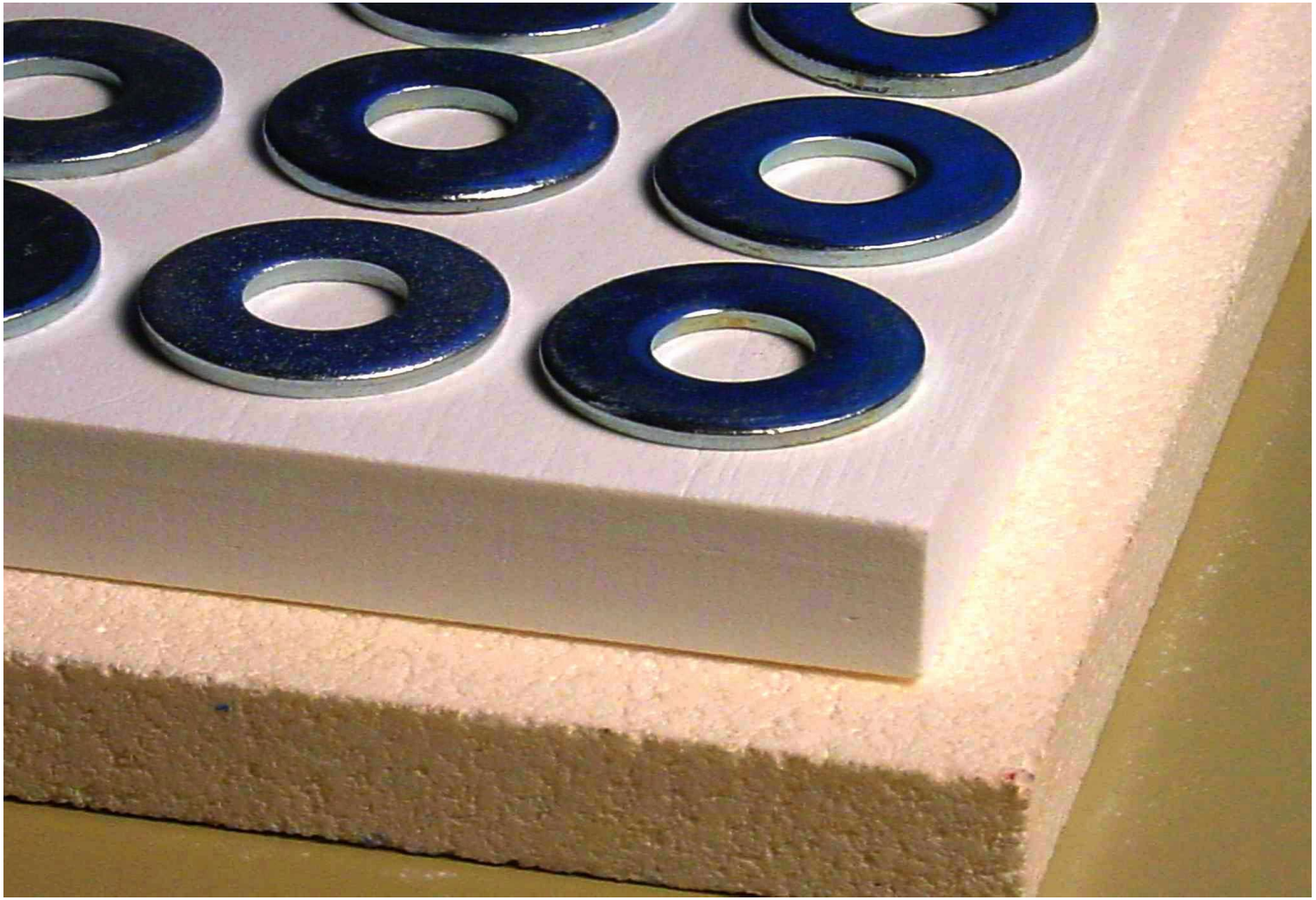
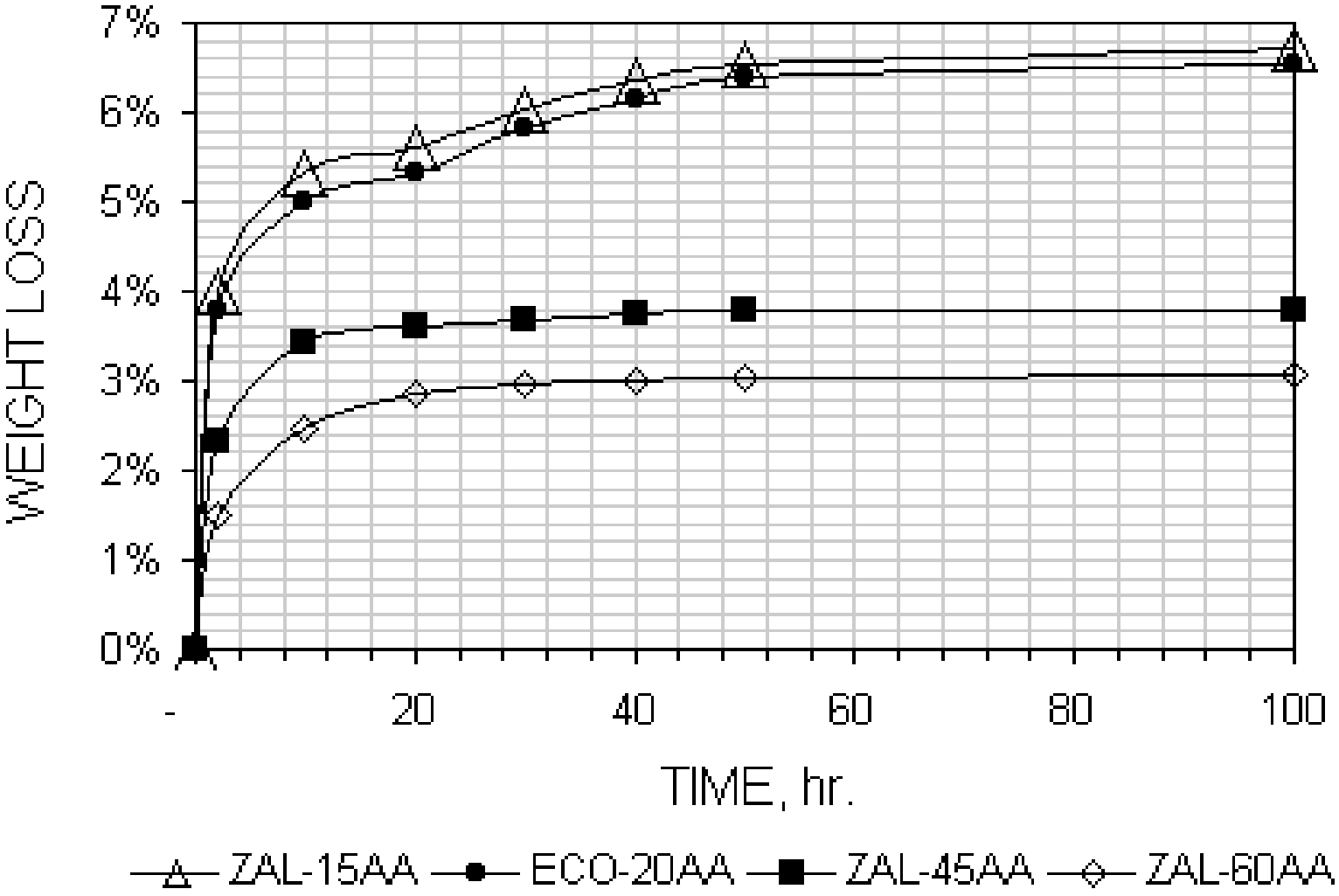


