

# Training in the Digital Age:

Using Digital  
Photographs  
in Process  
Technology  
Training

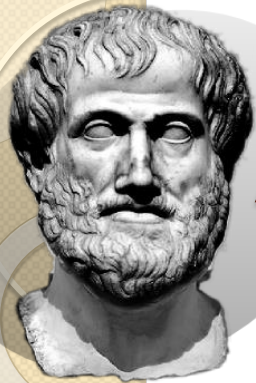


# Presenter

- Nat Byrom

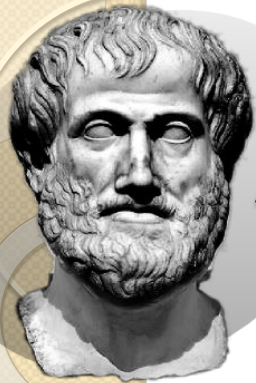
- Process Operator- Gulf Oil (1977-1985)
- Utilities Dept. Trainer- Chevron (1985-1992)
- Site Training Coordinator
  - Chevron PAR (1992-1995)
  - Clark, Premcor PAR (1995-2005)
  - Valero PAR (2005-2013) RETIRED!
  - Flint Hills Resources PAC (2013-???)





## Aristotelian Triptych (c. 340 BC)

1. Tell them what your going to tell them
2. Tell them
3. Tell them what you told them



# Aristotelian Triptych (c. 340 BC)

Instructors have always been judged on their ability to keep their students engaged. We fight an uphill battle unless we realize that most learners need to do more than just hear it.





# 7 Learning Styles

- Aural (sounds, music)
- Verbal (words by speech, writing)
- Physical (hands-on)
- Logical (reasoning, systems)
- Social (group learn)
- Solitary (self-study)
- Visual (pictures, images)

# Learning Styles

- Approx. 65% are visual learners
- Brain processes visual information 60,000 times faster than textual information
- 90% of all information to the brain is visual
- 40% of all nerve fibers are linked to the retina
- Our eyes can register 36,000 visual messages per hour



# Learning Styles

- Although 10% of secondary students are auditory learners, 80% of instruction is oral
- Visual aids in the classroom improve learning up to 400%



# Learning Styles

- Although 10% of secondary students are auditory learners, 80% of instruction is oral
- Visual aids in the classroom improve learning up to 400%

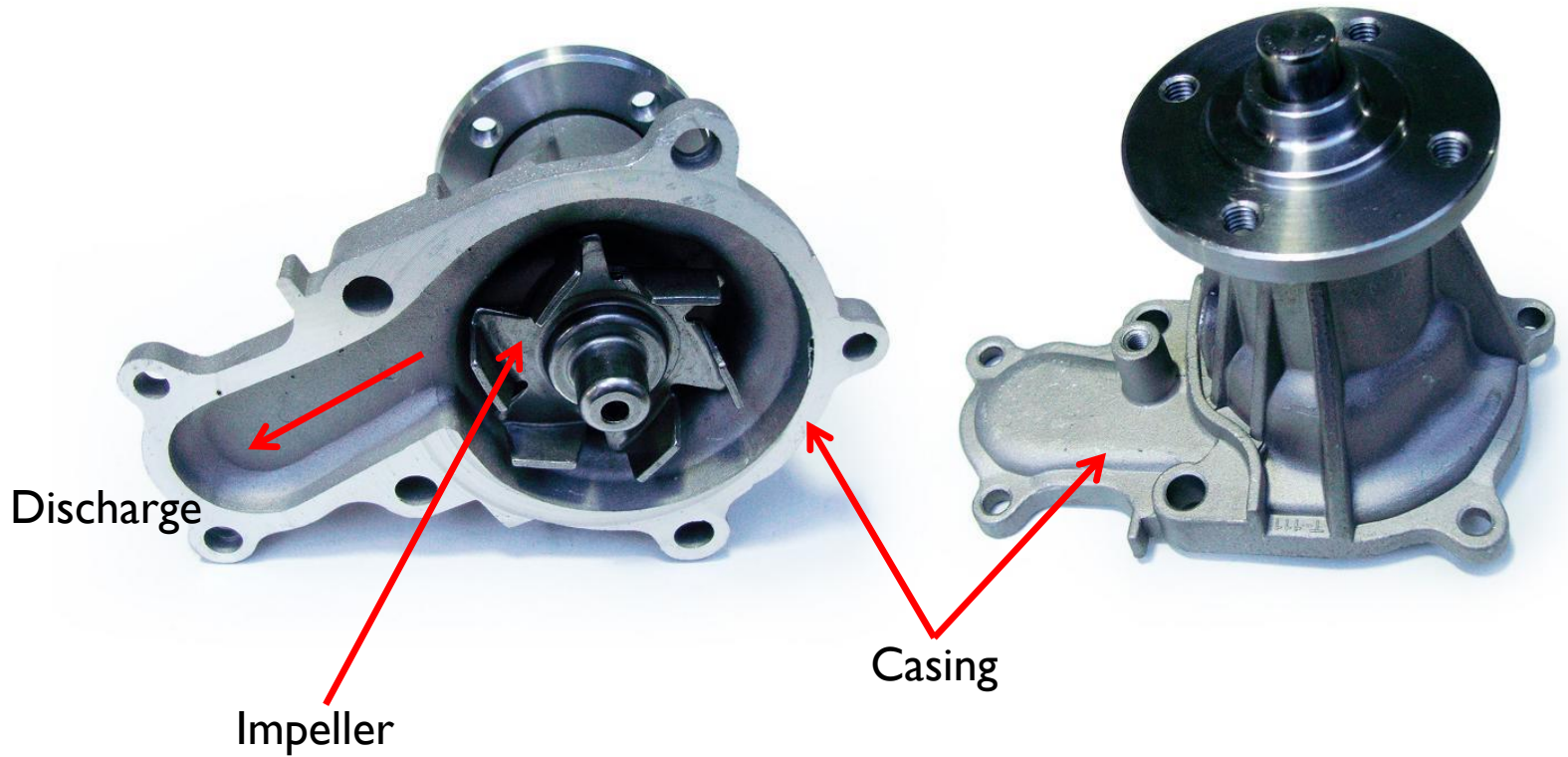
*Knowing what we know, why do we continue to base most instruction on lecture?*



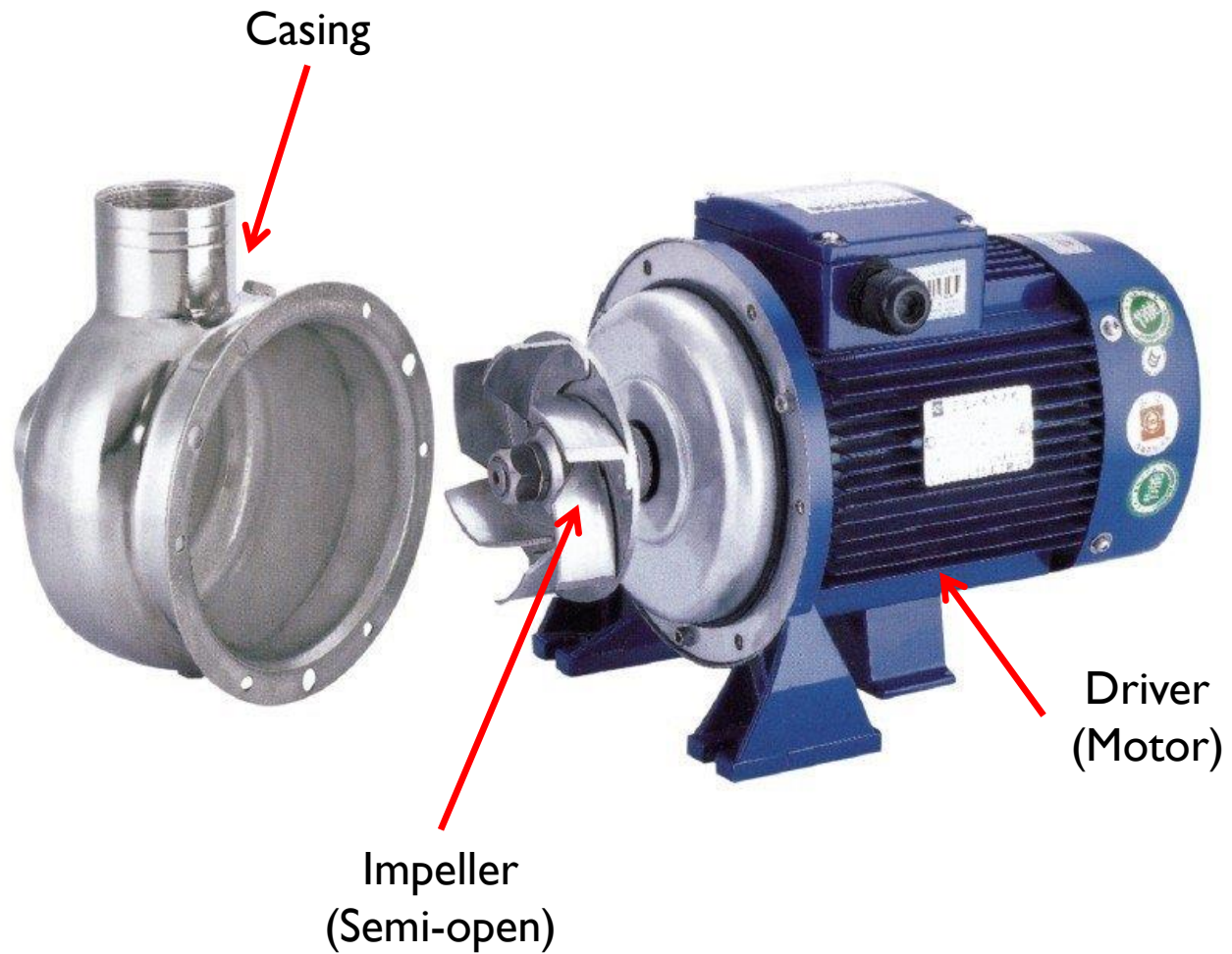
# Learning Styles

- Studies say that young adult males demonstrate a preference for learning through activities they are able to manipulate... it suggests that men are more visually stimulated, interested in information that they can have physical direct control over.

