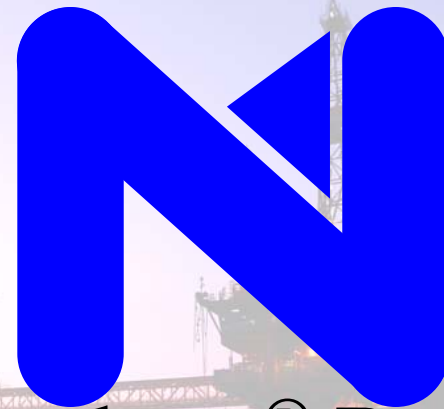
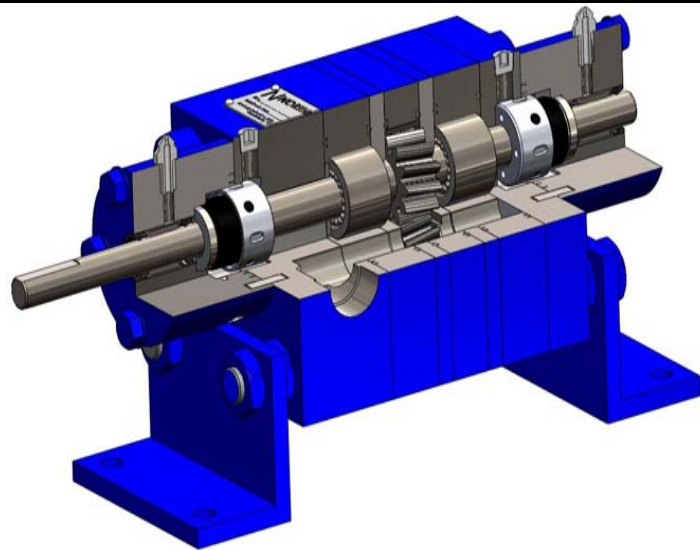






Northern[®] Pump
Division of McNally Industries

**Manufacturing the Highest
Quality Gear Pumps for
over 100 years**



Philosophy

- **Products tailored to each application**
- **Engineered to solve customer problems**
- **Customized, not Compromised**
- **Rugged - applications in the field for decades**
- **Life Cycle - Best Value**
- **Every application reviewed**



Industries Served

- **Chemical Processing Industry**
- **Coating Industry**
- **Precision Metering Applications**
- **Power Generation Facilities**
- **Food Service Industry**
- **Oil Refineries and Pipeline Service**
- **Medical Device and Pharmaceutical Industry**
- **Military Applications**

The background is a collage of four images: top-left shows a large industrial pipeline; top-right shows an offshore oil rig; bottom-left shows a close-up of stacked yellow pump components; bottom-right shows an industrial facility with smokestacks emitting white smoke, with a field of dry corn in the foreground.

