Specifying the Optimal Chemical Pump

Nancy Westcott

President, GoatThroat Pumps

Overview

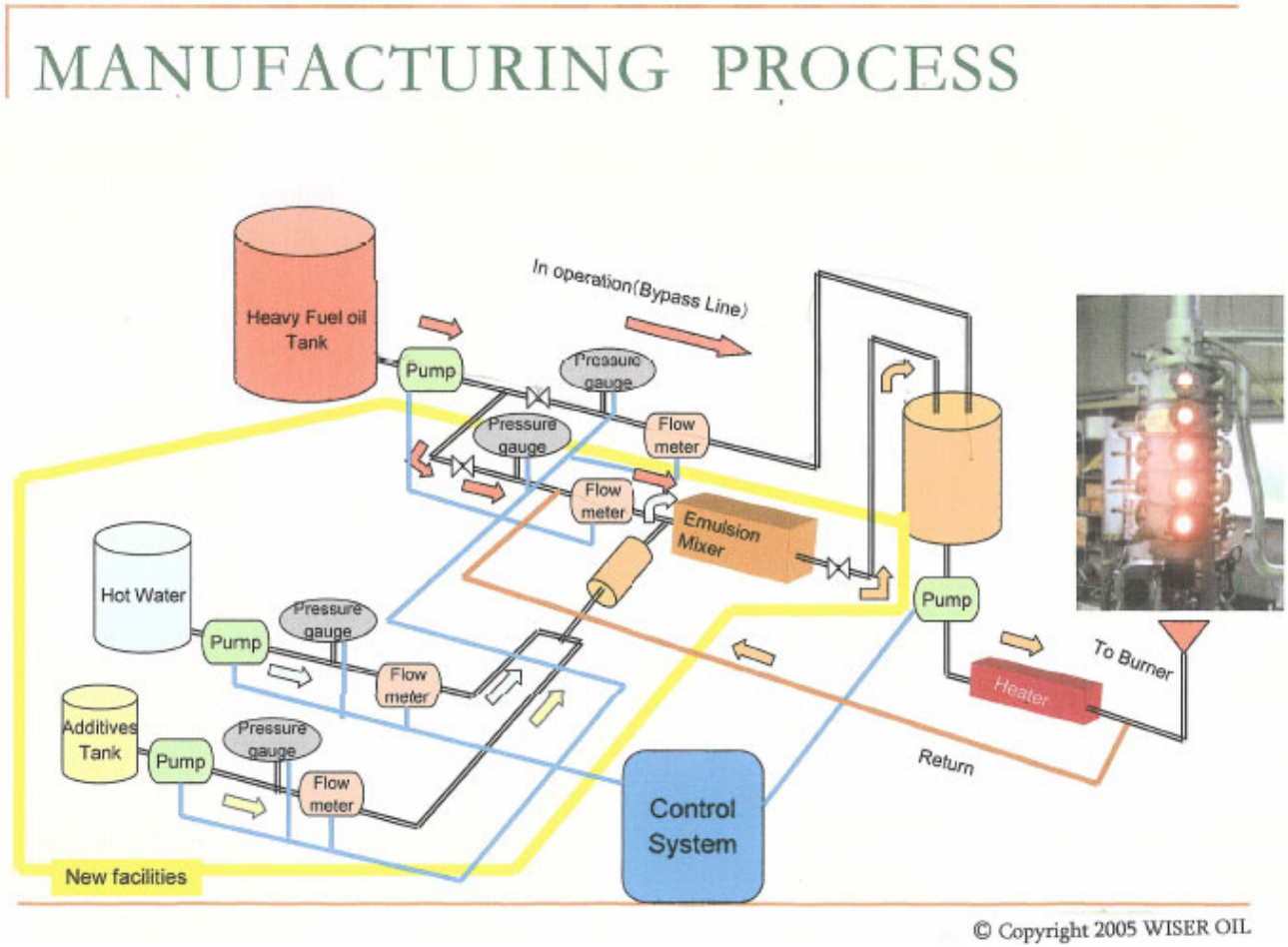
- Pump Locations and Uses
- Classification of Pumps
- Pump Selection
  - Define the Application Environment
  - Define the Specs
    - Flow Rates
    - Materials of Construction
    - Hazardous Locations