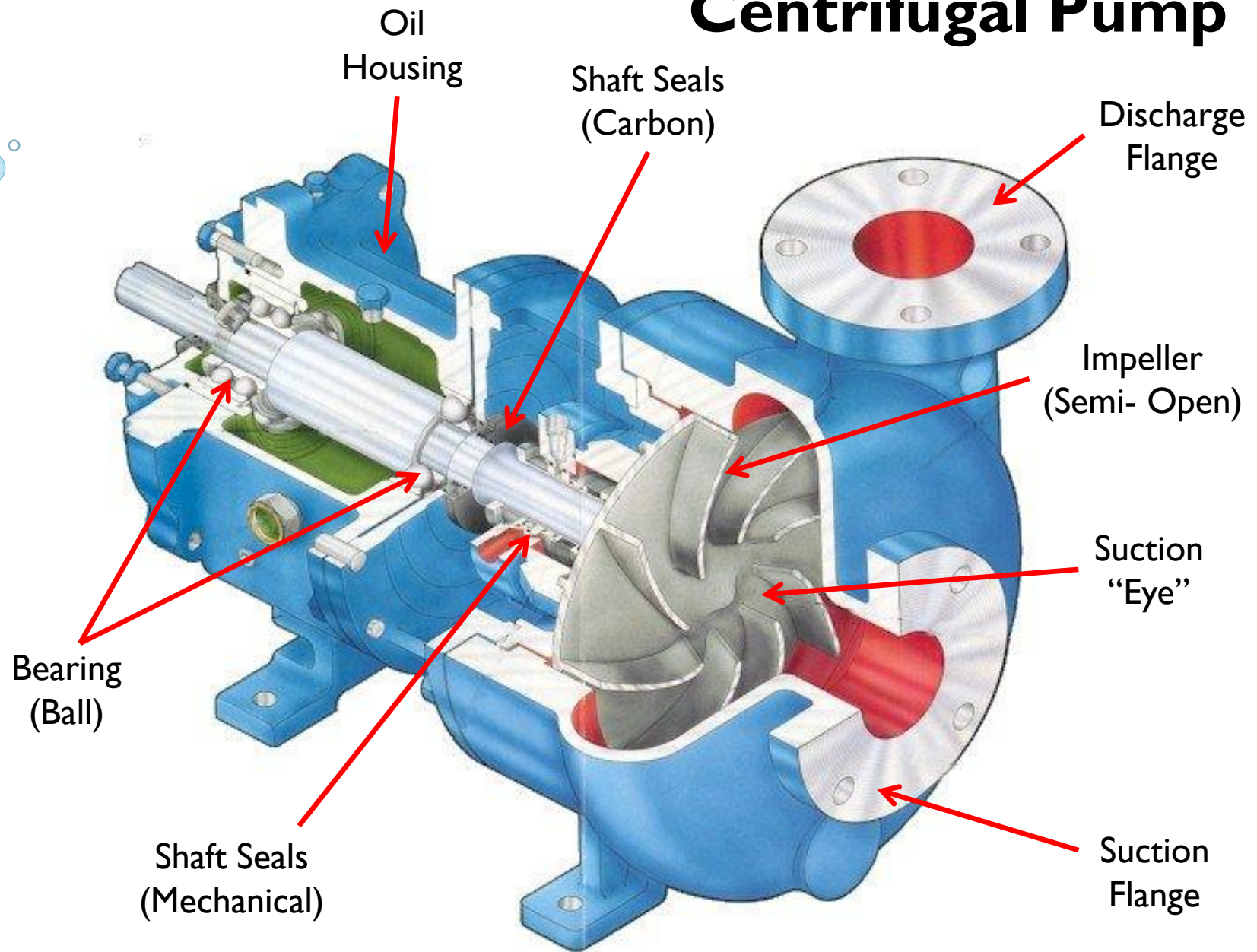
# Automotive Water Pump



# Centrifugal Pump



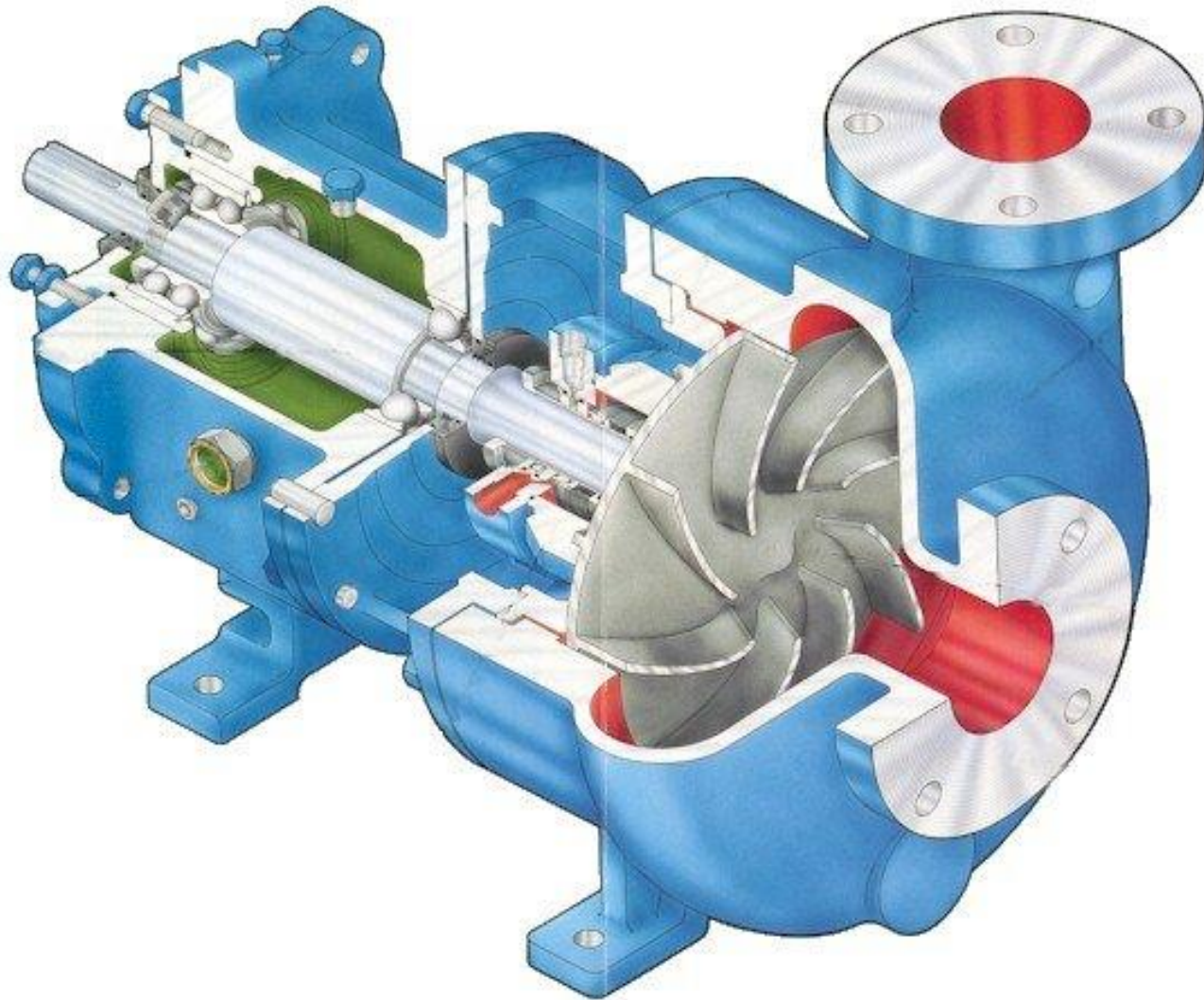
# Centrifugal Pump



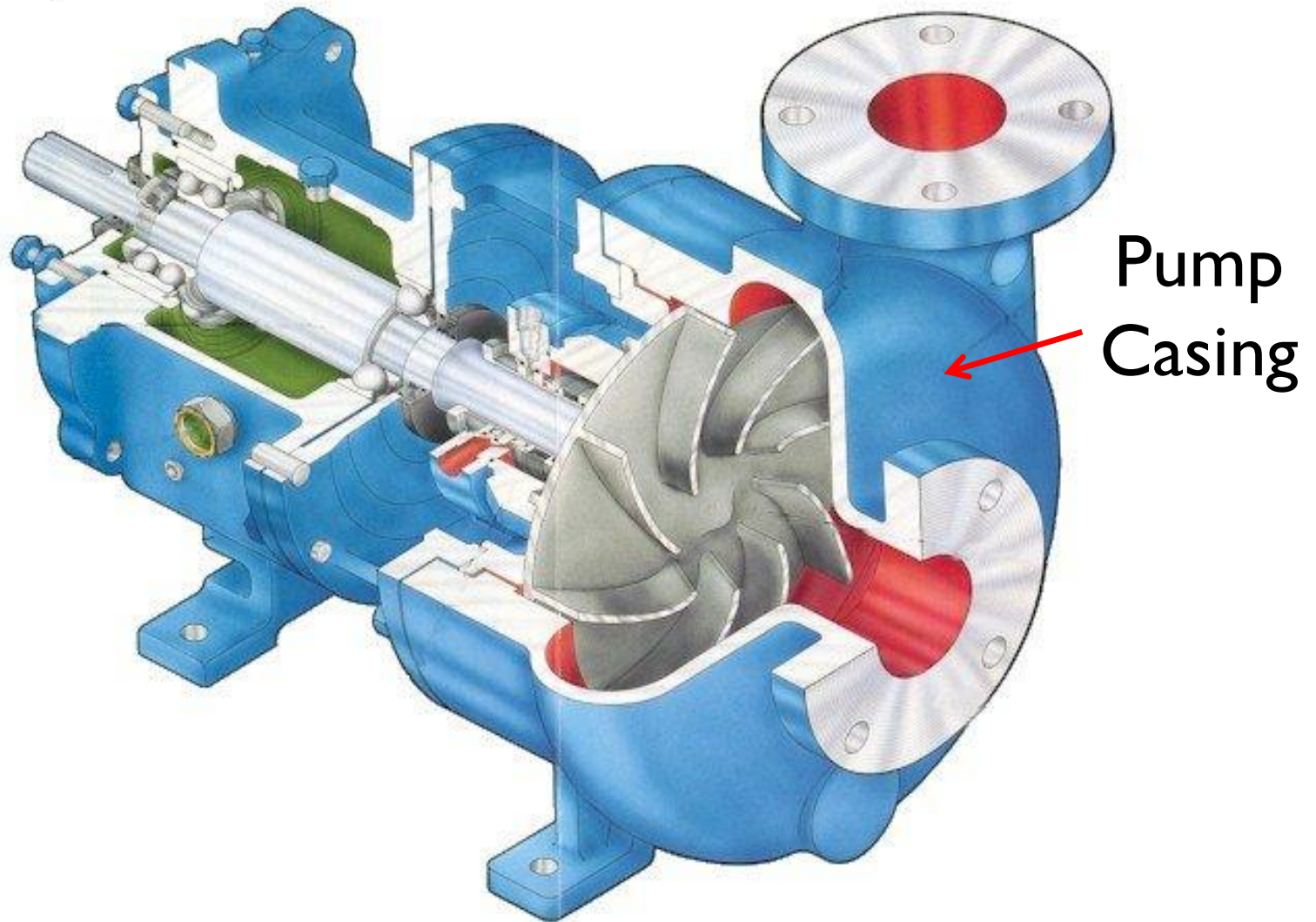
# Mixed-modality Principle

- Further studies also indicate that words should be presented as auditory narration rather than on-screen text when presenting an explanation using multimedia or graphic depictions.