Why We Lead

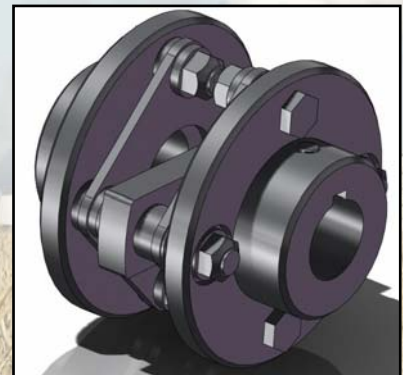
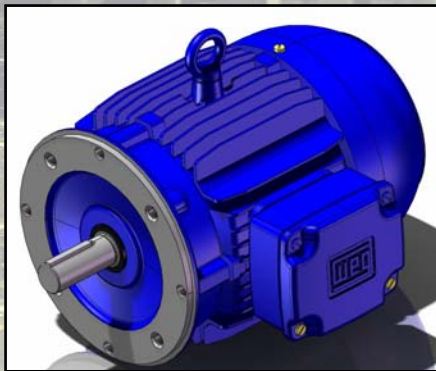
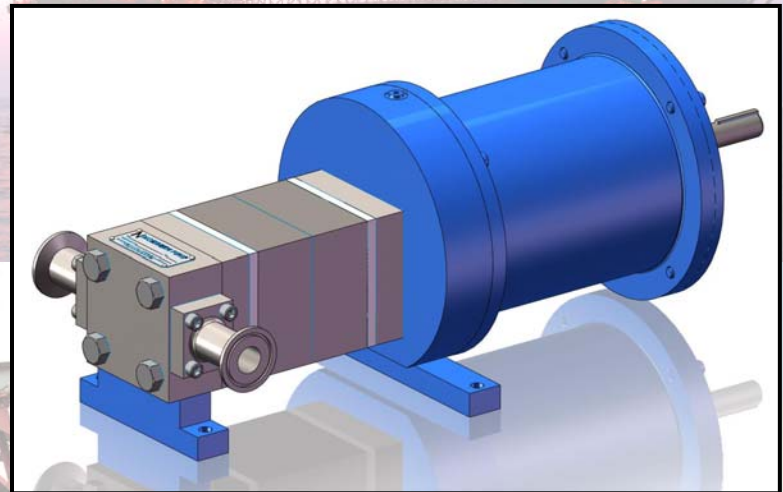
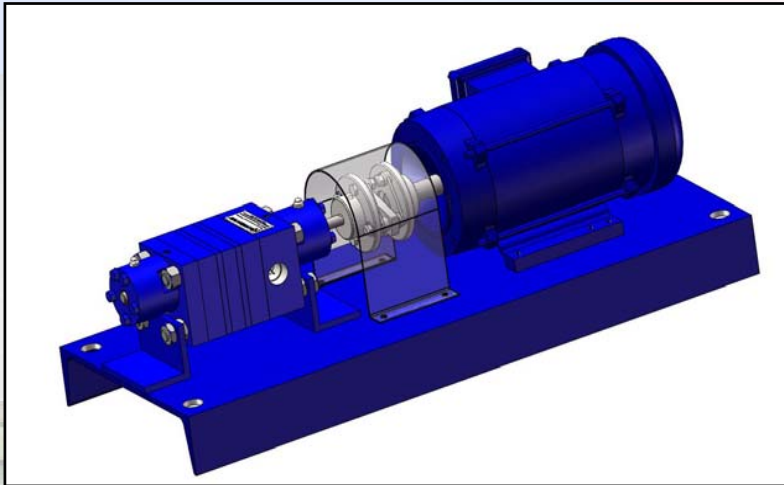
- Providing engineered solutions to customers
- Designing and building systems
- Support and enhance existing products
- Development of new products and systems
 - NPC Pumps
 - Mag Drive Pump
 - Modular Pump Designs

What We Provide

- Design Engineering / Project Management
- Specialized services to meet specifications
 - Custom Paint Solutions
 - Custom Part Design
 - Custom Materials of Construction
 - Special Material Process
- Spare parts and technical support
- Additional engineering support.....

Designing Your System

CAD Models



Making Your Decision

Product & Process & Information

NORTHERN® PUMP
A Division of McNally Industries

INSTRUCTIONAL DRAWING

APPLICATION OF HIGH TEMPERATURE PAINT SYSTEM FOR NORTHERN SUBMERGED SULFUR PUMPS

1.0 SCOPE

This process DRAWING covers the application of Sherwin Williams COR-COTE® HT Tank Lining and HI-Temp Coating to Northern® Submerged Molten Sulfur Pumps.

McNally Part Number 100679

2.0 PRODUCT DESCRIPTION

COR-COTE® HT Tank Lining and HI-Temp Coating is an epoxy novolac amine formulated for use under thermal insulation at elevated temperatures and for immersion service in water and hydrocarbons such as gasoline, fuel oil, and diesel fuel at ambient and elevated temperatures.

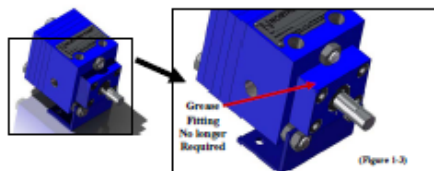
- Temperature resistant to 425°F, constant; 450°F intermittent (dry service)
- Self priming
- Chemical resistant
- Resistant to thermal shock
- Ambient temperature cure
- High build / edge retention in one coat

2.1 RECOMMENDED USES

- Steel and stainless steel tanks and piping under insulation
- Non-insulated structural steel and piping subjected to chemical or abrasion attack
- Use in areas subject to wet/dry cycling up to 300°F
- Use in areas where temperature resistance up to 450°F is required (dry service)
- Suitable for storage of gasoline, fuel oil, diesel fuel, and other similar hydrocarbon cargos
- Not certified for potable water immersion
- Water and wastewater facilities

