Best Practices for Pump Selection

Ben Ashe – MDM Inc.

Introduction

“There is a physical problem that is common to many fields, that is very old, and that has not been solved. It is not the problem of finding new fundamental particles, but something left over from a long time ago—over a hundred years. Nobody in physics has really been able to analyze it mathematically satisfactorily in spite of its importance to the sister sciences. It is the analysis of circulating or turbulent fluids.”

-Richard Feynman

Pumps: Theory of Operation

FMAC

- A pump converts mechanical energy into hydraulic energy
- Fluid enters the pump suction and flows into the eye of the rotating impeller
- As fluid approaches the eye, fluid pressure drops as it feels the centrifugal forces and changes direction from axial flow to radial flow

MDM PUMPS

Theory of Operation

FMAC

- The fluid proceeds radially outward from the eye and is accelerated along the impeller vanes by the centrifugal forces created by the rotating impeller

- The fluid leaves the tips of the vanes at a high velocity

- Fluid enters the volute, a region of increasing cross sectional area, where the fluid slows down and increases pressure
- Velocity head is converted into pressure head
- The fluid exits the pump at a higher pressure

MDM PUMPS

Theory of Operation

FMAC

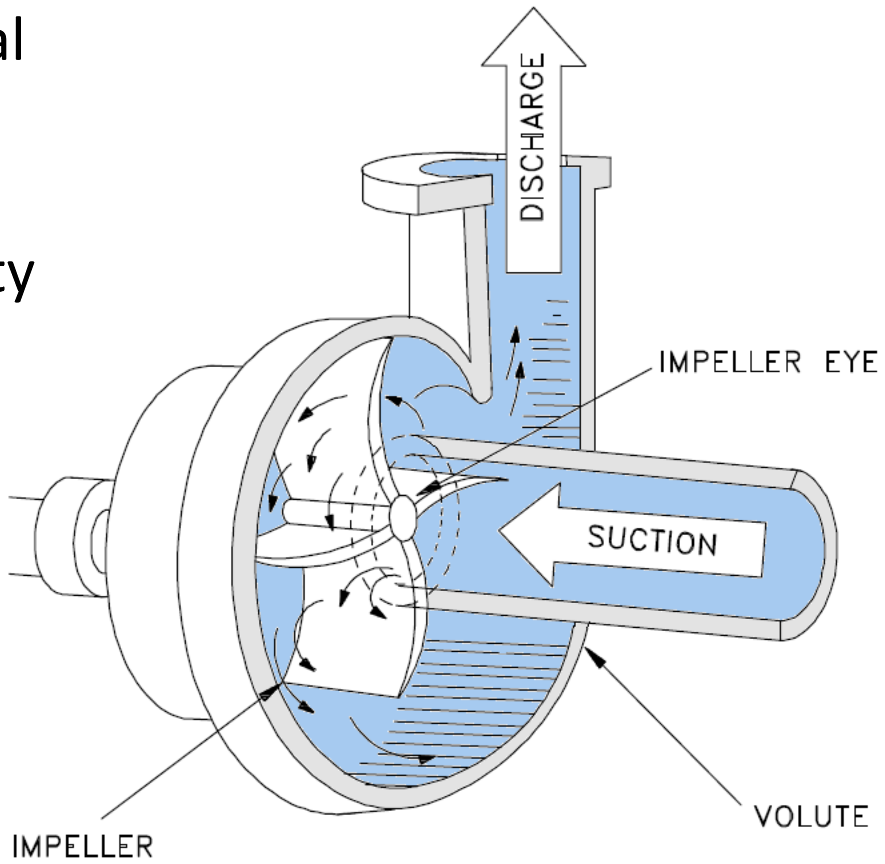
- The fluid proceeds radially outward from the eye and is accelerated along the impeller vanes by the centrifugal forces created by the rotating impeller

- The fluid leaves the tips of the vanes at a high velocity

- Fluid enters the volute, a region of increasing cross sectional area, where the fluid slows down and increases pressure

