



# SENECA FALLS OPERATIONS

*COMMITTED TO CUSTOMER SATISFACTION*



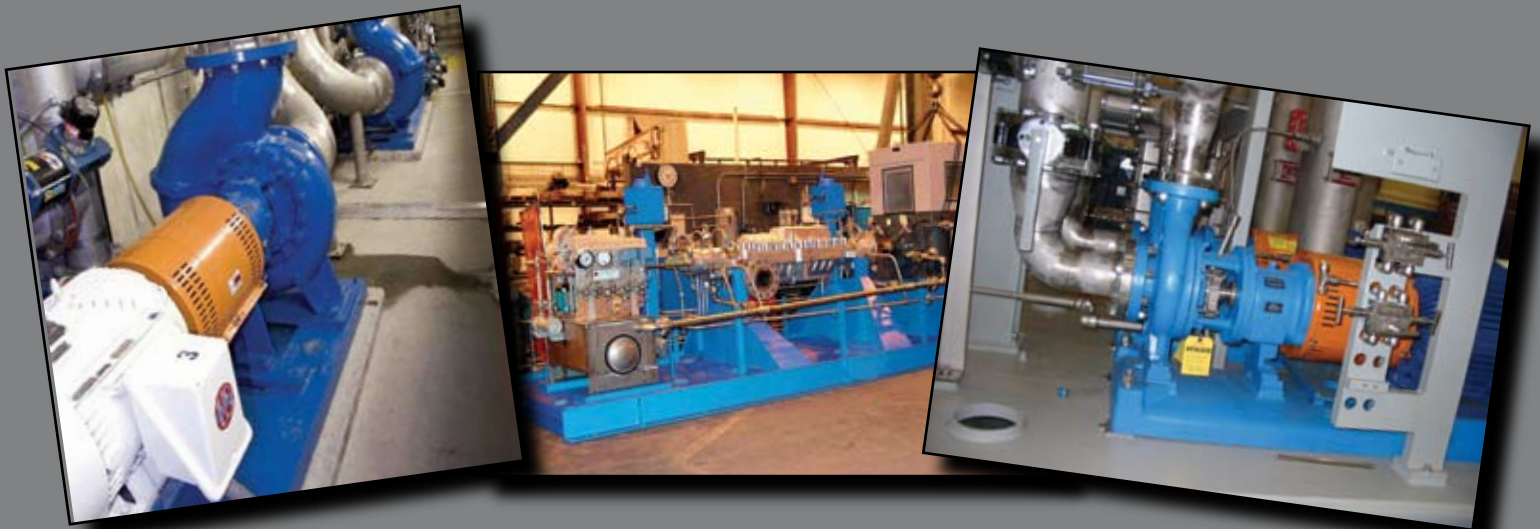
*Engineered for life*

# INDUSTRIAL PROCESS

## MISSION STATEMENT

To create the structure, process, and key indicators which encourage all employees to actively contribute to the continuous improvement of the corporation. Through teamwork and cooperation, we will enhance our ability to meet and exceed customer requirements and increase shareholder value. This will provide improved job security, standard of living, and pride for all IP employees.

# ITT GOULDS PUMPS



## [ A HISTORY OF EXCELLENCE ]

The ITT Goulds Pumps Seneca Falls Operations (SFO) at 240 Fall Street has been a cornerstone of the historic town of Seneca Falls, New York since 1904. The original company was founded over 150 years ago in 1848. In 1997, Goulds Pumps was purchased by the ITT Corporation. This led to the development of revolutionary new products, and record-breaking sales.

## [ LEADING BRAND IN HISTORY ]

Brands are built by positive user experiences with products over time. It reflects product performance, product quality, and customer acceptance and satisfaction. The 200,000 readers of *Industrial Equipment News* named Goulds Pumps the "Best Brand" in the Centrifugal Pumps category. Goulds Pumps has won three successive annual Readers Choice Awards from *Chemical Engineering*, *Food Processing*, and *Plant Services* magazines. The latest *Plant Engineering* magazine brand study reveals Goulds Pumps maintains the highest brand awareness and preference in the General Industrial market (4 times that of our closest competitor). In a *Chemical Engineering* pump study, Goulds scored highest in awareness and an 8-fold lead in preference over the nearest competitor.