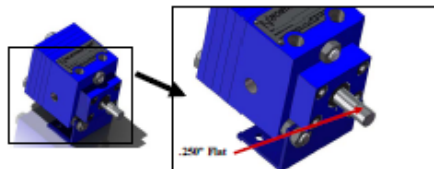
NORTHERN® PUMP
A Division of McNally Industries

This pump is equipped with a John Crane bonded type 9 Mechanical Seal. On the DEMO pump, the support bearing was a Steel Roller type bearing. Grease and lancing bearing on pumps equipped with mechanical seals with general purpose bearing grease every 6 months or every 500 hours of operation, whichever occurs first. The bearing has been greased at the factory, and should not need to be greased during the trial run. Replace mechanical seals if leaking occurs. The production will be constructed with a Carbon Graphite bearing in the place of a steel roller bearing. This would eliminate the need for additional lubrication and the grease fitting. (Figure 1-3)



(Figure 1-3)

The shaft diameter is .4979 ±.0002". The use of a .500" nominal diameter coupling is acceptable. However, it is recommended to use a coupling with a diametrical dimension of .496 ±.0005. A .250" wide flat is installed on the shaft for use with a coupling equipped with a set screw. (Figure 1-4)



(Figure 1-4)

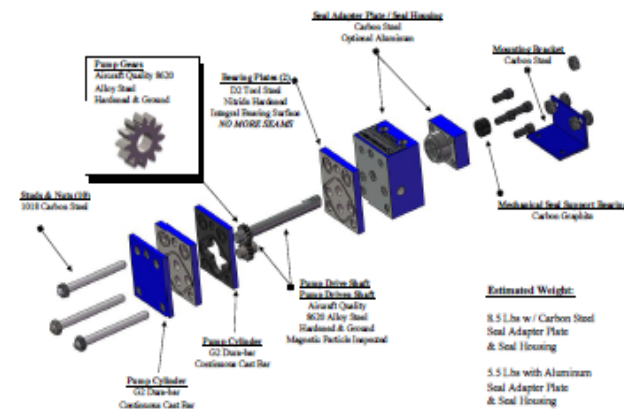
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Application of High Temperature Paint System for Northern Submerged Sulfur Pump	DATE 10/05/09	REVISION -	DWG NUMBER ID-1001
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NORTHERN® PUMP
A Division of McNally Industries