- Velocity head is converted into pressure head

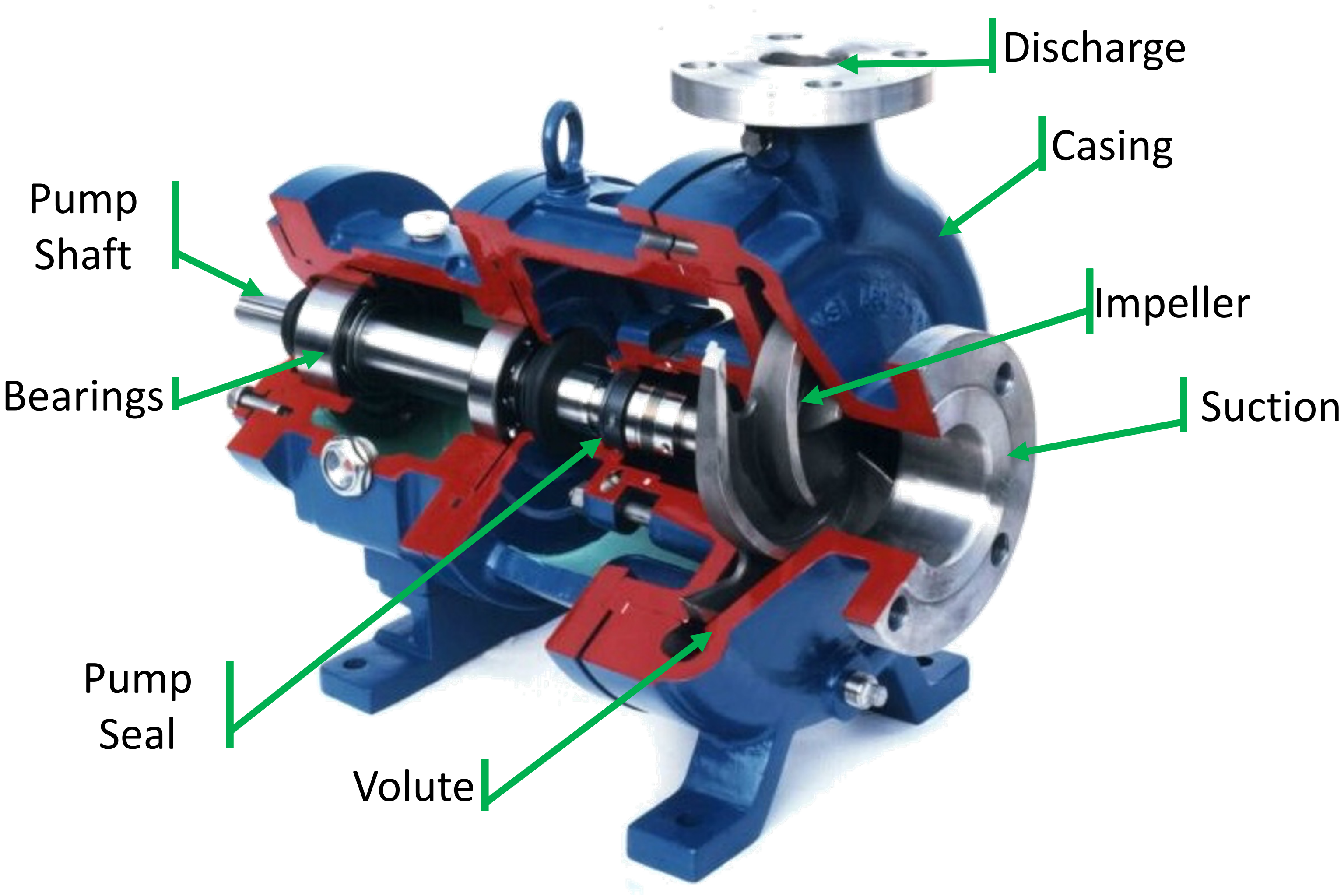
- The fluid exits the pump at a higher pressure



