



High Temperature System Designs, LLC
Molten Salt Systems & Components

Who We Are

Founded in 2015

Specializing in high-temperature molten salt systems

Full-service provider: Engineering + Manufacturing

Over 70 years of combined team experience

Based in Northwest Indiana

Why HTSD Was Started

Educating Customers to Ensure Safe, Successful Systems

HTSD was founded to answer questions about design, manufacturing, and commissioning of molten salt loops.

To educate our customers on system design pitfalls and safe operations of molten salt systems.

To bridge the gap between engineering, maintenance, and operations - ensuring both safety and profitability.

Safety is the Number One Concern



The 4 Major Problems with MS Systems



Freeze-ups within the system



Leaks from mechanical joints and valve packing



Environmental impacts



Human errors in molten salt system design

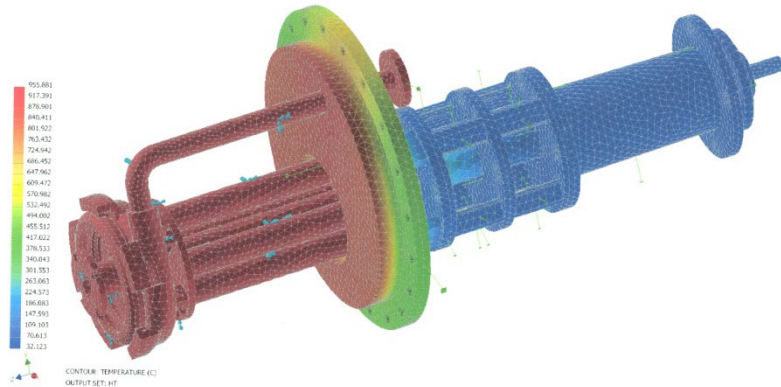
Any one of these, or any combination, can result in the loss of life or severe burns to your employees and catastrophic damage to your facility!



Engineering Services Overview

Comprehensive Technical Support

- Consulting
- System Engineering
- Component Manufacturing
- System Analysis and Testing
- Design Reviews
- Supply Chain Development
- R&D Loop Component Design
- Operational Mode Development
- Training



System Design & Integration

Engineering for Reliability

- ⚙ Piping system sizing and velocity optimization to minimize pressure drop
- ⚙ Strategic component placement & thermal zoning
- ⚙ Comprehensive heat tracing strategy
- ⚙ Complete system integration from concept to commissioning



Preheating & Salt Management

Critical to Startup Success

-  Preheat system designed to prevent freezing, thermal expansion, and moisture accumulation.
-  Salt melting procedures and protocols
-  Temperature monitoring and control strategies
-  Thermal stabilization techniques – preparation for salt loading



Analysis & Testing Services

Risk Mitigation Through Rigorous Analysis



Failure Modes and Effects Analysis (FMEA)



Hazard and Operability (HAZOP) Reviews



Thermal analysis for heat distribution



Stress analysis for structural integrity



Independent third-party technical evaluations



Building investor confidence through proven methodologies

Risk Assessment Matrix

Severity	Probability				
	1	2	3	4	5
1	Low	Low	Low	Low	Moderate
2	Low	Low	Low	Moderate	High
3	Low	Low	Moderate	Moderate	High
4	Low	Moderate	Moderate	High	Unacceptable
5	Moderate	Moderate	High	Unacceptable	Unacceptable
5	Moderate	High	High	Unacceptable	Unacceptable

Documentation & Support

System-Focused, Not Just Equipment-Focused



Comprehensive operator manuals (entire system, not just individual components)



Maintenance procedures and schedules



Detailed startup protocols



Training support and commissioning assistance



Ongoing technical consultation

Test Loop Sizes & Designs

From Benchtop to Pilot Scale

Benchtop Loops (1/4"-1/2" Piping)

Very small, custom-manufactured components; generally simple in design and used to test one or two aspects of a commercial system.