Wetted System Parts

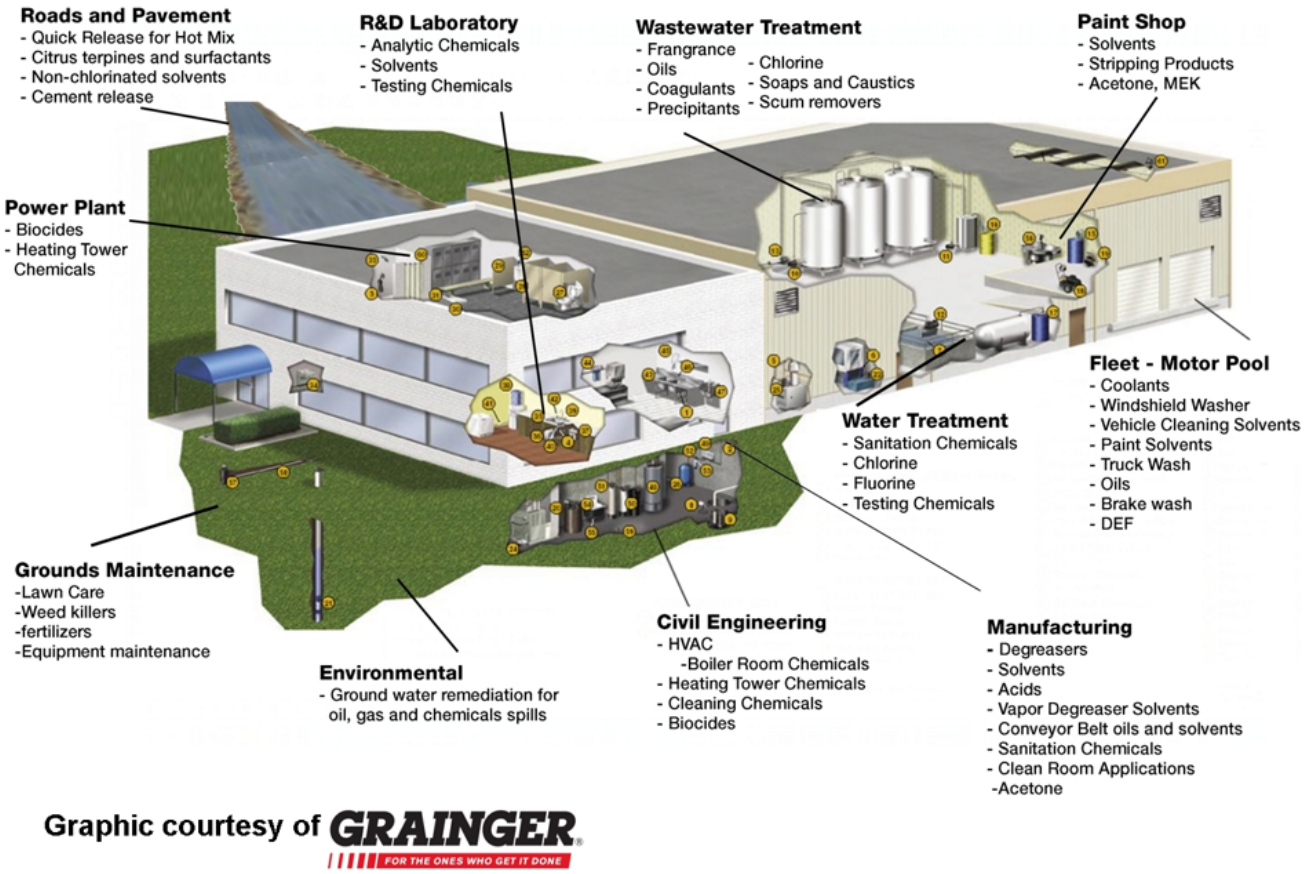
Must Be Inert

to the Liquid and Its Fumes

Pump System Components



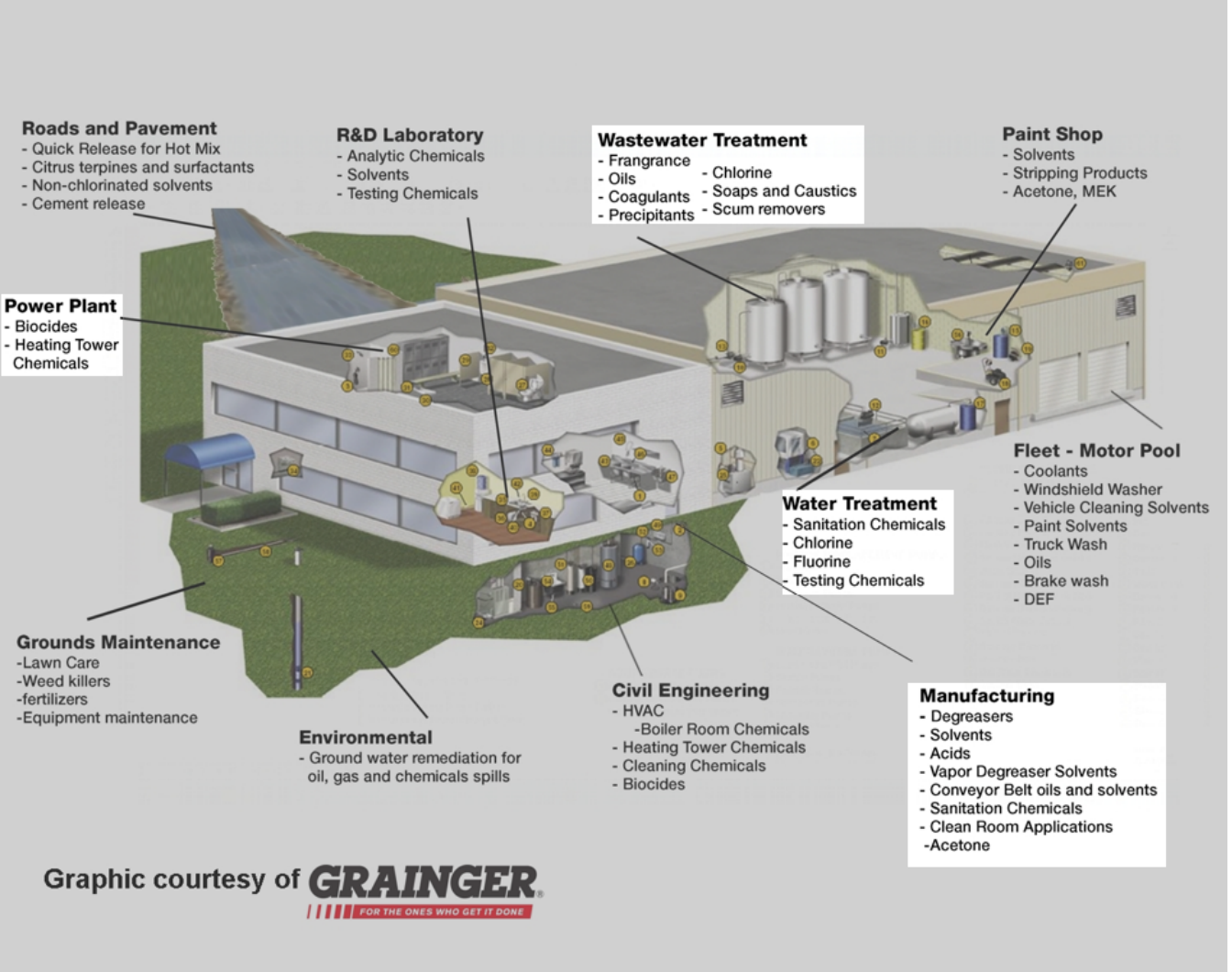
Pump Locations in a Plant



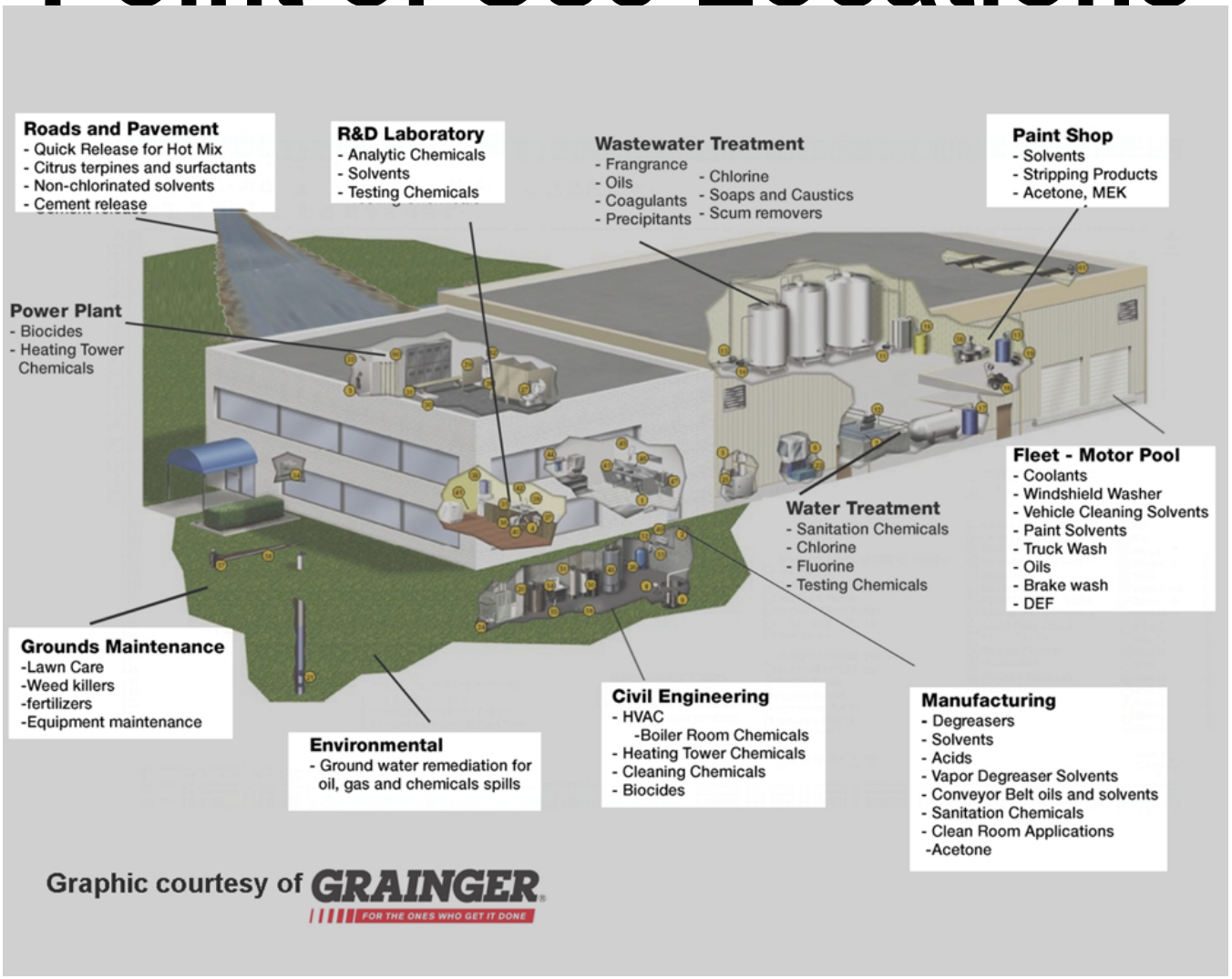
Graphic courtesy of GRAINGER

FOR THE ONES WHO GET IT DONE

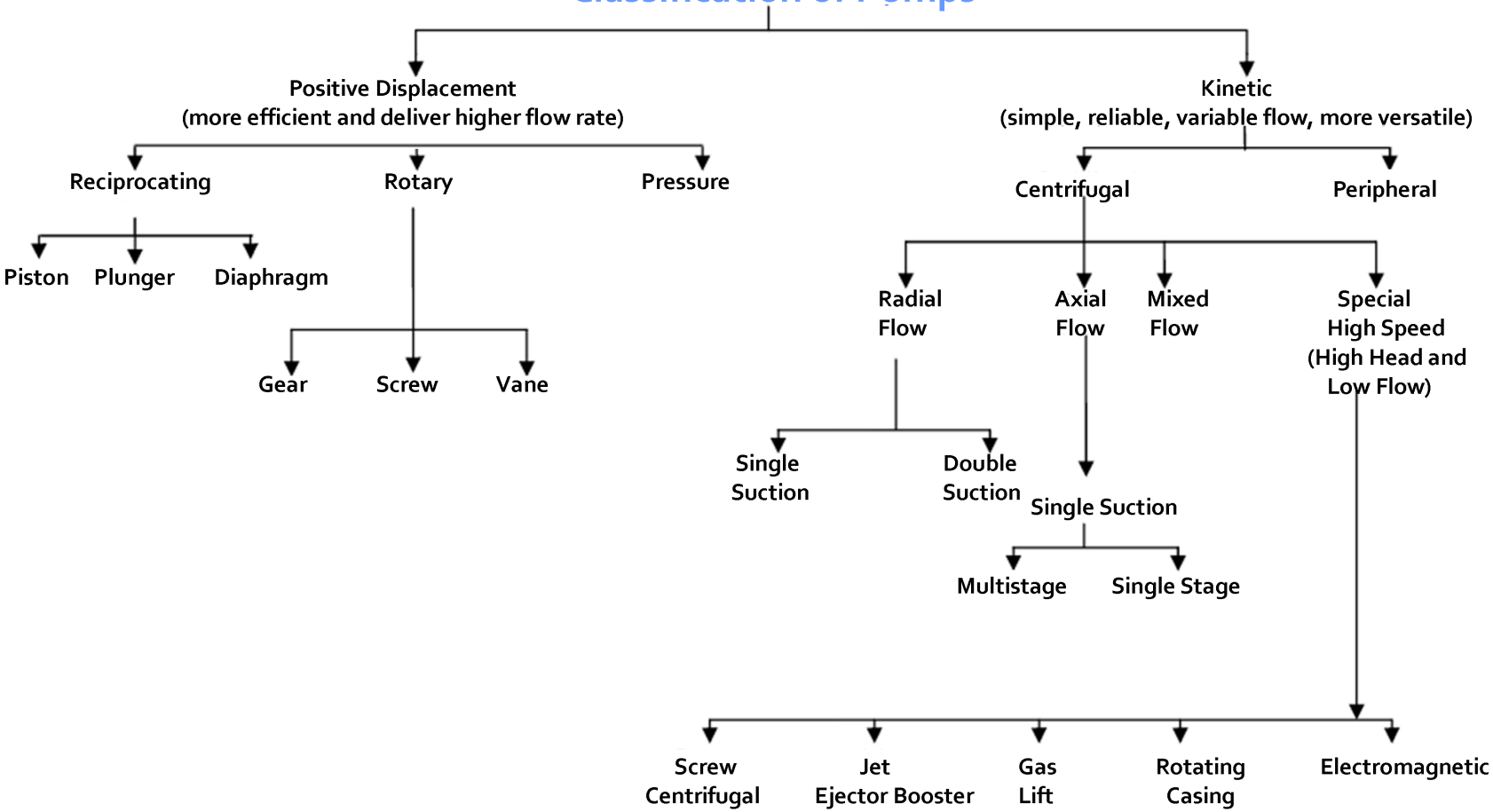
In-Line Pump Locations



Point of Use Locations

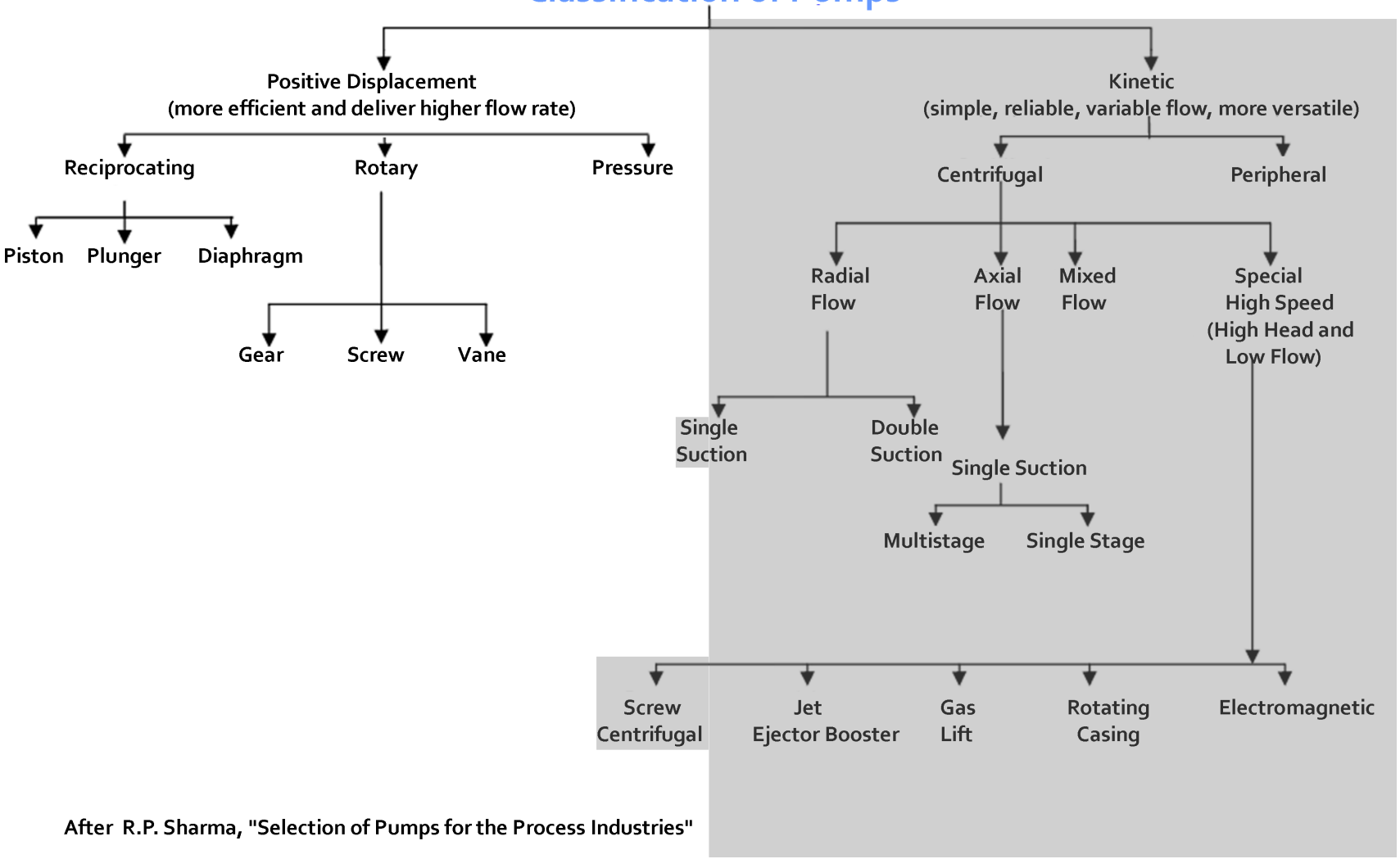


Classification of Pumps



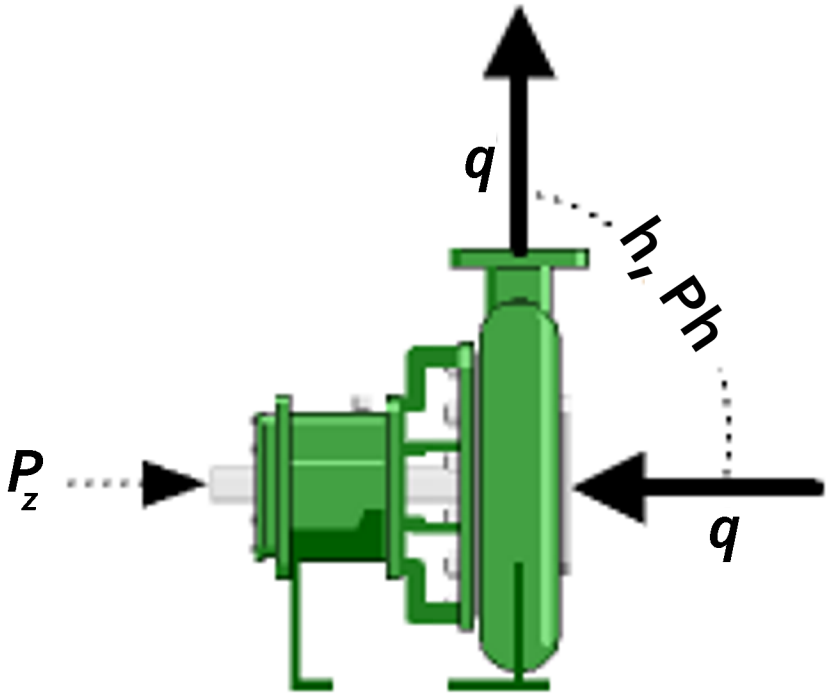
After R.P. Sharma, "Selection of Pumps for the Process Industries"