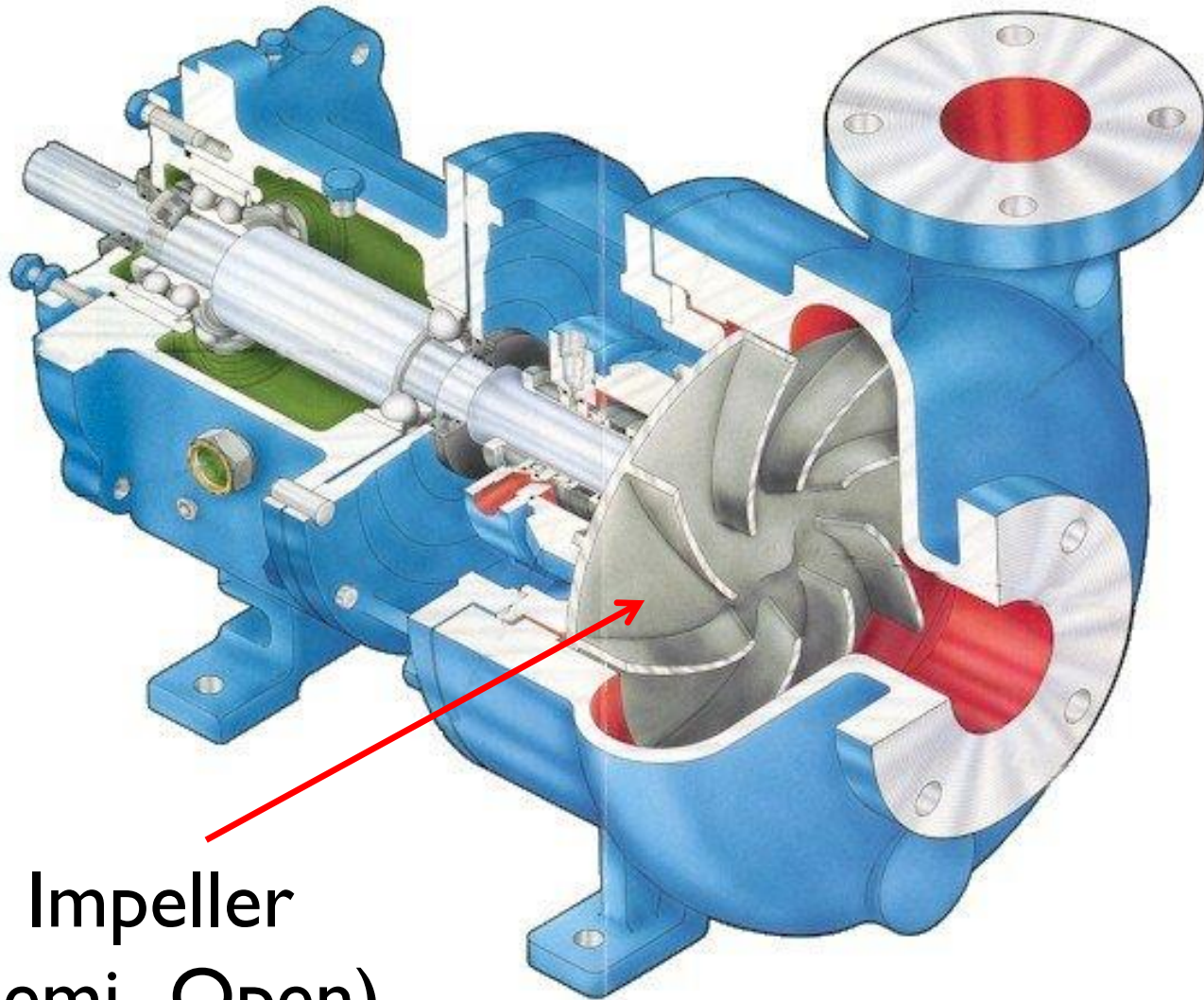
# Centrifugal Pump



# Centrifugal Pump



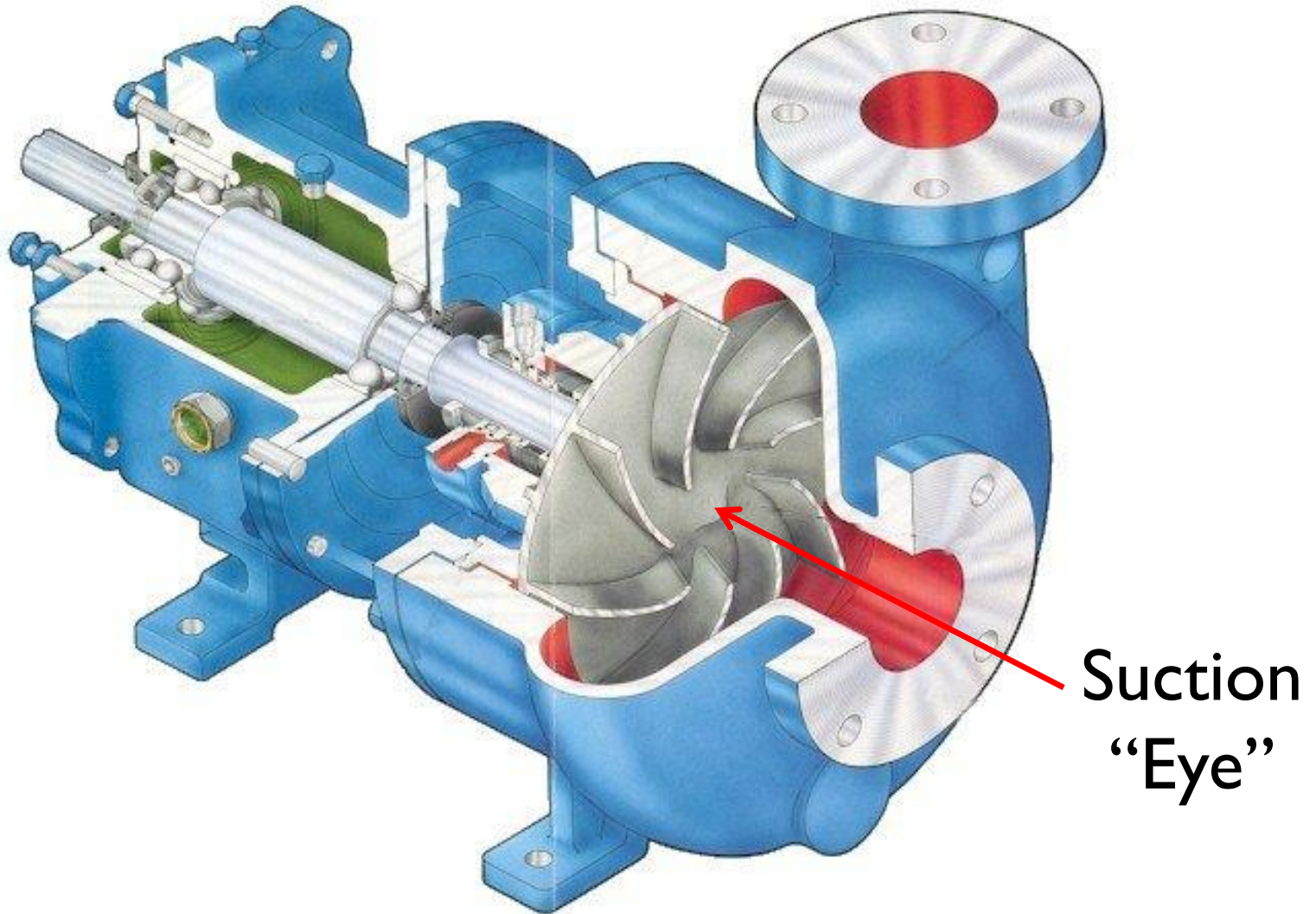
# Centrifugal Pump



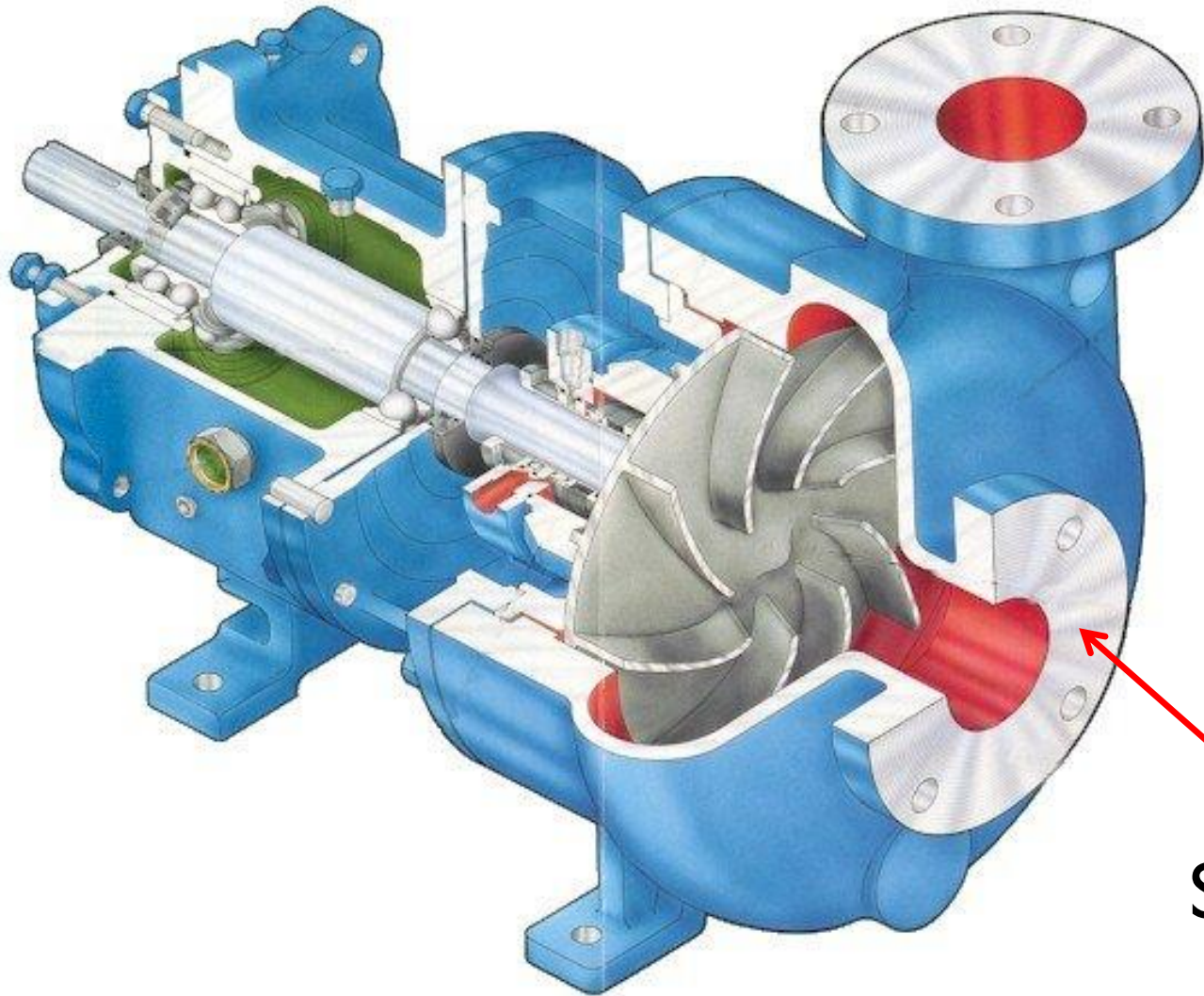
**Impeller  
(Semi- Open)**



# Centrifugal Pump



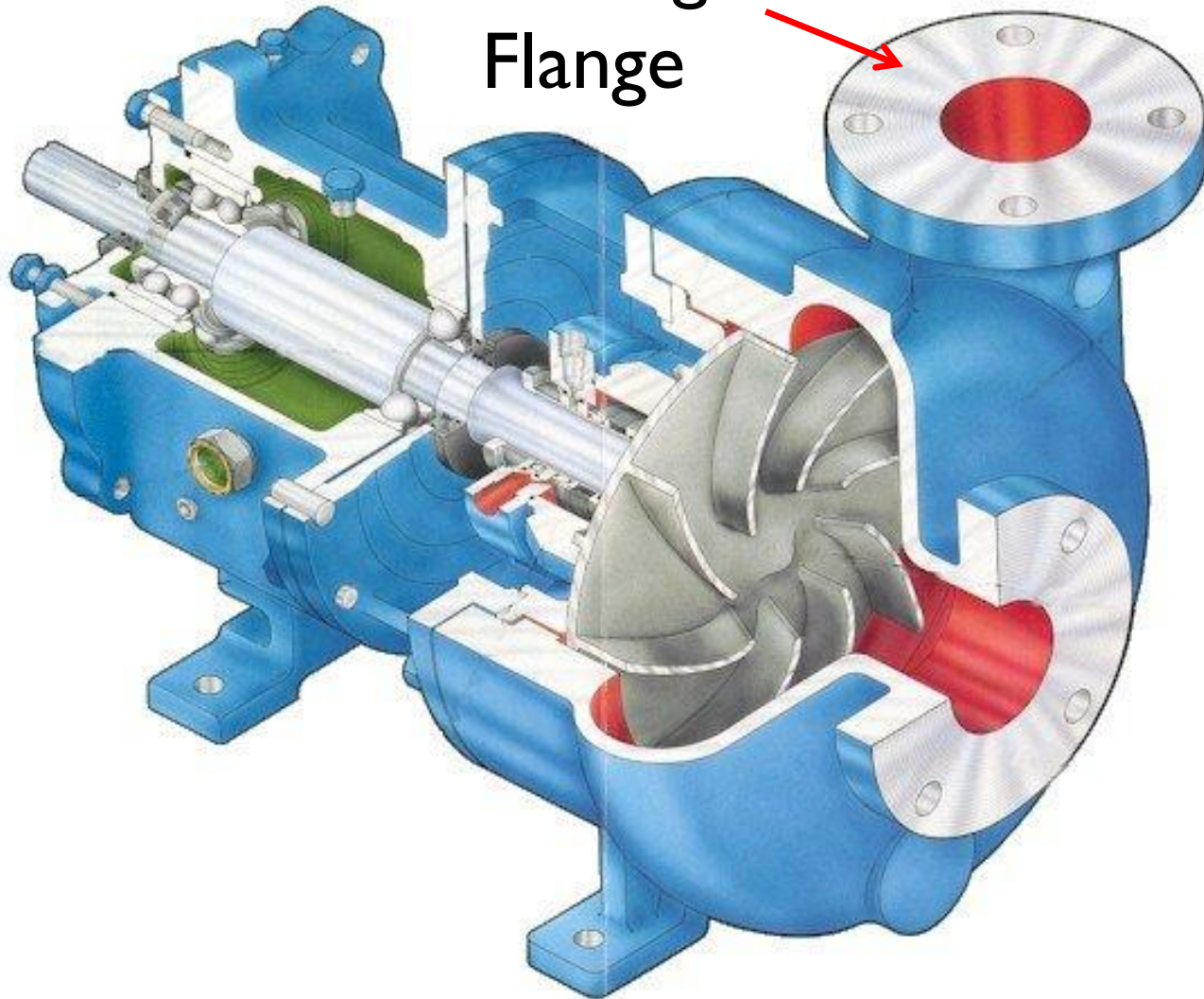