## [ THE INTERNATIONAL MARKET ]

Goulds Pumps is a major supplier to markets around the world. Goulds Pumps is also the world's leading manufacturer of residential well water pump systems. The company produces centrifugal process pumps, monitoring and control systems, and repair parts for chemical, pulp & paper, power generation, oil & gas, mining, primary metals, food & beverage, water, and wastewater.



# THE WORLD'S LARGEST PUMP MANUFACTURER

ITT Corporation ([www.itt.com](http://www.itt.com)) supplies advanced technology products and services in several growth markets. ITT is a global leader in water and fluid transport, treatment, and control technology. The company plays a vital role in international security with communications and electronics products; space surveillance and intelligence systems; and advanced engineering and services. It also serves a number of growing markets—including marine, transportation, and aerospace—with a wide range of motion and flow control technologies. Headquartered in White Plains, N.Y., the company employs approximately 40,000 people with revenues exceeding \$9 billion.

ITT Corporation's fluid technology business specializes in the manufacturing of pumps, valves, heat exchangers, and related equipment used to move, measure, and control fluids. The company provides products serving markets that include wastewater treatment, chemical processing, construction, bio-pharmaceutical, aerospace, and general industry.

## THE SENECA FALLS OPERATIONS

The Seneca Falls Operations (SFO) is the largest plant in Industrial Process (IP). Of the 560 employees who work at the Seneca Falls Operations, more than 300 are members of the United Steelworkers of America (USWA), Local 3298. All employees are encouraged to participate in the continuous improvement of the operation. Continuous improvement teams can be found throughout the factories in areas of safety, cost, quality, and process improvement. ITT's Industrial Process group employs more than 2,000 people worldwide. Our capabilities have been honed to provide engineered process pumps to meet the stringent and critical requirements of industrial processes.



**"Nothing but  
Engineered  
Process  
Pumps!"**

## THE CONCEPT OF FOCUSED FACTORIES

Today, the Seneca Falls Operations is divided into four customer-oriented focused factories: ANSI; Mid-Range; Engineered Products Operation (EPO); and an Engineered-to-Order foundry.

Seneca Falls Operations also includes fabrication, testing, and assembly capabilities in more than 920,000 square feet of space. Again, employee participation is encouraged. Major factory layout improvements have been redesigned and implemented through the joint efforts of management and USWA member teams.

This participation extends to the investments made in cell management and manufacturing, and the latest machining equipment, increasing overall efficiency, quality, and customer satisfaction.

## COMMITMENT AND TOTAL QUALITY

Total Quality Management and continuous improvement are the hallmark of the Goulds Pumps SFO and are recognized as being crucial to maintaining its leadership role in the global pump industry.