MDM PUMPS

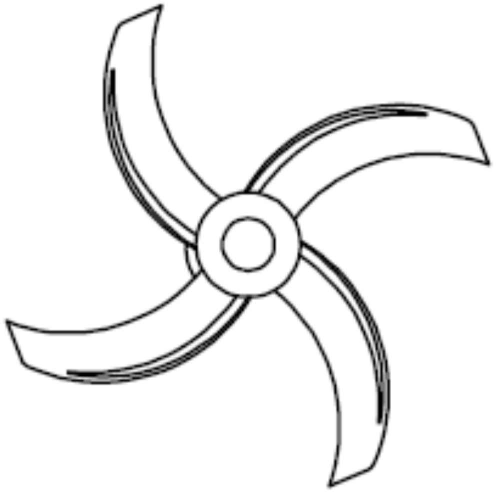
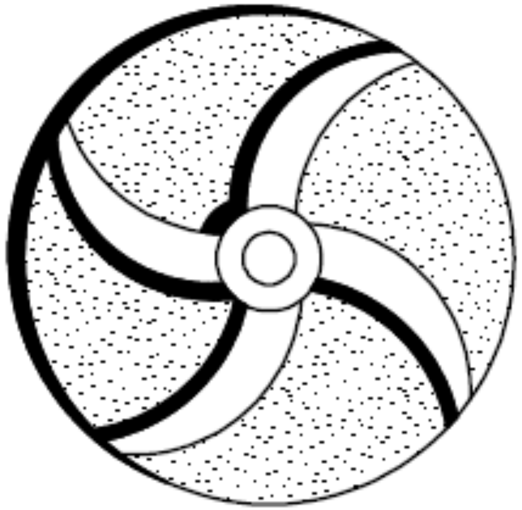
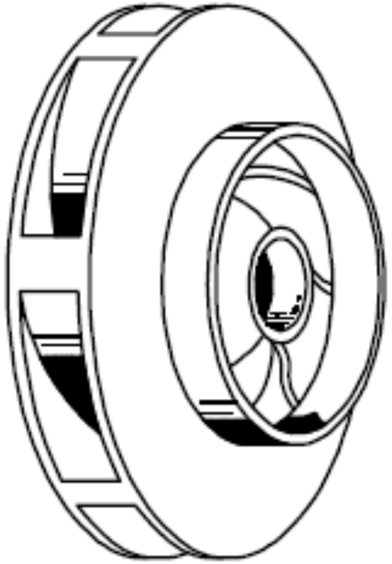
Major Pump Parts

FMAC



MDM PUMPS

Impeller Types

Open Impeller	Semi-Open Impeller	Closed Impeller
		

Features

FMAC

SEAL FLUSH PORT

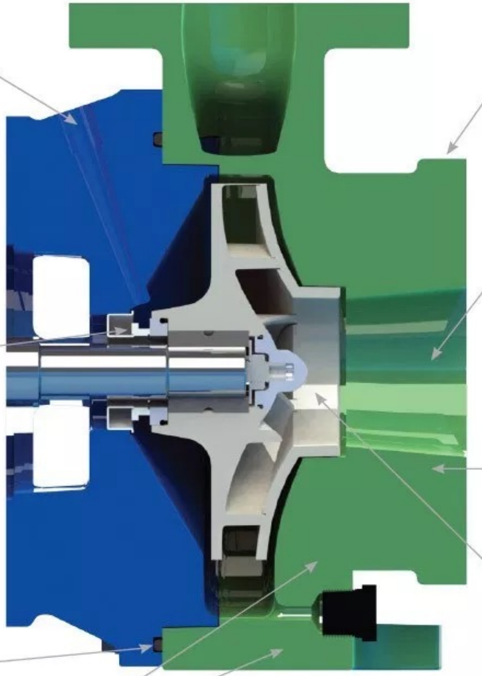
- Lubricates the mechanical seal
- Removes heat generated by the seal and motor shaft
- Extends the life of the seal
- Reduces maintenance cost
- Features two seal flush port configurations including plan 11, plan 13

IMPENATRA® II

- Non metallic design
- No metal in contact with process fluid
- Manufactured for sea water and chemical applications
- Seal faces and elastomers are available in a wide range of materials
- Ensures compatibility for corrosion resistance.

SIMPLICITY OF DESIGN

- One casing o-ring for quick and easy assembly.



THROUGH BOLT DESIGN

- True back-end pullout
- Ease of maintenance

PROPRIETARY BULK MOLDED VINYL ESTER COMPOUND

- Compression molded parts
- Superior resin rich surfaces
- Smooth hydraulic passages
- Promotes high pump efficiency
- Withstands the intensity of the toughest piping loads
- The thermoset formulation provides high temperature and chemical resistance in a wide array of applications

ENCLOSED IMPELLER

- Peak efficiency of 76%
- Internal hydraulic passages provide high efficiency performance