Zircar CERAMICS

WEIGHT LOSS vs TIME at 1450°C in HYDROGEN



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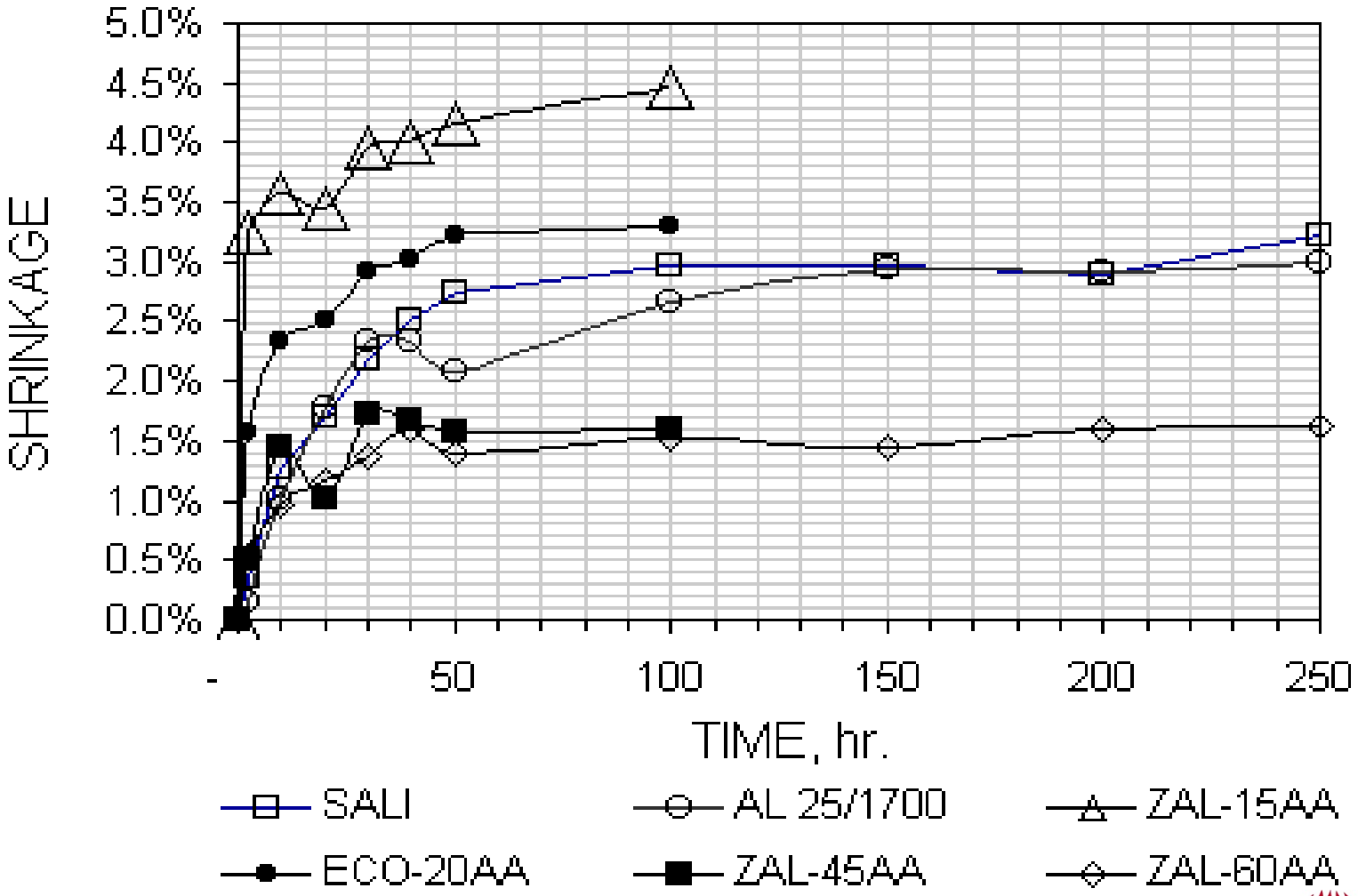
LENGTH and WIDTH SHRINKAGE vs TIME at 1450°C in HYDROGEN