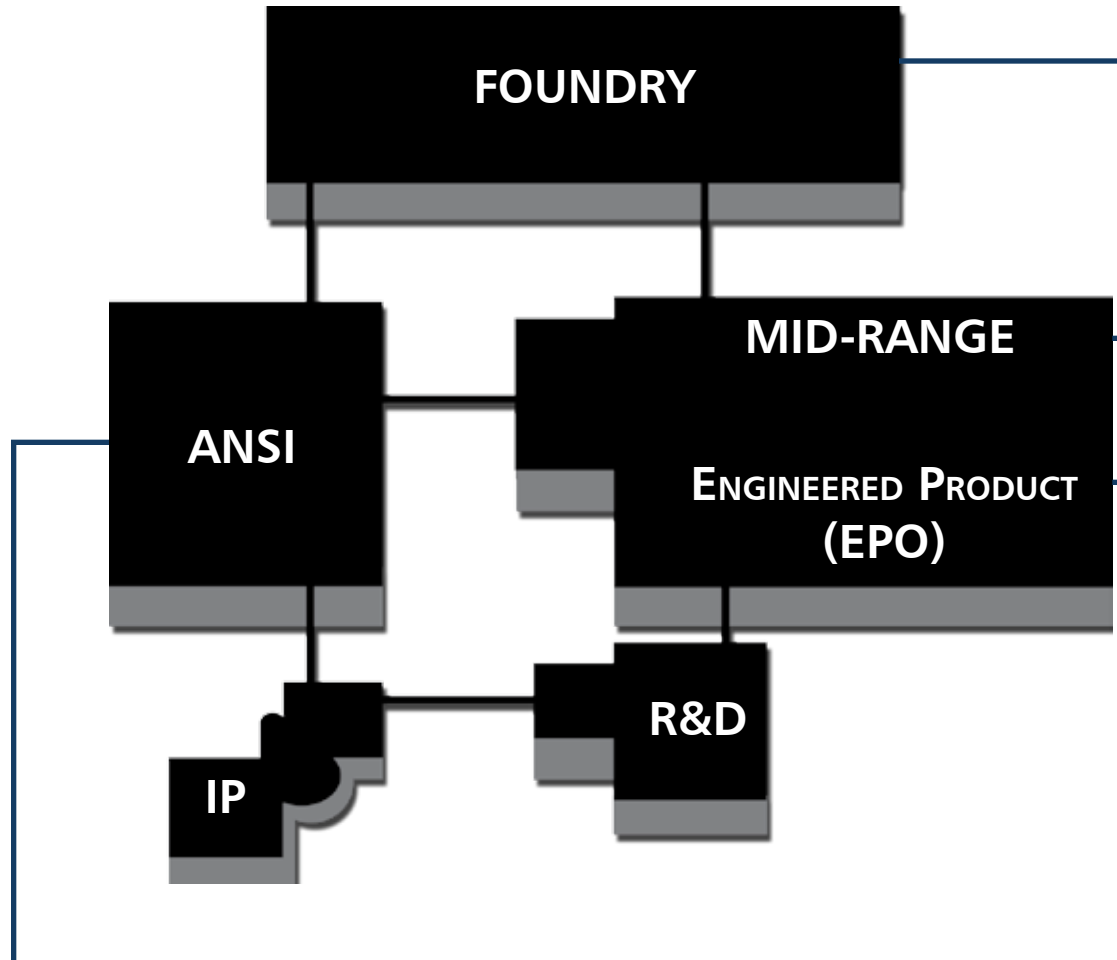
The Seneca Falls Operation employs skilled people who work with the latest designs, materials, sophisticated machinery, and advanced manufacturing concepts, to produce the highest quality and most reliable products offered in the marketplace. Continuous research and development and capital investments help safeguard the Goulds premier status in this highly competitive field.

Customer satisfaction has been and continues to be the backbone of the Operation's success. Management and workers strive to reduce lead times, increase same day shipments and improve delivery schedules, all of which are essential to preserve and maintain the company's leadership in the global pump industry.



## GOULDS PUMPS

### SENECA FALLS OPERATIONS



Regardless of material, our MAX-TEK® machining process produces a finished impeller to customer-specified diameter in minutes.



The MAX-TEK® impeller cell is a Lean concept that produces to demand without finished inventory.

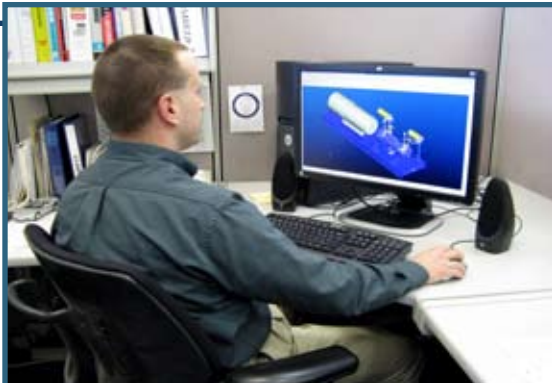




The foundry has two 6-ton and one 15-ton furnaces.



The Foundry's lab technician performs daily audit functions such as checking sand strength - a critical process in the making of molds. The metallurgist is checking the microstructure of metal.



Extensive packaging design capability utilizing CAD technology is a core competency at the EPO where exacting customer specifications for piping, instrumentation, and drive train systems are met.



Our sophisticated sideplate cell produces to demand from a rough casting.



No finished inventory is required to meet daily customer demand for suction sideplates.



The Cincinnati Milacron Horizontal Machining Center - A \$2.0M investment in this automated pallet cell allows the Mid-Range factory to automate "one-stop" machining of parts.



