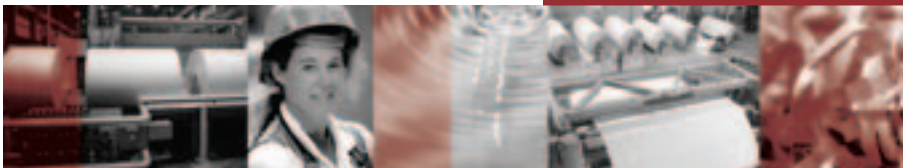
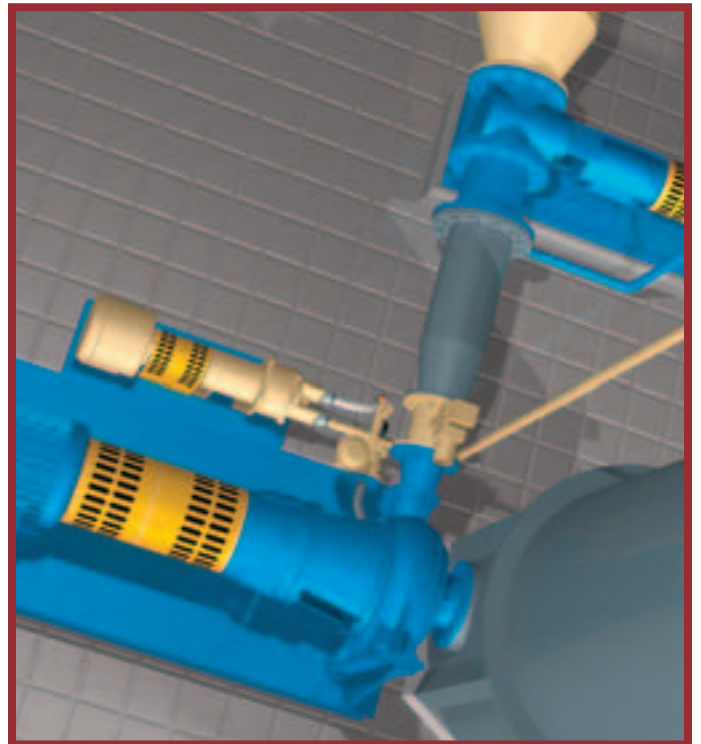


# Goulds 3500XD

Medium Consistency Pumping Technology

*Introducing X-Ducer™  
Medium Consistency  
Pumping Technology*





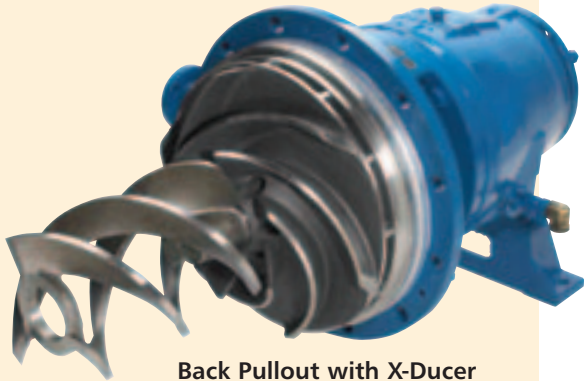
## The Goulds X-Ducer™ Performance Advantage:

---

- ◆ Improved Pumping Efficiencies
  - An increase of up to 8 efficiency points which translates into substantial energy savings
  - Performance which exceeds or rivals all competitors
- ◆ Expanded Coverage
  - Higher TDH generation for existing sizes
  - New, larger size to handle production rates to 2200 ADStpd (2000 ADMtpd) and heads to 650 feet (198 m)
- ◆ Dramatic Degas System Improvements
  - Allows for operation up to 10-11% consistency without a vacuum pump
- ◆ Lower Suction Head Requirements
  - Allows for lower, less expensive standpipe elevations and higher operating temperatures
- ◆ Existing Units Readily Converted to the X-Ducer Design



# Model 3500XD Advantages



Back Pullout with X-Ducer



3500XD (Front View)

## Advantage

## Benefit

### High Efficiency

- ◆ Lower power requirements
- ◆ X-Ducer design can permit upgrades with minimal investment

### Simplicity of Design

- ◆ Proven reliability
- ◆ Familiar to operating and maintenance personnel due to design — components and methods similar to conventional centrifugal pumps
- ◆ When required, maintenance is easy to perform

### Superior Reliability and Flexibility of External Degas System

- ◆ Easy to maintain external vacuum pump
- ◆ X-Ducer design further simplifies the degas system for consistency ranges up to 10-11% by **not requiring a vacuum pump**
- ◆ Avoids assembly techniques needed to achieve close clearances for proper internal degas operation
- ◆ Same back pull-out assembly regardless of type of degas system

### Control Scheme

- ◆ Simple level control scheme or flow control scheme when required
- ◆ Readily adapted to variable speed operation
- ◆ Effective response to process changes and upsets