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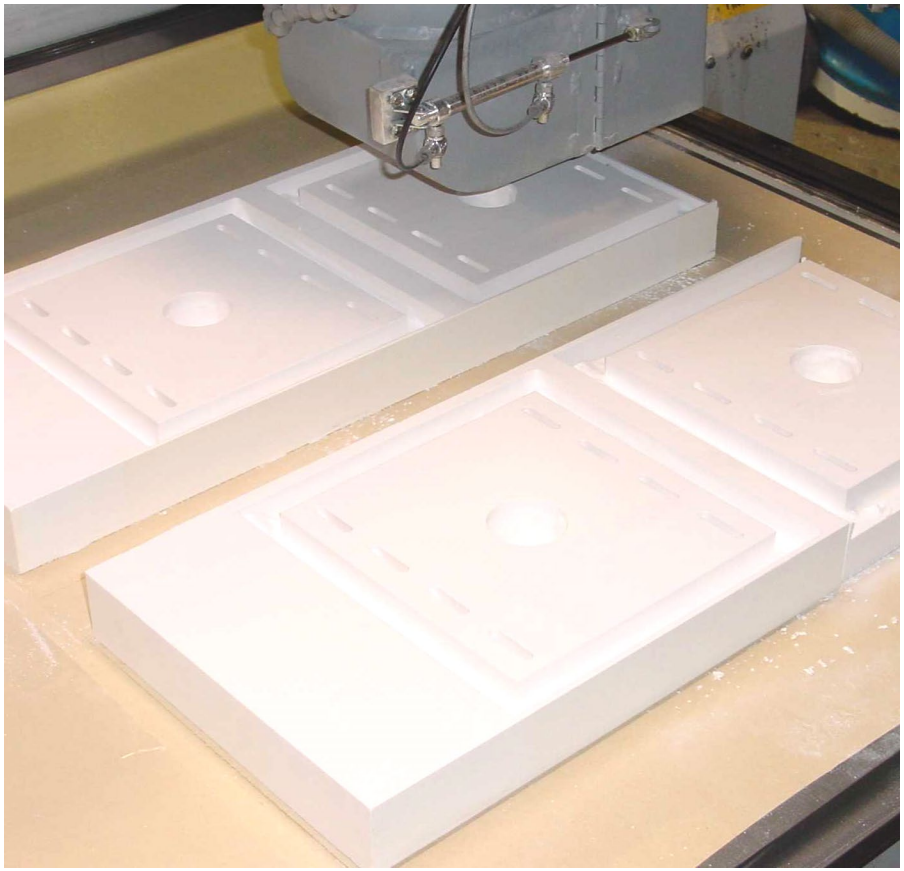
Machinability

Rapid Prototyping and efficient mass production.

Precision Machined Components

- ZCI owns 4 CNC Routers
- Well-equipped finishing department
- Tightest tolerances in a ceramic fiber product.



