



A network of companies offering the design, manufacturing, and service the customers that today's industrial gas, petrochemical, and new energy industries require.



CI Group Companies



Cryogenic Pump and Turbo Expander Division



ASU / LNG Plant Manufacturing Division



Providing Service for Cryogenic Group



Fabricator of cryogenic and gas processing equipment Heat Exchangers and Vaporizers



Engineering and Product Development Group



Rhine - Indian Manufacturing Facility



CO₂ Equipment Manufacturing Division



CI Group Companies



Geographic Presence

- OPERATIONS ON **FOUR CONTINENTS**
- MULTIPLE FACILITIES IN **TEN COUNTRIES**
- **ELEVEN FACILITIES** IN NORTH AMERICA
- **FOURTEEN OPERATIONS** INTERNATIONALLY



- Service Centers
- Local Agents
- Proposed Centers



ACD LLC



A Cryogenic Industries
Company





ACD LLC



Company Overview

- Cryogenic equipment manufacturer for the industrial gas and air separation industries, enhanced oil recovery operations, and alternative fuels projects
 - Reciprocating pumps
 - Centrifugal pumps
 - Turbo expanders
- Engineering Disciplines
 - Aerodynamics
 - Thermodynamics
 - Pressure vessel design
 - Systems integration
 - Structural/mechanical
 - Electrical/electronics
- ISO 9001 certified with over 40 years of experience in equipment manufacturing





ACD LLC



Reciprocating Piston Pumps

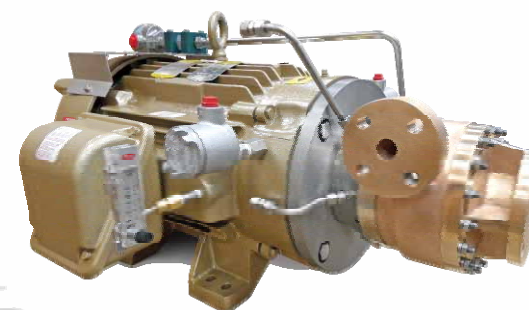
- Applications
 - Cylinder filling
 - Storage filling
 - Vehicle refueling stations
 - Enhanced Oil Recovery (EOR)
 - Coal bed methane applications
- Liquids Pumped
 - N_2 , O_2 , Ar, H_2 , CO_2 , LNG
- Features & Benefits
 - Pressures up to 17,000 psi
 - Flows up to 340 gpm
 - Up to 1,500 hp
 - Forced oil lubricated drives available





Centrifugal Pumps

- Applications
 - Trailer loading and offloading
 - Cylinder filling and storage transfer
 - Transfer boost
 - LNG refueling stations
 - Enhanced oil recovery
- Liquids Pumped
 - N_2 , O_2 , Ar, CO_2 , C_2H_2 , LNG
- Features & Benefits
 - Operate in continuous cool-down
 - Mechanical composite seal designs available
 - Vertical sealless and submerged multi-stage barrel mounted designs available
 - Cold box mounted process pumps
 - Hydraulic, electric, gear, and belt box drives
 - Single and dual labyrinth seal designs
 - Flows up to 1,200 gpm