B73lean

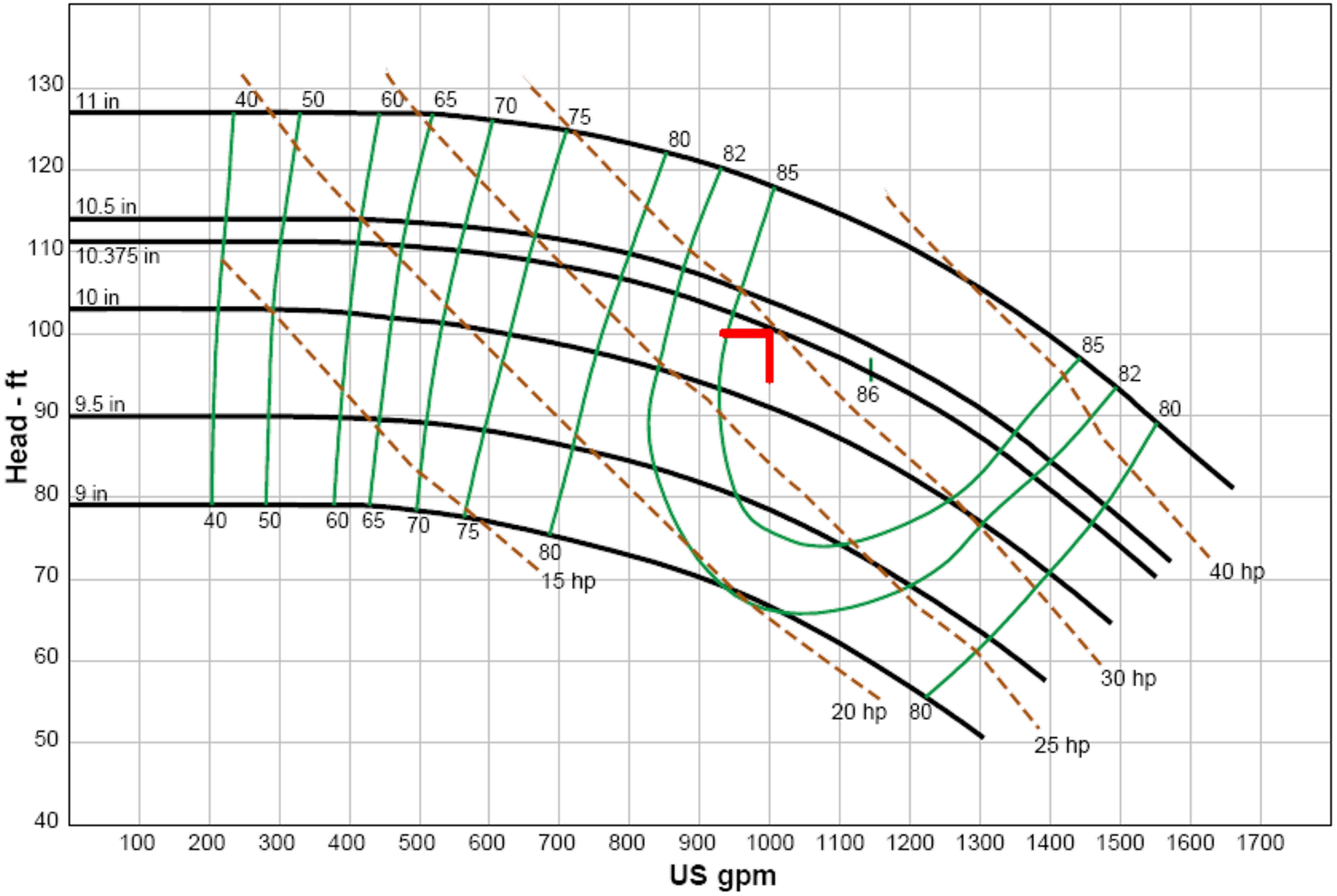
B73 LEAN®

Ensures inlet and discharge ports to be interchangeable with existing metal and plastic ANSI pumps conforming to the ANSI/ASME B73.1 specification.

B73lean® provides the ability to close-couple to five different NEMA JM motor frames (143JM through 215JM NEMA fame motors). This benefit provides lower acquisition costs and reduces the overall footprint when comparing to long coupled/ bearing frame pump and motor configurations.

