Optimization, Predictive Analytics, & Real-Time Process Models

Progressing Cavity Pumps (PCPs)

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Benefits

- Reduce operating costs
- Simulate design before put into place and simulate various operating scenarios for existing applications
- Optimize PCP operation (Machine Analytics)
- Alert about abnormal situations
- Provide usable data for analysis
- Monitor pump and system characteristics 24/7 from anywhere with HTML 5 technology

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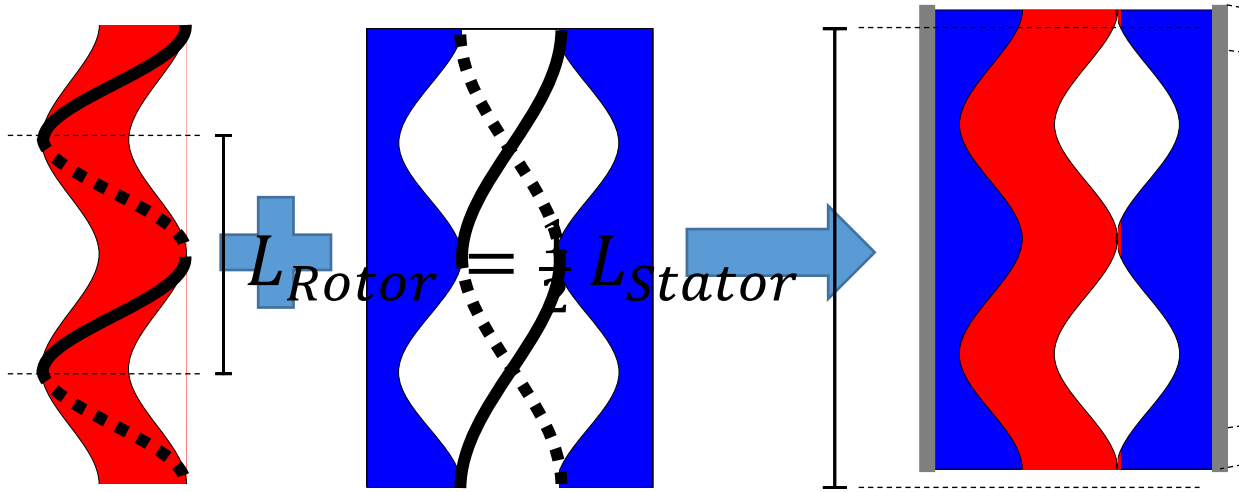
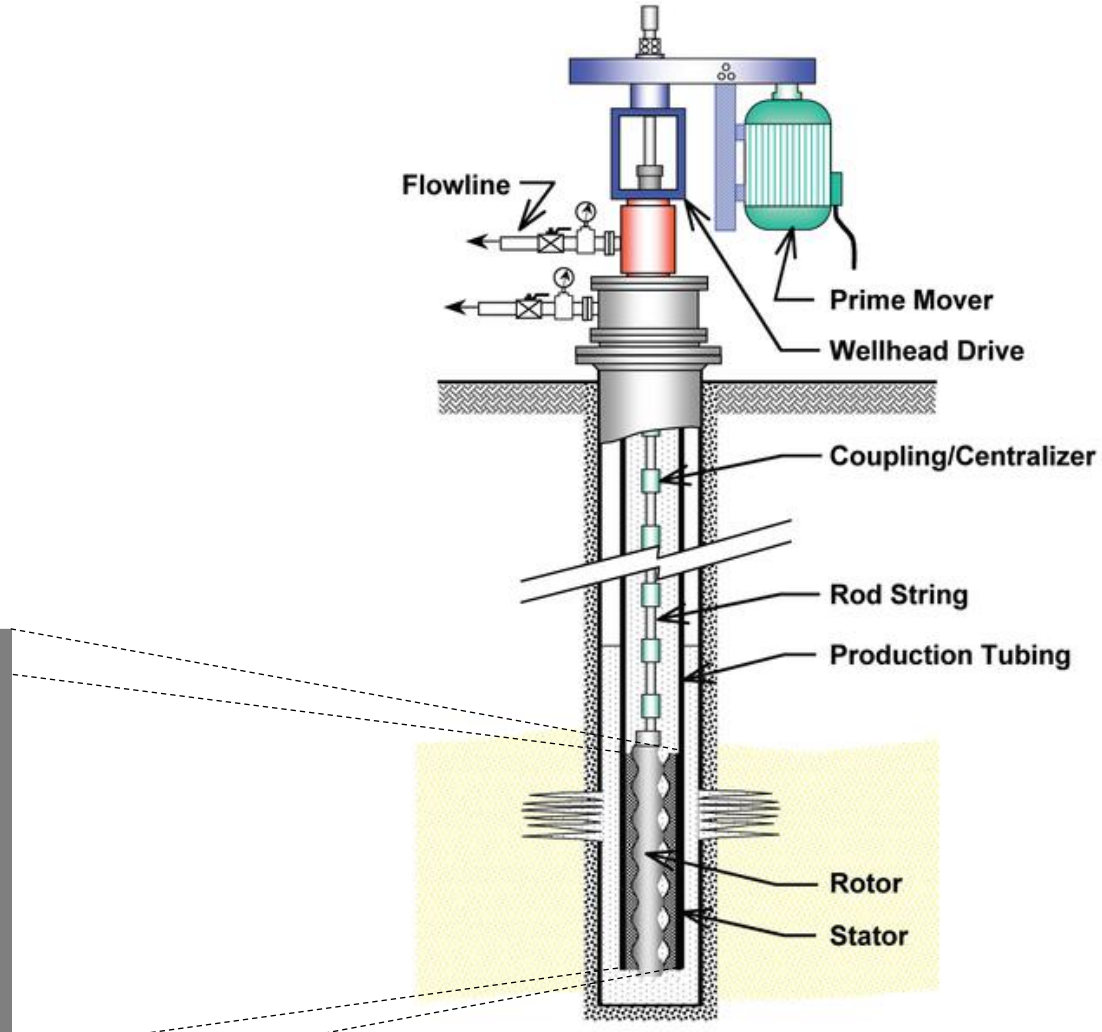
Overview