Classification of Pumps

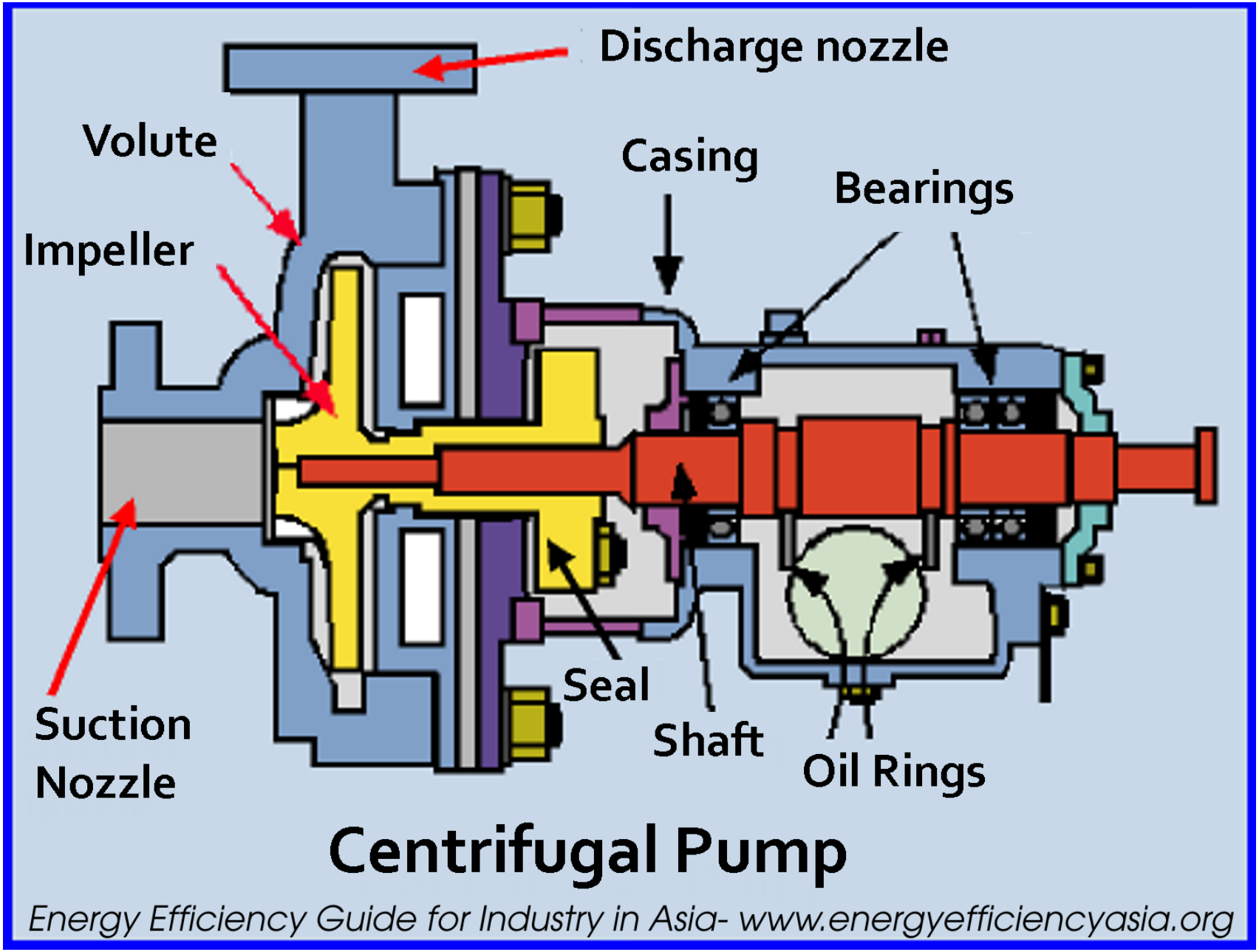


After R.P. Sharma, "Selection of Pumps for the Process Industries"

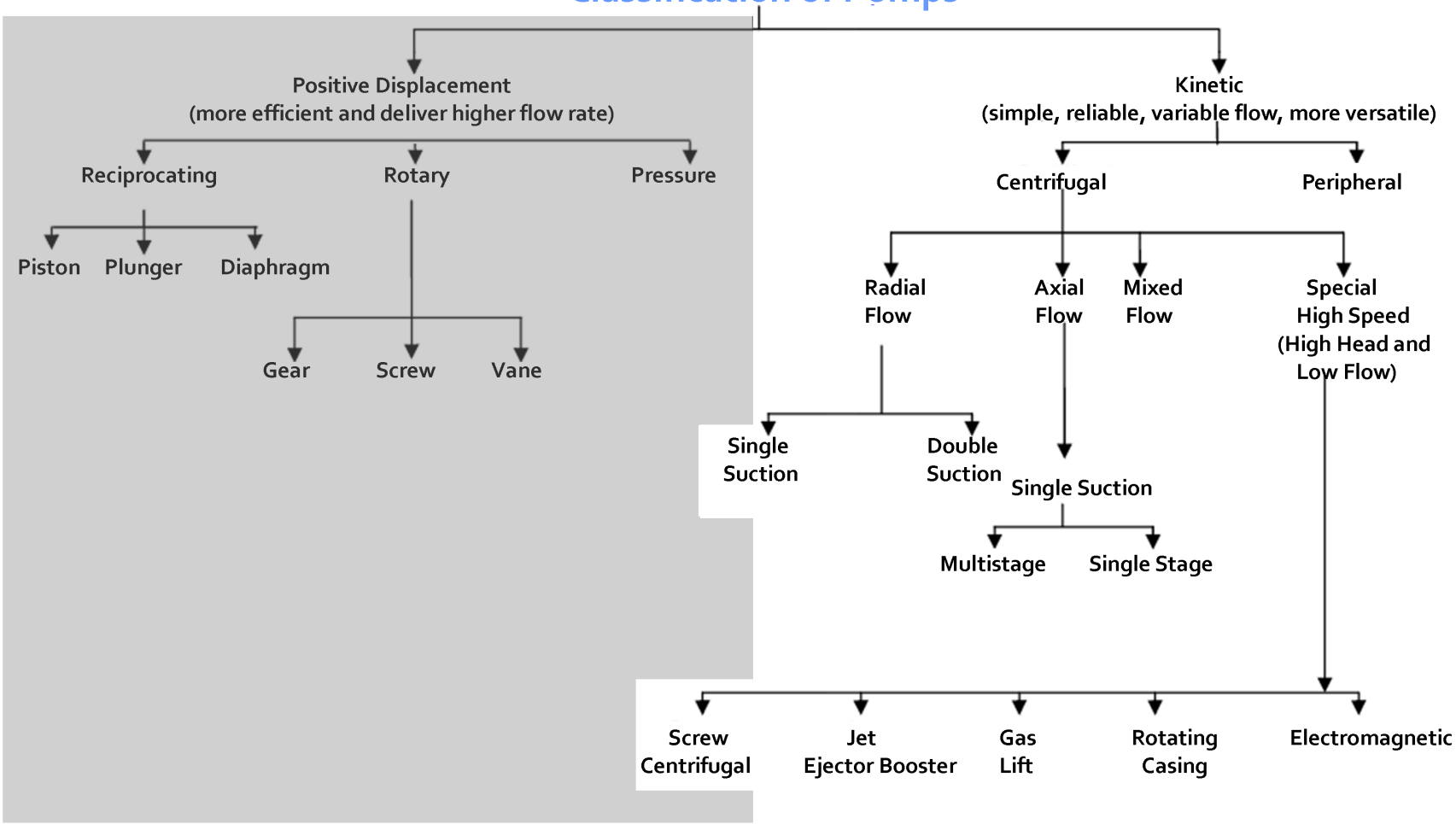
Centrifugal Pumps



engineeringtoolbox.com

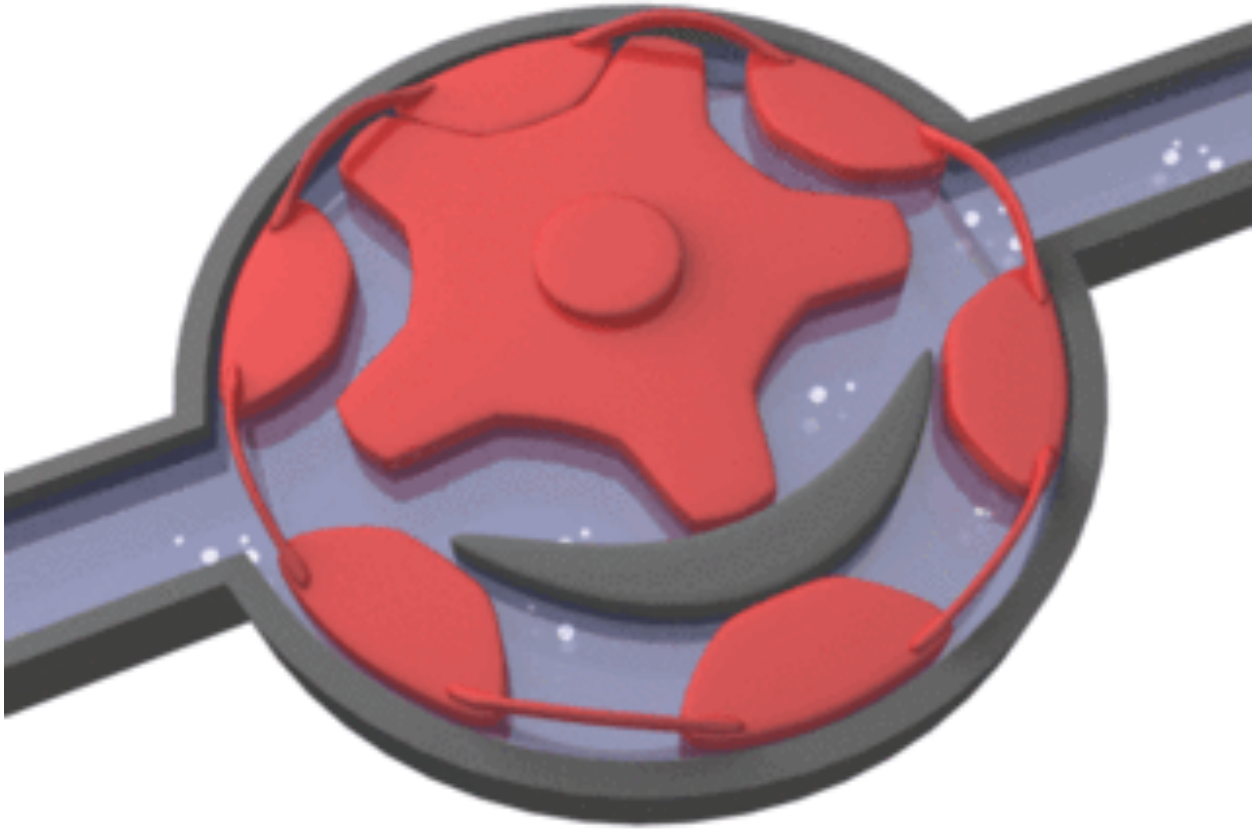

Discharge nozzle
Volute
Casing
Bearings
Impeller
Suction Nozzle
Seal
Shaft
Oil Rings
Centrifugal Pump
Energy Efficiency Guide for Industry in Asia- www.energyefficiencyasia.org