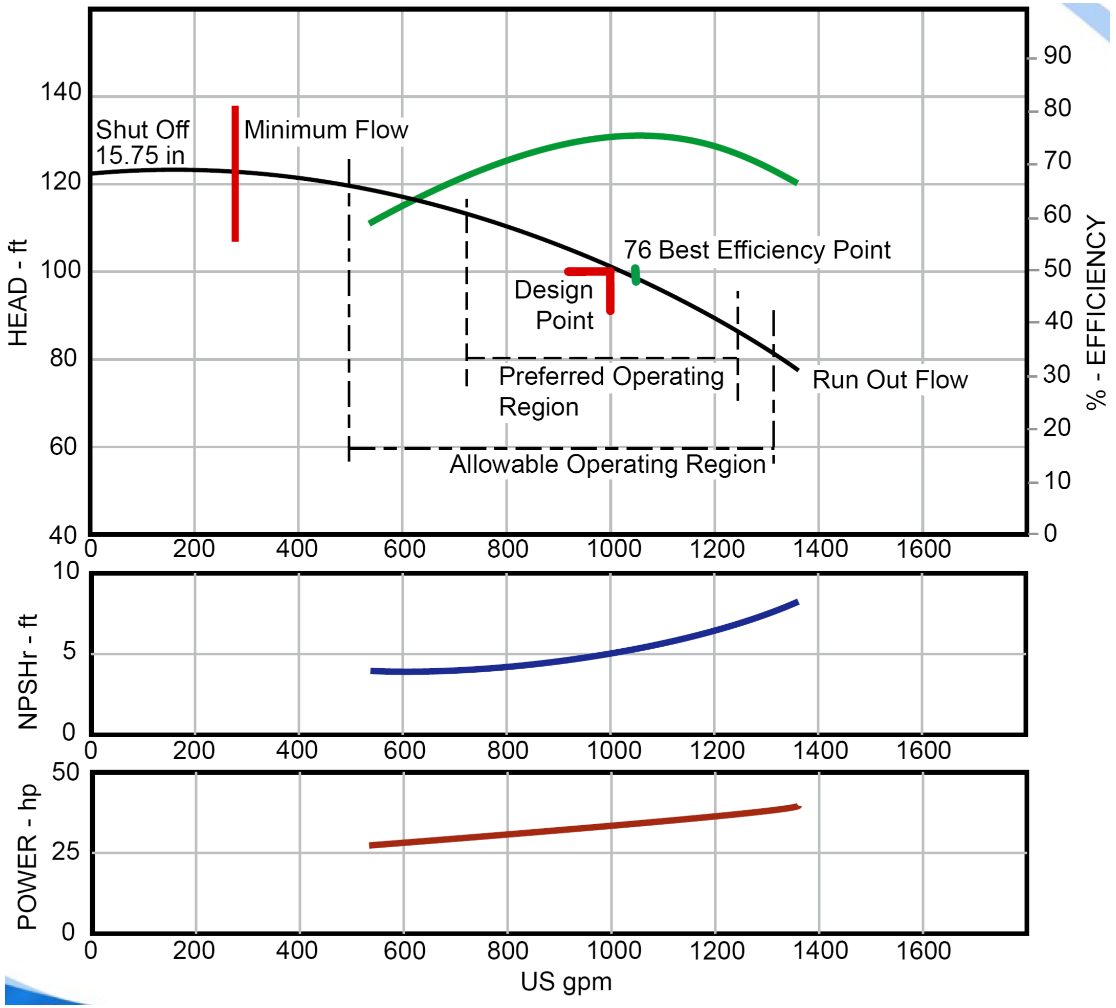
MDM PUMPS

Typical Pump Curve



Individual Pump Curve

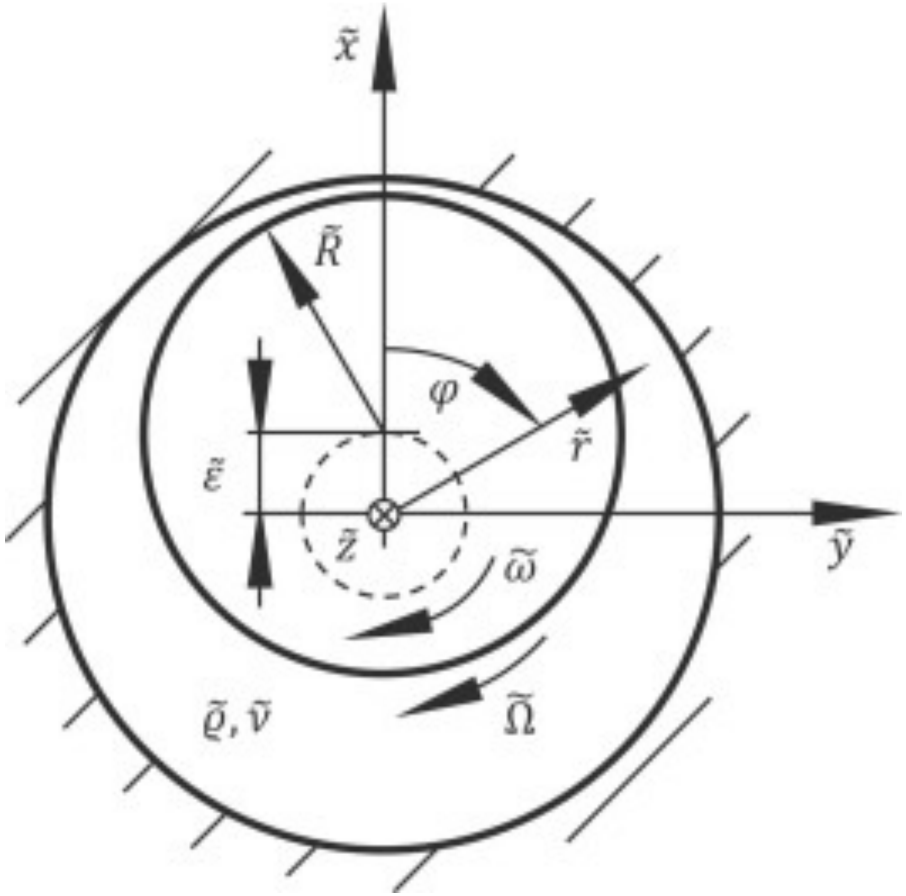
FMAC



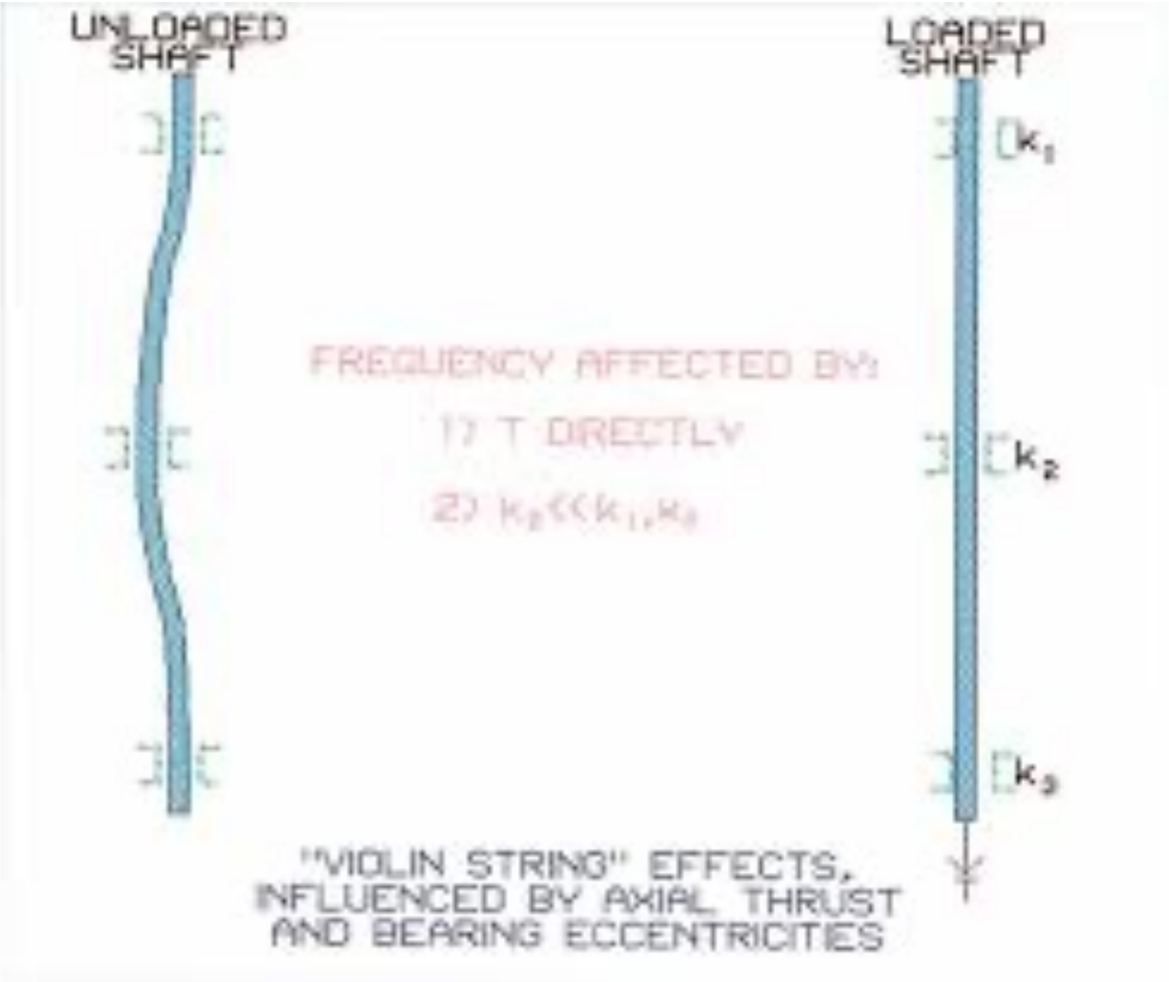