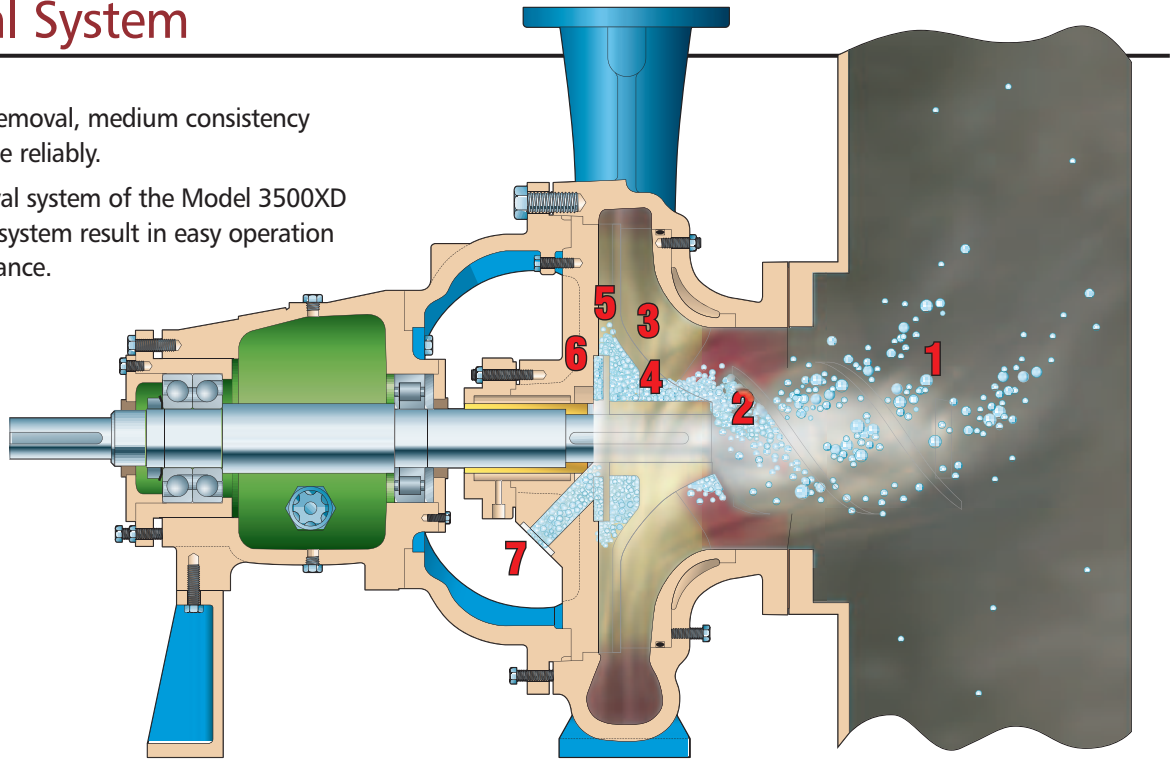
### Continued New Technology and Development

- ◆ X-Ducer design allows for operation up to 10-11% consistency without a vacuum pump
- ◆ Higher TDH generation with the X-Ducer design
- ◆ New size now available for higher production rates and high head requirements such as O<sub>2</sub> Delignification Reactor Feed service

# Model 3500XD Air Removal System

Without effective air removal, medium consistency pumps will not operate reliably.

The efficient air removal system of the Model 3500XD and the simple degas system result in easy operation and very low maintenance.



**1** *X-Ducer Initiates Flow and Begins Air Separation*

X-Ducer agitates pulp to assist flow into pump inlet. X-Ducer also separates air from water and fiber.

**2** *X-Ducer concentrates air core and develops pumping action*

X-Ducer utilizes conventional technology to concentrate air in core and prepare it for removal. Fiber and water move to the periphery of the X-Ducer, then is picked up by the impeller vanes. The air is concentrated near the center of the X-Ducer and is removed through the air extraction holes in the impeller. Using previous technology from inducers, sufficient pressure is generated to allow air to be removed for operation at pulp consistencies up to at least 10%.

**3** *Fiber and water are pumped by impeller vanes*

Fiber and water suspension are subjected to pumping action by impeller vanes. Modified concentric casing allows for operation over wide flow range.

**4** *Pumping action and degas system moves air, water and fiber through extraction holes in impeller*

Air and water, plus a small amount of residual fiber, pass through impeller air extraction holes.

**5** *Fiber and water pumped to impeller periphery*

The large pump-out vanes pump the fiber and water to the periphery of the impeller.

**6** *Air with water is extracted past secondary air separation device*

Air with water is extracted across the top surface of the patented (US Patent#5,087,171) secondary air separation removal device into the vacuum system. This device permits separation of any remaining fiber which may be present at this point. Fiber pull through the vacuum system is virtually eliminated.

**7** *Air and water are removed through degas system*

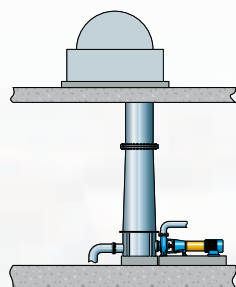
The air and water from the degas system is discharged to drain or returned to the standpipe. Depending on the service conditions and design pulp consistency, a vacuum pump may not be needed.