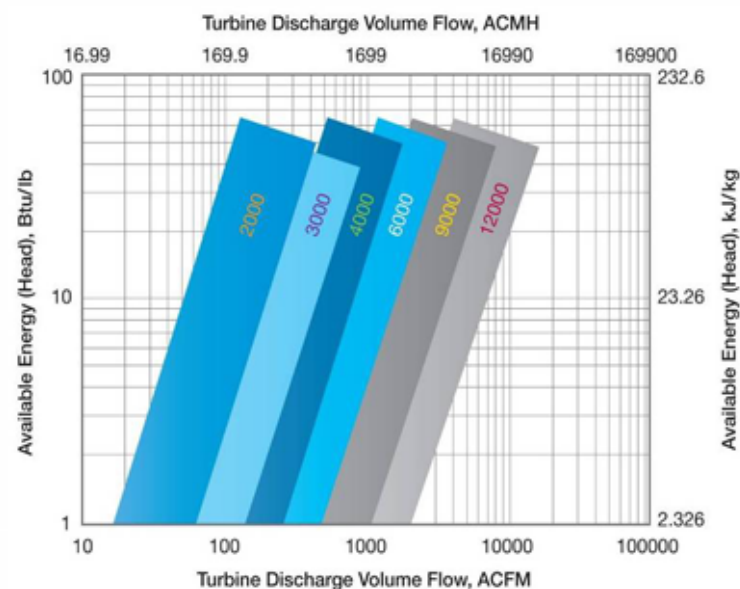
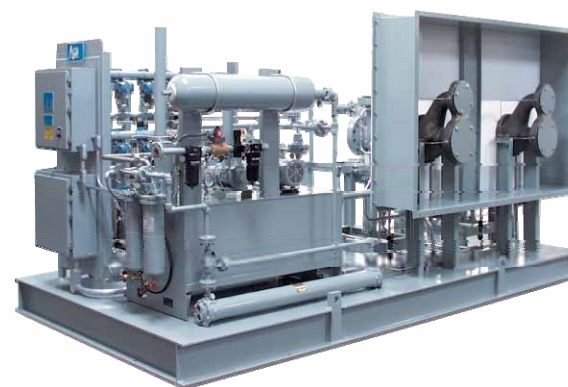


ACD LLC



Turbo Expanders

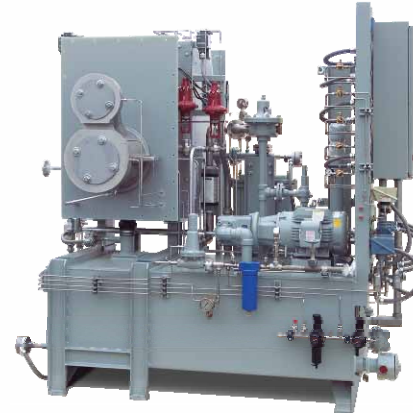
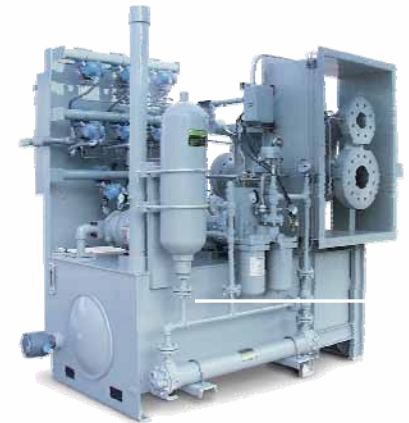
- Applications
 - Industrial gas production
 - Air separation (100 to 3,000 tons per day)
 - Liquefaction
- Fluids Handled
 - Air, nitrogen, waste gas (high oxygen content), carbon dioxide
- Features & Benefits
 - Expander efficiencies up to the low 90%
 - Refrigeration production up to 10,000 hp (7,500 kW)
 - Rotor speeds up to 115,000 rpm
 - Nominal wheel diameters from 2" to 12"





Turbo Expanders (Cont)

- Features & Benefits (Cont)
 - Over 900 units in operation worldwide
 - Cryogenic performance testing to verify design performance
 - Rugged designs with compact footprints
 - Individually balanced components for ease of field replacement
- Available Turbo Expander Models
 - Turbo Expander Hydrobrake (TH) Series
 - Turbo Expander Compressor (TC) Series
 - Turbo Expander Hydrobrake Cryogenic Compressor (THC) Series





CI Service Companies





CI Service Companies



Company Overview

- Cryogenic Equipment Repairs
 - Equipment cleaning, inspection, repair, calibration, pressure testing, and serialization
- New Product Sales
 - Cryogenic pumps, vaporizers, alternators, and turnkey pumping systems
- Exchange Program
 - Oxygen-cleaned exchange pumps available on shelf for quick delivery
 - Cost-effective components replacement schedule
- Managed Inventory
 - Extensive spare parts inventory
 - Online order processing
- Training Program
 - In-house training available for customers