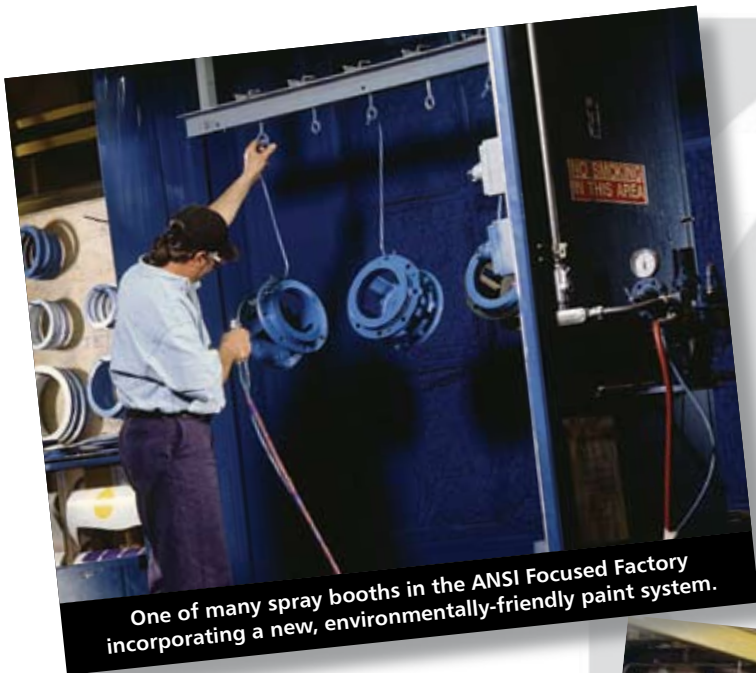
The control center (CINCRO) for the Cincinnati Milacron enables one operator to control all aspects of the machining process.

## ANSI FACTORY

*World's Largest Producer  
of the ANSI Process Pump*

### ANSI FOCUSED FACTORY

The ANSI Focused Factory produces ANSI model pumps and repair parts. Manufacturing capabilities include all aspects of machining, assembly, testing, and shipping. The factory layout of 165,000 square feet of space was designed and implemented through a joint effort by Goulds management team and United Steelworkers of America (USWA) and includes focused cellular technologies and investments in Computer Numerical Control (CNC) machine tools, all implemented using Lean Manufacturing.



One of many spray booths in the ANSI Focused Factory incorporating a new, environmentally-friendly paint system.



A 3196, fully assembled and baseplated, is prepared for shipment to the customer.





Special corrosion resistant coatings to customer requirements are processed for a broad array of industrial process applications



Pumps are assembled on a streamlined conveyor process.



This impressive Casing cell, automates the machining of ANSI casings.

#### [ MODEL LINES PRODUCED ]

- 3196, 3198, 3296, 3298, 3796, LF 3196, CV 3196, NM 3196, NM 3171, 3655.

#### [ MACHINE SHOP ]

- Cellular manufacturing enables focusing on "one-stop" machining of major components.
- 35 CNC machine tools
  - between 20 HP and 60 HP spindle capability
  - .0001" dimensional repeatability capability
- 30 manual machines.
- SPC is utilized to monitor and control critical dimensions on most processes.
- Machine tools are networked to the CAM system for data exchange, archiving and retrieval.

#### [ TESTING ]

- Component "HydroTest" is performed on all pressure containing parts.
- Automated closed loop test system for performance, NPSH and vibration testing.
- Dynamic balance is performed on all impellers/repellers to ISO specifications. Additional investment in this cell increases balance capacity volume by 200%.
- Helium gas leak test on Magnetic drive pump liquid ends.

#### [ ASSEMBLY ]

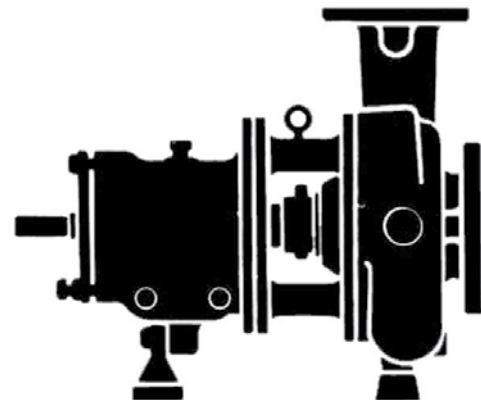
- Clean Room power end assembly completed in 1997.
- Additional build stations added in 1998 for increased capacity.
- Conveyor assembly of metallic and non-metallic pumps with 40-point quality inspection prior to shipment.
- Integration of all OEM components.
- Paint Booths:
  - 2 paint booths dedicated to final pump assembly
  - 3 paint booths dedicated to special coatings
  - 2 paint booths dedicated to parts coating
  - All parts washed prior to painting
  - Reformulated paint: water borne paint system - environmentally friendly
- Magnetic drive pumps assembled in clean room environment.