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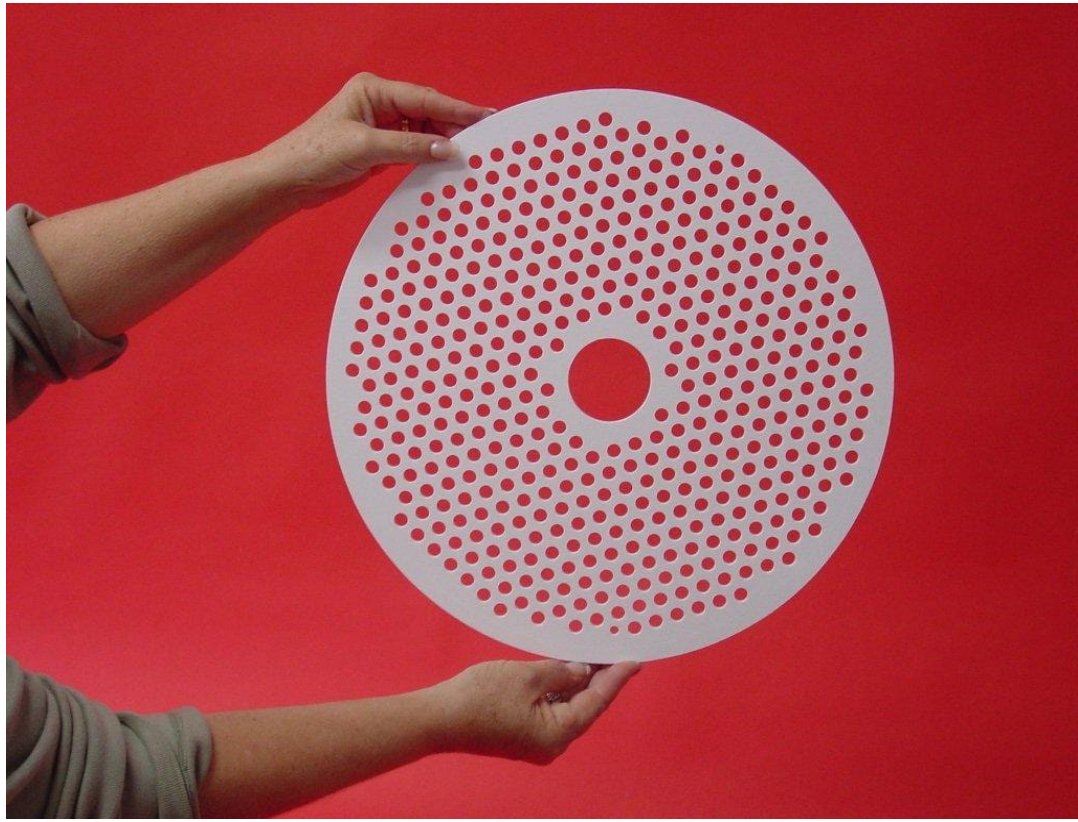
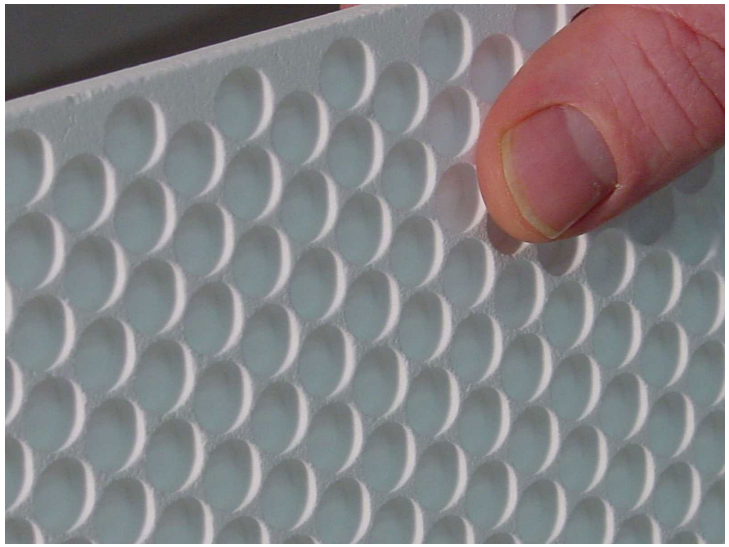
Precision Machined Fixtures





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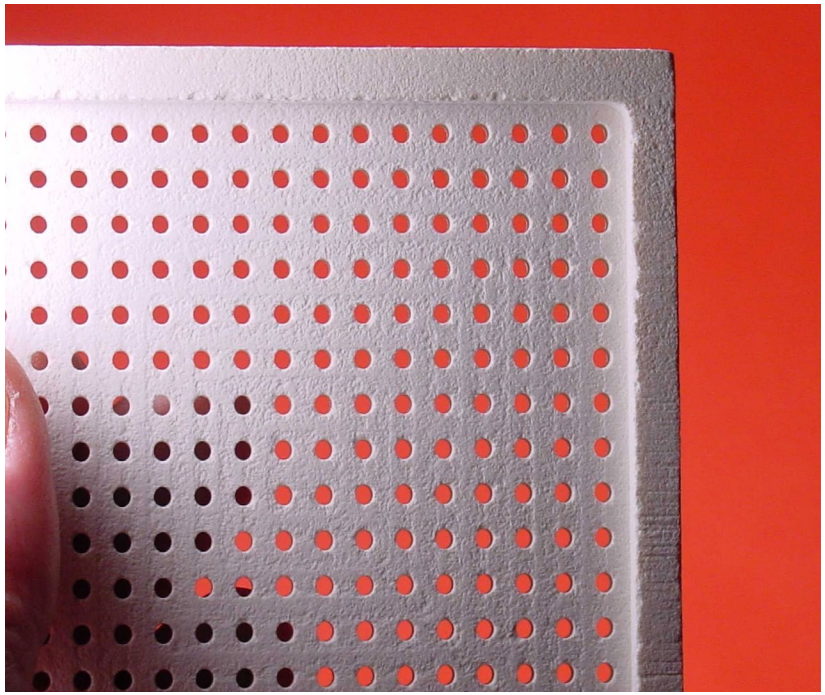