CI Service Companies



Worldwide Locations

- **1982** Cryogenic Industries Pittsburgh (PIT) - Pittsburgh Cryogenic Services
- **1989** Cryogenic Industries Toronto (CAN) - CryoCanada
- **1990** European Operations ACD CRYO
- **1994** Cryogenic Industries California (CAL) - CryoCal
- **1996** Cryogenic Industries Atlanta (ATL) - CryoAtlanta
- **1996** Cryogenic Industries Malaysia (MAY)
- **1997** Hangzhou Cryogenic Industries China (HAN)
- **1998** Cryoquip Australia (MEL)
- **2001** Cryogenic Industries Houston (HOU)
- **2004** Cryogenic Industries Korea (CIK)
- **2005** Cryogenic Industries Red Deer (RED) - CryoCanada
- **2009** Cryogenic Industries India (ACDI)
- **2010** Cryogenic Industries Brazil (CIB)





Cryoquip Inc.





Cryoquip Inc.



Company Overview

- Cryogenic and gas processing equipment fabrication
- Vaporizer and heat exchanger equipment
- LNG/ASU column fabrication
- Extensive manufacturing capabilities
 - Indoor facilities — 96,000 sq. ft
 - Outdoor storage & testing facilities — 160,000 sq. ft
 - 120 ton crane capacity





Cryoquip Inc.



Products

- Vaporizers
 - Ambient
 - Natural draft, forced draft, high pressure, hybrid, semiconductor, Uniflo, wide-spaced, and pressure builders
 - Water Bath
 - Direct fired (VFTU Series), steam sparged (STI) & (VSSU)
 - Shell & Tube
 - VWU and VSU Series
 - Electric
 - VEB, VEB, and SEB Series
 - Well Service
 - ADFV and VWP Series
- LNG Vaporizing Systems
 - 'Send out' vaporization systems for peak shaving plants, temporary gas pipeline supply in the event of emergency or scheduled shutdowns, vessel pressure building, or other process applications for either continuous or temporary service
- SF6 Gas Recycling





Cryoquip Inc.



Installations

- Land-Based LNG System with 12 Uniflo Vaporizers (Shenzhen, China)
 - 60,000 Nm³/hr peak



- Sabine Pass LNG Regasification Facility (Cameron Parish, Louisiana, USA)
 - Natural draft regasification - requires no power



Cosmodyne LLC.





Cosmodyne LLC



Company Overview

- Standard cryogenic air separation plants manufacturer
 - Liquid plants (4 to 200 TPD)
 - Gas plants
 - Product Liquefiers
- Natural Gas Liquefiers
 - Nitrogen recycle refrigeration
- Over 400 Cosmodyne plants located worldwide
- Air separation plant models to accommodate independents as well as major industrial gas and oilfield service companies



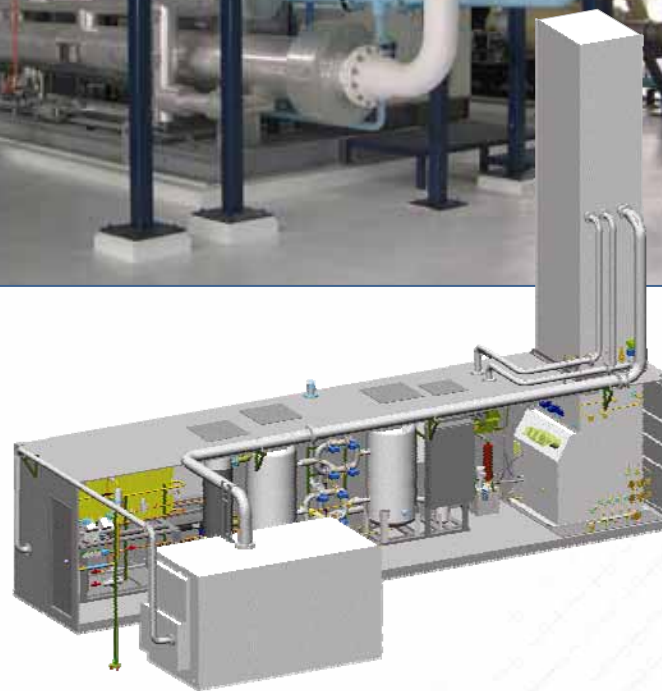


Cosmodyne LLC



Product Models

- GFED Series Liquid Plants
 - 4-7 tons/day
- ASPEN Series Liquid Plants (Mobile)
 - 15-30 tons/day
- POPLAR Series Liquid Plants
 - 52-192 tons/day
- LGN/TGN Nitrogen Generators
- ELM Nitrogen Liquefiers
- LNG Plants
 - 1,000 – 2,000 gallons/day





**CRYOGENIC
INDUSTRIES**

Cosmodyne LLC



Installations

- 50 MTD LNG Plant





Energent Corp.