Classification of Pumps



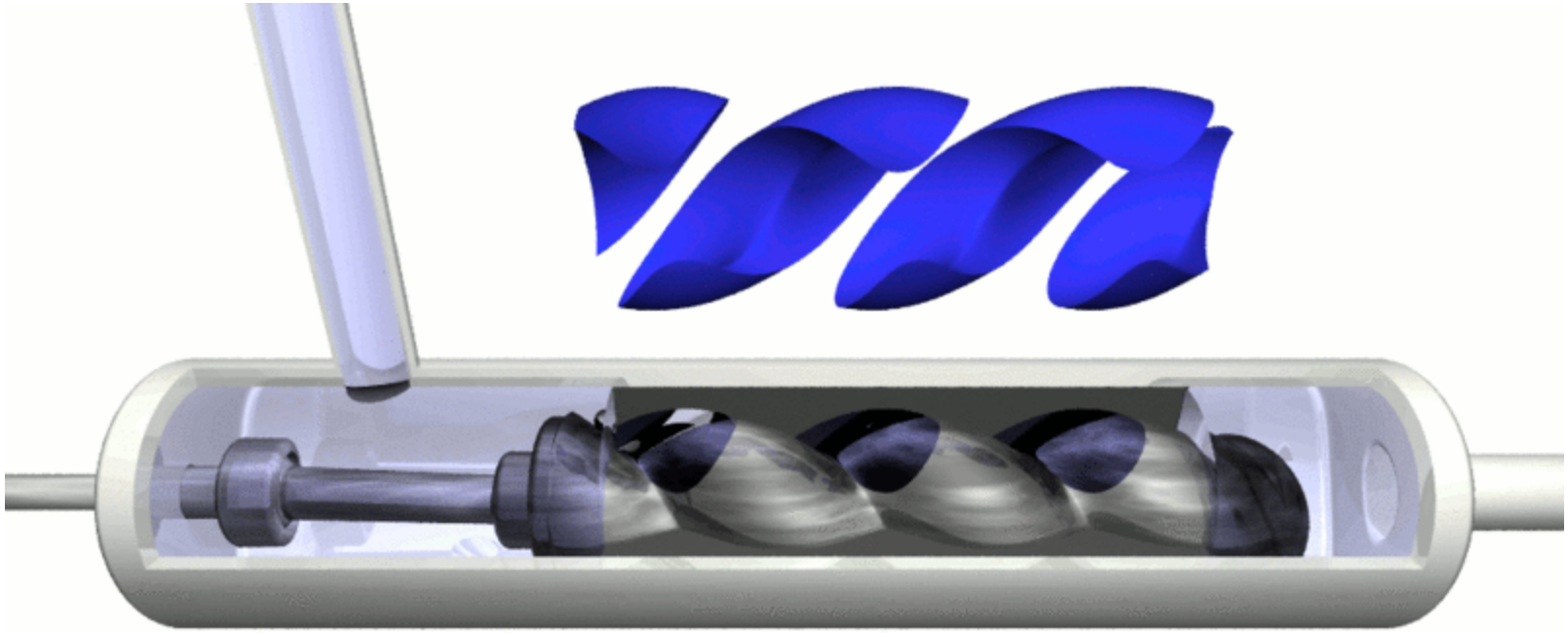
After R.P. Sharma, "Selection of Pumps for the Process Industries"