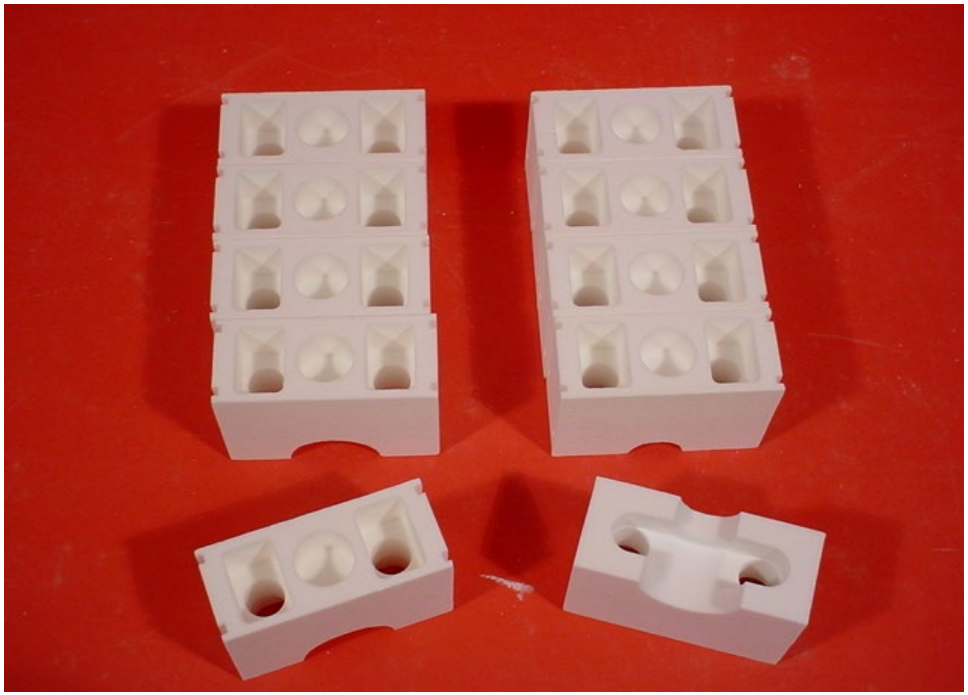

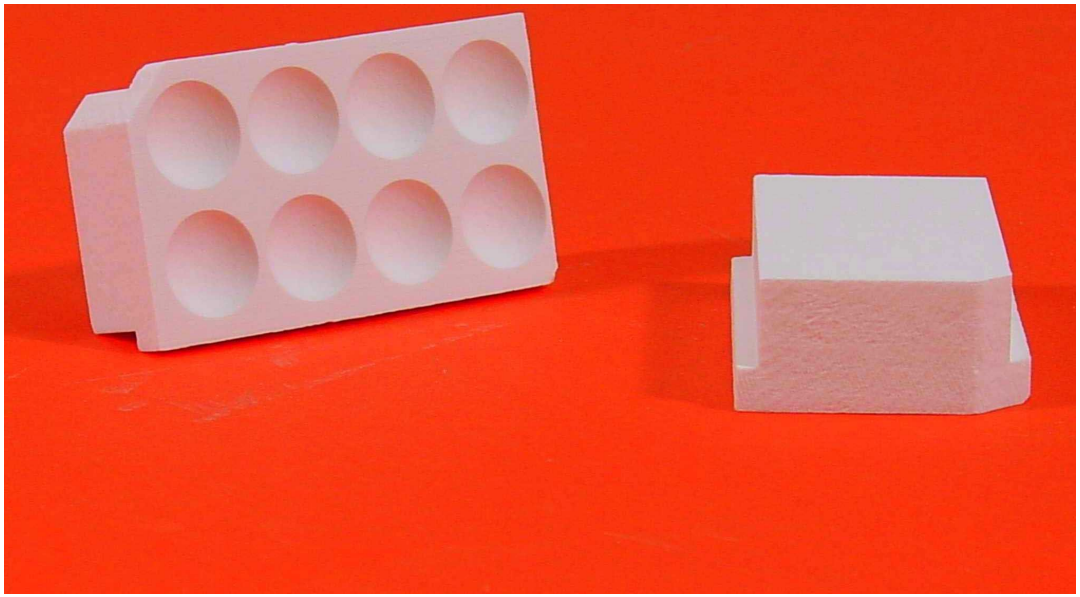

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New Developments

- "Naneramic Infusion" – Custom-made fixtures with a proprietary hardening treatment for AA products.
- Increased setter life through enhanced wear resistance.
- More firing cycles.
- Lower cost of ownership in tough fixturing applications.