# Centrifugal Pump



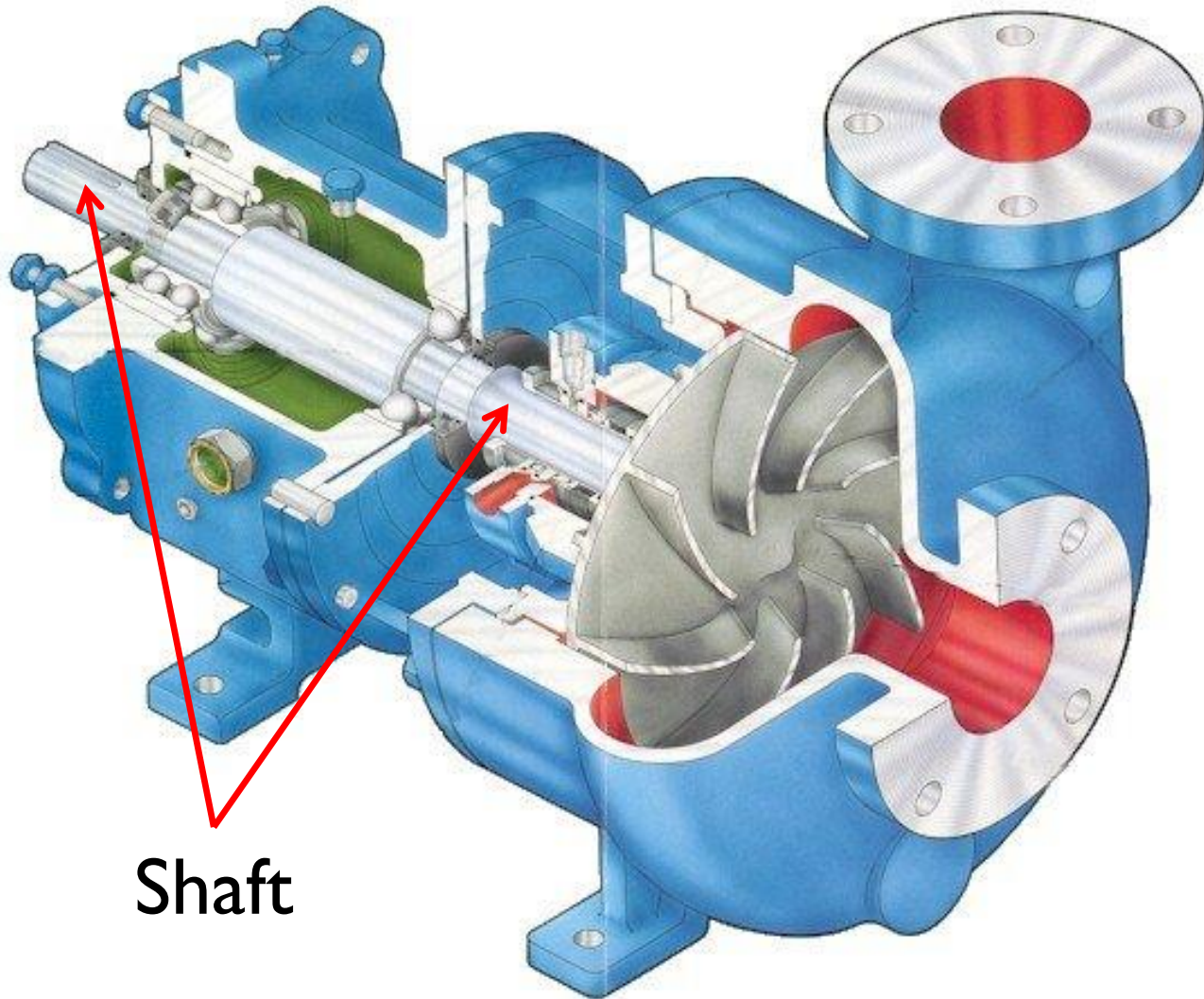
Suction  
Flange

# Centrifugal Pump

Discharge  
Flange

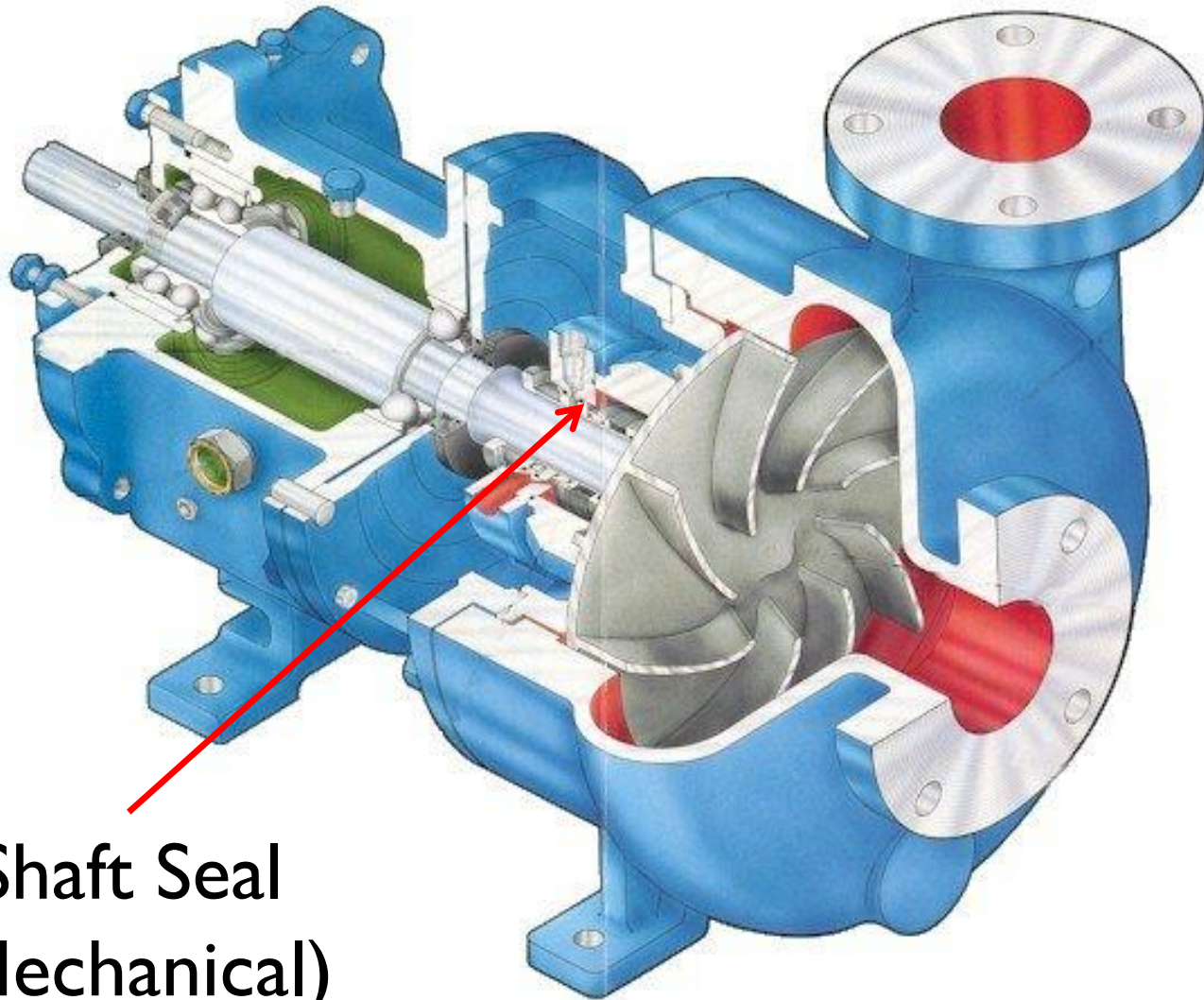


# Centrifugal Pump



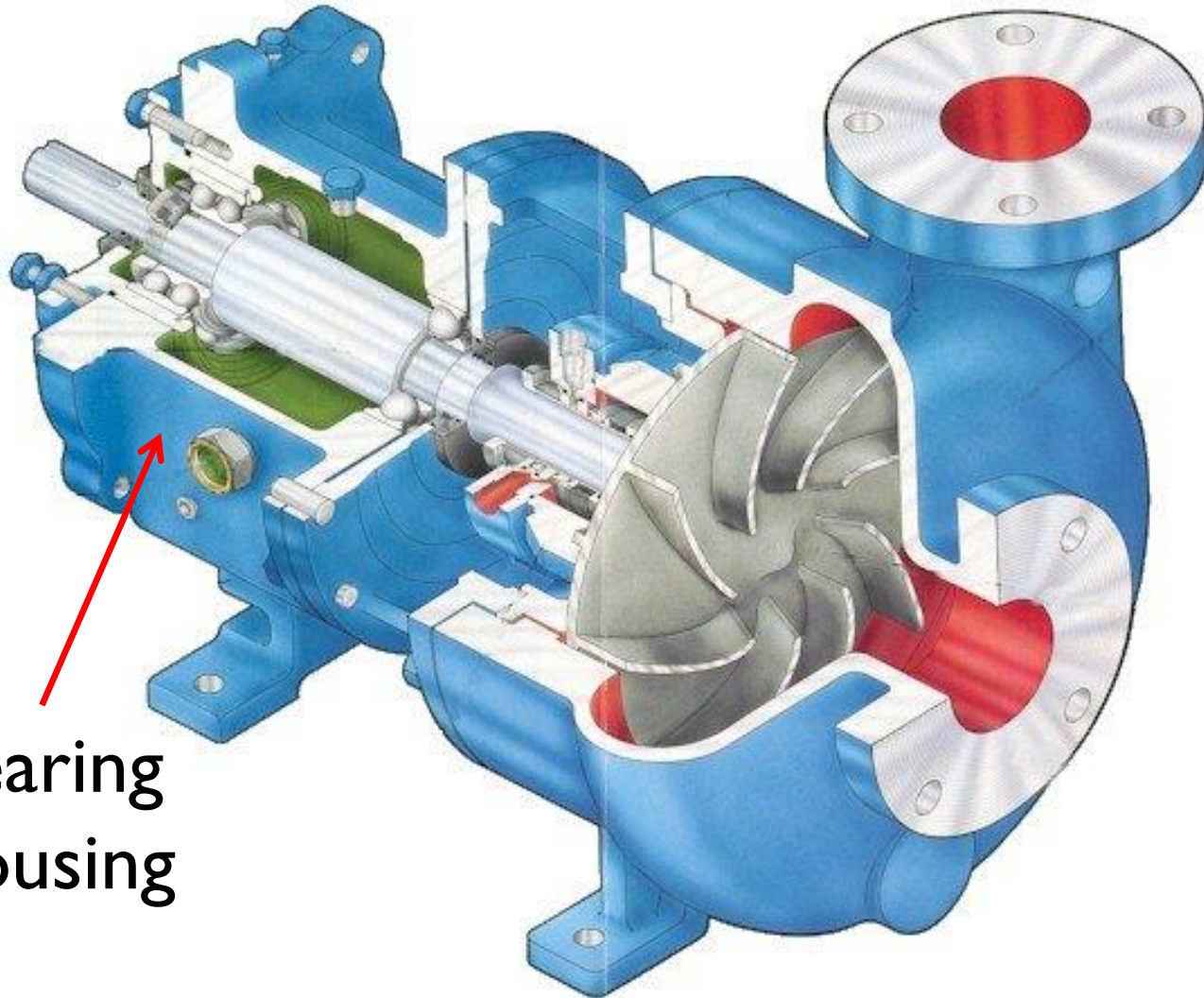
Shaft

# Centrifugal Pump



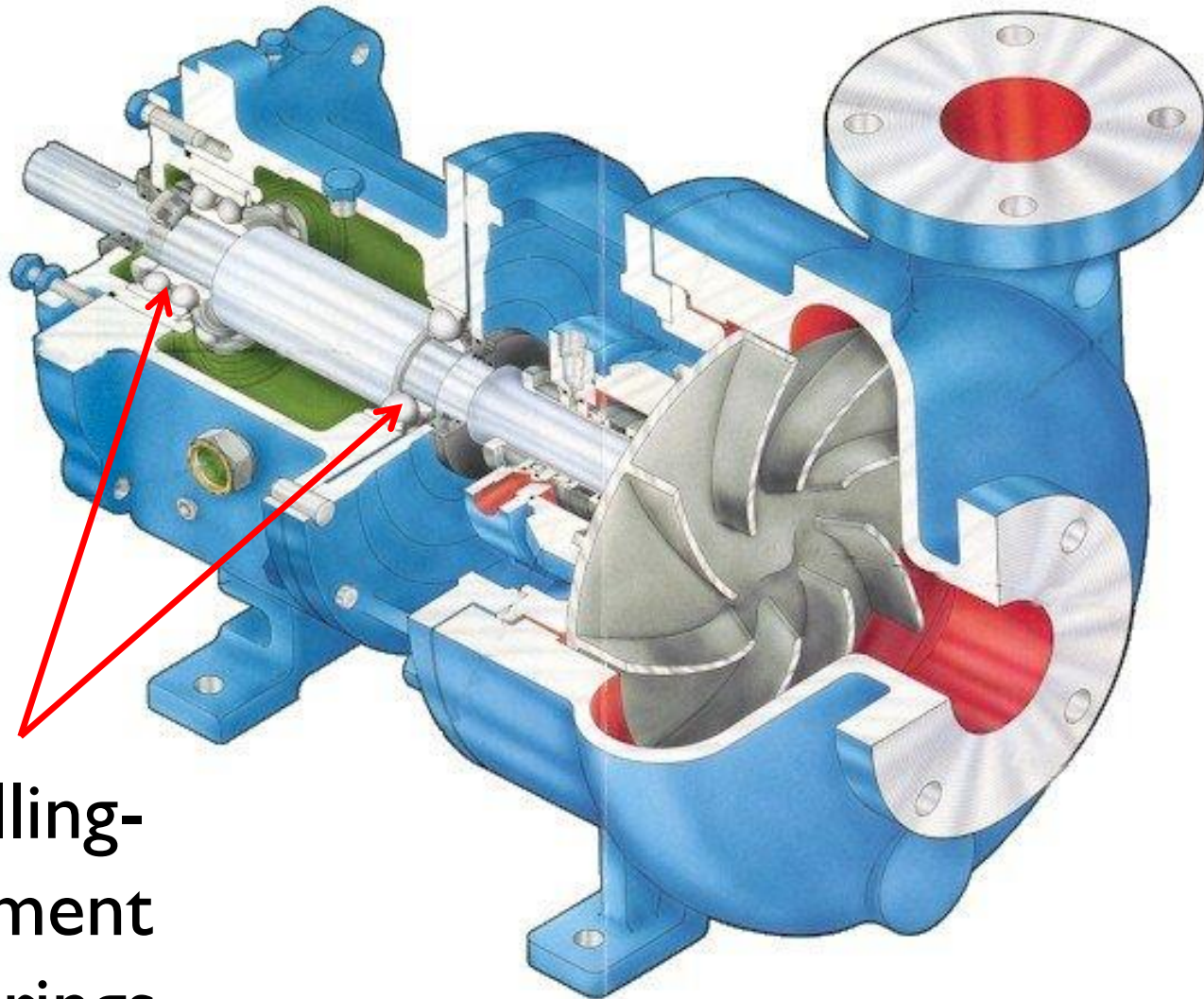
Shaft Seal  
(Mechanical)