Custom Pump Design
Designed for: McKee Foods
4300-03-MCKEE



Pump Manufacturing

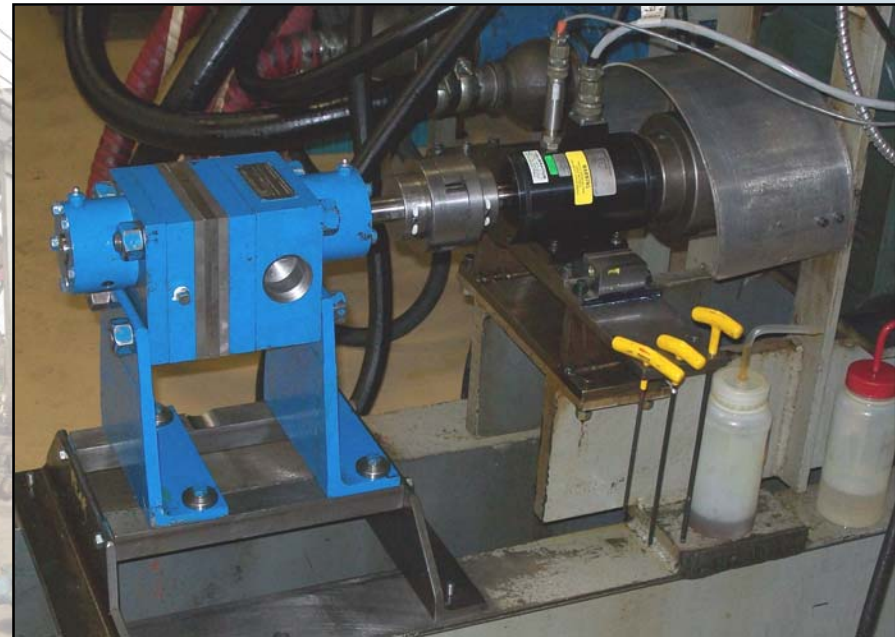
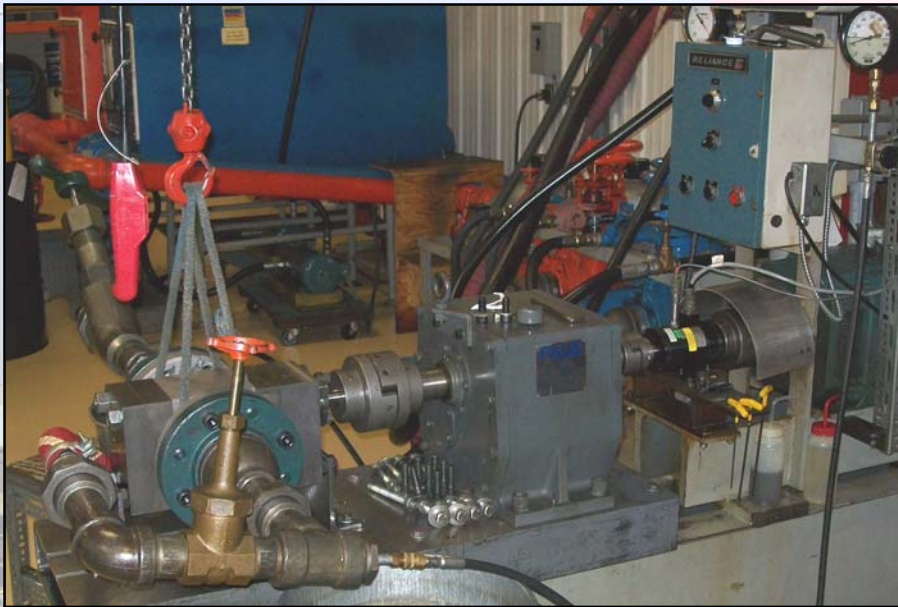
- In-House
- Experienced
- Resourceful
- Controlled Process



Comprehensive Testing

Hydrostatic & Performance Testing

100% Performance Testing



Hydrostatic testing
when requested

Comprehensive Testing

Certified Test Data

NORTHERN® PUMP

Division of McNally Industries
340 W. Benson Avenue, P.O. Box 125, Grantsburg, WI 54840
800/86-1410 • 715/683-5177 • FAX 715/683-5174
E-MAIL: info@northern-pump.com
WEBSITE: http://www.northern-pump.com

Pump Materials and Capacity Information

Manufacturer of Pump: Northern Pump Division of McNally Industries

Pump Model: 4600-15-D1755

Standard Dimension Designation: 4600-15 (5.5" x 5.5" x 1.5" cylinder & gears)

Pump Serial Number: 4940

Rotation of Pump: Clockwise (Standing over the motor, looking toward input shaft of the pump)

Materials of construction:

- Gears & Shafts: Aircraft Quality 8620 Alloy Steel - Hardened & Ground
- Bearings: 5210 Alloy Roller Bearings - Hardened & Ground
- Cylinder: ASTM A108 Carbon Steel-W/brized Iron Liner Insert
- Bearing Plates: ASTM A108 Carbon Steel
- Wear Plates: D2 Tool Steel - Nitride Hardened
- Seal Adapter Plate: ASTM A108 Carbon Steel
- Seal Housing: ASTM A108 Carbon Steel
- Dowel Studs: ASTM A108 Carbon Steel
- Nuts: ASTM A108 Carbon Steel
- Mounting Brackets & Unit base: ASTM A36 Structural Steel
- O-Ring Elastomer Material: Viton

Design Discharge Pressure: 700 PSI

Rated Flow Capacity: .0177 in³ per rev. (30.9 Gallons per Min. @1750 RPM)

Relief Valve Set Pressure: No relief valve installed

Speed in Revolutions per Minute: 1750 RPM

Mechanical Seal Information:

- Manufacturer: John Crane
- Type: IS-1 Mechanical Seal
- Size: 1.000" Nominal Shaft Size (John Crane Part Number M171998)
- Face / Seat Material: Tungsten Carbide Face and Seat
- Elastomer: Viton O-Ring
- Body Material: Stainless Steel

When your reputation depends on it!



NORTHERN® PUMP

Certified Test Data and Performance Report

Pump Order Data

Pump Model Number 4600-15-D1755
Pump Serial Number 4940
Northern Sale Order Number 494136
Customer P.O. Number 17744
Customer Shrier Martin Process Equip.