#### [ REINVESTMENT ]

- Abrasive Turning Technologies
  - Investment in this technology is yielding 70% reduction in cycle times and eliminating machine set-up time.
- Bearing Housing cell
  - A two-machine cell consisting of (1) lathe integrated with a robotic material handling system for loading and unloading parts, an automated gauging/statistical control station that interfaces with the machine control to make offset adjustments to 50 millionths (both programmable and readable) and (2) turret equipped milling, drilling and tapping machine, integrated with a robotic material handling system.

#### [ SHIPPING ]

- Domestic and export packaging.
- Service to all major carriers in addition to QWIKSHIP (24-hour) program.



# MID-RANGE FACTORY

## MID-RANGE OPERATIONS FOCUSED FACTORY

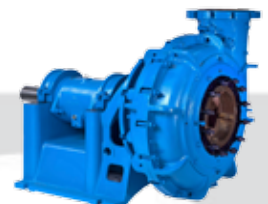
Mid-Range Operations includes component machining, fabrication, testing, assembly, and shipping. The factory layout was designed and implemented jointly by Goulds management team and United Steelworkers of America (USWA). This factory includes focused cells in an expansive 350,000 square feet of space.



A Mid-Range factory operator assembling the 3180 XL power end into the casing.



3171



SRL



3410



Commercial performance testing of the 3420 large double suction pump is monitored by the centrifugal pump tester and the supervisor of Quality Assurance.



Nearly 30 feet tall, the Ingersoll Bridge Mill is an efficient 2-table system that mills, drills, taps, and bores large casings.

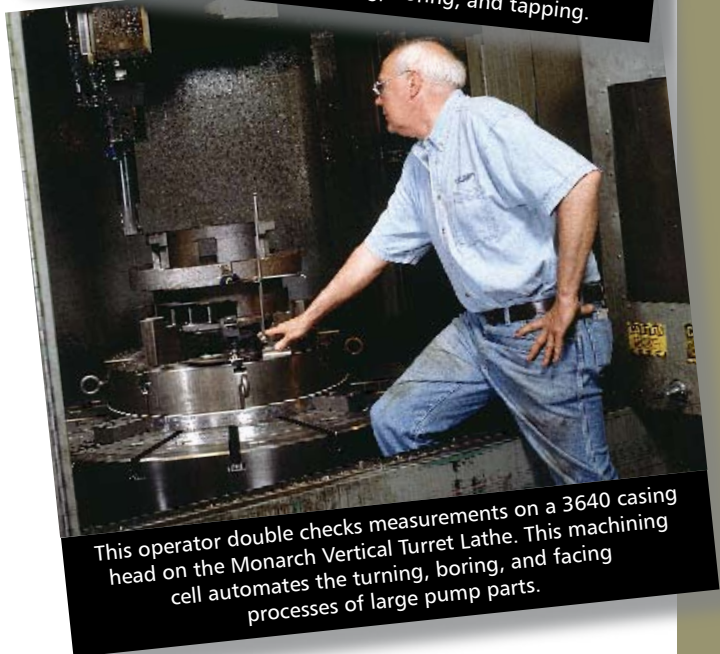




Sophisticated CNC Boring holds tolerances to the most stringent industrial standards.



This impressive Flexible Machining Center rotates the 3410 XL split casing pump part for milling, boring, and tapping.



This operator double checks measurements on a 3640 casing head on the Monarch Vertical Turret Lathe. This machining cell automates the turning, boring, and facing processes of large pump parts.

**[ MODEL LINES PRODUCED ]**

- 3171, API 3171, 3175, 3180/85, 3181/86, 3316, 3355, 3410, 3500, JC, SRL, 5500, Trash Hog®, HS, HSU/L, VRS

**[ MACHINE SHOP ]**

- Cellular manufacturing is utilized focusing on flexibility.
- 60 CNC machine tools, 80 manual machines
  - 125 HP spindle capability
  - .0001" dimensional repeatability capacity
  - Up to 30-ton crane capability
- Full welding fabrication capabilities including MIG, TIG, "Stick" and Heliarc for structures and piping.
- SPC is utilized to monitor and control critical dimensions at key processes.
- Machine tools are networked to the CAM System for data exchange.