Gear Pumps



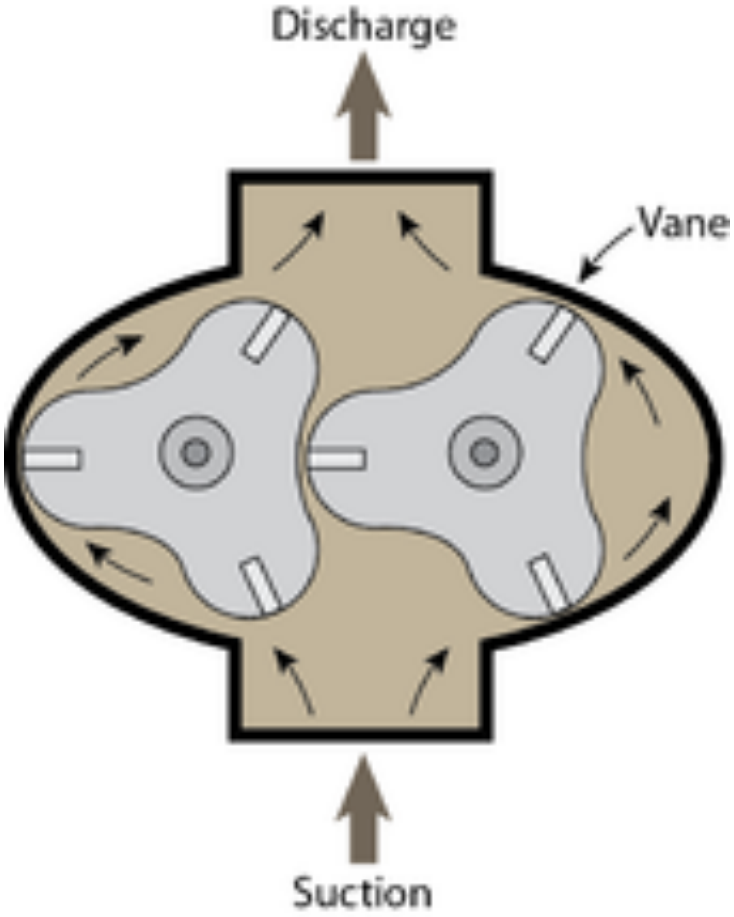
From Wikipedia.com

Progressive Cavity Pumps



From Wikipedia.com

Lobe Pumps

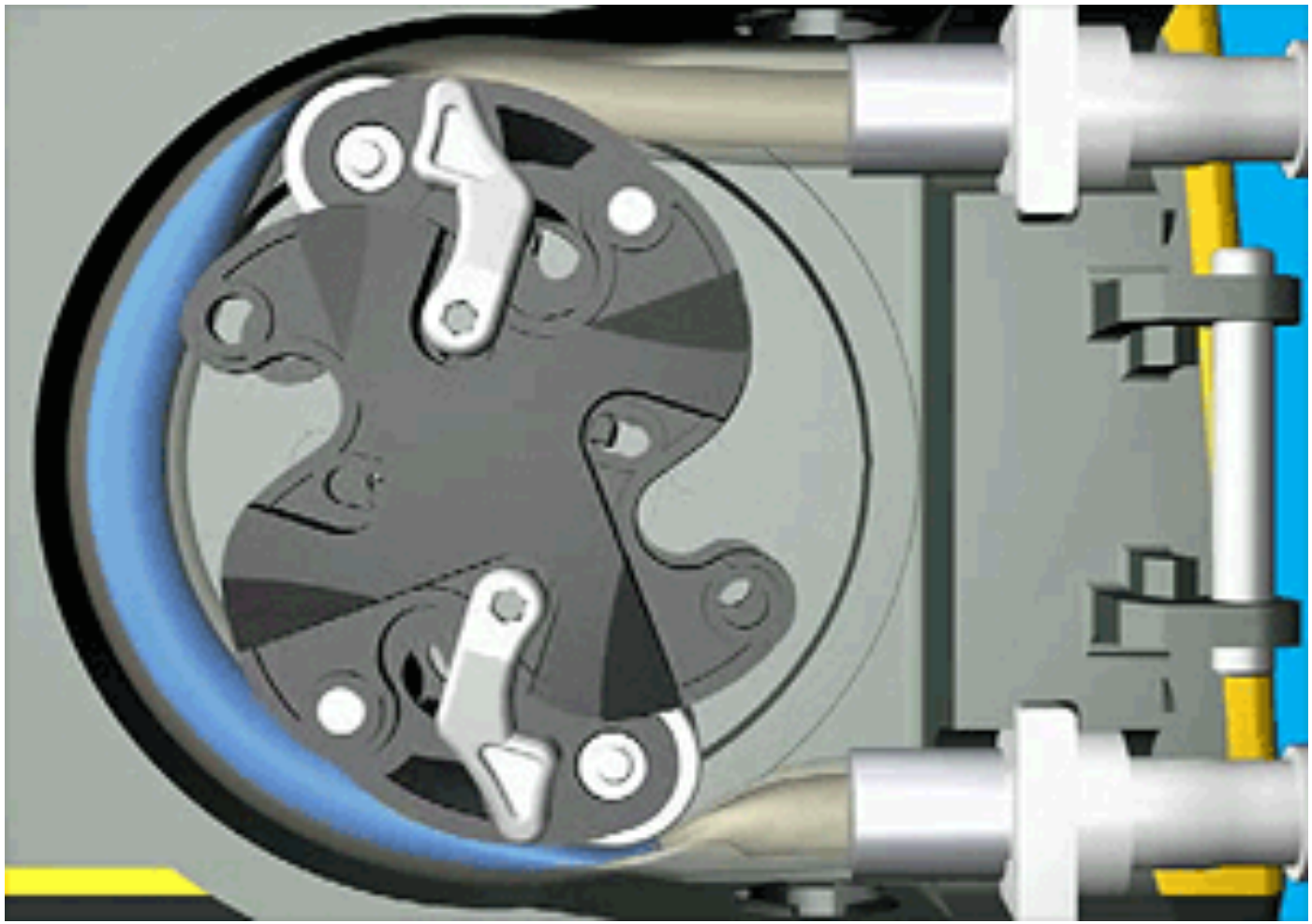


From Wikipedia.com

Rotary Vane Pump

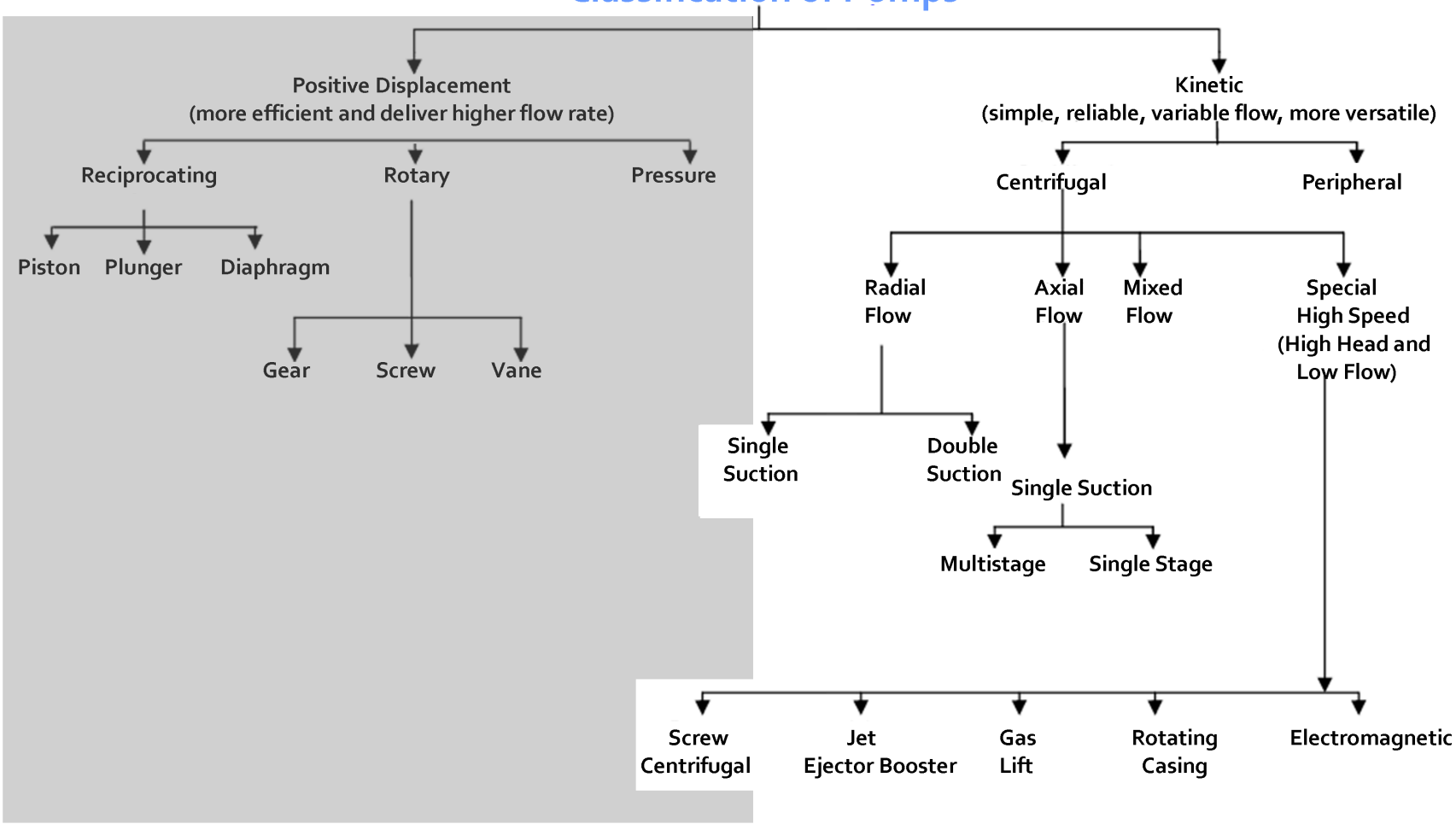
From Wikipedia.com

Peristaltic Pumps



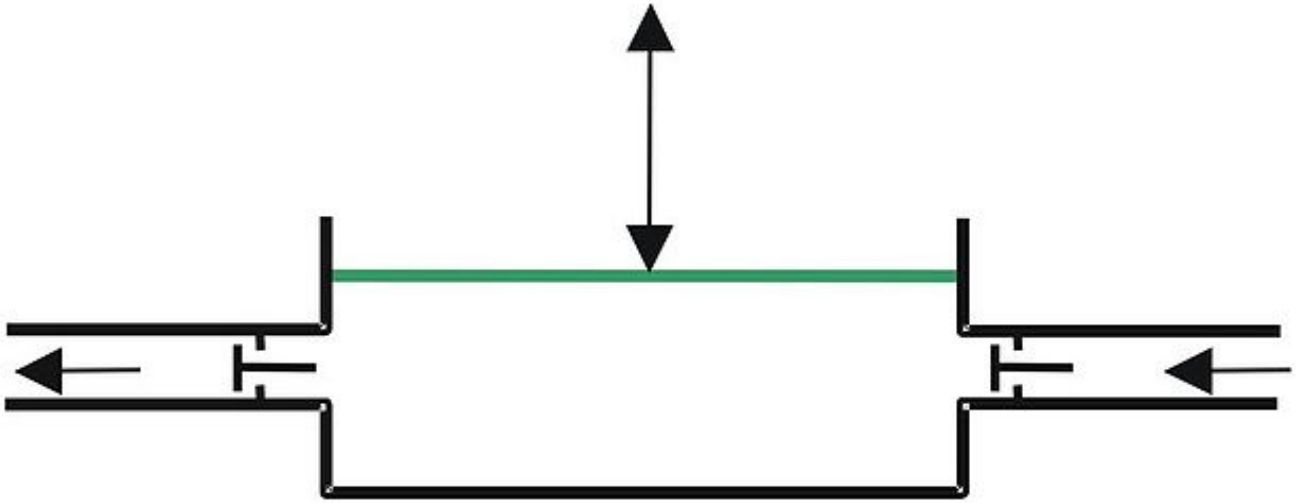
From Wikipedia.com

Classification of Pumps



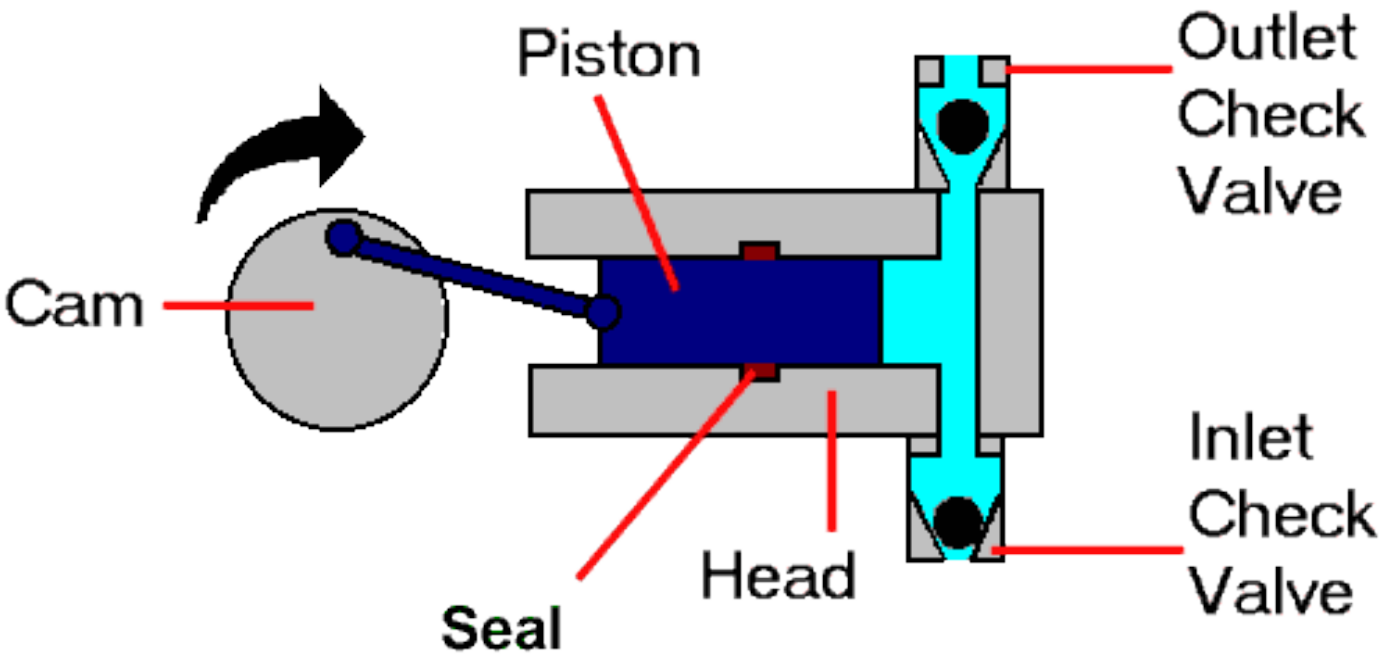
After R.P. Sharma, "Selection of Pumps for the Process Industries"

Diaphragm Pump



From Wikipedia.com

Piston Pump



From Wikipedia.com

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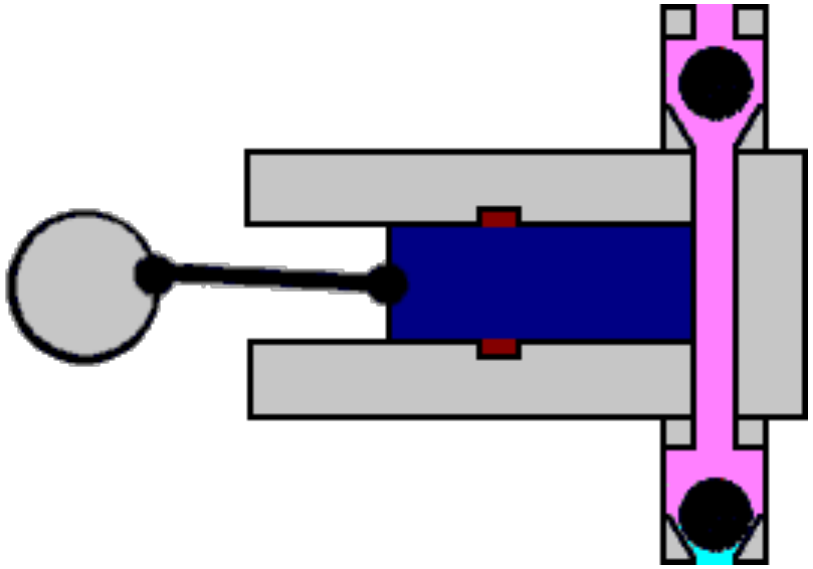

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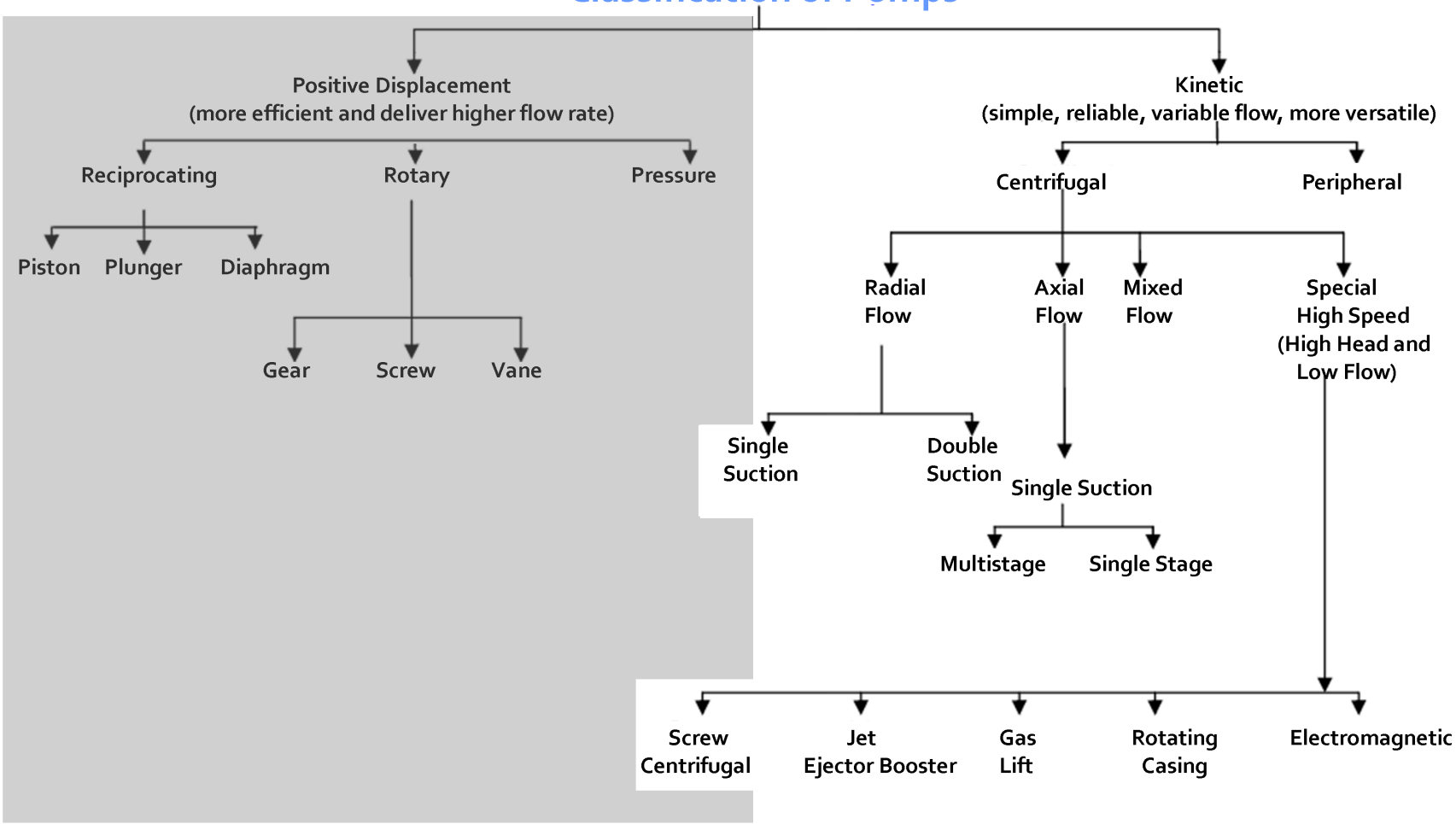
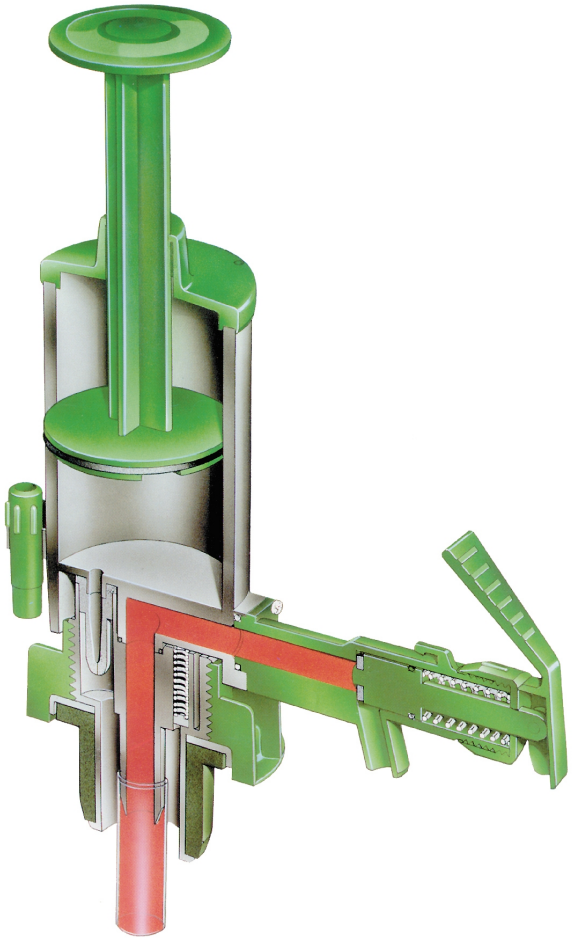
Classification of Pumps