## Proven Goulds Applications

Extensive worldwide installations operate reliably on services in pulping and bleaching operations. These successful installations result from:

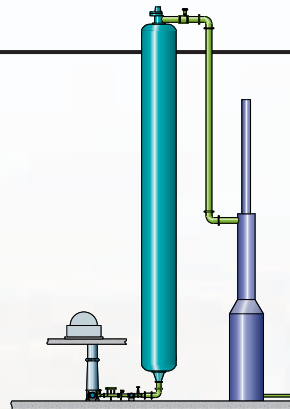
- 1. Defining Requirements** Understanding and defining the requirements for operation — operating data parameters, piping layouts and knowledge of related equipment (washers, mixers and system components)
- 2. Designing Systems** Designing systems to meet the operating criteria
- 3. Commissioning** Commissioning the systems when required by the users

## Pumping Solutions



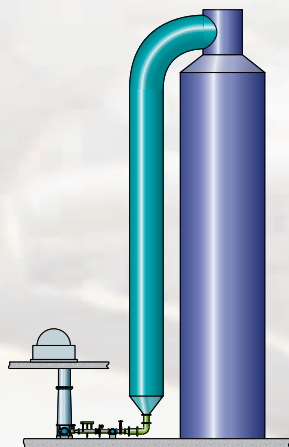
### Pumping from Washers, Presses and Disc Filters

Pulp at consistencies up to 14% from different washer types feed into Goulds standpipes to be pumped to the next operation.



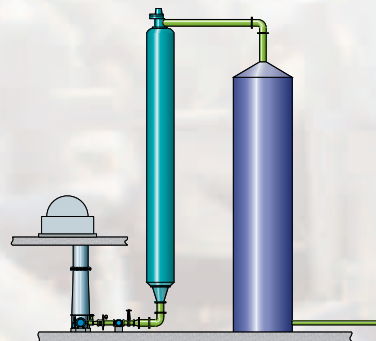
### O<sub>2</sub> Delignification Reactor

Pumping from a standpipe to an O<sub>2</sub> mixer adding oxygen before the reaction tower. Steam can also be added to elevate the stock temperatures to the required levels.



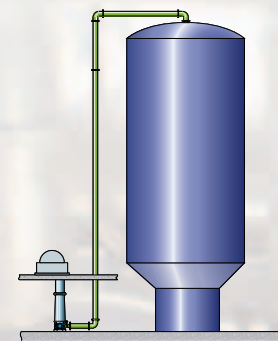
### D Stage Feed Pumping

Pumping from a standpipe to a titanium ClO<sub>2</sub> mixer and feeding the chlorine dioxide tower.



### Eop Stage Pumping

Pumping through an O<sub>2</sub> mixer into a retention tube and extraction tower. Back pressure may be applied at the top of the upflow retention tube. Hydrogen peroxide and caustic may also be added at the pump suction.



### High Density Tower

Pumping to a HD tower with a conventional standpipe unit or pumping from a HD tower with a tower bottom installation. Pumping to multiple HD towers is also possible. Long distances may require booster units.



# Medium Consistency Pumping Solutions

## Heavy-Duty Design

**Patented**  
Air Separation Device

**LABYRINTH SEALS STANDARD**

Frame is sealed with labyrinth seals to protect against the harsh environments encountered in pulp mills and bleach plants.

**BEARINGS**

- Thrust bearing is angular contact PumpPac® designed to handle uni-directional thrust loads.
- Radial bearing is cylindrical roller design to handle radial loads.
- Bearings are designed for a 14-year average life based on maximum loads.

**LUBRICATION**

Flood oil is standard with cooling coil in sump.