# Centrifugal Pump



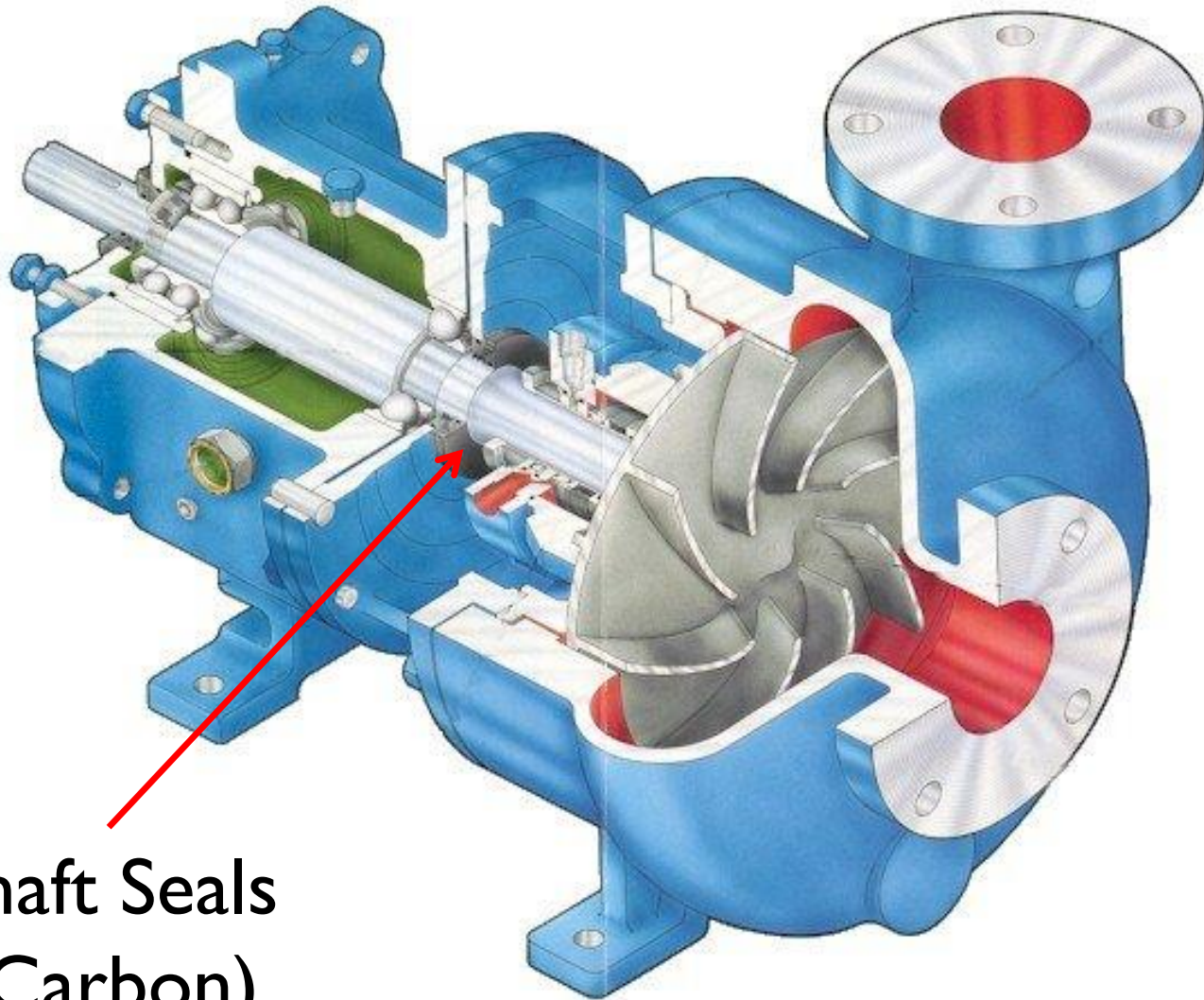
Bearing  
Housing

# Centrifugal Pump



Rolling-  
Element  
Bearings

# Centrifugal Pump



Shaft Seals  
(Carbon)



# Sources

- Royalty “Free”
  - Pay once, then use
- Public Domain
  - Non-copyrighted
  - Anything published before 1/1/1923 (USA)
- Fair Use
  - Highly dependent on situation, consult attorney
- Wikipedia
  - Free content encyclopedia

# Sources

Get a digital camera... go to the unit... that's easy, huh?

## Not so fast, bub!

- Considerations:  
Hazardous atmospheres



Intrinsic Camera \$3,000

# Sources

Get a digital camera... go to the unit... that's easy, huh?

## Not so fast, bub!

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Intrinsic Camera \$3,000

OR



SLR Digital \$900



(Borrow this one)

# Sources

- Further considerations:
  - Humans
    - Performance Contracts
  - Intellectual Property
    - Not theirs, not yours
  - Internal uses only!
    - Don't generate non-business related profit w/o compensation

# Rendering

- Software
  - Corel PaintShop Pro (\$60)
  - Adobe Photoshop Elements (\$70)
  - Microsoft Office
    - Brightness & Contrast
    - Color
    - Cropping
    - Red Eye Removal

# Rendering

- Cloning to cover, replace things



# Rendering

- Brightness & Contrast to change light



# Embedding

<u>Assignment and Check Off</u>	<u>Performance Step</u>	<u>Supporting Information</u>
---------------------------------	-------------------------	-------------------------------

## PUMP PARTIAL DISASSEMBLY IN FIELD

- |      |   |             |
|------|---|-------------|
|      | 7.0 REMOVE (12) suction cover nuts, using impact wrench.  | See fig. 3  |
| Mech | 7.1 Separate suction cover from pump casing using wedges. | See fig. 4. |



Figure 3



Figure 4

- |      |   |   |
|------|---|---|
|      | 8.0 REMOVE impeller nut (right hand threads – CCW to loosen).                               | See Fig. 5. Use 1 1/8" 8 PT socket. If imp fails to come off, the casing will also have to be removed to pull off the impeller per following steps. |
| Mech | 8.1 Attempt to slide impeller off shaft. If impeller does not come off proceed to step 8.2. |   |
|      | 8.2 Remove (4) nuts from elbow at discharge flange and casing to column flange.             | See Fig. 6. Discharge flange must be separated at elbow before nut, indicated by arrow, can be completely removed.                                  |



