Alkali Metal Products

Pumps  Flow Meters  Valves  Pressure Transmitters
Creative Engineers, Inc.

Creative Engineers, Inc. (CEI) is a multifaceted chemical engineering company. The principal consultants within the company have a combined 60 years of experience in process design, construction, operation and maintenance of chemical process facilities.

CEI focuses on our core capabilities of alkali metal expertise, process engineering and pilot plants. Our staff is able to help with all aspects of alkali metals materials. CEI’s engineers have over 80 years combined experience working with these unique materials such as NaK, sodium, potassium, and potassium superoxide.

To our clients we provide value through process engineering deliverables, designing, building and operating pilot plants and equipment solutions for alkali metal applications.

CEI’s staff members are all chemical, mechanical, or electrical engineers who have spent the majority of their careers in operations within chemical and other manufacturing processes, giving us a unique customer perspective. We know how hard it is to find engineers and equipment that will deliver when the pressure is on to operate a process day in and day out and ship product out the door.

For alkali metals, conductive fluids and other high temperature applications CEI provides unique electromagnetic pumps, valves, flow meters and pressure transmitters that deliver results in these challenging conditions.

CEI prides itself on its ability to bring value through:

- Creative and New Ideas
- Dedicated result focused resources
- Schedule compression through rapid work pace

CEI engineering consultants collaborate with you to meet your goals.

Creative Engineers Inc.
Pittsburgh, PA | York, PA | Phoenix, MD
P.O. Box 206 Phoenix, MD 21131
Phone (443) 807-1202
info@CreativeEngineers.com
www.creativeengineers.com
Alkali Metal Pumps

CEI can build pumps for your alkali metal and other conductive liquids application.

Features

• Electromagnetic highly specialized pumps for moving conductive liquids e.g., liquid metals – NaK, Na, Li, etc
• Welded or flanged pipe connection
• Compact design
• No seals—rotating or static
• Continuous operation at liquid metal temperatures to 1600 °F (871 °C)
• Operable in high radiation fields
• Differential pressures to 50 psig, higher pressures possible with series installation of two or more pumps
• Laboratory, Benchtop, Research and Development, Process Development sized pumps available

Benefits

• Leak-free - Welded or flanged pipe connection – no leak points
• No moving parts, no worn parts to replace
• Small footprint fits into tight spaces
• Electromagnetic design allows
  o Flow control from 0% to 100 % of capacity with no throttling valves.
  o Full reversible flow in only minutes
• Low maintenance – reliable to 40 years or more
• Proven performance since the 1950’s
• Seven styles to choose from
• A wide range of flow rates and pressures available
• CEI has the capability to deliver new and custom designs

Upstream or downstream liquid-handling systems available for storage, cleanup, separation, purification, processing of pumped fluids
Alkali Metal Magnetic Flow Meters

CEI can build custom magnetic flow meters for your alkali metal and other high temperature conductive liquids application.

**Features**
- Continuous operation at temperatures up to 1600 °F (871 °C)
- No moving parts -- no seals -- no diaphragms
- Accuracy within +/- 2% measured flow
- Straight-through flow -- no internal restrictions
- Optional thermocouple to monitor temperature
- Operable in radiation fields

**Benefits**
- Design reduces leak risk to near zero
- Measurement accuracy allows for critical R&D work and quality process control
- Low Pressure Drop
- Low maintenance
- Reliable to 40 years or more
- Proven performance since 1950’s
- Can be mounted in any position
  - Laboratory, Benchtop, Research and Development, Process Development
  - sized flow meters available

CEI’s York Facility can calibrate flow meters with alkali metals

Handling systems available for storage, purification and processing

Benchtop NaK vessel part of system for high quality applications
Alkali Metal Reactor Valves

CEI can design and build custom reactor valves for alkali metal and other high temperature applications.

Features
- Direct reactor nozzle mount
- No Metal / Reactant contact in valve or piping
- Self cleaning seat
- Bellows sealed for safe use with Alkali Metals - Sodium, NaK, others
- Ideal for alcoholate production; including sodium methylate

Benefits
- Accurate temperature control
- Accurate weight additions
- Ideal for pulse feed systems
- Various sizes to match your flow rate requirements

CEI also provides design, build and operation of process development pilot plants, laboratory research systems, benchtop units and skid mounted systems.
High Temperature Pressure Transmitters

CEI can deliver pressure transmitters for any high temperature applications.

Features
- NaK Filled Capillary
- Inconel Mounting Flange with other options available

Benefits
- High temperature pressure measurement
- Keep plant standards by using your standard transmitter model
- Non Volatile capillary fluid allows for operation at high temperatures

CEI also provides electrical, programming and controls engineering services for chemical or manufacturing processes

CEI’s Typical Electrical, Automation and Controls Deliverables
- Process Control Strategy
- Power, Instrument and Controls Design
- HMI Design
- Programming (DCS, PLC, HMI)
- Interlock Design, Implementation and Testing
- Wiring, One Line and Three Line Diagrams
- Electrical Heat Trace Design
- Instrument Specifications
- Instrumentation Loops Drawings
- Automation Integration
- Automation and Power System Upgrades
- Construction Management
- Start Up & Commissioning
Other CEI Services

Engineering Services

CEI can provide Chemical, Process, Mechanical, Electric, Instrumentation, and Automation engineers to assist in projects or process studies.

Deliverables Include:

• Conceptual Process Designs and Alternatives
• Evaluation of Process Alternatives
• Scale Up Designs
• PFDs - Process Flow Diagrams
• P&IDs - Piping and Instrument Drawings
• Mass and Energy Balances
• Equipment Specifications
• Heat Transfer Calculations
• Relief Valve Sizing
• Operating Procedures
• Control System Functional Specification
• Process Hazard Analysis (PHA)
• Conceptual, Budgetary and Construction Estimates
• Piping Specifications and Isometrics
• Equipment Layout
• Bid packages
• Project Management

Pilot Plants

CEI has the engineering capability to design and build your turnkey custom:

• Pilot plant or R&D Unit
• Benchtop unit
• Lab Scale set up
• Demonstration unit
• Skid mounted system
• Production System

Further, CEI has the facilities and personnel to operate this unit to help achieve your goals including:

• Proof of Concept
• Technology Evaluation
• Technology Extension
• Process Development
• Milestone Data for Investors
• Economic Feasibly
• Commercialization