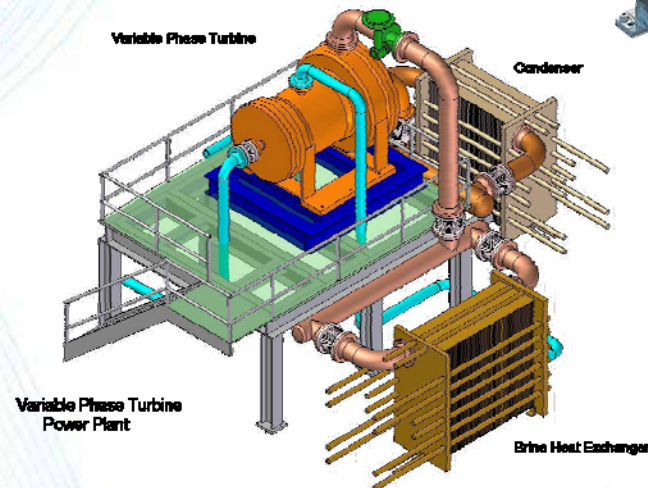


Energent Corp.



Company Overview

- Engineering group involved in the research and development of pressure recovery turbines, waste heat recovery systems, and new energy technologies
- Takes product ideas through the conceptual, design, prototype, and demonstration phases



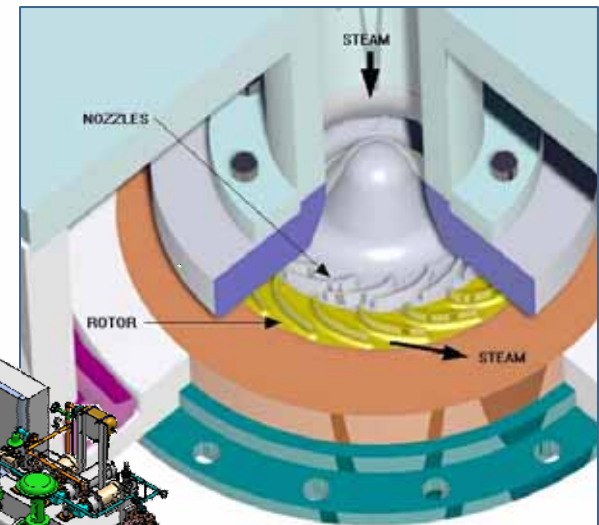
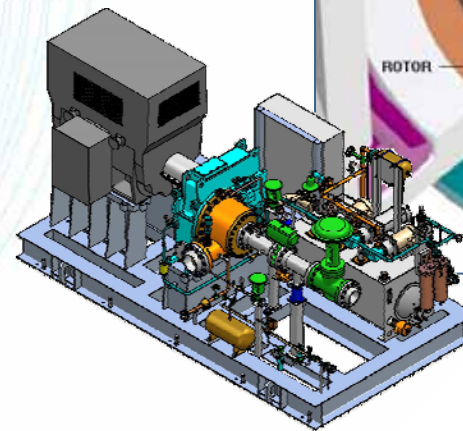


Energent Corp.