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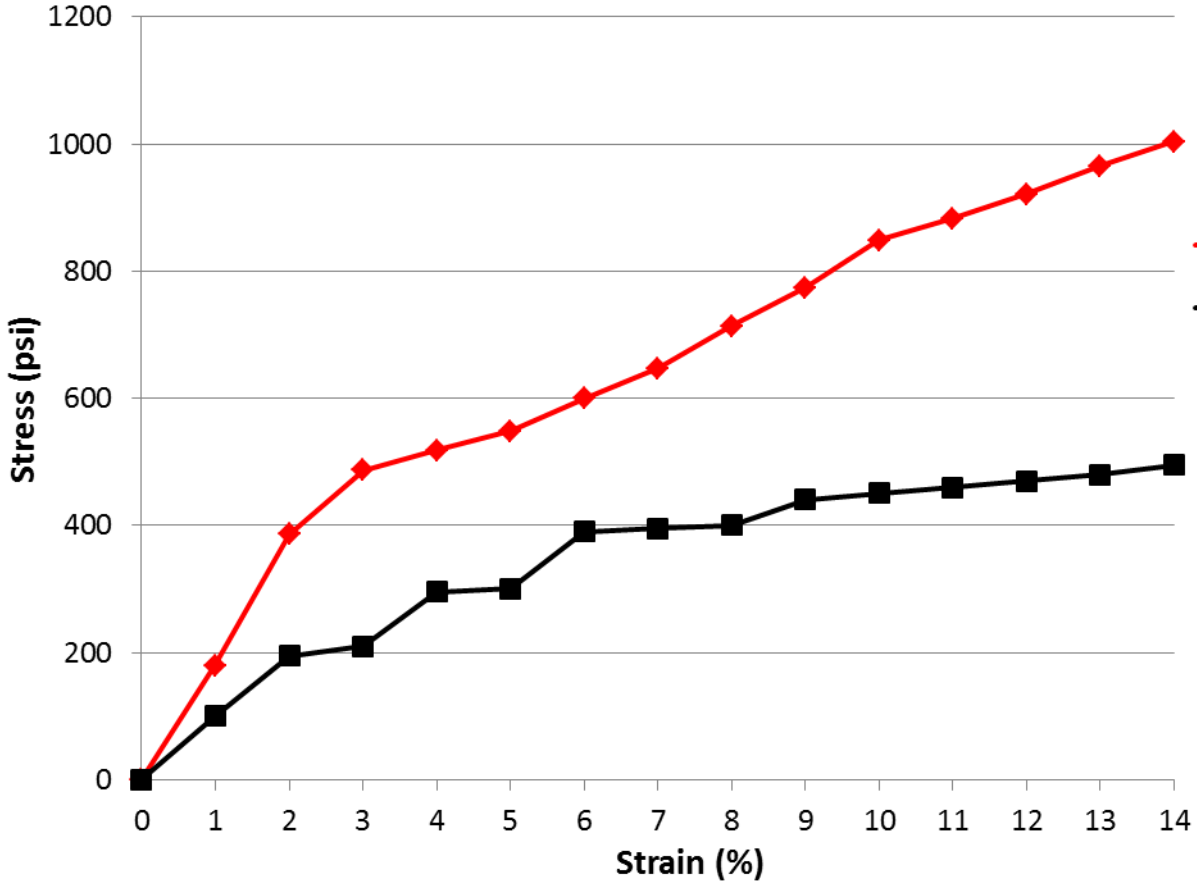
Compressive Resistance
ZAL-45AA with Al_2O_3 Infusion A Vs. Standard ZAL-45AA



Load Applied Normal To Fiber Plane

ZAL-45AA Al2O3 Infusion A

ZAL-45AA Standard

Note: ZAL-45AA Al_2O_3 Infusion A data represents the average of three samples measured in Development Project 13-004. ZAL-45AA Standard data represents the data published on ZCI webpage.