Pump Performance Description

Pump Speed 1750 RPM
Inlet Pressure 0-700 PSI
Differential Pressure 200-700 PSI
Discharge Pressure 700 PSI Max
Rate of Flow (GPM) 26 GPM @ 700 PSI ΔPressure
Collection Period (Actual Time) 1 Min. @ Each Increment
Pump Displacement (In³/rev) 4.09

Liquid Data

Liquid Description #2 Fuel Oil
Liquid Temp. (F @ Start of Test) 70°F
Liquid Temp. (F @ End of Test) 81°F
Liquid Viscosity (cP) 5

Power Data (@ maxΔP, RPM, Flow)

BHP Required See Performance Curve
Volumetric Efficiency See Performance Curve
Mechanical Efficiency See Performance Curve

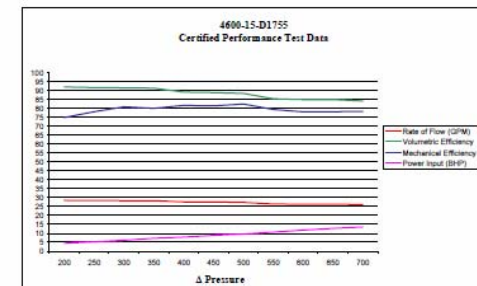
Hydrostatic Test

Test Pressure 1050 PSI (+5)
Time @ Test pressure 30 Minutes Minimum

NPSHR Test

NPSHR @ .5% Flow Rate 15" Hg (-7.36 PSI)

Pump Displacement (In ³ per Rev)	Test RPM	Pump Capacity (GPM)	Δ Pressure	Rate of Flow (GPM)	Rate of Flow (GPM) (BHP per Flow)	Power Input (BHP)	Actual Slip (In ³ per Rev)	Volumetric Efficiency	Mechanical Efficiency
4.09	1760	30.8648	200	28.8	3.7620000	4.441	0.3280	91.88	74.88
4.09	1760	30.8648	250	28.4	3.7480000	6.005	0.3412	91.68	78.11
4.09	1760	30.8648	300	28.4	3.7420000	6.108	0.3478	91.60	80.87
4.09	1760	30.8648	350	28.3	3.7367920	7.218	0.3643	91.84	80.06
4.09	1760	30.8648	400	27.8	3.6446920	7.89	0.4463	88.11	81.87
4.09	1760	30.8648	450	27.5	3.6329040	8.88	0.4671	88.82	81.37
4.09	1760	30.8648	500	27.4	3.6186000	9.88	0.4786	88.56	82.41
4.09	1760	30.8648	550	26.5	3.4914000	10.98	0.6988	96.36	79.40
4.09	1760	30.8648	600	26.3	3.4742400	11.8	0.8168	84.84	78.08
4.09	1760	30.8648	650	26.3	3.4742400	12.77	0.8168	84.84	78.18
4.09	1760	30.8648	700	26.1	3.4426800	13.6	0.8474	84.17	78.32



Hydrostatic Test conducted by Dale Erickson (2496) Date 11/5/2009
Performance Test conducted by Steve Lee (4212) Date 11/5/2009
NPSHR Test conducted by Steve Lee (4212) Date 11/5/2009
Supervising Engineer: E. Amsnick (2032) Date 11/5/2009

Main Pump Lines

4000 Series

- Up to 1200 psig Inlet
- 0.05 to 200 GPM
- Up to 2000 psig Disc.
- Up to 28" Hg Suction
- 0.5 to 1,500,000 cP
- Temperatures to 850 F
- RPM up to 3600
- Many Materials Available

NPC Series

- Disassembles in Minutes
- Pulse free flow
- Up to 150 psig Disc.
- Up to 250 RPM
- 20 to 1,500,000 cP
- Corrosion Resistant