Products

- Euler Turbine (Radial Outflow)
 - Applied to pressure letdowns (PRV replacement) in power systems, including the Kalina cycle and ORC
 - Radial outflow turbine is uniquely suited to handle vapor expansions where particulate or moisture are present
 - Titanium alloy blisk turbine rotor provides strength as well as corrosion and erosion resistance
 - Single-button start, user friendly controls
 - Complete power system package



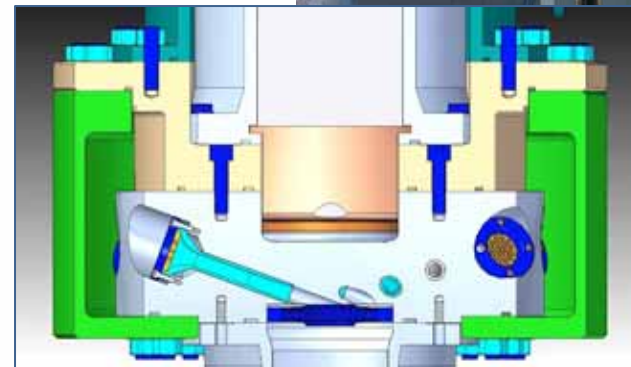
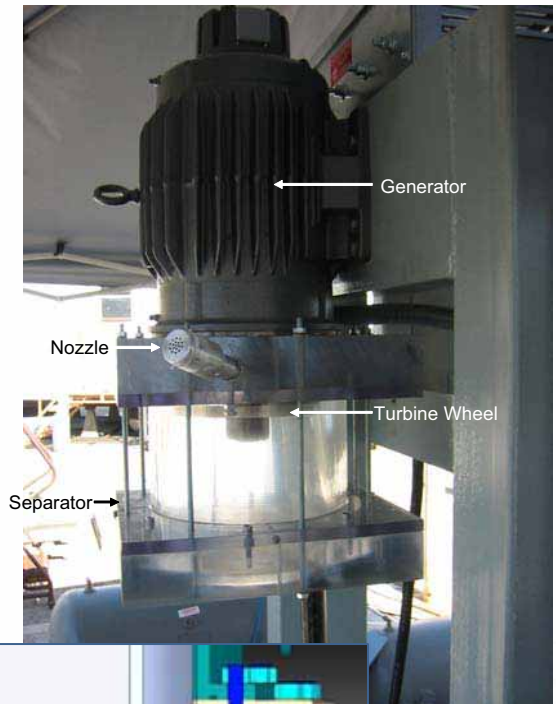
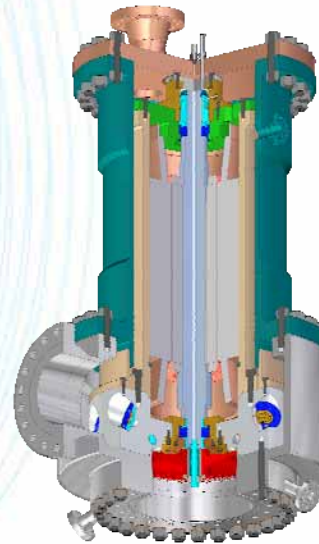


Energent Corp.



Products (Cont)

- Variable Phase Turbine (VPT)
 - Applied to pressure letdowns (J-T valve replacement) and power systems, including the Kalina cycle, ORC, and VPC
 - Combines converging-diverging nozzles with an axial impulse turbine to recover energy from supercritical, flashing liquid, vapor, and liquid expansions
 - Synchronous speeds eliminates gearbox
 - Hermetic system eliminates shaft seal
 - Applications in LNG and air separation markets