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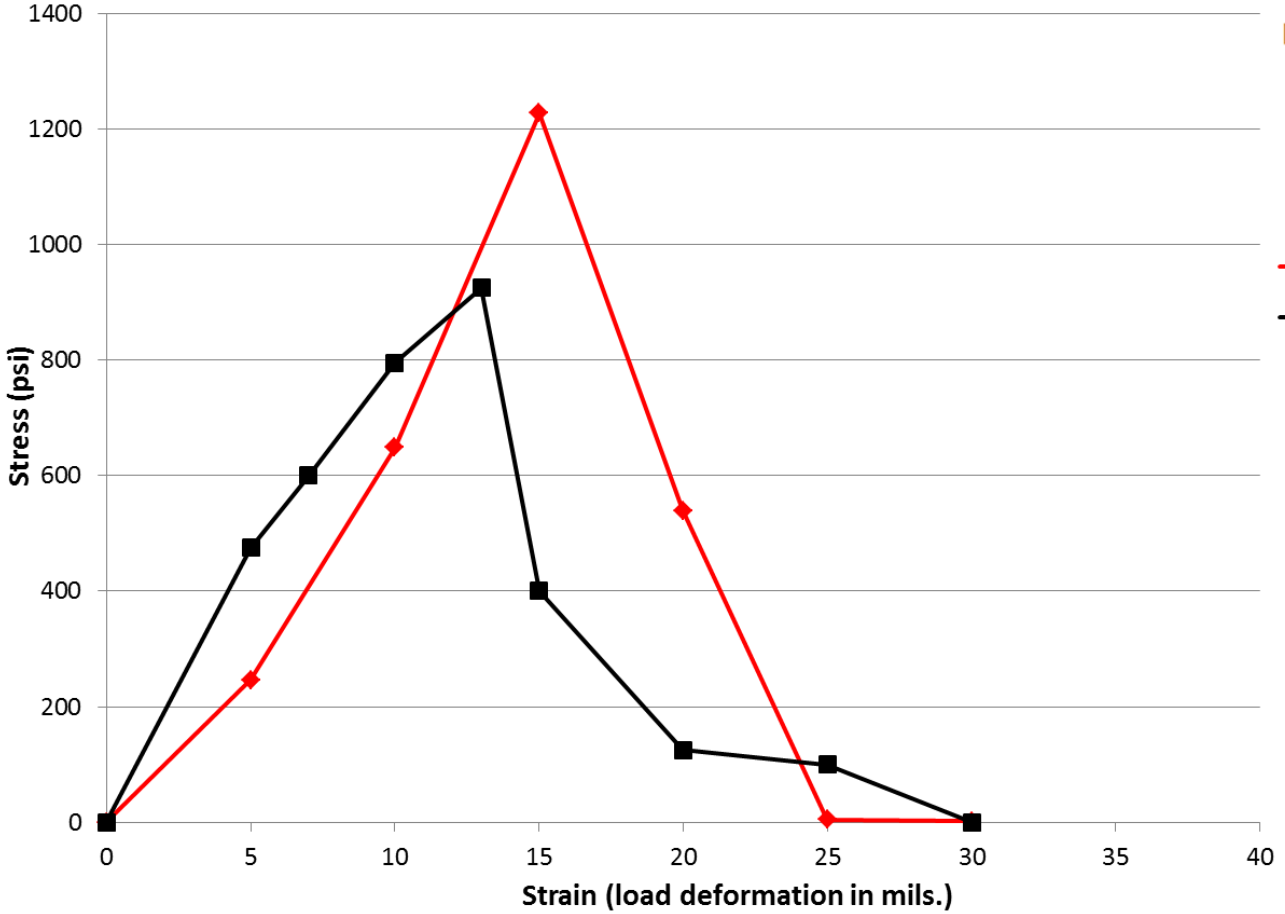
Flexural Strength
ZAL-45AA with Al_2O_3 Infusion A Vs. Standard ZAL-45AA



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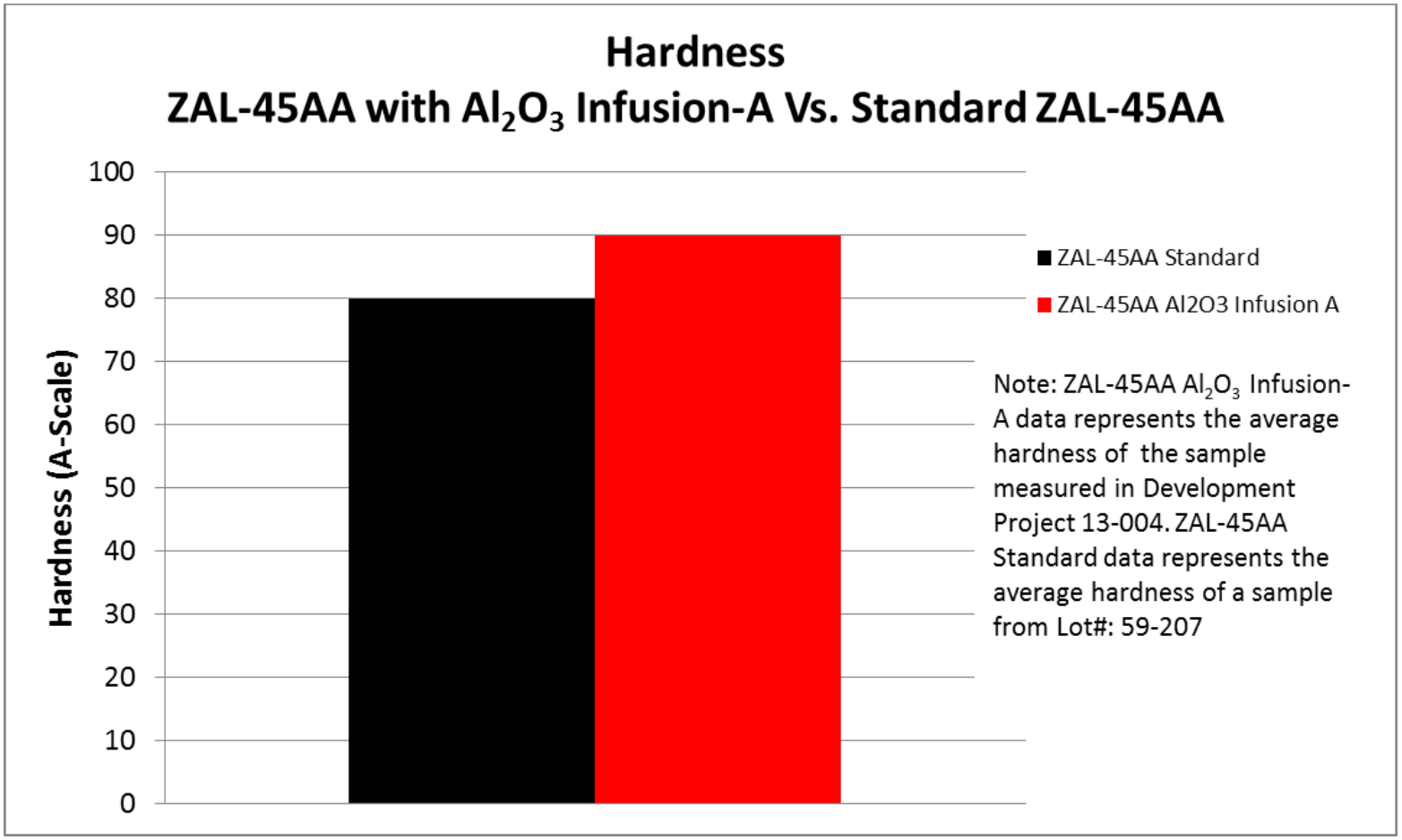