**[ TESTING AND QUALITY ASSURANCE ]**

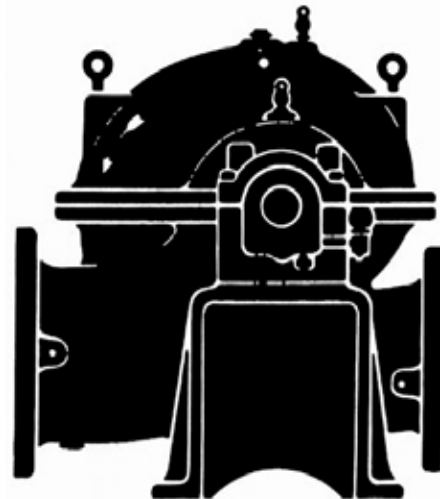
- Component "HydroTest" is performed on all pressure containing parts at 1.5 times maximum working pressure.
- Closed loop and open sump for customer performance test requirements. Capacity from 1 HP - 700 HP and 38,000 GPM, R&D provides additional range for capacity flow. Computer analysis of test results.
- Static or dynamic balance of all impellers/repellers to ISO specification.
- Magnetic particle and dye penetrant non-destructive testing capabilities, up to nuclear qualifications.

**[ ASSEMBLY ]**

- Precision-fitted assembly of all pumps with a 40-point quality inspection prior to shipment.
- Integration of all OEM components including all types of electrical wiring.
- Four paint booths, including surface preparing equipment for standard low VOC and custom paint applications.

**[ SHIPPING ]**

- Domestic and Export packaging.
- Service to all major carriers in addition to QWIKSHIP (24-hour program).





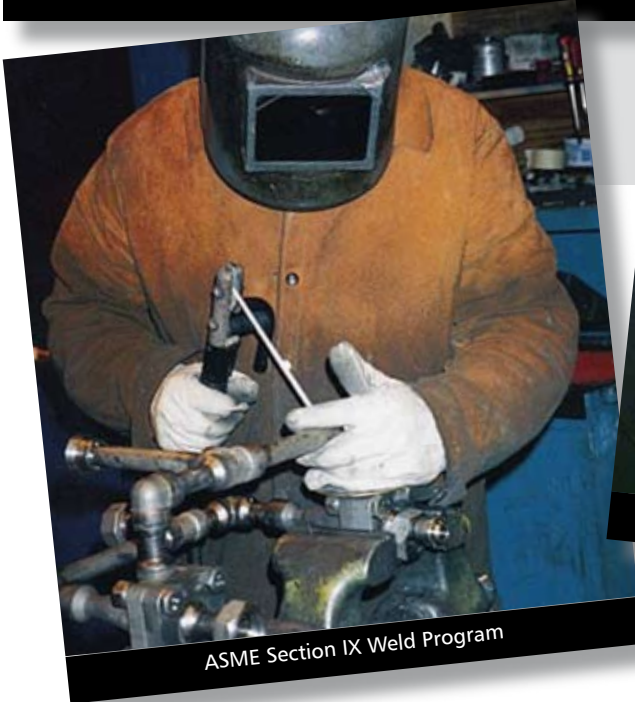
## ENGINEERED PRODUCTS

### ENGINEERED PRODUCTS OPERATION (EPO)

EPO's world-class project management staff and highly skilled engineering teams manage contracts to meet the most stringent requirements of engineering contractors. EPO's project based approach is well suited to meet the growing demand in Chemical, Petrochemical, Power, and Oil & Gas markets for complete turnkey products. The operation includes contract management, customized engineered designs, global procurement, material inspection, component upgrading, precision assembly, full range non-destructive quality testing, value added packaging, final product inspection, and shipping/packaging capabilities.



This liquid penetrant test, performed on a Model 3620 casing head to assure structural conformance, is an example of the EPO's non-destructive examination capabilities.