**DEGASIFICATION NOZZLE**

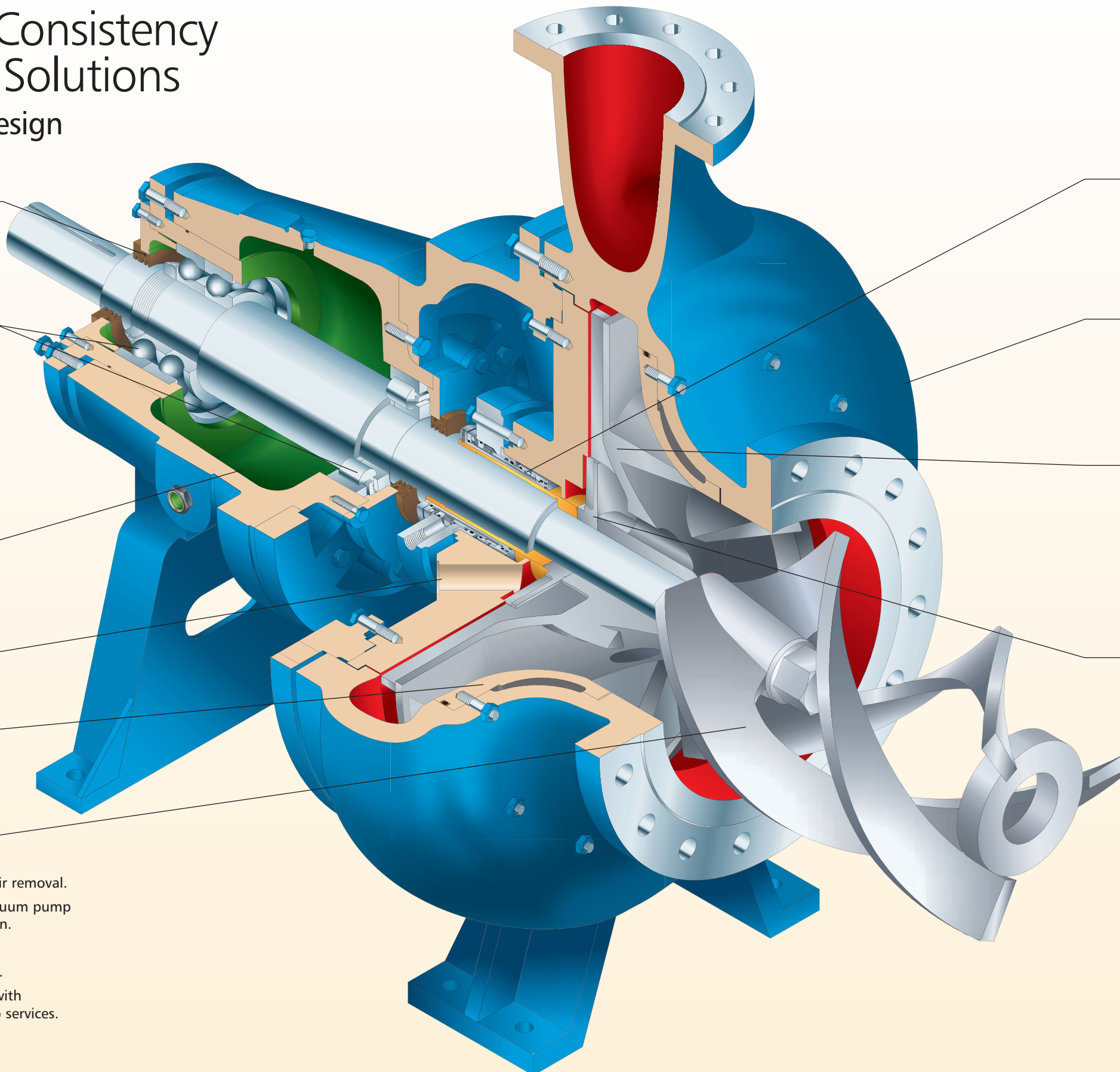
Removes air to vacuum system.

**RENEWABLE SIDEPLATE**

- Easily and economically replaced for extended casing life.
- Sealed from pumpage.

**X-DUCER**

- Cast X-Ducer assists stock entry to pump.
- Constant pitch, hollow X-Ducer improves air removal.
- For pulp consistencies up to 10-11%, a vacuum pump is not required for effective degas operation.
- Allows for more efficient pump operation.
- Secured to shaft with heavy-duty shaft nut.
- Derived from existing inducer technology with modifications for medium consistency pulp services.



**DOUBLE CARTRIDGE MECHANICAL SEALS**

- For optimum sealing over full range of operating conditions.
- Seals from various manufacturers are available.

**CASING**

- Centerline discharge.
- Modified concentric design is key to efficient air removal and allows a wide operating range.
- Readily adapted to horizontal design

**IMPELLER**

- Open impeller with full back shroud.
- Easily adjustable close front clearance to maintain high pump efficiency.
- Large air extraction holes to remove air.
- Step cut design to optimize air separation and fiber retention.

