

'the team you can trust'

design

installation

maintenance



Dangers of Running Pumps at Off Design Conditions

Rob Sviderskas
Engineering Manager



'the team you can trust'

design

installation

maintenance



Well Known Danger Zones

- Cavitation
- Running Dry
- Non - Flooded Suction

- What about running wet against a closed system?

'the team you can trust'

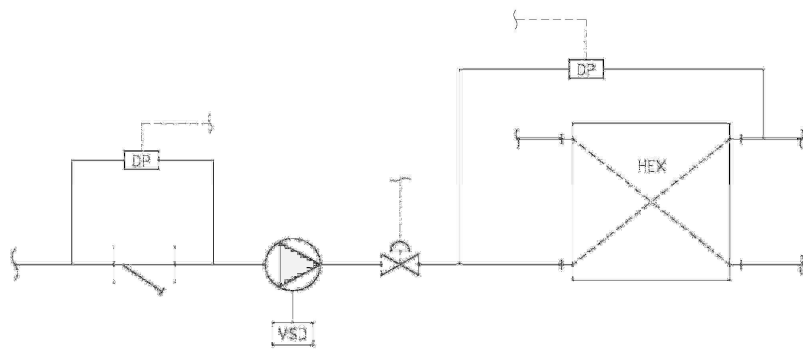
design

installation

maintenance



Typical arrangement



'the team you can trust'

design

installation

maintenance



No Flow Condition

- Heat transferred to fluid
- Some heat radiated through pump casing
- **BUT**
- Most of the heat is retained in the fluid
- **WHAT HAPPENS NEXT?**

'the team you can trust'

design

installation

maintenance



EXAMPLE

- Typical shut off head 350kPa
- Water boils at 138°C under these conditions
- Consider 100 l/s system with 55kW motor.
- Temp Rise = 42.4 x BHP

$$W_p \times C_p + W_w \times C_w$$

'the team you can trust'

design

installation

maintenance



Quick Number Crunch

- Temp Rise = $\frac{42.4 \times 74}{268 \times .506 + 16 \times 1.0}$
- 20.6°F ~ 11.5°C per minute
- From 20°C to 138°C in 10.3 minutes
- If components still intact **STEAM** forms!



'the team you can trust'

design

installation

maintenance



EFFECT

- Severe vibration occurs
- Bearings can fail
- Typical seals rated for 100 to 120°C
- Some casing materials are temperature limited
- If steam escapes near people can be fatal!

'the team you can trust'

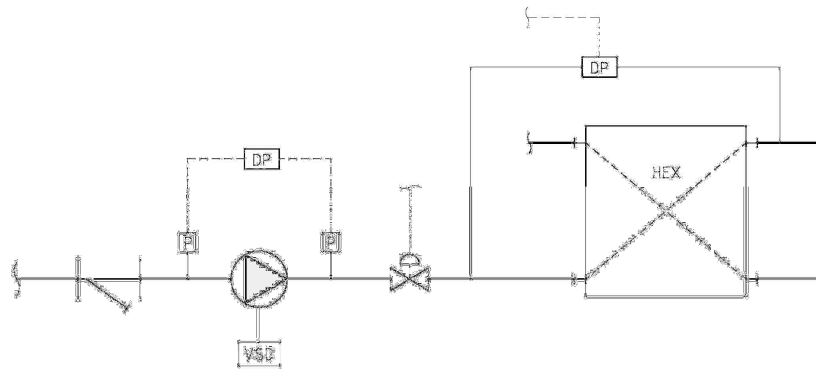
design

installation

maintenance



Suggested Fix



'the team you can trust'

design

installation

maintenance



QUESTIONS?



TRIPLE 'M'

GROUP OF COMPANIES

'the team you can trust'