Laboratory-Size Loops (1"-2" Piping)

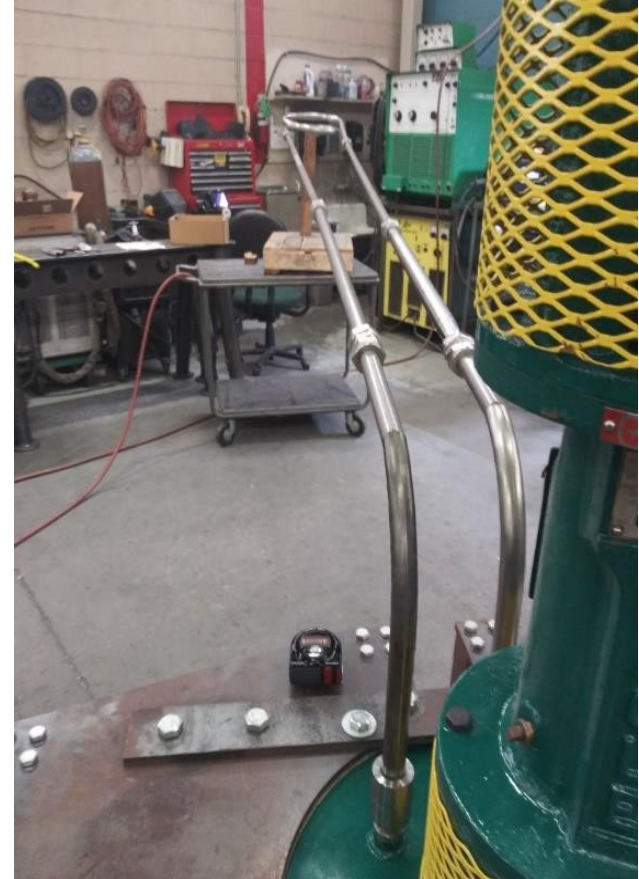
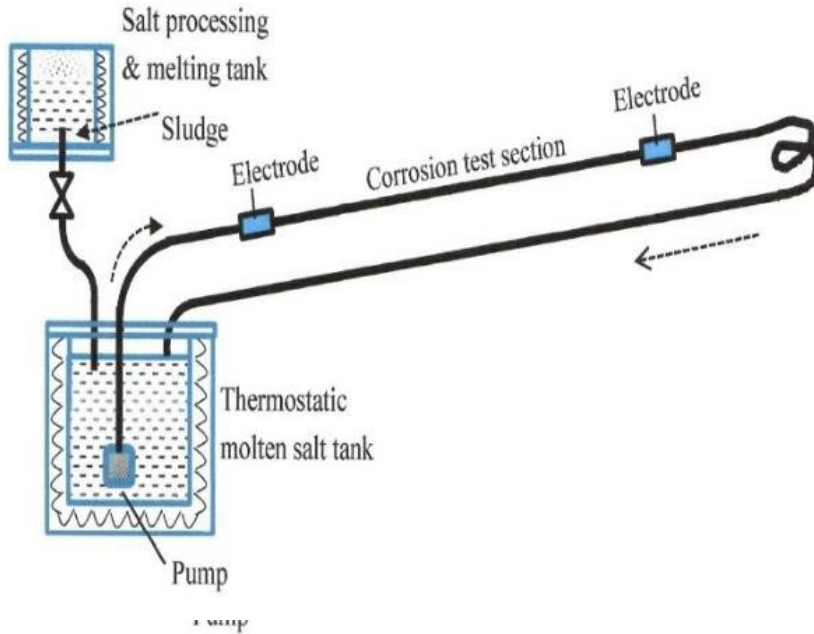
Small commercially available components. Can have multiple test areas. Many features become scalable for pilot systems and commercial plants.

Pilot-Size Loops (3"-6" Piping)

Medium-sized commercially available components. Can be very complex, testing multiple features. Validation to de-risk critical components for commercial systems.