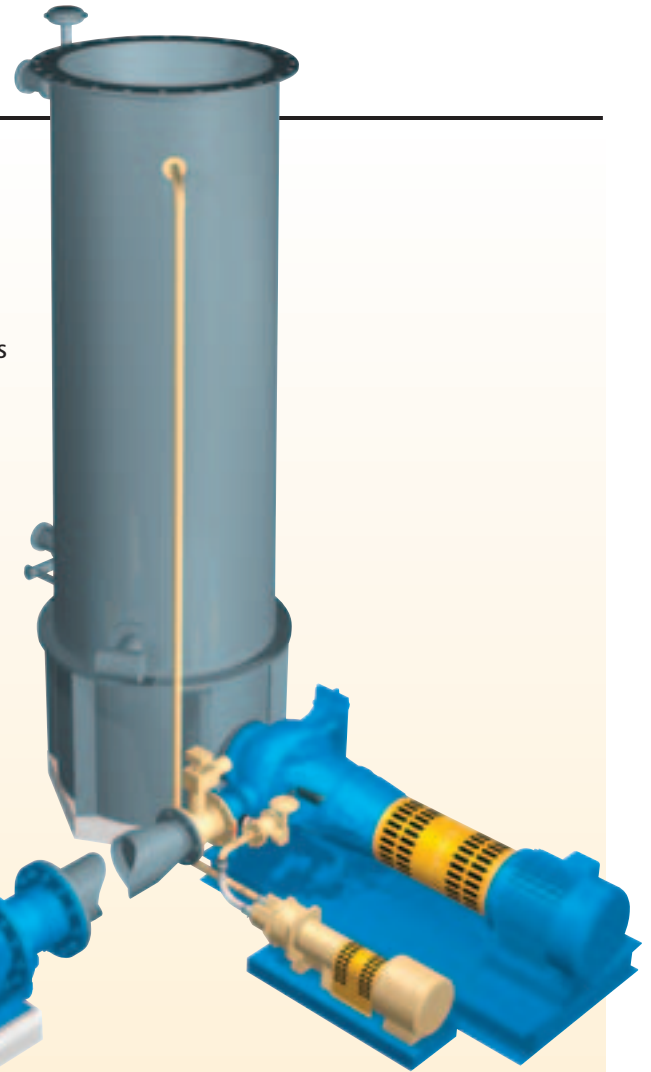
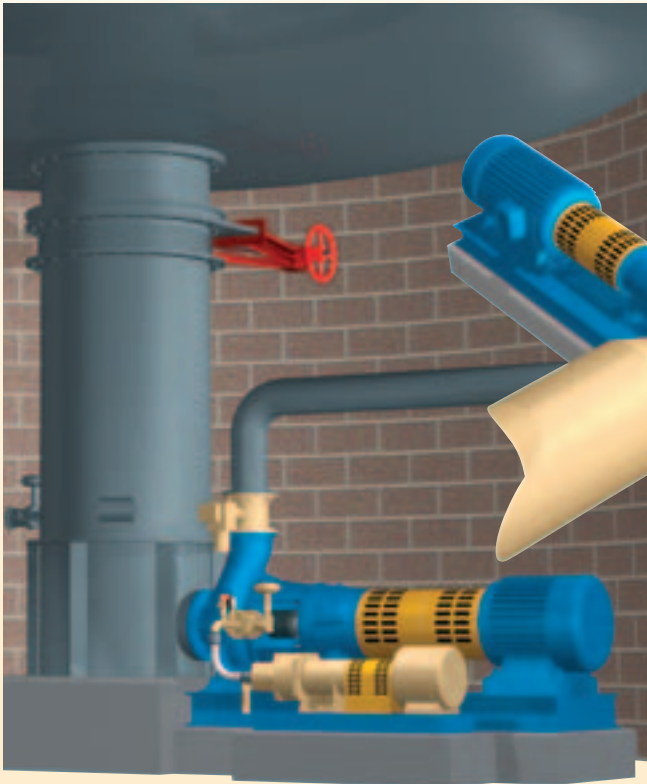
**SECONDARY AIR SEPARATION DEVICE**

- Patented design (U.S. patent #5,087,171).
- Assists in minimizing or eliminating fiber pull through vacuum system.

## System Configurations

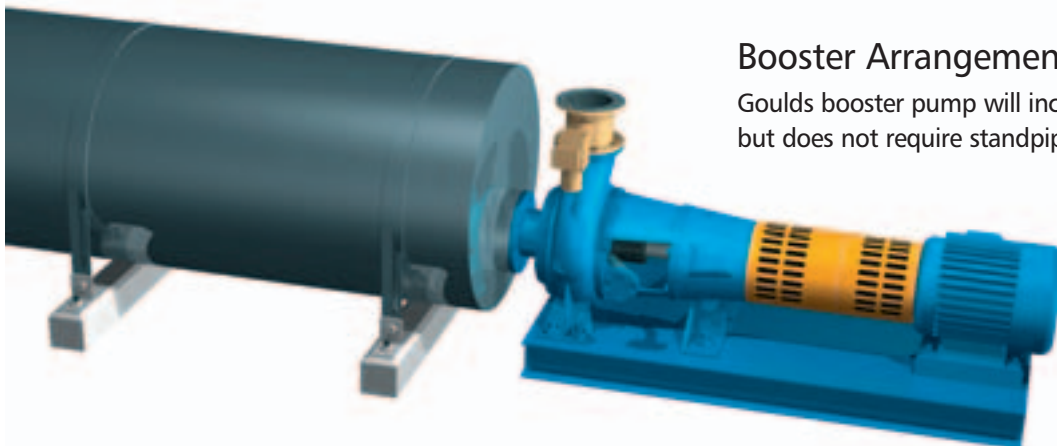
### Standpipe Arrangement with ClO<sub>2</sub> Mixing

Stock from washers, presses and thickeners feed special Goulds standpipes that are reverse tapered to prevent stock bridging. Systems include controls for vacuum, dilution, level and flow.



### Tower Bottom Arrangement

Stock from bleach/storage towers falls into Goulds feed chute connected to the tower with expansion joint and isolation valve. Depending on tower level and consistency, a vacuum pump may not be required.