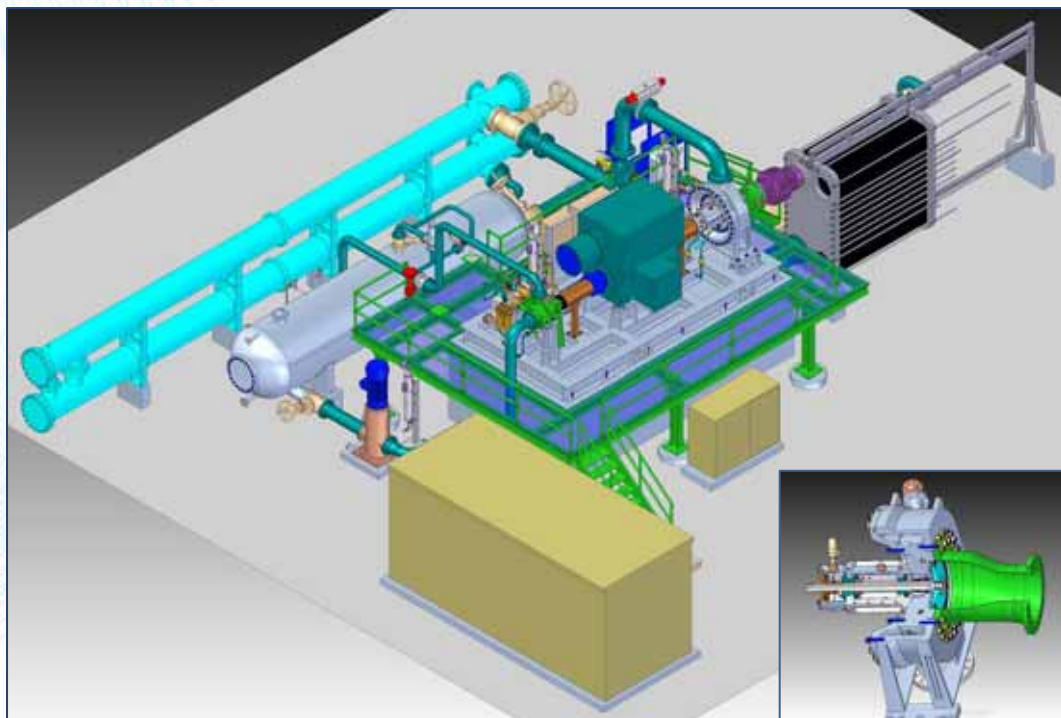


Energent Corp.



Installations

- Euler Turbine (Bruchsal, Germany)
 - 500 kW Kalina Cycle
 - 27,800 rpm



- Variable Phase Turbine (DOE/Coso Geothermal, Coso Springs, CA)
 - 1 MW Variable Phase Cycle (VPC)
 - Target: \$2,500/kWe installed



Rhine Engineering Pvt. Ltd.



RHINE ENGINEERING





Rhine Engineering Pvt. Ltd.



RHINE ENGINEERING

Company Overview

- Design, manufacturing, project management, and installation of turnkey equipment and systems for process plants
- Extensive manufacturing capabilities
 - 17 acres
 - Indoor facilities — 10,000 m²
 - 50 ton crane (double trolley of 25 tons each) and two 10 ton cranes
 - Light bay with two 10 ton cranes
 - 8 ton mobile crane
 - U/U-2 Stamp ASME Section VIII Division 1/2
 - R Stamp Certification
 - CCOE





Rhine Engineering Pvt. Ltd.



RHINE ENGINEERING

Products for Installation

- Rotary Kiln
 - 40/50 THK x 2.32m ID x 23.7m L 110 MT



- N₂/O₂ Receivers for Praxair
 - 90 m³ capacity



Rhine Engineering Pvt. Ltd.



RHINE ENGINEERING

Products for Installation

- Liquid CO₂ Tanker
 - 25 MT capacity



- Conveying Hopper
 - 55 m³ capacity



**CRYOGENIC
INDUSTRIES**

Wittmann LLC.



WITTEMANN



Wittmann LLC.



Company Overview

- 130 years of experience
- Specializing in the design, manufacturing, and servicing of CO₂ equipment
 - Skid mounted production units
 - Recovery units
 - Purification units
- Extensive manufacturing capabilities
 - Indoor manufacturing facility — 75,000 ft²
 - Automated machining and welding
 - ASME Code Section VIII Division 1 Certified
 - MIL-I-45208
 - European pressure vessel codes compliant





Wittmann LLC.



Products

- CO₂ Recovery Systems
 - Brewery Fermentation
 - Distillery Fermentation
 - Flue Gas
- CO₂ Production (Direct-fired) System
- LCO₂ Stripping System
- Acid Gas Removal System
- By-Product Recovery System
- Catalytic Oxidizer
- CO₂ Vaporizers
 - Economizing Process (EPV), Water Heated (WHV), Ambient Heated (AHV), and Cold Temp (CTV) Steam
- Storage Tanks
 - Static (urethane insulated), static (vacuum insulated), portable, and ISO units
- Carbonators





**CRYOGENIC
INDUSTRIES**

Cryogenic Industries

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