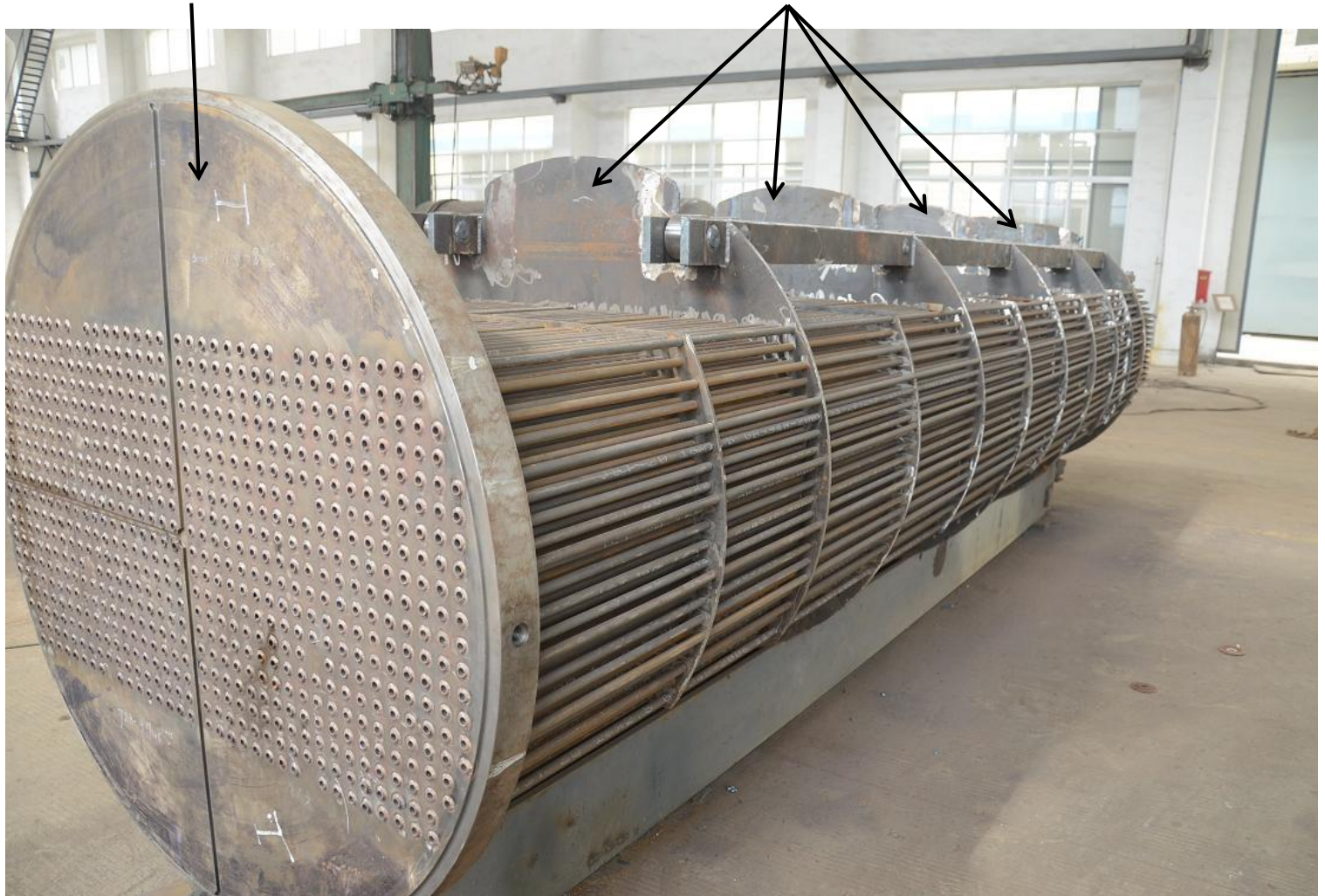
# Adding Text, Arrows



# Adding Text, Arrows

Tube End Plate

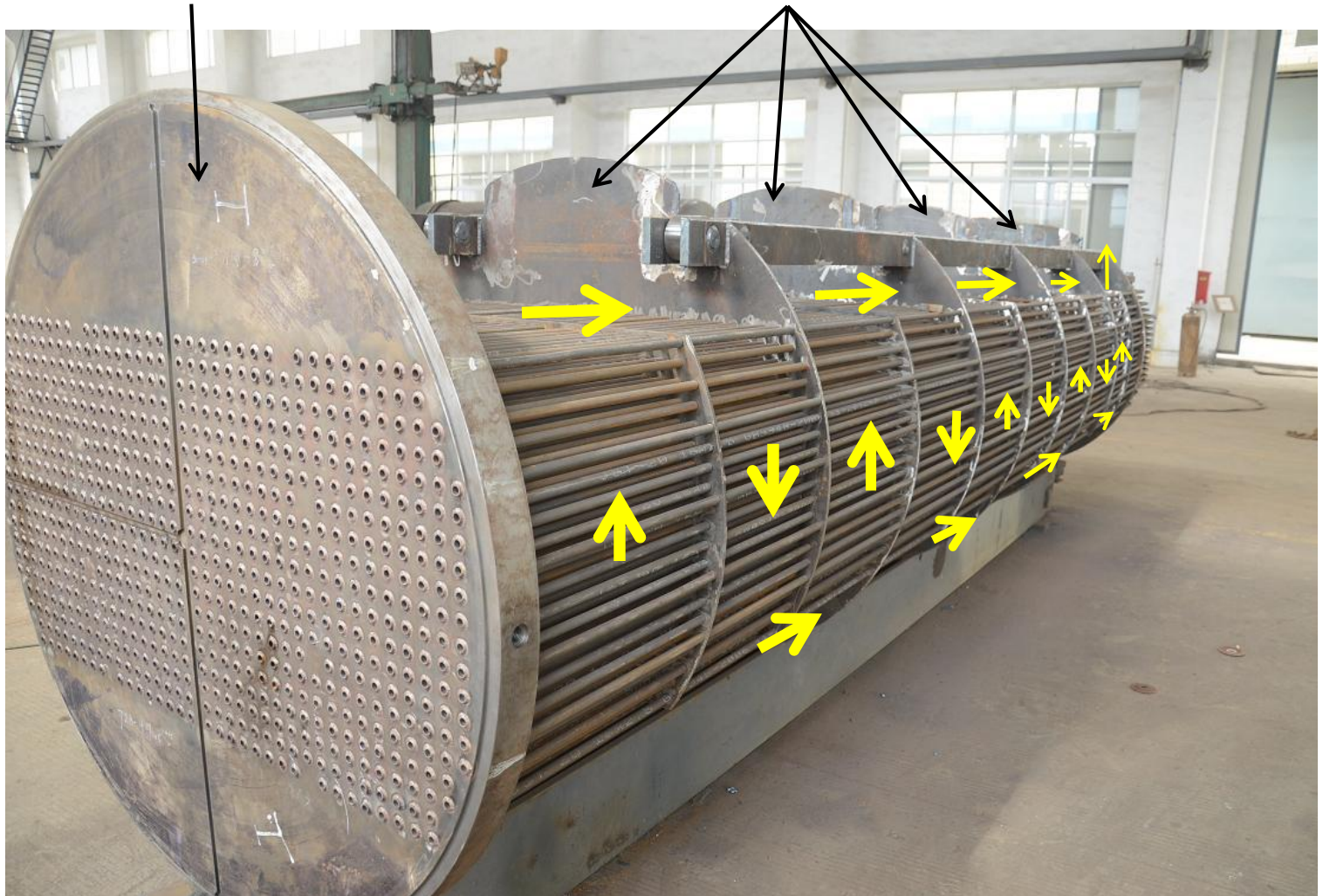
Tube Support/ Baffle Plates



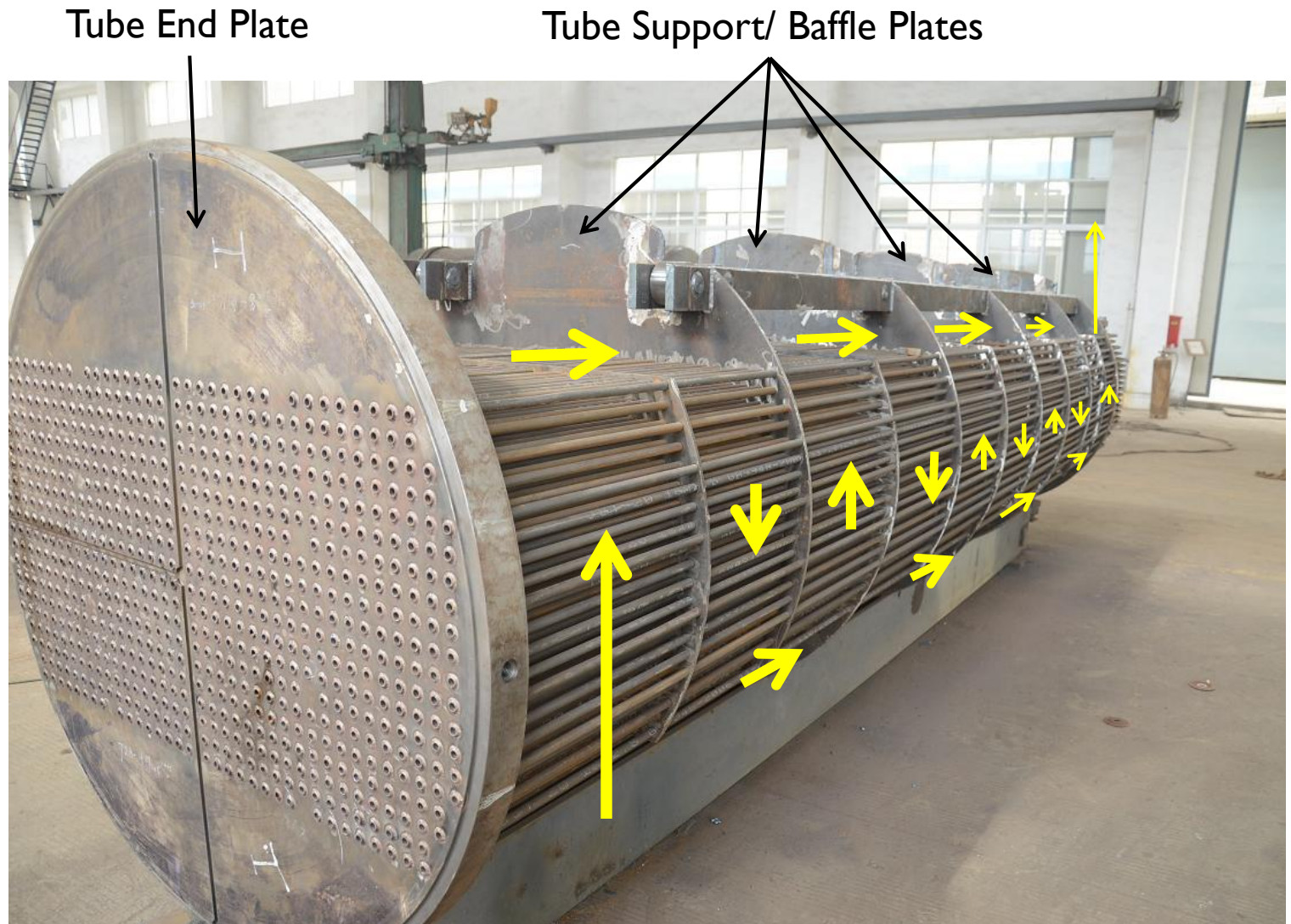
# Adding Text, Arrows

Tube End Plate

Tube Support/ Baffle Plates



# Shell Side Flow



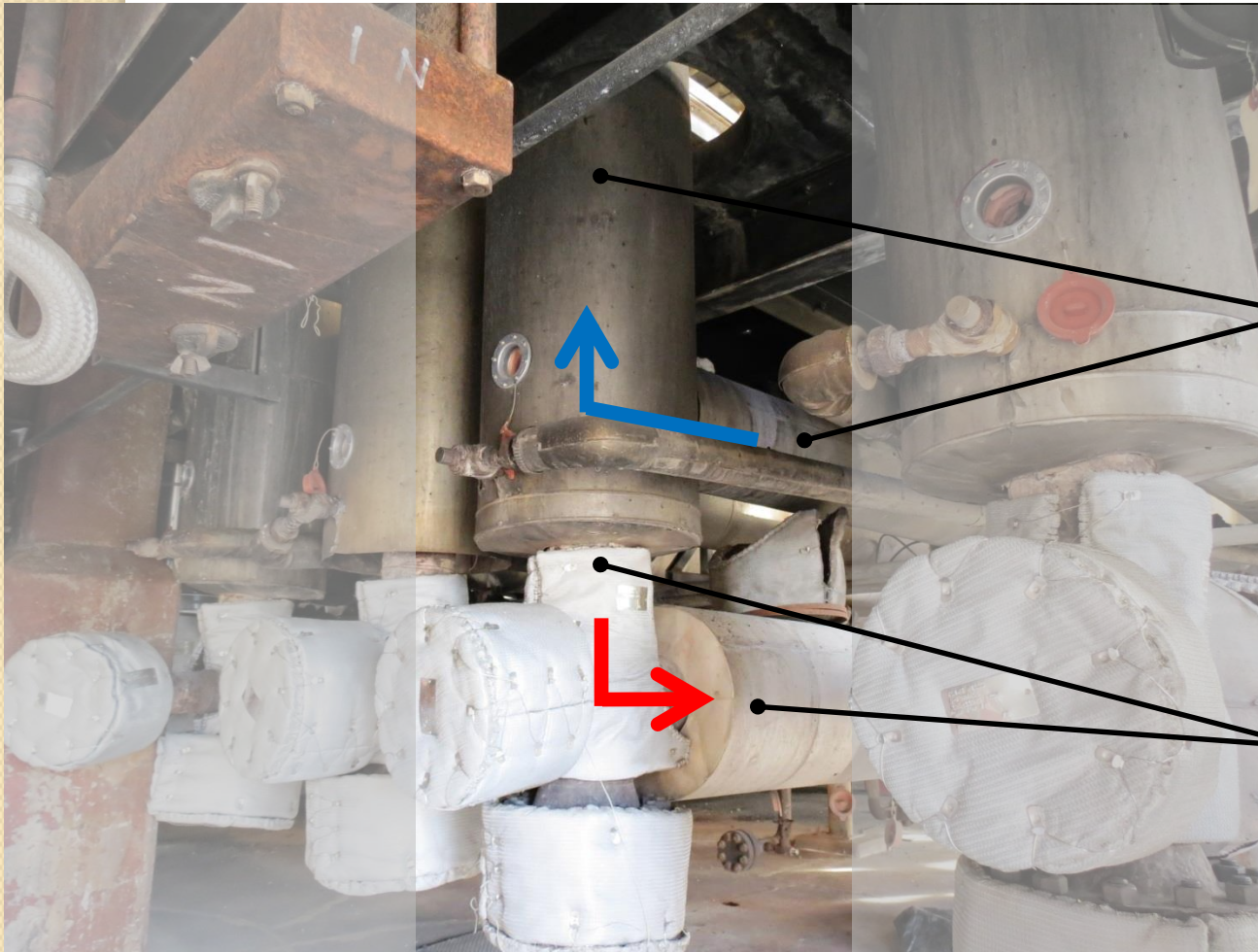
# Shading for Emphasis



# Steam Jacket Heat Exchangers

## USX

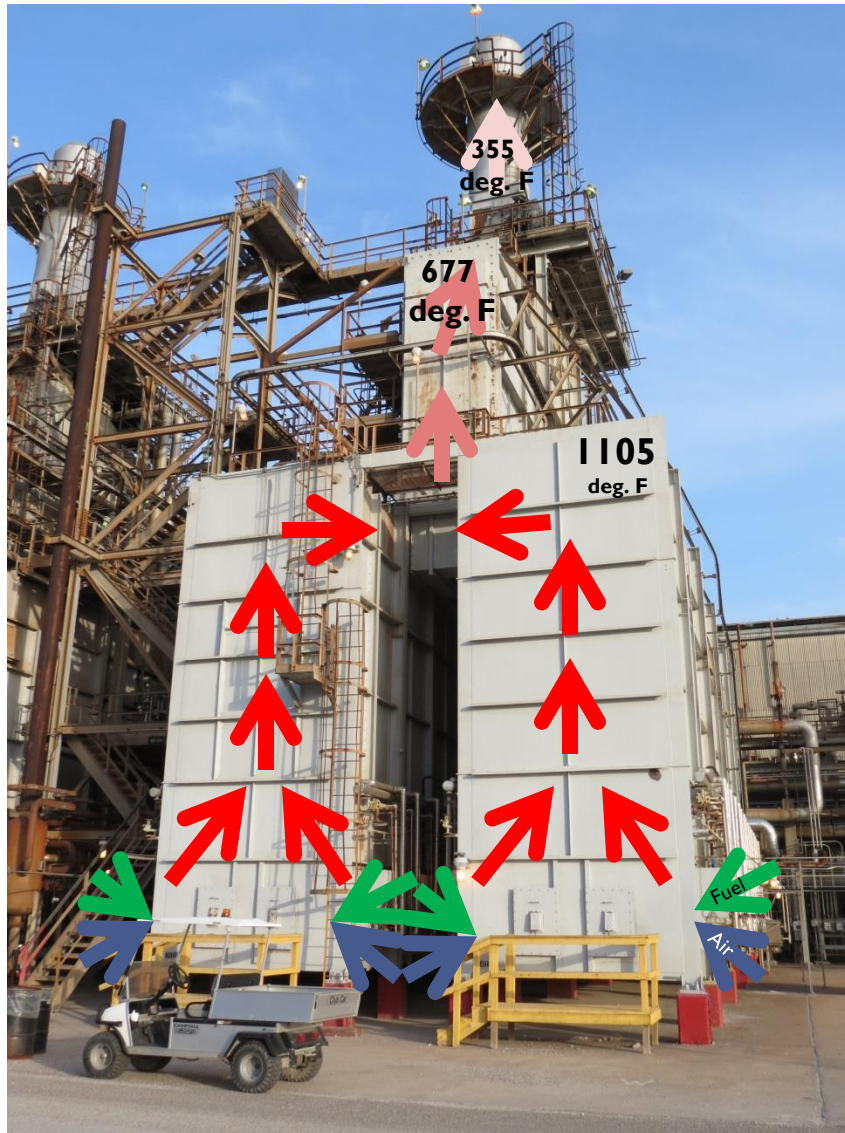
Steam jacketed exchanger (pipe in pipe) is used to quench the process side and produce steam in the heat exchange. Uses cross-flow with hot process going down and steam generated up.



**Outer Pipe**  
(boiler feedwater  
to steam)

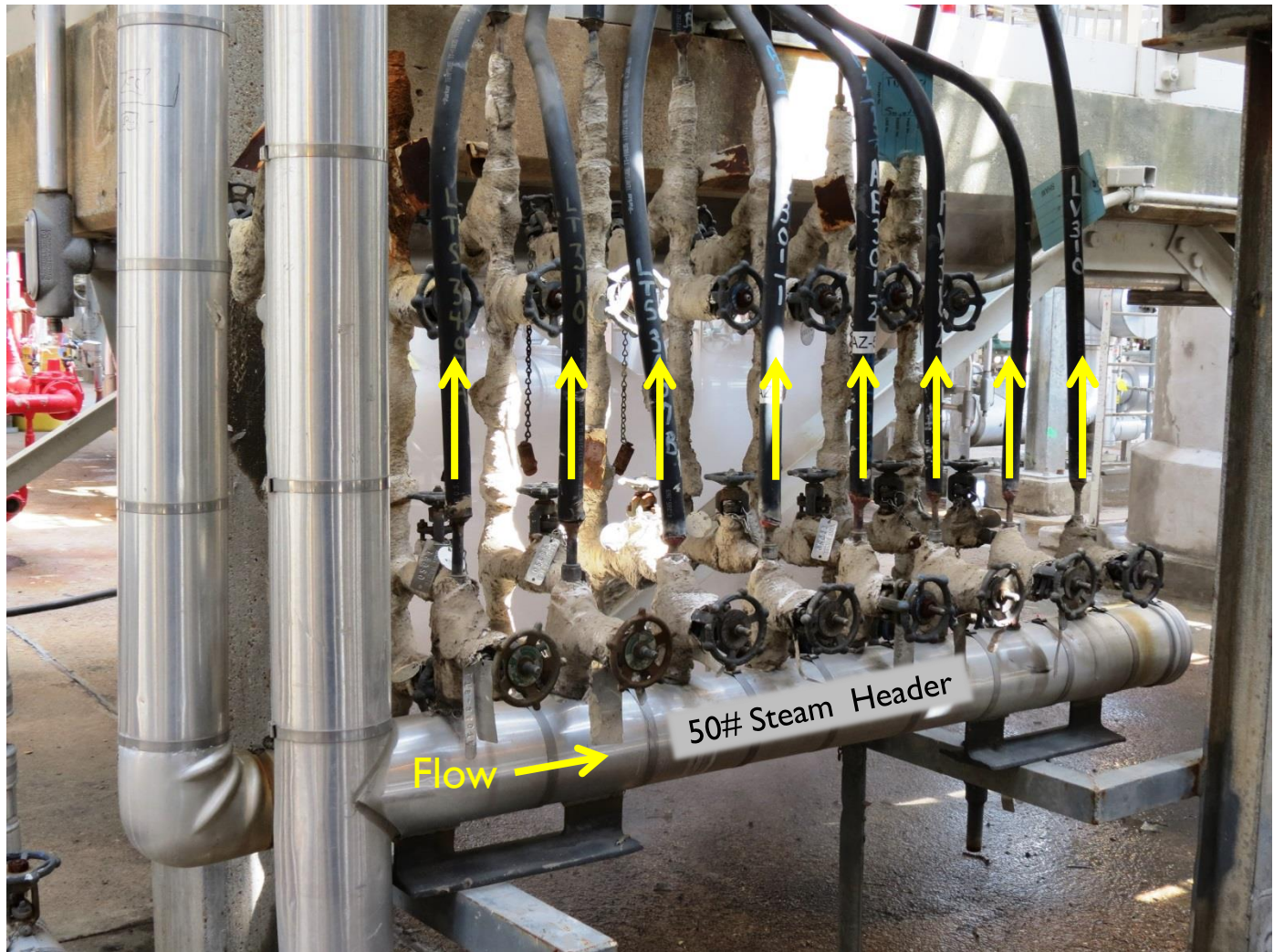
**Inner Pipe**  
(hot process stream  
to quench)

