

# Pumps in Peril

## WHO THEY ARE

Vertical turbine, circulator, vertical in-line, split case, end suction, ANSI, ring section, barrel, submersible, positive displacement

## WHAT THEY DO

Fluid dynamics, flow, head, total head, pressure, velocity, myths

## HOW THEY DO IT

Theory of operation, impellers, specific gravity, vapor pressure, friction losses, affinity curve, system curve, series vs. parallel operation, variable speed

## ARE THEY DOING IT RIGHT?

Hydraulic load, water horsepower, efficiency, troubleshooting, the Kennedy audit

## WHAT KEEPS THEM GOING

Function and maintenance of:

packing, mechanical seals, couplings, rolling element bearings, journal bearings, thrust bearings, lubrication, bearing seals, breathers, oilers

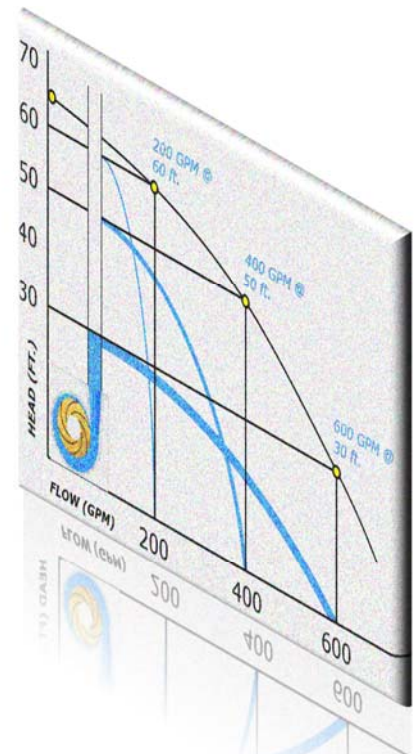
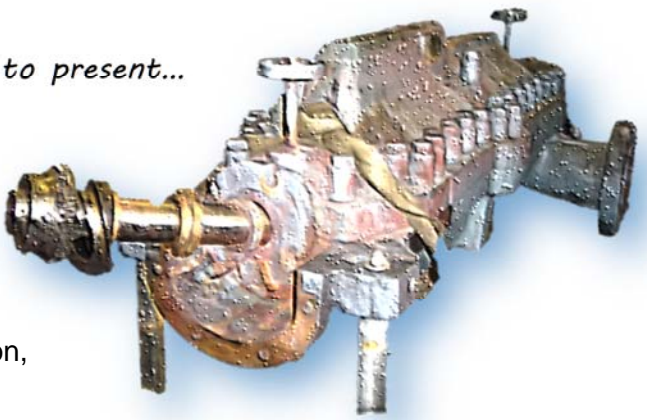
## PERILOUS PUMPING

### **Hydraulic Distress:**

The hostile system curve, deadheading, heavy load, light load, taking the blame, erosion, flashing, cavitation, NPSH deficiencies, suction pressure, starvation, suction & discharge recirculation, drinking air

### **Mechanical Distress:**

Vibration, radial thrust, axial thrust, run out, imbalance, reverse rotation, motoring, misalignment, soft foot, pipe-strain, friction, fatigue, seizures, leaks, unlucky bearings



## PROTECTING THEM FROM US

Upgrades, precision installation, extensive prestart checks, priming, bold start-ups, monitoring, efficient operation, planned maintenance, continuing education, bonus tips