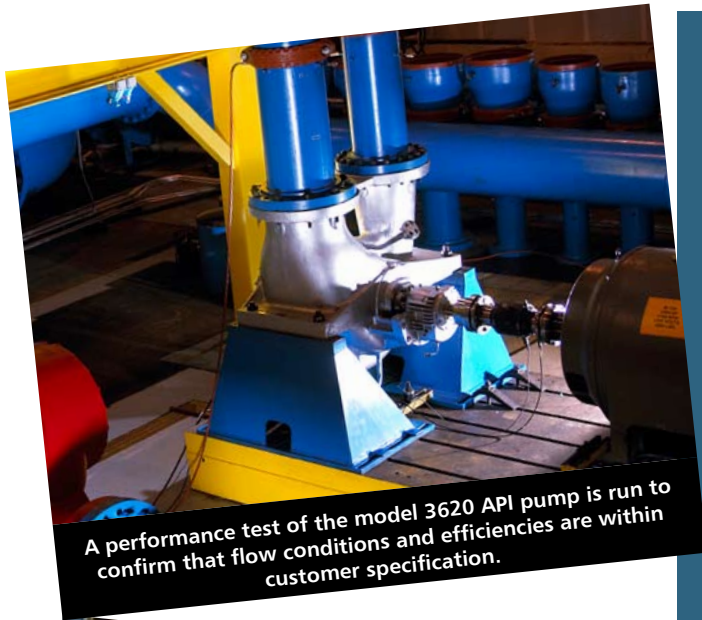


ASME Section IX Weld Program



3700 Magnetic Particle Inspection





A performance test of the model 3620 API pump is run to confirm that flow conditions and efficiencies are within customer specification.



3620 at run-test



The EPO project management teams coordinate all software and hardware aspects of engineering contracts from initial order receipt through design, procurement and manufacture, assembly and testing, packaging, customer requested changes, unit inspections, and final shipment.

#### [ MODEL LINES PRODUCED ]

- Manufacture: API Overhung OH2/OH3 (3700, 3900, 3910), API Between Bearing Products BB2 (3620, 3640), Multi-Stage BB3 (3600, 3311), Axial Flow (Model AF)
- Packaging of all Seneca Falls Operations (SFO) products to meet Engineering Contractor specifications.

#### [ CONTRACT PROJECT MANAGEMENT ]

- Project Managers control all major project requirements from order receipt through final shipment.
- Project Management teams ensure unique customer specifications are met.

#### [ PUMP ASSEMBLY ]

- Precision-fitted assembly of all pumps with as-built measurement and documentation of critical assembly dimensions.

#### [ MATERIAL INSPECTION AND COMMON UPGRADES ]

- Captive non-destructive examination (NDE) capabilities include magnetic particle inspection, liquid penetrant inspection, ultrasonic inspection, and positive material identification testing.
- Requirements for radiography are met through local suppliers.
- Commonly encountered and routinely managed foundry level casting controls include weld maps, heat treat charts, chemical analysis, physical data etc.
- Full dimensional inspections.
- Wetted surface upgrade requirements, including boron gas diffusion coating and monel cladding, as well as special hard facing requirements on sleeves and rings.

#### [ TESTING ]

- Static or dynamic balance of all component impellers and dynamic balance of multi-stage rotors to ISO/API specifications including residual unbalance testing.
- Hydrostatic tests are performed on all pressure containing components and required subassemblies at 1.5 times maximum working pressure. Variations to standard testing include extended duration hydrotests and customer, witness tests.
- Customer performance test range: 4,000 BHP and 60,000 GPM
- Full range of hydraulic and mechanical product testing capabilities: NPSH, flow, head, efficiency, vibration, sound level, bearing temperatures, nozzle load, full train.

#### [ PACKAGING ]

- Design and fabrication of seal systems and bearing lubrication systems involving complex piping arrangements fabricated to ASME specifications.
- Equipment monitoring instrumentation selection and installation.
- Integration of all OEM components including electrical interface design and wiring.
- Drive train engineering including multiple component drive train systems, unique coupling and guarding arrangements, and customized baseplate designs.
- Documented precision shaft laser alignments for all mounted drivers.
- Pre-paint surface preparation facilities include media blast cleaning equipment and a deionized hot water detergent washing.
- Climate controlled booths and paint equipment to handle standard high-quality, low-VOC paints as well as custom multi-coat multi-part coating systems requiring documented dry film thickness checks.
- Unique product marking, tagging, and labeling to meet customer requirements.