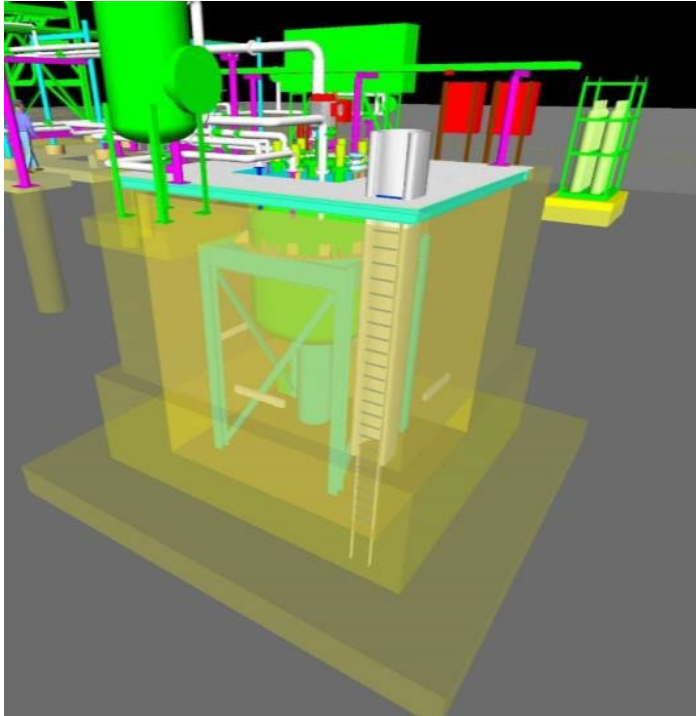
Laboratory Test Loop

University of Arizona



Pilot Size Test Loop

Gasmer – Houston, TX



Other Equipment

University of Wisconsin–Madison and Shell



Our Customers

Diverse Client Base Across Multiple Sectors



National
Laboratories



Universities
&
Research



General
Industry



Power
Generation



Thermal
Storage

International facilities: Spain, Italy, and beyond

Projects: Sandia National Labs, Oak Ridge, UMW, University of Arizona, Shell Oil

Product Portfolio

Engineered & Manufactured Components

Miniature Pumps

up to 750 °C

Custom Tanks & Vessels

up to 750 °C

Complete Piping Systems

*with structural
support*

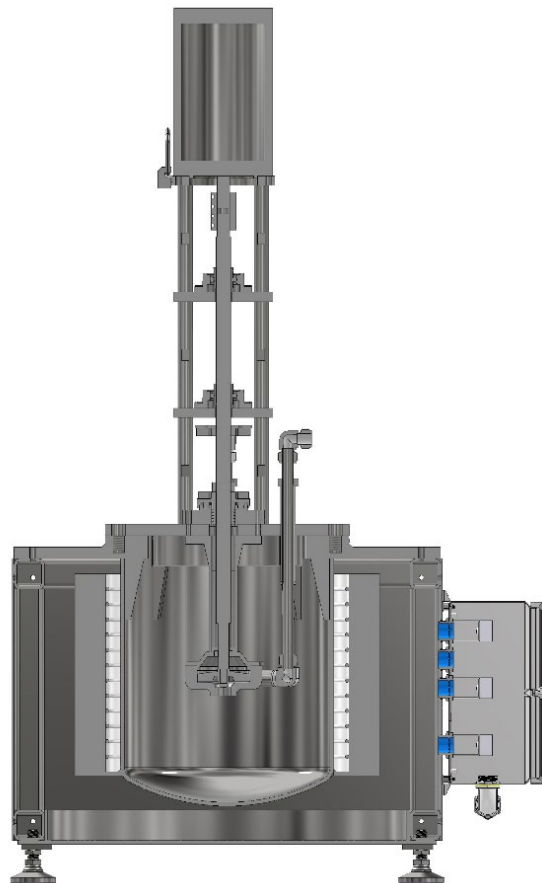
Control & Monitoring

custom designs

Heat Tracing Solutions

integrated

All designed for extreme molten salt environments



Miniature Pump

Precision-Engineered for Molten Salts

Materials	316 Stainless Steel or Alloy 600
Operating Temperature	Up to 750 °C
Sealing Options	Mag drives available for leak-free operation
Control	VFD-controlled: 1800 or 3600 RPM
Discharge Sizes	1/2" or 3/4"
Customization	Engineered to meet flow requirements