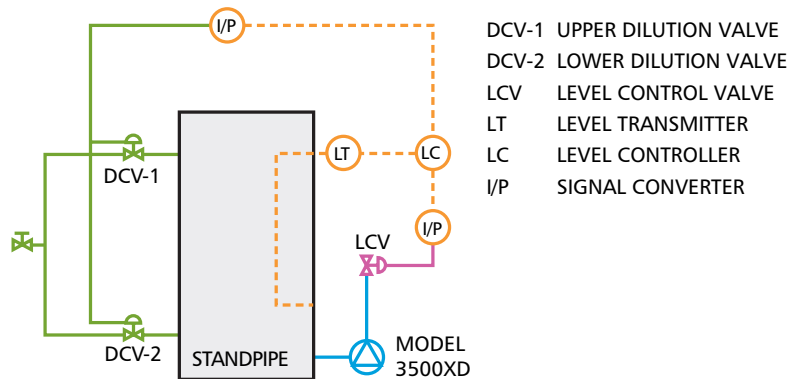
### Booster Arrangement

Goulds booster pump will increase pressure but does not require standpipe or degassing system.

# Standard System Controls, Alarms & Interlocks

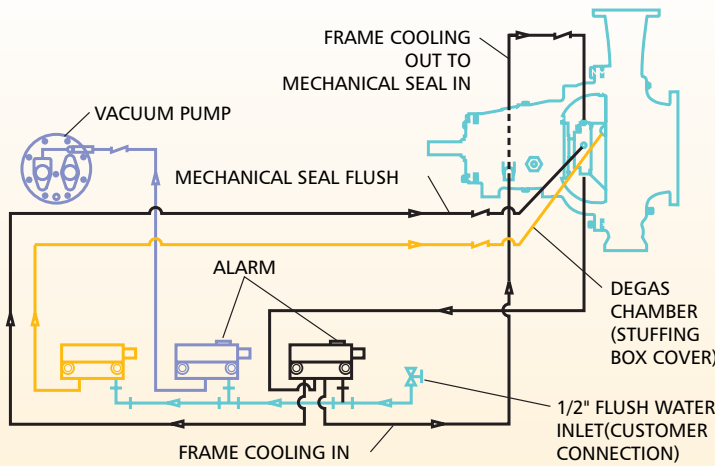
## Standpipe Level/Dilution System

- Constant standpipe level maintained by LC controlling LCV on pump discharge.
- **Alarms** set at 85% and 10% level.
- Start up **Interlock** at minimum of 10% level to prevent dry running of pump.
- Automatic dilution system to assist pumping when standpipe level deviates outside its allowable set point range.



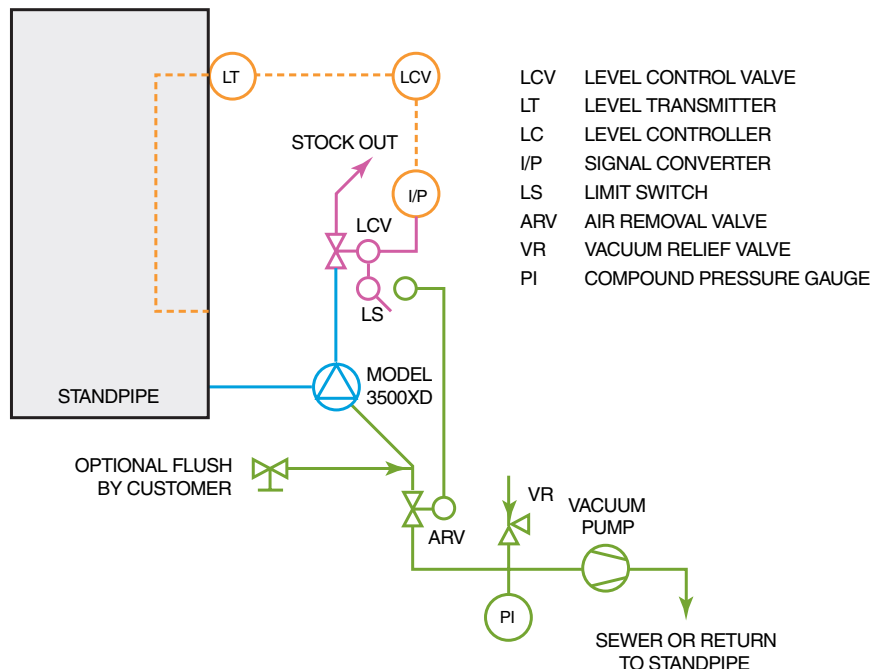
## Seal & Flush Water System

- Three separate flow meters control flow to:
  - Mechanical seal & bearing cooling coil
  - Vacuum pump make up
  - Degas chamber
- An **Alarm** sounds if the flow rate drops below 50% of the required value.
- An **Interlock** keeps the pump from starting up without minimum seal and flush water flow.