# Superheater Flue Gas Path



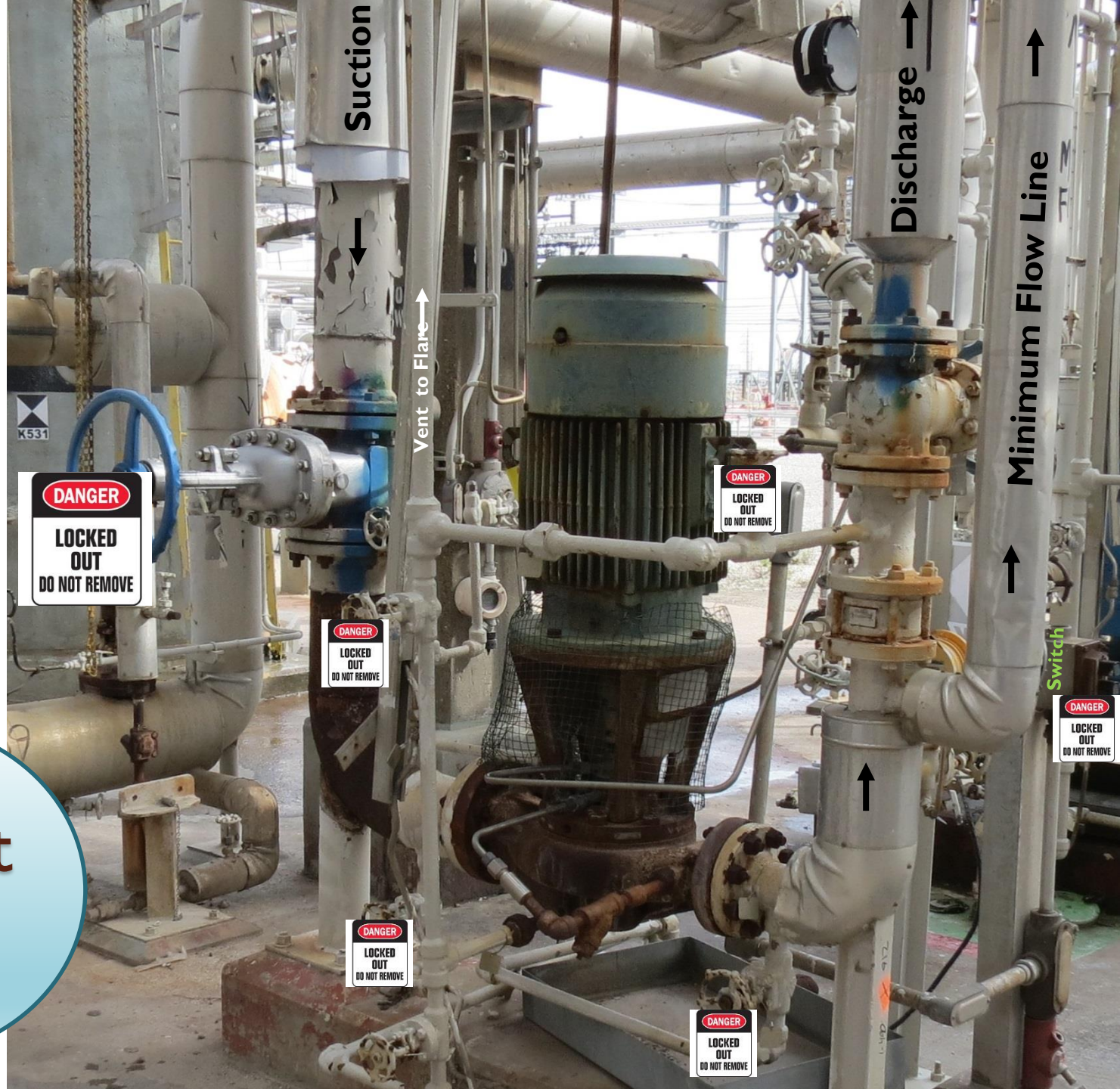
1. Drawn in by induced draft fan, air mixes with fuel at burners.
2. Combustion occurs, producing radiant, conductive heat.
3. Flue gas travels up radiant section heating wall tubes.
4. Furnace temperature at roof near 1100 deg. F
5. Flue gas joins paths, enters convection section.
6. Flue gas loses heat to convection tubes, economizer.
7. Flue gas leaves I.D. fan, exits stack at 355 deg. F.

# Tracing Steam To Instruments

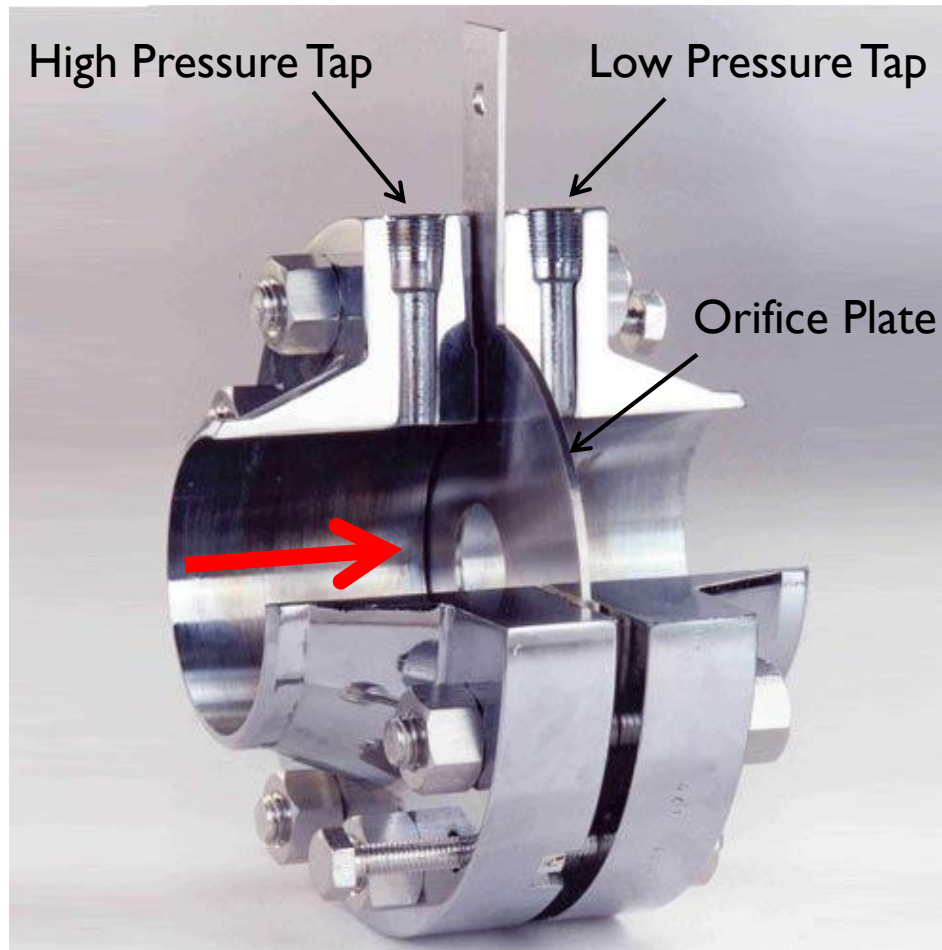




# Lockout Points



# Orifice Plate Installations



Flow creates a difference in pressure ( $\Delta p$ ) in the tap lines. This  $\Delta p$  becomes greater as flow increases and lessens as flow decreases. The tap lines are routed to a DP Cell which calculates the flow rate for the fluid.

**Operating Tip:** The fluid in the tap lines is static (non-flowing). Impurities can clog the lines over time causing sensitive changes in pressure to not be transmitted to the DP Cell. Instrument Technicians can periodically “blowdown” the tap lines to prevent this condition.

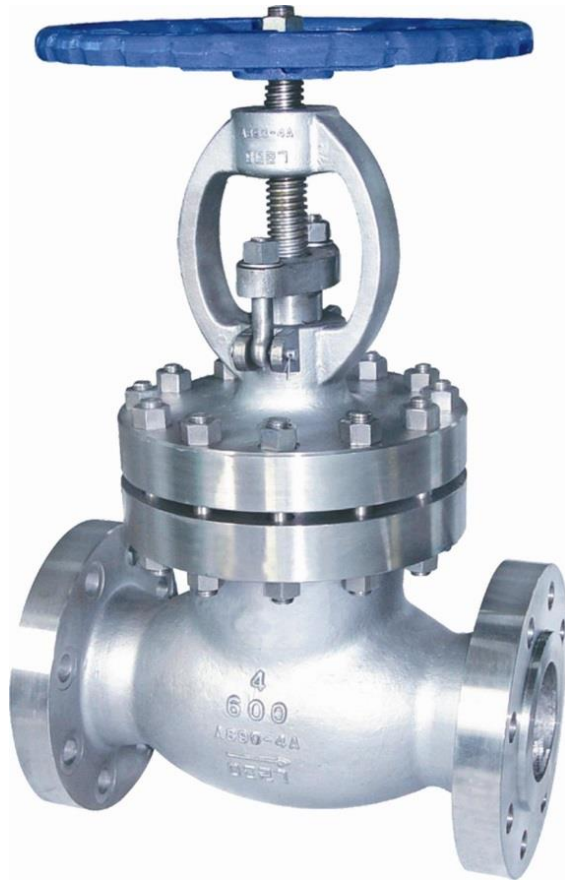
# Butterfly Valves

## Characteristics:

- Simple design, fewer parts
- $\frac{1}{4}$  turn operation, quick shutoff
- Ok for modulating or shutoff
- Ok to 700 psi
- Some handles have trigger catches to hold disc in position



# Globe Valves



## Characteristics:

- Suited for shutoff or flow modulation
- High pressure applications okay
- Has distinct flow characteristics related to porting design
- Okay for corrosive or high viscous materials
- Can be designed for high pressure differentials across valve

# Ball Valves

## Characteristics:

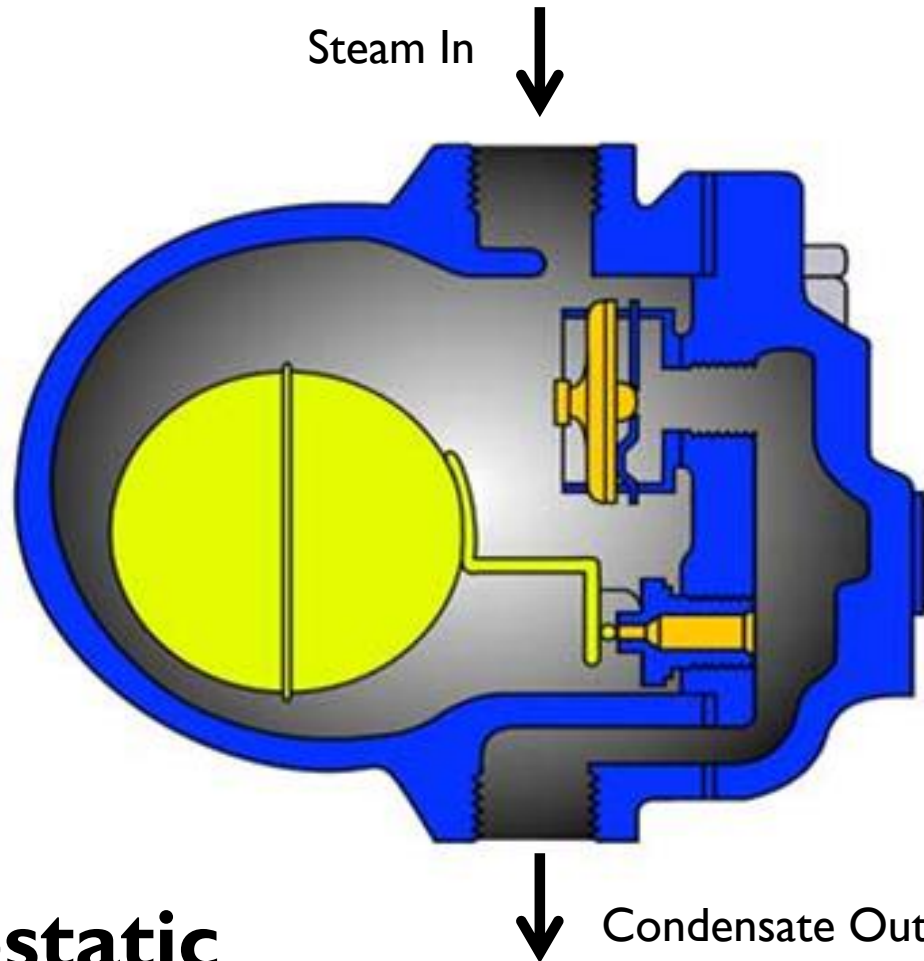
- Durable
- Suited for shutoff or full open
- Typically small in size (< 12")
- 1/4 turn, quick operation
- Handle position indicates open, close



