

4 Process Analysis

Initiate Process Audits

- Furnace Design
- Installation Requirements
- Melting Practices
- Furnace Maintenance
- Metal Transfer
- Casting
- Metal Quality Issues



Scan for the URC:
PROCESS AUDIT
For The Aluminum
Casthouse

5 Product Selection

Solutions AWEARness Application

- Provide a Value Proposition/Solution, Specific to Each Customer and Furnace

- Not Every Furnace Is The Same!

Midwest Aluminum Customer A – Identified Audit Issues

Typical Melter/Holder	Aluminum Resistance	Hot Strength	Abrasion Resistance	Thermal Shock Resistance	Alkali Resistance	Corundum Resistance	URC PRODUCT
Bellyband	X	X	X		X	X	UNI-SHIELD 70A
Upper Sidewall		X	X		X	X	UNI-SHIELD 70A

- Due to the ease of pumping, this installation was completed ahead of schedule.
- No corundum build-up issues reported.
- Customer is very happy with the UNI-SHIELD 70A walls, as they are “super easy to clean.”

Midwest Aluminum Customer B – Identified Audit Issues

Typical Melter/Holder	Aluminum Resistance	Hot Strength	Abrasion Resistance	Thermal Shock Resistance	Alkali Resistance	Corundum Resistance	URC PRODUCT
Bellyband		X				X	UNI-PUMP 85 AL
Upper Sidewall		X				X	UNI-PUMP 85 AL

- Due to the ease of pumping, this installation was completed on schedule.
- Customer commented that after many months of production, the UNI-PUMP 85 AL looks “unbelievable”, as there is “no corundum build-up that they were experiencing previously”.

Product Line Arsenal

- 60% to 90% Alumina, Low Cement With ‘AL’ Additive Package
 - Andalusite-Containing Mix
- 67% to 92% Fused Silica, Low Cement With ‘AL’ Additive Package
- 60% to 80% SiC, Low Cement With ‘AL’ Additive Package
- Complete Range of Repair Materials
 - Gun Mixes, Plastics, Shotcretes

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Solutions **AWEAR**ness

FOR THE

Aluminum Casthouse



1 Strategic Goal

Satisfy the Aluminum Customer Value Proposition

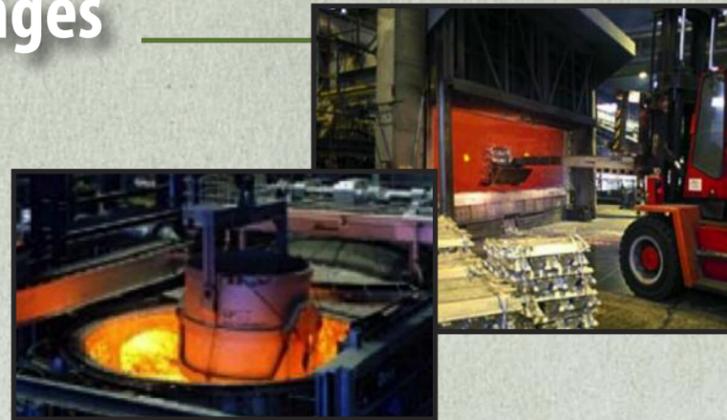
- Reduce Total Process Costs/MT of Metal Produced
- Improve/Impact Metal Quality
- Improve/Optimize Furnace Availability
 - Superior Service Performance and Lining Life
 - Faster Rebuild Turnaround Time



2 Customer Challenges

Identify Critical WEAR Mechanisms

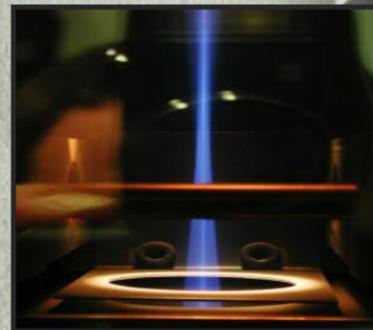
- Aluminum Corrosion Resistance
- Hot Strength Properties
- Mechanical Abuse
 - Impact & Abrasion
 - Thermal Shock Resistance
- Alkali Resistance
- Corundum Resistance



3 Product Qualification

Solutions AWEARness Qualification

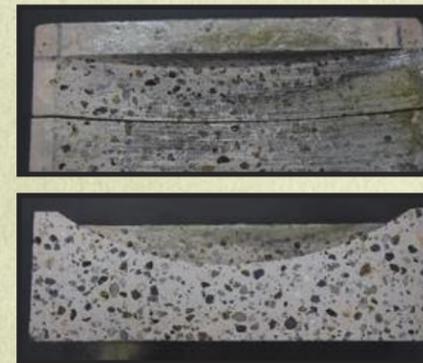
- Testing Program To Best Simulate WEAR Mechanisms



Testing WEAR Mechanisms

Aluminum Corrosion Resistance

72 Hour 7075 Alloy Cup Test at 1500°F

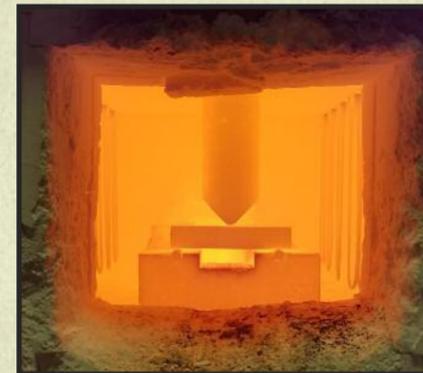


Four Day Immersion Test With 5% Mg at 1562°F



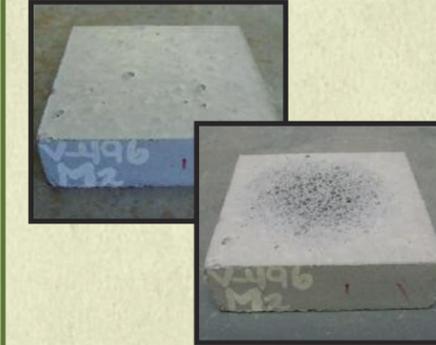
Hot Strength Properties

Hot MOR at 1500°F and 2000°F Tests



Mechanical Abuse – Abrasion Resistance

C-704 Abrasion Test



Mechanical Abuse – Thermal Shock Resistance

2200°F Water Quench Prism Spall Test



Alkali Resistance

100% Sodium Carbonate, 100% Potassium Carbonate, 50/50 Blend Cup Tests at 900°C (1652°F)



Corundum Resistance

Chemical Stability With Higher Purity Lower Silica Systems –
(4Al + 3 SiO₂ = 2 Al₂O₃ + 3 Si)



WEAR Mechanism By Application

Typical Melter/Holder	Aluminum Resistance	Hot Strength	Abrasion Resistance	Thermal Shock Resistance	Alkali Resistance	Corundum Resistance
Hearth	X	X	X	X		
Ramp/Sill	X	X	X	X		
Lower Sidewall	X	X	X			
Bellyband	X	X	X		X	X
Upper Sidewall		X	X		X	
Roof		X			X	
Jambs/Lintel		X	X	X		