## Degas System

- Vacuum pump operates when Model 3500XD operates.
- ARV is open when LCV is open.
- An **Alarm** will sound if the vacuum pump shuts down.
- Closing ARV can isolate air removal system.
- For applications limited to 10-11% consistency the vacuum pump is not required.
  - Unit will use an ARV to prevent water in standpipe from draining
  - When in operation ARV will be open and degas line will vent to drain or air separator.





## Pumping Solutions

### Typical Model 3500XD Installations

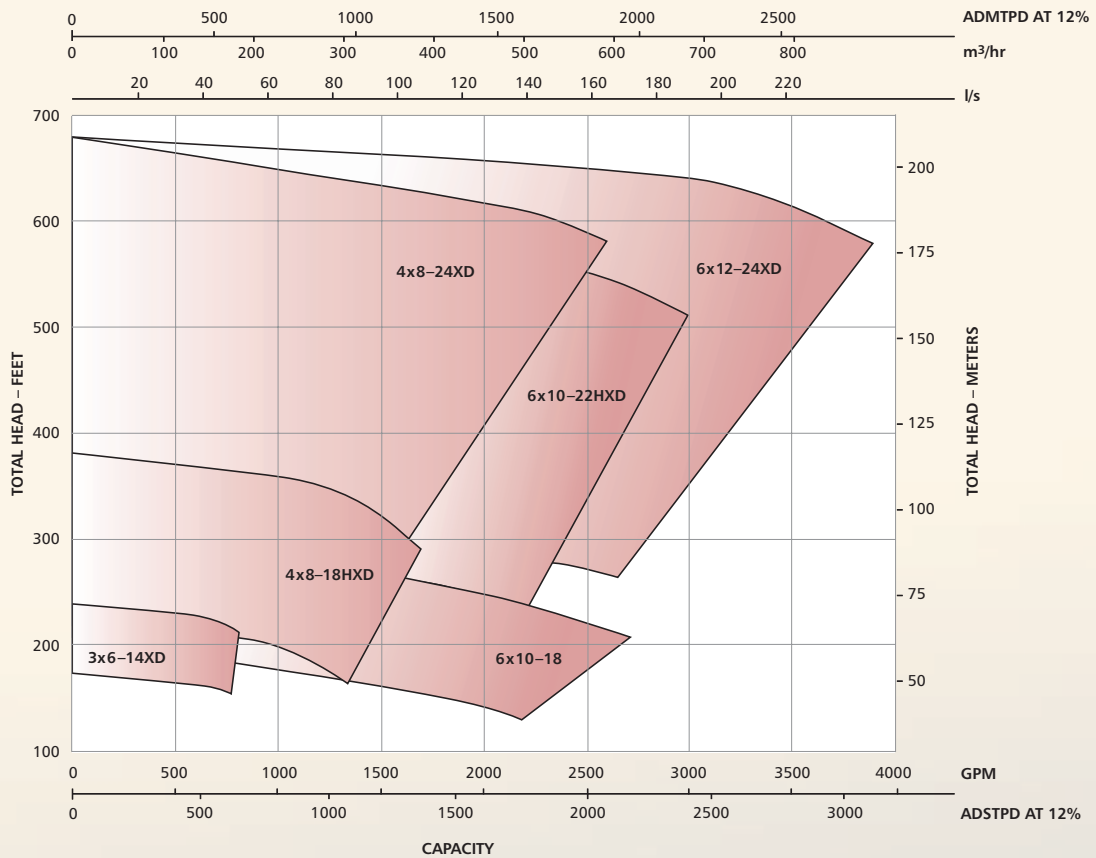


Caustic stage pumping from washer operating at 1200 TPD at 12% consistency. One of seven units in complete bleach line.



Bleached pulp from final wash stage being pumped to HD storage.