Other

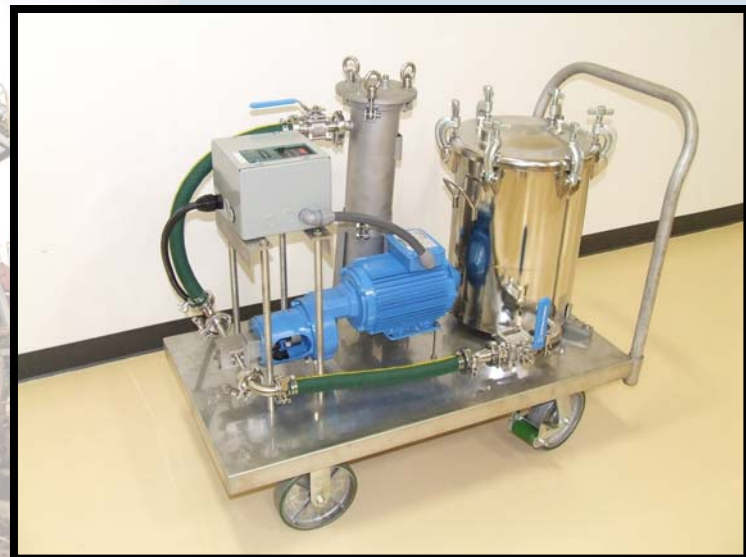
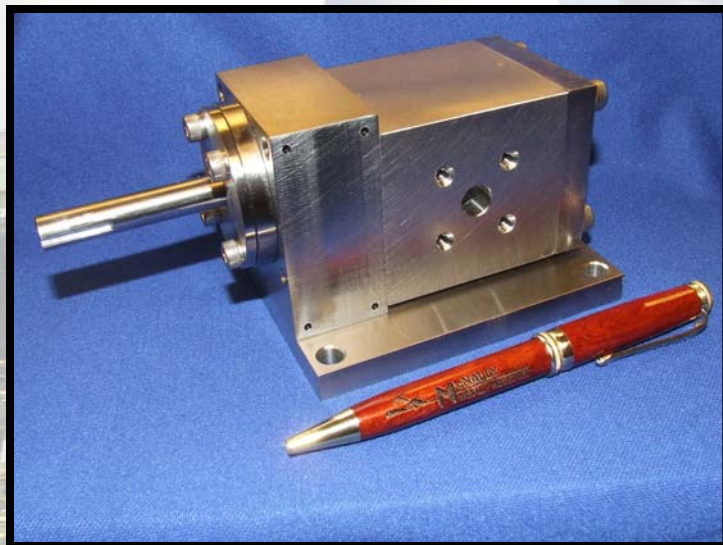
- Horizontal Molten Sulfur
- Vertical Sump Pumps
- Magnetic Drive
- Military Pumps
- Contract Design
- OEM Replacements