MDM PUMPS

The Lomakin Effect

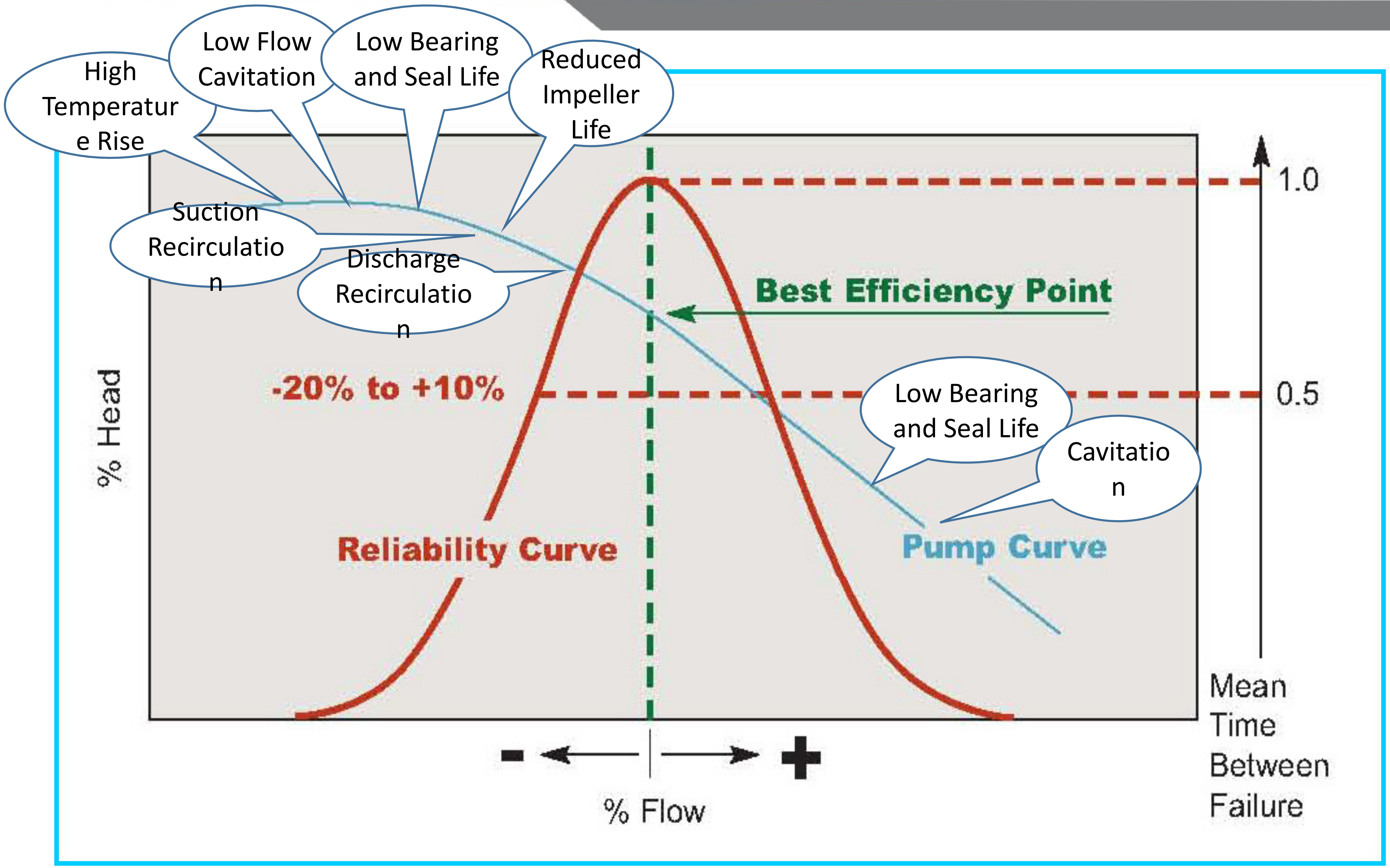
The Lomakin Effect is
a force created at the wear rings and throttle bushings within a centrifugal pump. The force is a result of an unequal pressure distribution around the circumference of the component during periods of rotor eccentricity or shaft deflection.



