Blackmer Products
WYTH’S LAW

Under the most rigorously controlled conditions of capacity, pressure, temperature, and other variables, the pump will do as it damn well pleases.
STERN’S ADDITION TO WYTH’S LAW

Any attempts to alter the pump’s performance from what it is doing to what you really want will make it deviate further from the desired point.
Pump Definition:

A pump is a machine that adds energy existing in a liquid in an increment sufficient for the required service. This service may be the production of velocity or the overcoming of friction or external pressure.
Types of Rotary Pumps

- VANE
  - Blade
    - Bucket
    - Roller
    - Slipper
  - Vane in Rotor
    - Vane in Stator
  - Constant Displacement
    - Variable Displacement

- PISTON
  - Axial
  - Radial
  - Constant Displacement
    - Variable Displacement
  - Single Piston
    - Multi Piston

- FLEXIBLE MEMBER
  - Flexible Tube
  - Flexible Vane
  - Flexible Liner
  - Constant Displacement
    - Variable Displacement

- LOBE
  - Single Lobe
  - Multiple Lobe
  - Spur
    - Helical
    - Herringbone
  - Timed
    - Untimed

- GEAR
  - External
  - Internal
  - Crescent
    - No Crescent
  - Timed
    - Untimed

- CIRCUMFERENTIAL PISTON
  - Single
  - Multiple
  - Timed
    - Untimed

- SCREW
  - Single
  - Multiple
  - Timed
    - Untimed
Blackmer manufactures:

- Rotary, Positive Displacement, Sliding-Vane Pumps
Blackmer manufactures:

- **Rotary**
  Turns in a circle.

- **Positive Displacement**
  A constant volume of liquid is moved with each revolution of the pump.

- **Sliding-Vane Pumps**
  Vanes slide in and out of a rotor.
3 Forces in Blackmer pumps

- CENTRIFUGAL FORCE
- PUSH RODS
- LIQUID PRESSURE
Operating Principles

- Centrifugal force from rotor rotation throw vanes out of rotor slots.
- Push rod operating between opposing vanes help initiate vane movement.
- Liquid pressure entering vane slots act on rear of vane.
  - Maintains contact with cylinder bore.
  - Maintains pump efficiency.
Vanes are forced back into the slot as the cylinder bore decreases.
• The push rod moves through the rotor to initiate movement of the opposing vane.
- As the rotor turns the vane moves outward at the intake port creating a void drawing liquid in.
- Fluid is transferred between the vanes.
- At the outlet, fluid is discharged as pumping chamber area is reduced (and vanes forced back).
Operating Principles

- What if vanes are in backwards?
- No hydraulic force available
- Reduced flow
  - 30% less flow
- Fluid pulsation
  - Hose and piping movement and wear
• Vanes **Self-Adjust** to maintain pump efficiency.
• Vanes are the sacrificial wear part.
• Sliding-vane pumps maintain like-new operation.
- During rotation, vanes remain in contact with cylinder.
- Fluid is transferred between vanes from inlet to discharge.
- No Metal to Metal contact.
Operating Principles

• At the discharge, fluid is discharged as vanes move into slots & pumping chamber decreases.
• Creates high pressure area that causes fluid to flow out the pump discharge.
Pumping Chamber Areas

Fluid flow through the pump:

- **Inlet** - Expansion
- **Transport** - Static
- **Outlet** - Reduction
Cavitation occurs when the pressure at the pump inlet drops below the fluid vapor pressure.

The fluid then “boils.”

Cavitation is the formation of “vapor” bubbles at the pump inlet.

When the vapor bubbles return to liquid, the vapor collapses violently… 

*Implosion*
Results of Cavitation

- Noise
- Vibration
- Damage to pump and piping
- Reduced flow
Cavitation Suppression Liners
Standard in all LGL pumps
Cavitation Suppression Liners

Flow and Noise vs. Inlet Vacuum
TLGLF3, 125 psi, 640 rpm

Flow (gpm)

Inlet Vacuum (-psi)

New Liner Noise Level

Previous Liner Noise Level

Flow
- Blackmer relief valves protect the **pump**, not the system.

- Always recommend using external Bypass Valves
Ball Bearing Support

- Symmetrical ball bearing support
- Maintains even shaft load for mechanical seals & increased pump life
Why Rotary-Vane Pumps?

– Sustained high-level performance.
– Preferred technology for handling light petroleum fluids – like LPG.
– Maintains efficiency – longer pump life
– Easy maintenance.
– Symmetrical bearing loads for long life.
– High energy efficiency – lowers energy costs
– Maximum shaft sealing through:
  • exclusive integral mechanical seal design.
– Two Year Performance Assurance Warranty
Questions?