Success Stories

Coating Solution Systems

NPC Pump

**NPC Coating
Solutions**



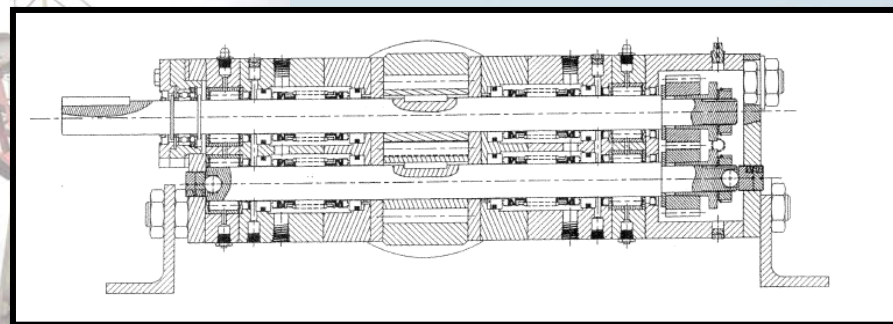
Success Stories

Customer Specific Solutions

Magnetic Drive Pump

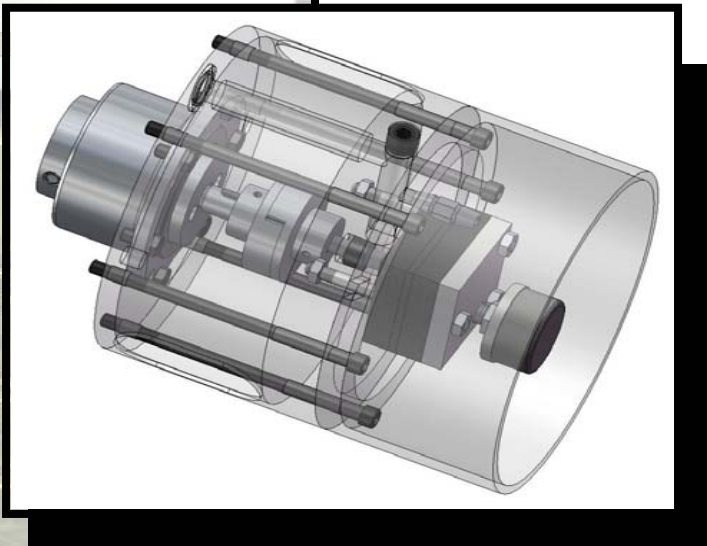
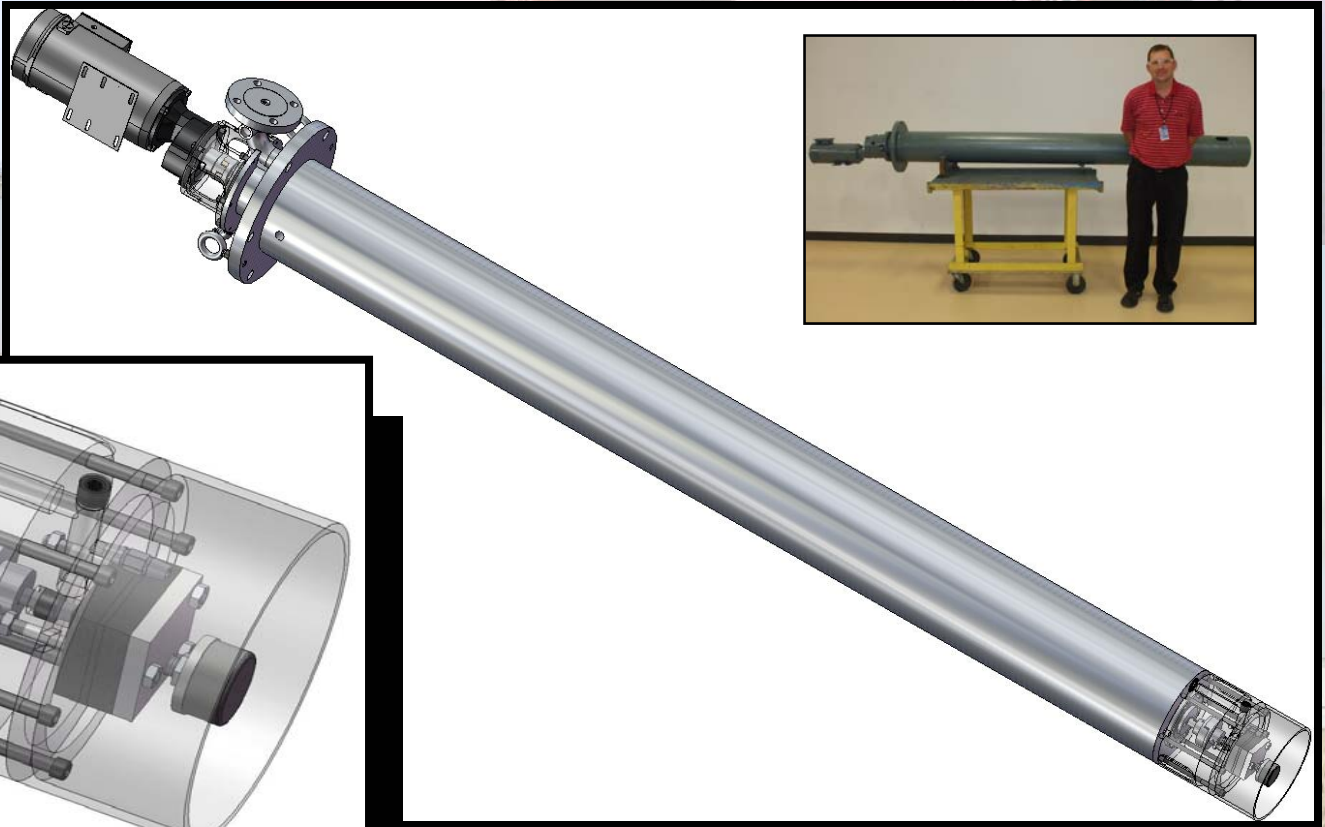


T- Pump



Success Stories

Vertical Unit



Success Stories

Military Pumping Systems

Phalanx Coolant
Pump

F-22 PAO
Pump System

Land Combat
Transmission
Pump