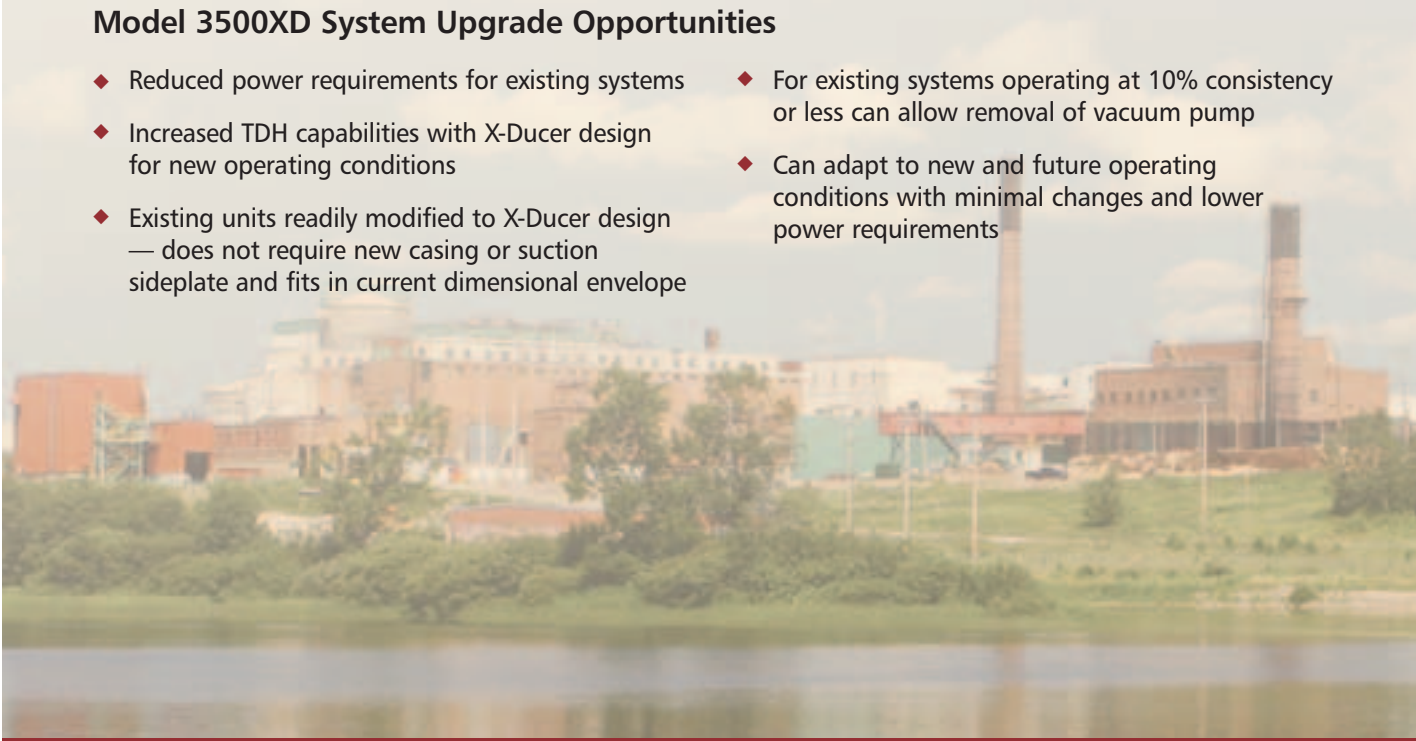
# Hydraulic Coverage



## Pumping Solutions — Upgrade Existing Systems

### Model 3500XD System Upgrade Opportunities

- ◆ Reduced power requirements for existing systems
- ◆ Increased TDH capabilities with X-Ducer design for new operating conditions
- ◆ Existing units readily modified to X-Ducer design — does not require new casing or suction sideplate and fits in current dimensional envelope
- ◆ For existing systems operating at 10% consistency or less can allow removal of vacuum pump
- ◆ Can adapt to new and future operating conditions with minimal changes and lower power requirements





**PRO Services®**  
 Extending  
 Equipment Life...

**Product Repair** (all types and brands of rotating equipment)

- Service Center Repair
- Field Service
- Parts Supply

**Reliability Improvement**

- Inventory Management
- Replacement/Exchange
- Turnkey Repair/Installation
- Training

**Optimization of Assets**

- Predictive Analysis/Condition Monitoring
- Root Cause Failure Analysis
- Pump & System Assessments
- Upgrades – Mechanical & Hydraulic
- Maintenance Management/Contract Maintenance

- Technical Expertise
- Fast Turnaround
- Factory Trained Service Personnel
- Emergency Service – 24 hours/day, 7 days/week
- Quality
- ISO and Safety Certified

# PROSMART

ProSmart™ encompasses the latest technology\* in condition monitoring to transform your Predictive Maintenance program into a Plant Profitability program. It provides a cost-effective solution to maintaining uptime on all of your rotating equipment. ProSmart continuously monitors, analyzes and annunciates an alarm when critical criteria is not met. By identifying, diagnosing, and sounding an alert to potential equipment problems before they have a chance to manifest into unexpected downtime or catastrophic failure, ProSmart helps to assure plant profitability.



**ProSmart delivers benefits that go right to the bottom line.**

- Extends equipment life
- Optimizes costly “walk arounds” by skilled personnel
- Can help reduce overall equipment failures and the cost of downtime
- Sends alerts prior to potential catastrophic process failures
- Automatically alerts personnel to machine problems
- Consolidates data for equipment optimization (\*Patent pending)

ProSmart is a wireless machinery monitoring system that collects and analyzes operating data automatically every 5 seconds. Integrated analysis capabilities provide enhanced data and reporting functions.

# PUMPSMART System Options

- Energy savings
- Provides for pump protection
- Low flow protection (torque-based) when low levels are encountered in standpipe
- Provides upper speed limit to protect motor and drive from excessive load
- Provides lower speed limit to allow Model 3500XD air removal system to work satisfactorily
- Several proven control schemes allow for the maximum benefit of variable speed drive system
- Allows for future operating condition with same pump
- Allows for same pump size to be used when multiple pumps are involved with large TDH variations among them
- Allows for one impeller diameter (and Back Pullout) to be used for multiple pump installations — minimize inventory for critical services



Visit our website at [www.gouldspumps.com](http://www.gouldspumps.com)