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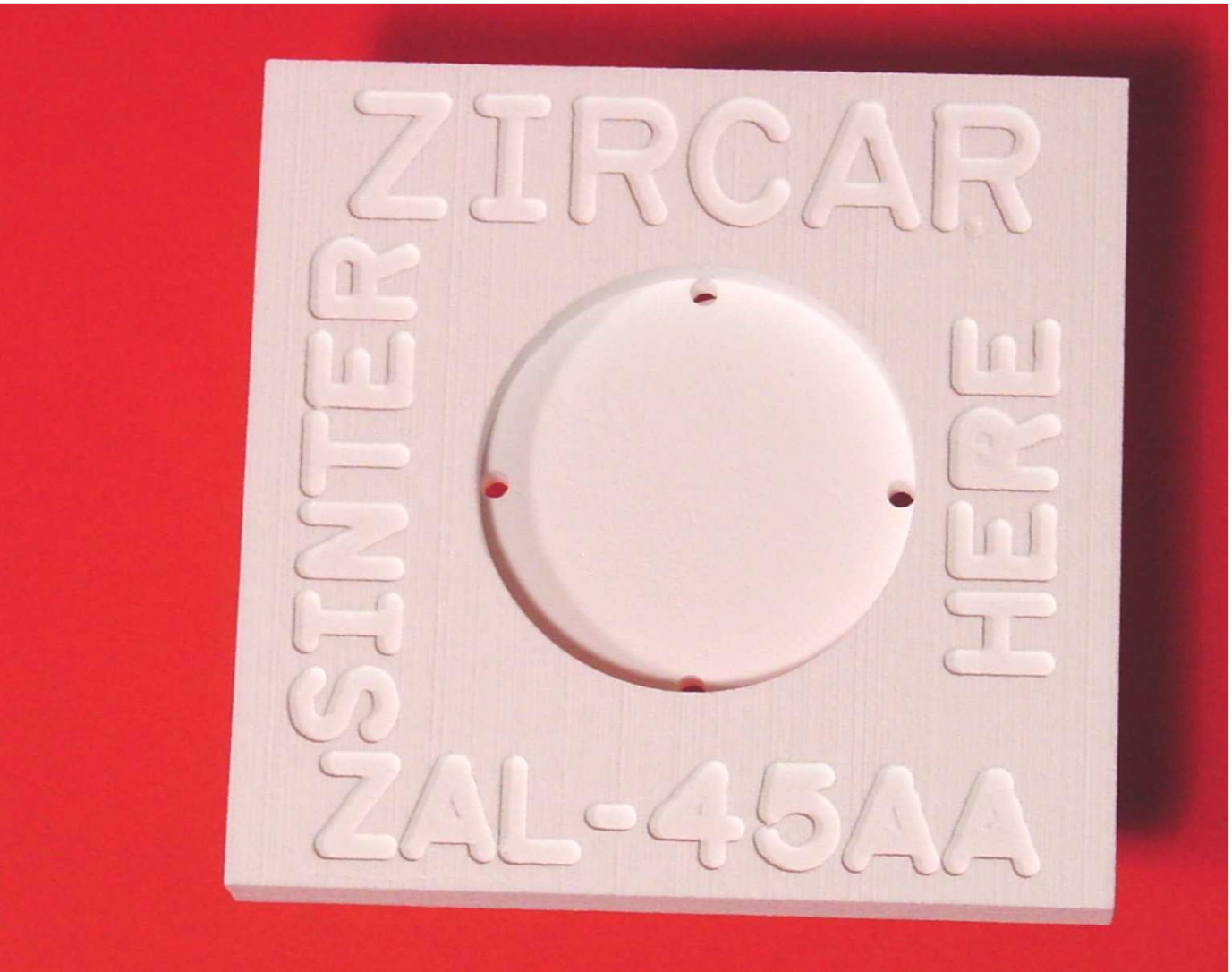
Low Mass Sintering Fixtures With NANERAMIC INFUSION



Samples Available During Tabletop Reception

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Thank You

David P. Hamling
Vice President
dph@zircarceramics.com
Tel: 845-651-6600 ext. 13
www.zircarceramics.com

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