After R.P. Sharma, "Selection of Pumps for the Process Industries"

Pressure Pump



Pump Selection: Define the Need

- Centrifugal
  - Variable Flow Rate depending on pressure head and flow rate
  - Not good with viscous fluids
  - Changing pressure or head will have a dramatic effect on flow rate
- Positive Displacement
  - Fixed Flow Rate
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Pump Selection: Define the Specs

- **KIND OF MATERIAL BEING PUMPED**
- **PUMP OPERATION**
- **OPERATING ENVIRONMENT**
- **HOW POWERED**
- +++++++ many more

Pump Selection: Define the Specs

- **KIND OF MATERIAL BEING PUMPED**
  - Food
  - Base, Acid, Solvent
  - Flammable or combustible liquid
  - Slurry, Solid Or Clear
  - Viscosity Of Material
  - Hot or Cold Liquid Temperature
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  - Adjustable Or Fixed Flow Rate
  - Continuous Or Occasional Duty
  - Continuous Flow Vs Pulsing
  - Might It Need To Run Dry?
- **OPERATING ENVIRONMENT**
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  - Temperature
  - Wet vs Dry Environment
- **HOW POWERED**

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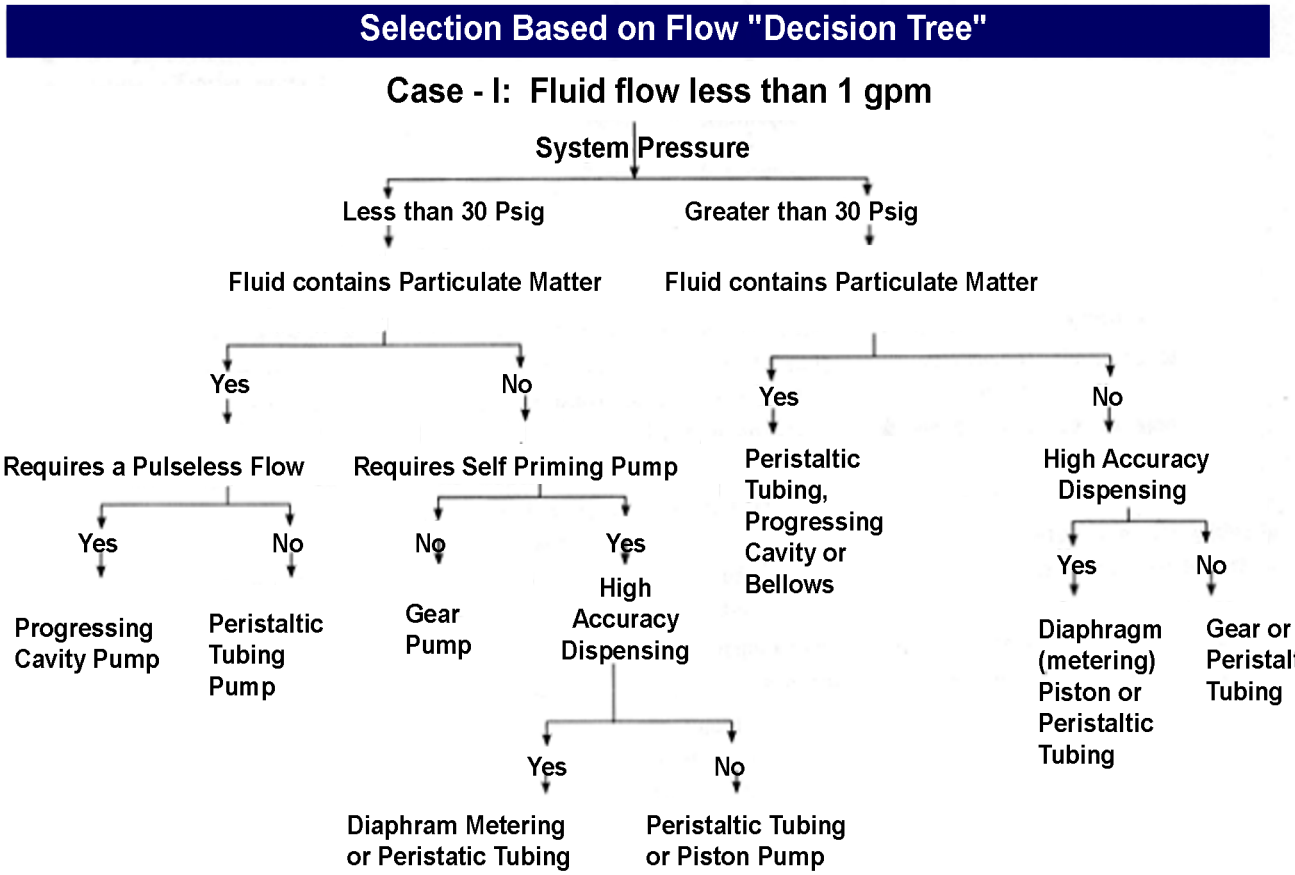
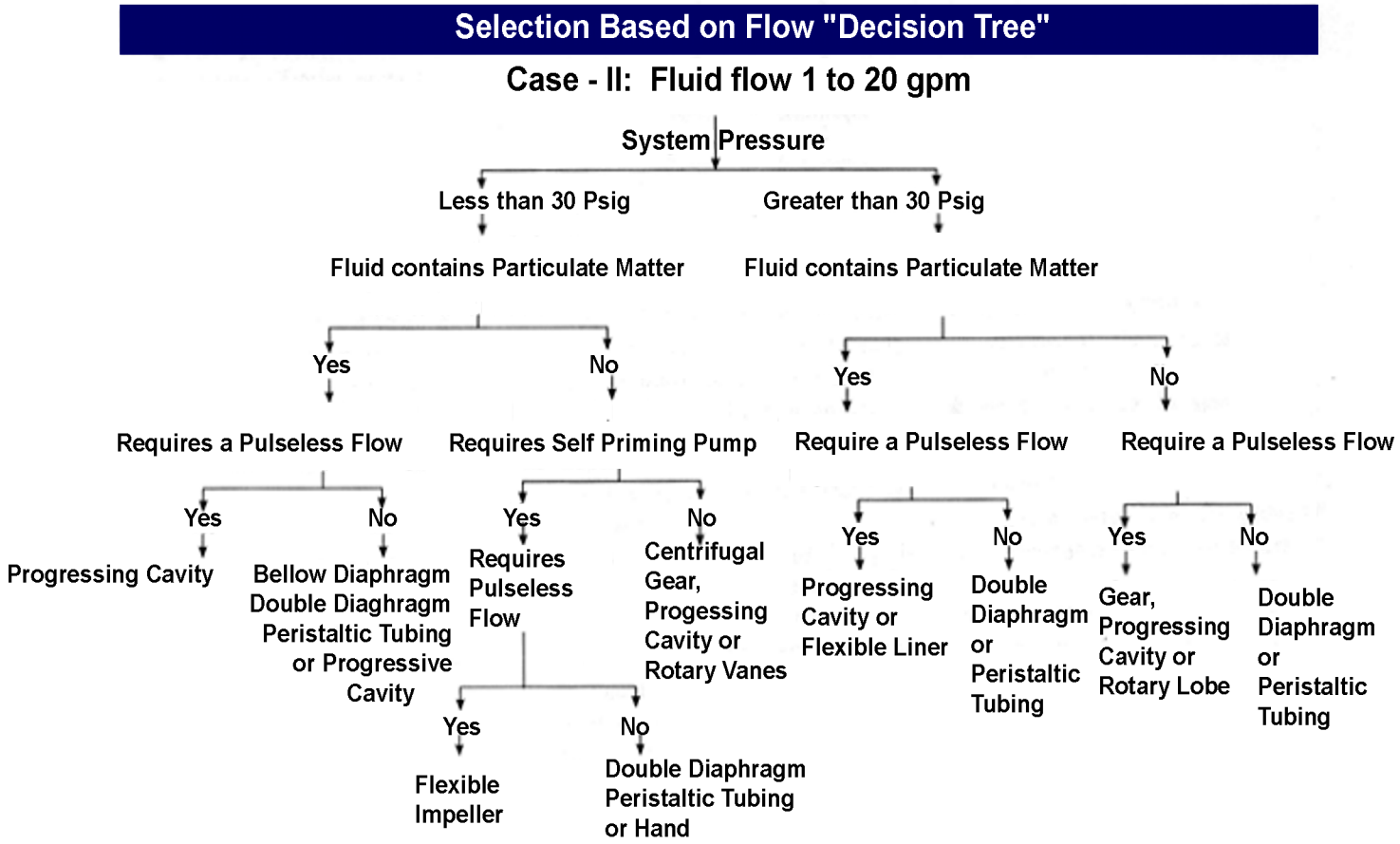
- **OPERATING ENVIRONMENT**
  - Temperature
  - Wet vs Dry Environment
- **HOW POWERED**
  - Electric, Pneumatic Or Hand Operated

Pump Selection: Flow Rate



R.P. Sharma: "Selection of Pumps for the Process Industry"