Tanks & Containment Systems

Custom-Sized for Your Application

Materials	316 Stainless Steel or Alloy 600
Operating Temperature	Up to 750 °C
Sizing	Designed per system requirements
Heating Systems	Integrated heater systems
Monitoring	Thermal controllers and monitoring
Compliance	ASME code compliance options available



Control Systems

Turnkey Integration Solutions

Control Systems

- Simple heater control
- Full system automation
- Manufactured by qualified third-party partners



Piping Systems

Turnkey Integration Solutions

Piping Systems

- Complete piping systems with structural support
- Integrated heat trace and thermal monitoring
- Seamless integration with existing infrastructure



Our Team

Deep Expertise in High-Temperature Systems

Dan Barth

Business Development Manager and Owner

40+ years in molten salt/sodium pumping systems

Brian Barth

Vice President/General Manager

30-year Navy career in Nuclear Engineering; Lean Six Sigma Black Belt

William Nagle

Chief Technical Officer

24 years, MS, Stanford, MBA, Chicago, FEA/CFD/Thermal/Stress Analysis

Dr. Adam Burak

Senior Technical Advisor

Founder, Arbor Halides; 10+ years molten salt expertise; USMC Veteran

Logan Smith

Engineer

Design and engineering support

Industry-Leading Suppliers & Partners

Connecting your project with industry leaders

Ability Engineering	Engineering consulting services
Arbor Halides	Molten salt expertise, actinide handling capability
Bertrams	Complete turnkey heating plants
Buckeye Fabrication	Pressure vessels - 60,000+ ASME vessels, 50+ years
Copenhagen Atomics	Portable molten salt loops, high-purity salts
GOSCO Valves	Specialty ball valves for critical service
HKM Sales & Consulting	Process heating solutions (35+ years)
Nagle Pumps (NPI)	70+ years, heavy-duty pumps for extreme applications
PMT Nuclear	Nuclear industry expertise
Sporian Microsystems	Advanced sensors for high-temperature applications

Copenhagen Atomics

High Purity Salts and Portable Molten Salt Loops

High-Purity Salts

- FLiNaK, FLiBe and Chloride Salts
- Purity levels as low as 20 PPM of oxides

Portable Molten Salt Test Loops

- Fully integrated test platform
- Adjustable flow rates and temperature
- Cloud data storage and real-time charts

[Copenhagen Atomics](#)