### ***Safety Tip:***

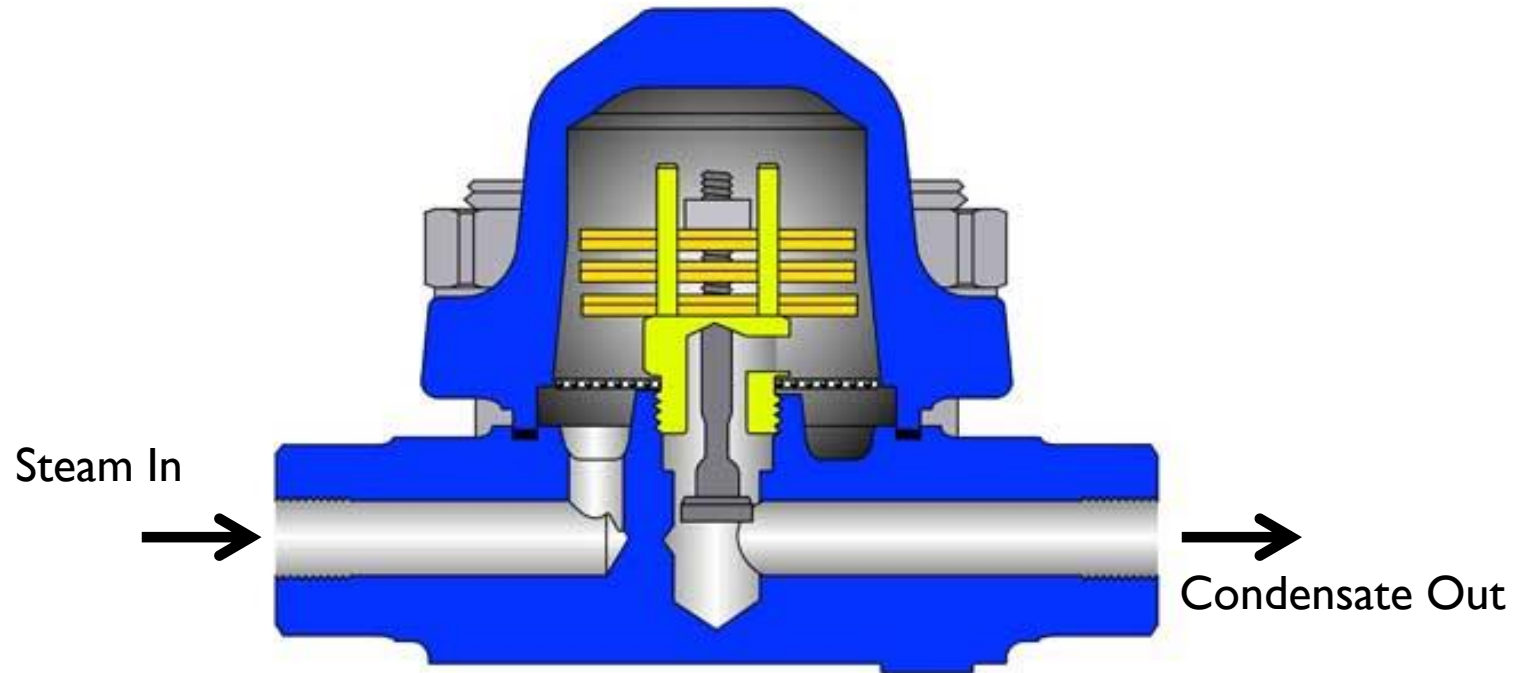
-These valves can be easily “bumped” closed or open causing potential loss of instrument air, etc. or other operational upsets. The valve pictured has a locking device.

# Float Type Steam Traps



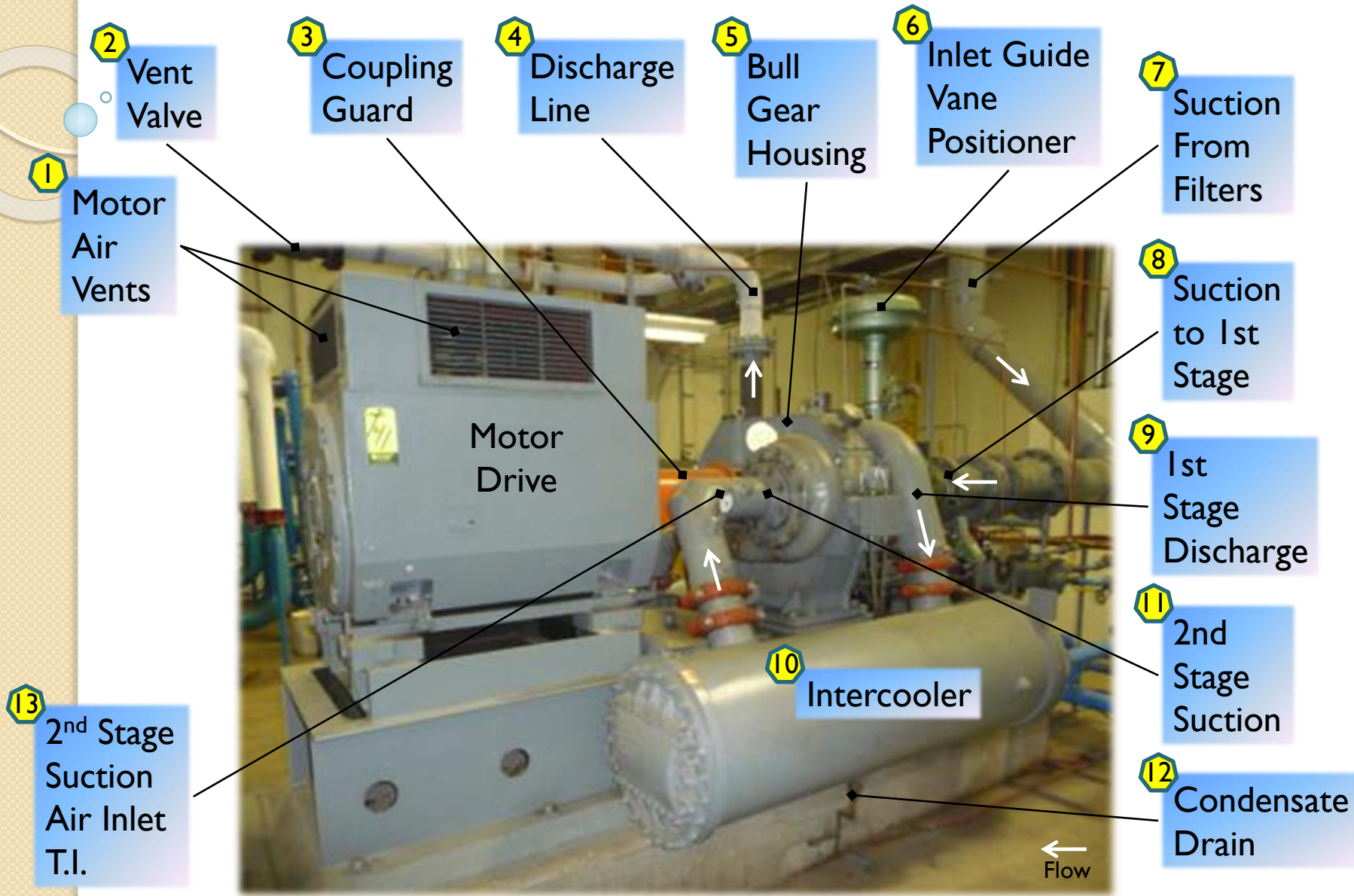
**Float &  
Thermostatic  
Trap**

# Thermostatic Type Steam Traps



**Bi-metal  
Trap**

# Care Points



Air Compressor



# The Promised Practical Tips

- **PRESS the BUTTON!**
  - Easier than restaging
- **Take 'em BIG**
  - Enlarging/ cropping
- **Clarity**
  - Tripod, monopod
  - Use display zoom... delete & reshoot
  - Trigger

# The Promised Practical Tips

- Shoot the signs



# The Promised Practical Tips

- Bring extra cards
  - Relatively cheap
  - More, smaller
    - Better 4- 2Gig than 1- 8Gig
  - Don't fill in "raw" mode
  - Known to "crash", backup ASAP!



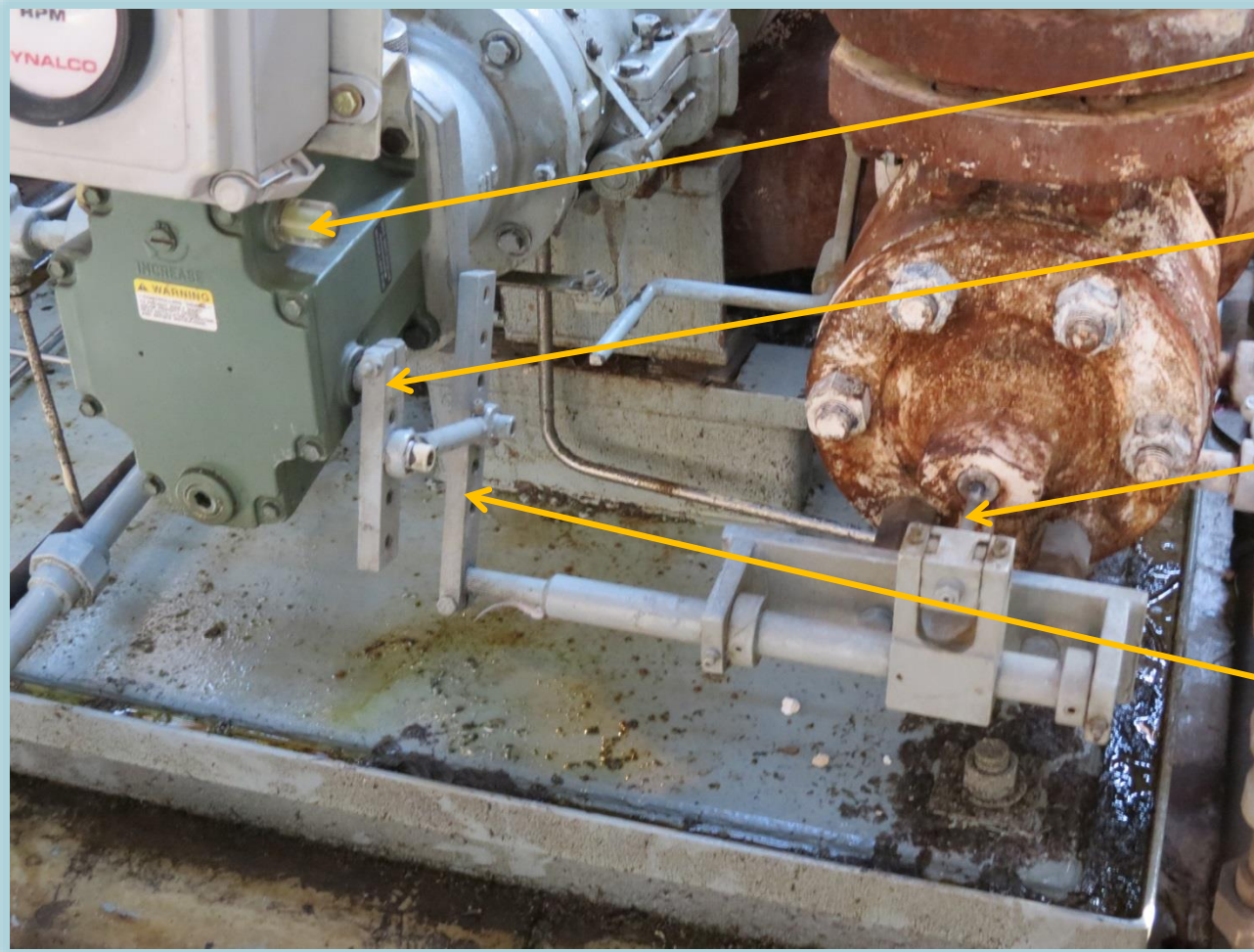
# The Promised Practical Tips

- **Simplicity**



# The Promised Practical Tips

- **Simplicity**



Oil Sight Glass

Terminal Output Shaft

Steam Admission Valve

Speed Control Linkage

# The Promised Practical Tips

- Eye catchers





# The Promised Practical Tips

- For CBT's:
  - Camera Settings
    - JPG (not RAW or TIFF)
    - Finest Quality/ Compression
    - Date/Time: OFF
    - ISO: 800
    - White Balance: Day
    - Metering: Center Weighted

# The Promised Practical Tips

- For CBT's:
  - Camera Positioning
    - Sun over shoulder
    - Horizontal camera
    - Multiple sides, views
    - WIDE not zoom
    - Take GOOD and BAD examples



# The Promised Practical Tips

- For CBT's:
  - Steady does it
    - Tripod
    - Monopod

or

The “Death Grip”



# Points to Ponder

- Your work may endure...
  - Evergreen
    - Use established software, upgrade often
    - Store source materials on a backed-up site, not CD's or thumb drives
    - PSM operator training is based on procedures, review and renew training materials with procedures