Pump Selection: Flow Rate

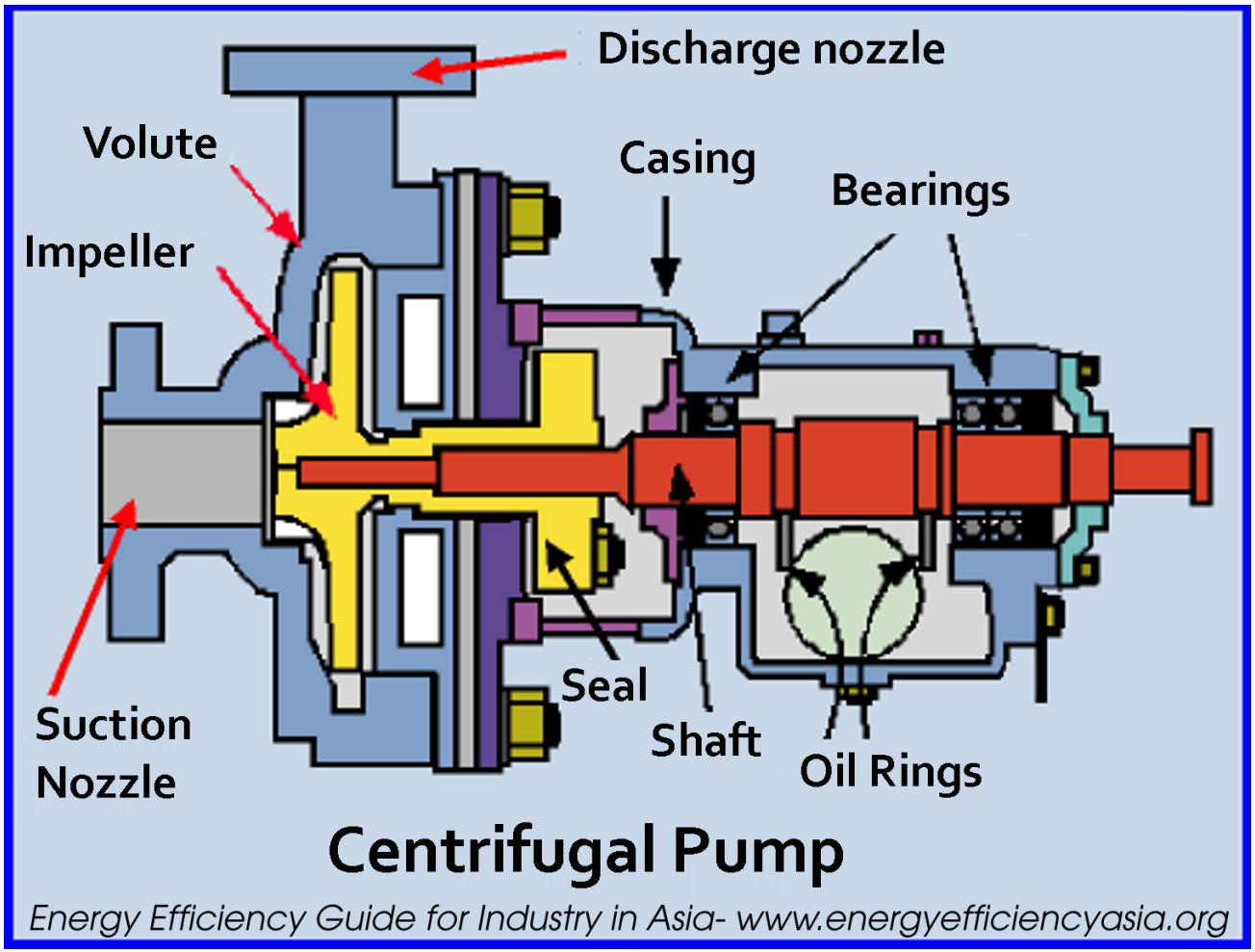


R.P. Sharma: "Selection of Pumps for the Process Industry"

Materials of Construction

- Match the liquid with the pump components to avoid corrosion or deterioration of either the product or the pump.

Materials of Construction



Materials of Construction

- FOOD GRADE PUMPS
  - Must be made of FDA compliant materials
  - Must be cleanable to appropriate standards with heat or chemical
    - Stainless Steel
    - Food grade plastics and elastomeric parts (rubber parts)

Materials of Construction

- Hazardous chemicals require MSDS
- This special paperwork can help figure out what pump materials are correct.

Materials of Construction

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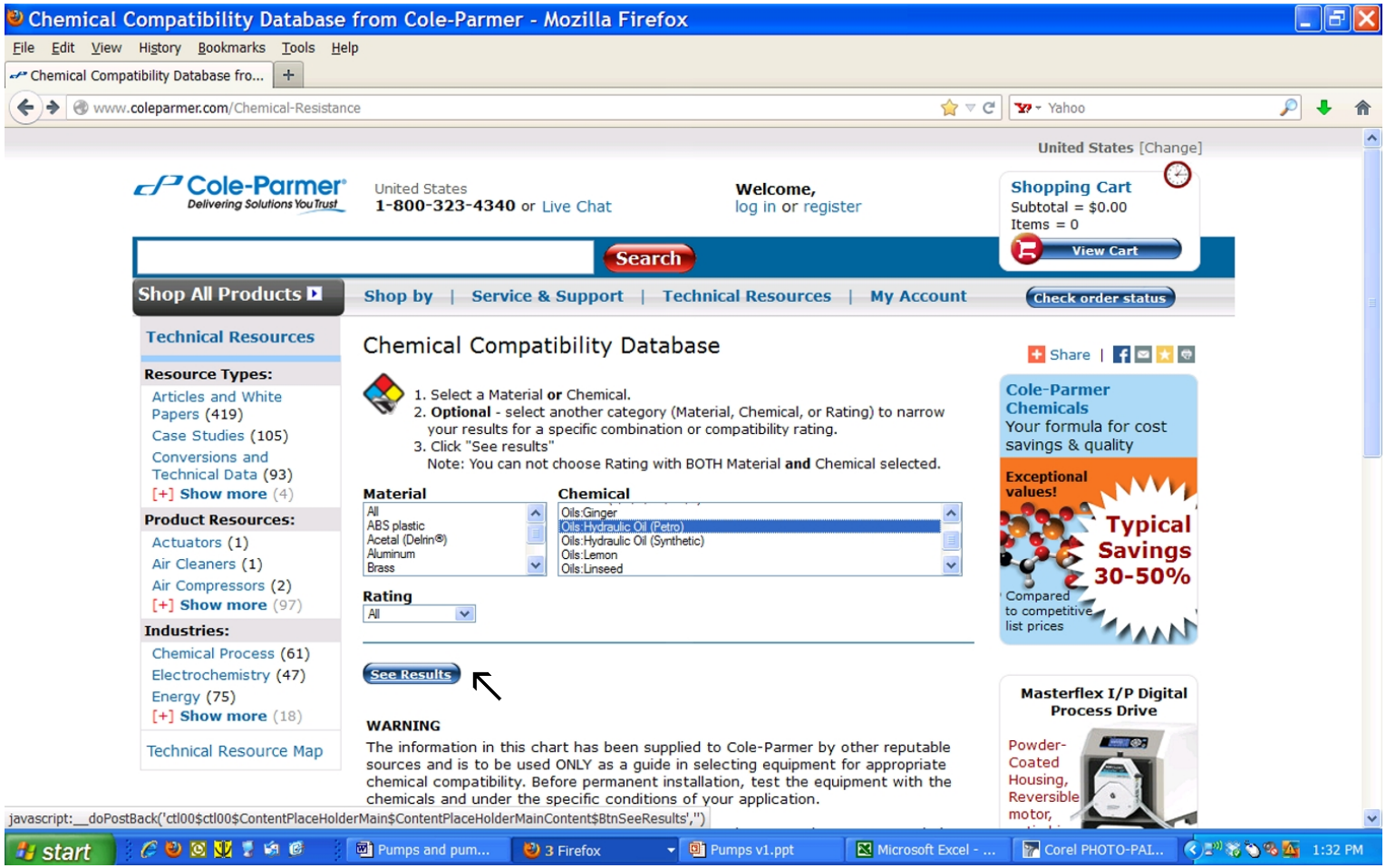
- The MSDS, Material Safety Data Sheet has a new name – SDS.
- See more at: http://www.msdsonline.com/blog/2012/08/from-msds-to-sds/#sthash.Mr11Dqm0.dpuf

Materials of Construction

- ON-LINE RESOURCES FOR MATERIALS SELECTION
- http://www.coleparmer.com/Chemical-Resistance
- http://www.flw.com/datatools/compatibility/
- http://goatthroat.com/complete-chemical-liquid-compatibility-guide/
- http://www.goatthroat.com/downloads/GoatThroat%20Training/Johnson%20Chemical%20Guide.pdf

Materials of Construction



Share

1. Select a Material **or** Chemical.
2. **Optional** - select another category (Material, Chemical, or Rating) to narrow your results for a specific combination or compatibility rating.
3. Click "See results"
   Note: You can not choose Rating with BOTH Material **and** Chemical selected.

Material

All
ABS plastic
Acetal (Delrin®)
Aluminum
Brass

Chemical

Oils:Ginger
Oils:Hydraulic Oil (Petro)
Oils:Hydraulic Oil (Synthetic)
Oils:Lemon
Oils:Linseed

Rating

All

See Results

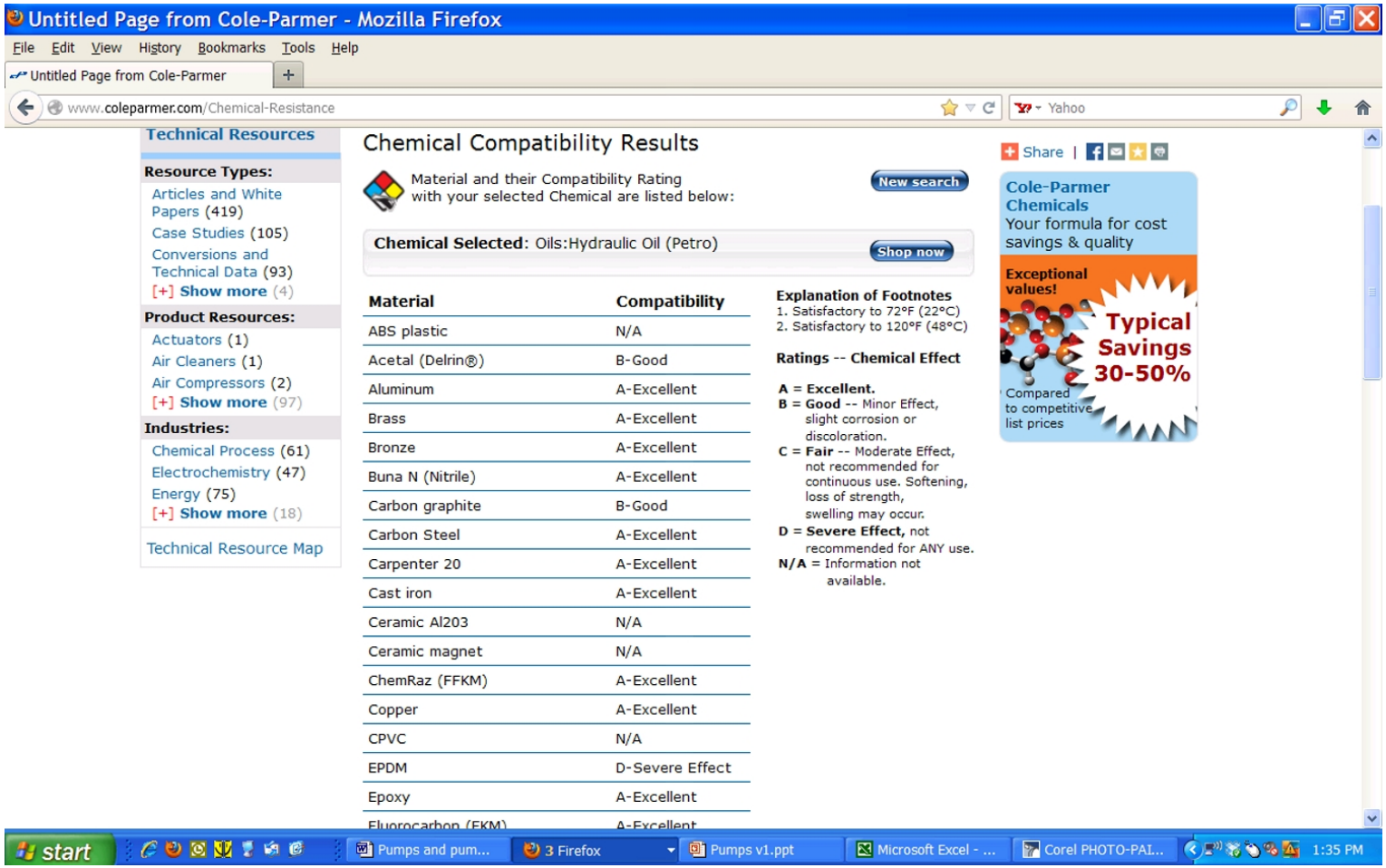
WARNING

The information in this chart has been supplied to Cole-Parmer by other reputable sources and is to be used ONLY as a guide in selecting equipment for appropriate chemical compatibility. Before permanent installation, test the equipment with the chemicals and under the specific conditions of your application.