GOSCO Valves

Quality Valves for Flow Control

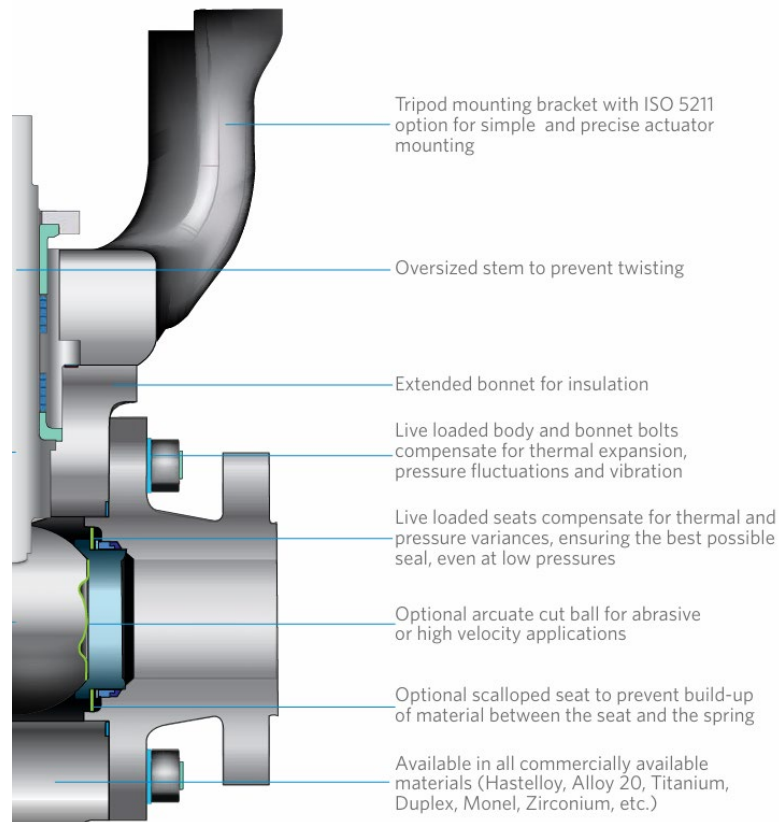
Specifications

- ½" to 16" Standard Port
- 150 Class up to 4500 Class
- Up to 788°C (1450°F)

Coating

- High Velocity Oxygen Flame
- Boroniding
- Ceramics

[Gosco Valves | Severe Service Ball Valves](#)



Buckeye Fabricating

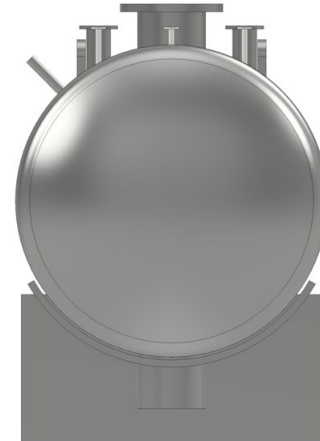
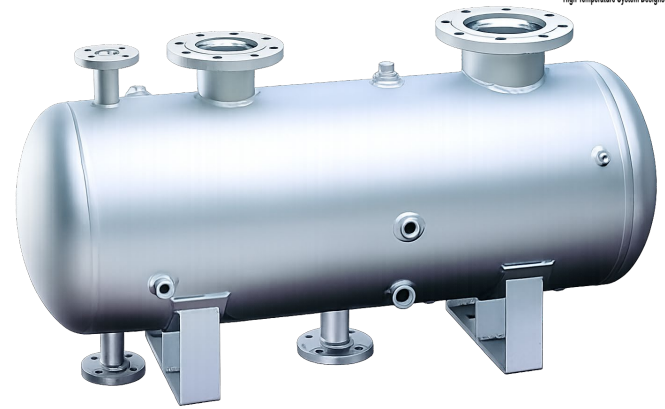
Masters of Steel Tank Fabrication



Capabilities

- 60+ years of proven experience
- Manufactured over 60,000 ASME pressure vessels
- Industry-leading turnaround times
- Advanced fabrication using CNC
- Up to 80,000# vessels

[Home - Buckeye Fabricating](#)



Arbor Halides

Molten Salt Expertise – backed by decades of experience

Capabilities

- Actinide Salts
- Advanced Purification
- Scale and Traceability
- Industry Experience



[Home - Arbor Halides Inc](#)

Why Choose HTSD?

Proven Track Record of Success

Operational Systems at Sandia, Oak Ridge, and international facilities

Complete system approach prevents costly failures

Independent reviews build investor confidence

Support from lab-scale to commercial deployment

Comprehensive support throughout project lifecycle

Things to Remember

Key Principles for Molten Salt Systems

No single design is adaptable to all applications. Molten salt systems must be designed to meet the individual requirements of each specific application.

The design and materials of construction must support and strengthen each other because of the extremely high temperatures these applications will experience.

These **applications require a high degree of coordination** between design, materials of construction, and the intelligent application of critical components.

Experience in molten salt systems is critical. From conceptual designs to commissioning, the system will have many pitfalls that must be de-risked to ensure safety.

Let's Discuss Your Project



Dan Barth: danbarth001@gmail.com | 727-776-7952

Brian Barth: brianbarth.htsd@gmail.com | 864-387-9235

Website: www.htsd-us.com