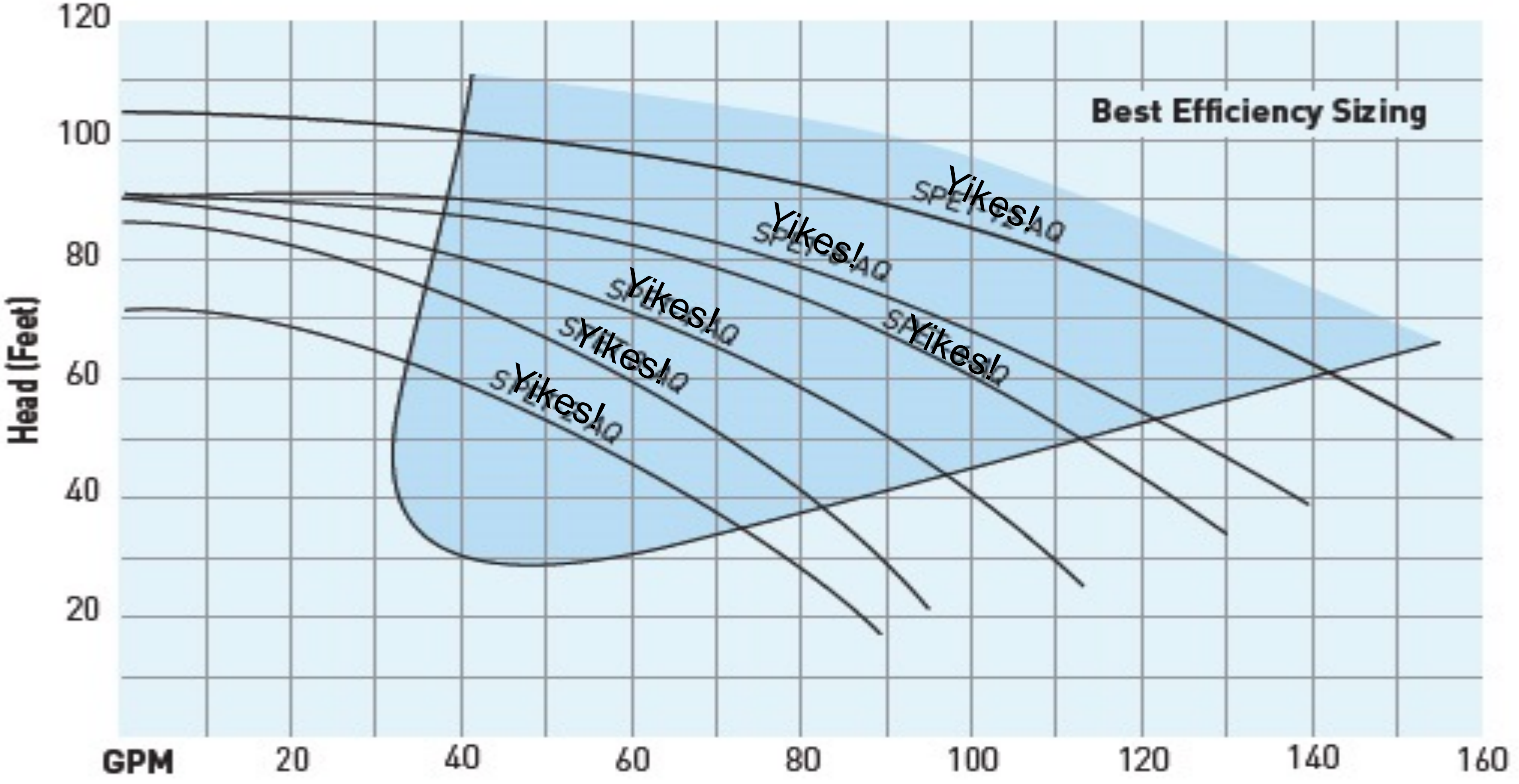
The Lomakin Effect



Operating Point Affects Reliability



What Efficiency?



Florida Marine Aquaculture Coalition

MDM PUMPS