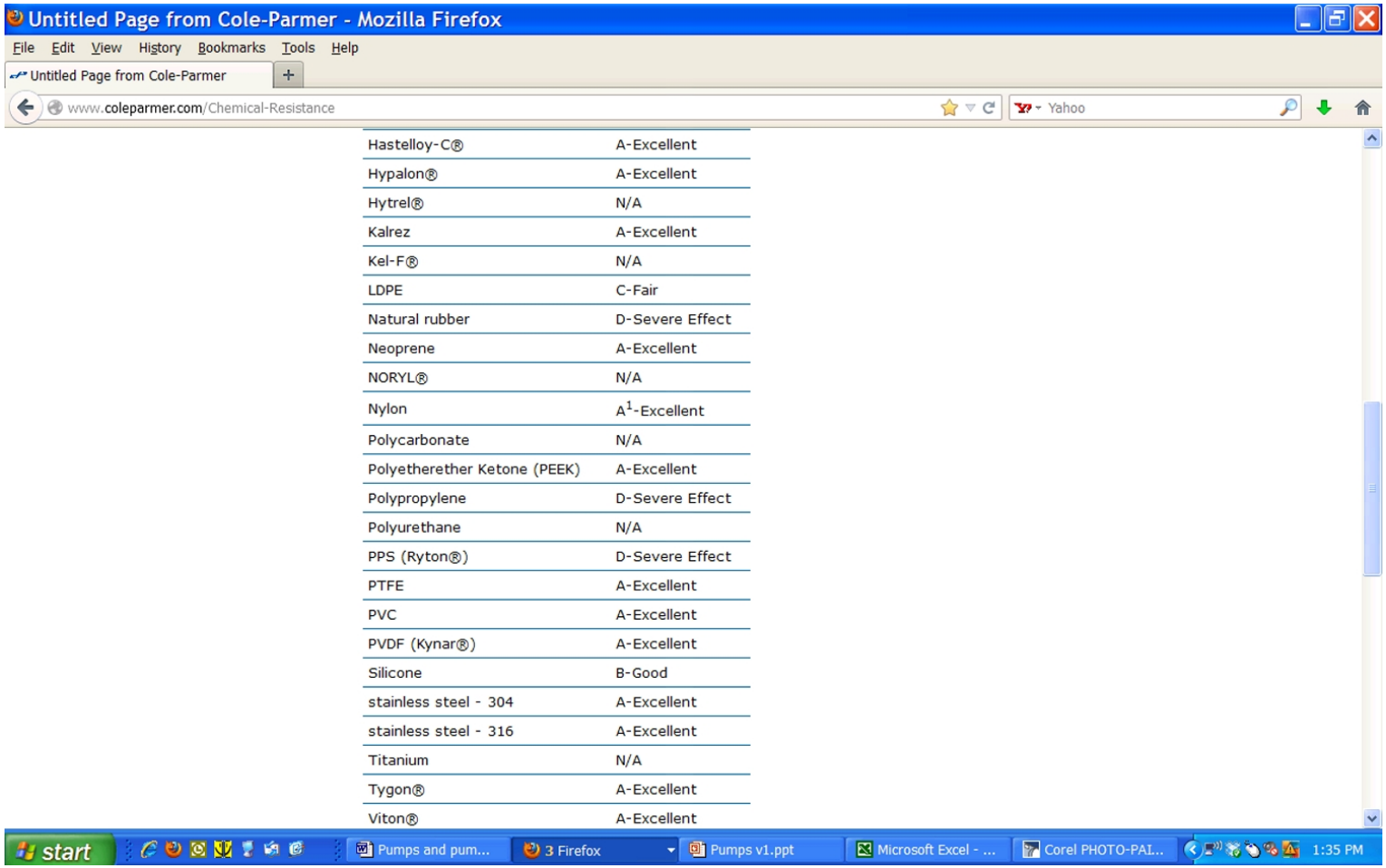
derMain$ContentPlaceHolderMainContent$BtnSeeResults','')

Pumps and pum... | 3 Firefox | Pumps v1.ppt | Microsoft Excel - ... | Corel PH

Materials of Construction



Materials of Construction



Hastelloy-C®	A-Excellent
Hypalon®	A-Excellent
Hytrel®	N/A
Kalrez	A-Excellent
Kel-F®	N/A
LDPE	C-Fair
Natural rubber	D-Severe Effect
Neoprene	A-Excellent
NORYL®	N/A
Nylon	A[1]-Excellent
Polycarbonate	N/A
Polyetherether Ketone (PEEK)	A-Excellent
Polypropylene	D-Severe Effect
Polyurethane	N/A
PPS (Ryton®)	D-Severe Effect
PTFE	A-Excellent
PVC	A-Excellent
PVDF (Kynar®)	A-Excellent
Silicone	B-Good
stainless steel - 304	A-Excellent
stainless steel - 316	A-Excellent
Titanium	N/A
Tygon®	A-Excellent
Viton®	A-Excellent

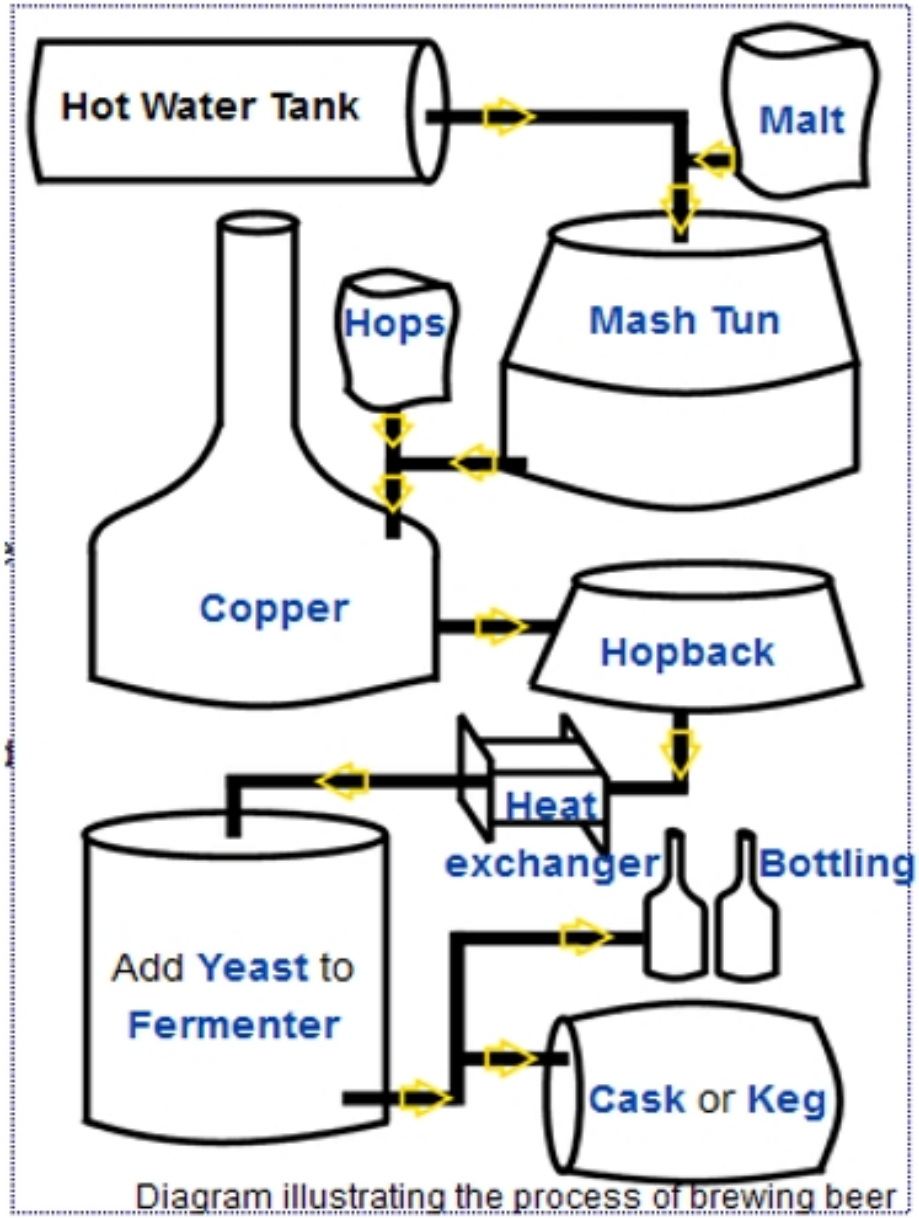


Diagram illustrating the process of brewing beer

Pumps for Hazardous Locations

Pumps for Hazardous Locations

EQUIPMENT CERTIFICATIONS

- WORLDWIDE STANDARDS
  - **IECEX**
- EUROPEAN STANDARDS
  - **ATEX**
- U.S. STANDARDS
  - **NFPA**
  - **UL**
  - **FM**
  - **INTERTEK**

Discussion Groups

- Linked-In has some great discussion groups going and they have answers from all over the world:
  - **Pump engineers**
    - Current discussions – slurry pumps; dry run production devices; fish mortality, injury and removal in cooling water intake systems
  - **Pump Professionals**
    - Current discussion: What is the benefit of having two pressure vessels on discharge header for two pumps instead of one vessel for two pumps, is it possible to select properly one vessel on one side instead of having 2?
  - **Pump Bombas – In English language**
    - Current discussions: **Centrifugal Force is Farce !@#$**

Contact:

Nancy Westcott

President, GoatThroat Pumps

www.goatthroat.com

nwestcott@goatthroat.com

Call 212.255.6964/ 866.639.4628

Reference Material

- All about plastics in pumps http://www.roadsbridges.com/application-possibilities-grow-plastic-pumps
- When to choose a pd vs centrifugal http://www.michael-smith-engineers.co.uk/pdfs/When%20to%20use%20a%20Positive%20Displacement%20Pump%2002.pdf
- When to choose peristatic http://www.pump-zone.com/topics/pumps/pumps/choosing-right-pump-paint-systems

Reference Material

- Slurry vs others http://www.pumpscout.com/articles-expert-advice/slurry-pumping-aid103.html
- Centrifugal vs diaphragm http://www.wwdmag.com/pumps-centrifugal/picking-pump
- Ebay's version choose the right pump http://www.ebay.com/gds/5-Tips-for-Choosing-the-Right-Pump-/100000000177634171/g.html

Reference Material

- Really good British equipment overview http://www.pumpeng.co.uk/choosing-the-right-pump.aspx
- Sizing etc http://www.edwardsvacuum.com/uploadedFiles/Resource/Technical_Articles/How%20to%20Select%20the%20Right%20Vacuum%20Pump%20for%20the%20Application.pdf
- Excellent pump selection primer http://www.energymanagertraining.com/Journal/24092005/SelectionofPumpsforProcessIndustries.pdf

Reference Material

- Everything about centrifugal pumps http://net.grundfos.com/doc/webnet/mining/_downloads/pump-handbook.pdf
- Immersible pumps http://us.grundfos.com/products/find-product/mtr-spk-mth-mta/jcr%3Acontent/tabbedpanel/brochures/par2/downloads/download_2/file/file.res/L-MT-SL-002.pdf

Reference Material

- Electrical energy useage and pump selection http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=17&ved=0CHcQFjAGOAo&url=http%3A%2F%2Fwww.retscreen.net%2Ffichier.php%2F908%2FChapter%2520Pumps%2520and%2520Pumping%2520Systems.pdf&ei=AJB7UpiuDNStsATI14GACA&usg=AFQjCNH3kekNDCAMJnfpD_CasiMuZgwh_A&sig2=mVikpmGGMQUihJfUGio92A

Reference Material

- Life cycle cost
- http://www.ciras.iastate.edu/publications/EnergyBP-ChemicalIndustry/Sourcebook_Chapter7.pdf
- Gorman Rupp http://www.grpumps.com/files/AV-05559.pdf