#### [ FINAL INSPECTION AND SHIPPING ]

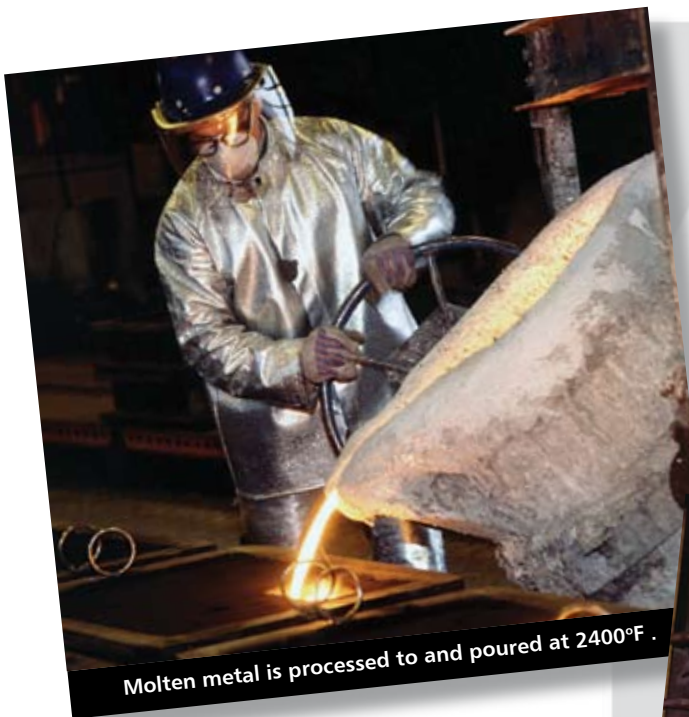
- Complete unit inspections to assure full physical compliance with customer specification.
- Domestic and export shipment preparation, including preservation for long term storage.
- Service to all major carriers.



## FOUNDRY FACTORY

### FOUNDRY FOCUSED FACTORY

The Foundry produces gray iron, ductile iron, and bronze castings for the Seneca Falls Operations (SFO) and other plants within Fluid Technology. The facility has core and mold making, melting heat treatment, and cleaning operations. A pattern shop and metal testing lab are also maintained to insure complete process control and quality. A major investment to modernize the No-Bake molding operation was completed in 1999. This investment provided significant cost reductions, shorter lead times, and a vast improvement in customer service and quality.



Molten metal is processed to and poured at 2400°F.



These controls constantly monitor and calibrate furnance activities. Approximately 65% of pouring is done at night when energy is more cost-efficient.



Molten metal is being poured into a large ladle from the 6-ton furnace. The foundry has one 15-ton and two 6-ton furnaces.





The No-Bake molding area handles large-size models such as the Goulds 3420 - up to 18,000 lbs or more. This operator is placing a core in a No-Bake mold. The mold is coated with mold wash to improve surface finish.



This roll-over-draw machine separates large cores from the core box. The cores are then assembled and painted.



This medium-sized Double Suction pump casing is made from hardwood lumber in the Foundry's Pattern Shop. This casing is being prepared for mold making.

#### [ CORE MAKING ]

- Core making facilities are extensive and utilize a variety of core processes matched to production requirements and core configurations.
- Processes including Furan No-Bake, Isocure, Pepset, Shell Core, and Oil Sand are utilized to provide the most economical solution for different applications.
- Conveyor handling systems are provided to improve efficiency.

#### [ MOLD MAKING ]

- Both Furan No-Bake and Green Sand molding processes are utilized with 100% reclaimed sand.
- Various handling systems are employed including radio controlled cranes (20 tons) and conveyor systems.
- Flask sizes up to 12 feet by 12 feet are utilized providing castings up to 9 tons.
- Maximum efficiency is achieved through the use of semi-automatic conveyor lines and conveyor systems.

#### [ MELTING ]

- Iron, brass, ductile and ni-resist are produced in one 15-ton and two 6-ton induction furnaces fed by automatic charging systems.
- Molten metal is processed to and held at 2700°F.
- Capacity is 9 tons/hr. at full power.

#### [ HEAT TREATMENT ]

- Gas fired furnaces are utilized with programmable cycle controllers to provide specified metallurgy for ductile iron.

#### [ PATTERN SHOP ]

- An on-site pattern production facility is maintained for pattern engineering, construction, and maintenance.
- Patterns are constructed from wood, urethane and metal.
- Seven separate pattern storage buildings house 7,209 patterns for various pump line models. 2,966 of these are active patterns.

#### [ CLEANING ]

- Cleaning equipment such as Didion drums, blast table/rooms and abrasive tools are utilized to prepare all castings for machining.

#### [ FOUNDRY LAB ]

- A full complement of sand and metal testing equipment is provided to insure mold and metal quality.
- The lab is responsible for total process control.

#### [ INVESTMENT AND MODERNIZATION ]

- A major investment to modernize the No-Bake molding operation completed in 1999. This investment provided significant cost reductions, shorter lead times, and a vast improvement in customer service and quality.







**ITT**

Goulds Pumps



**Goulds Pumps**

**240 Fall Street, Seneca Falls, NY 13148**

**[www.gouldspumps.com](http://www.gouldspumps.com)**