- Positive displacement
- Contentious flow
- Core elements
  - Spinning helical steel rotor
  - Stationary elastomer stator





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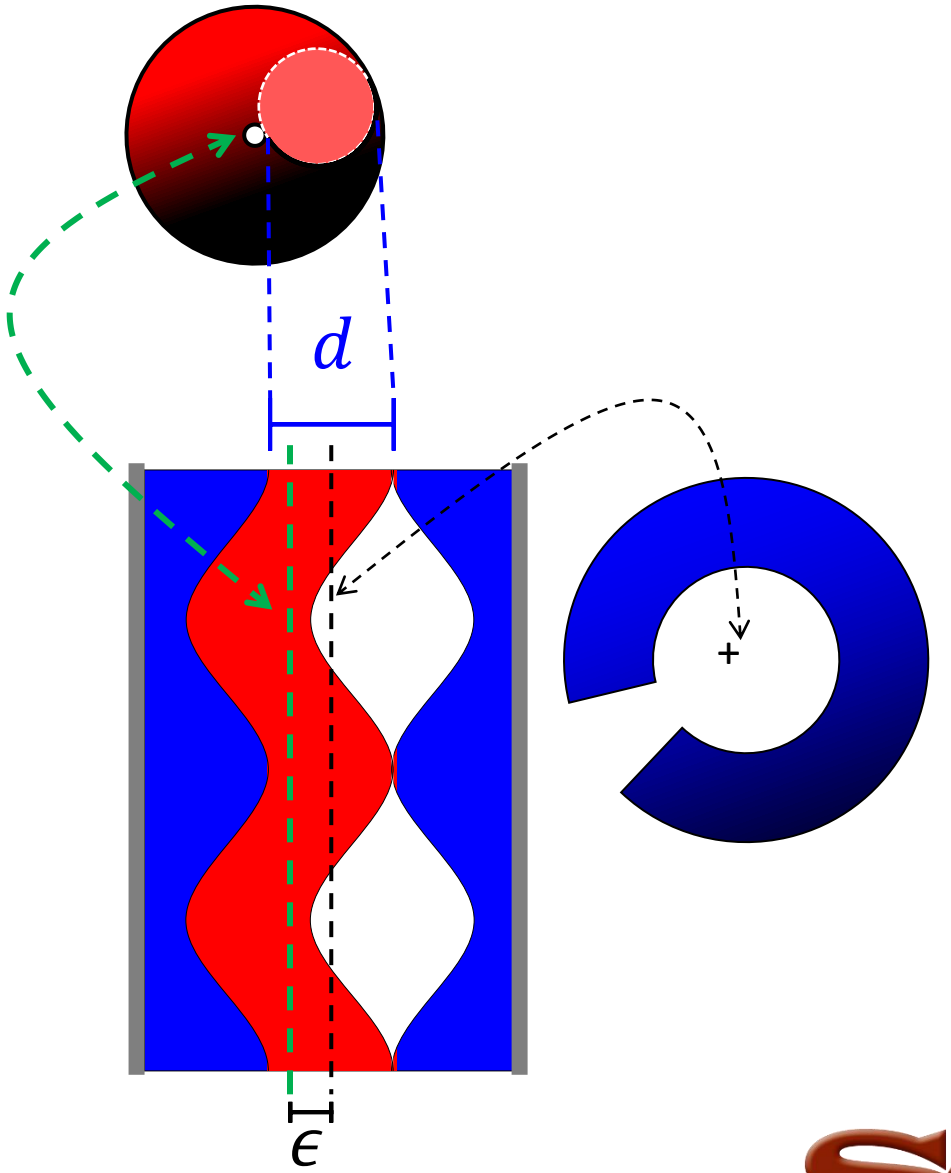
Determine the Flow Rate

- Volumetric displacement

$$s = 4\epsilon\, d\, L_{Stator}$$

- Ideal volumetric flow rate

$$q_{Ideal} = s\, N_{Rotor}$$



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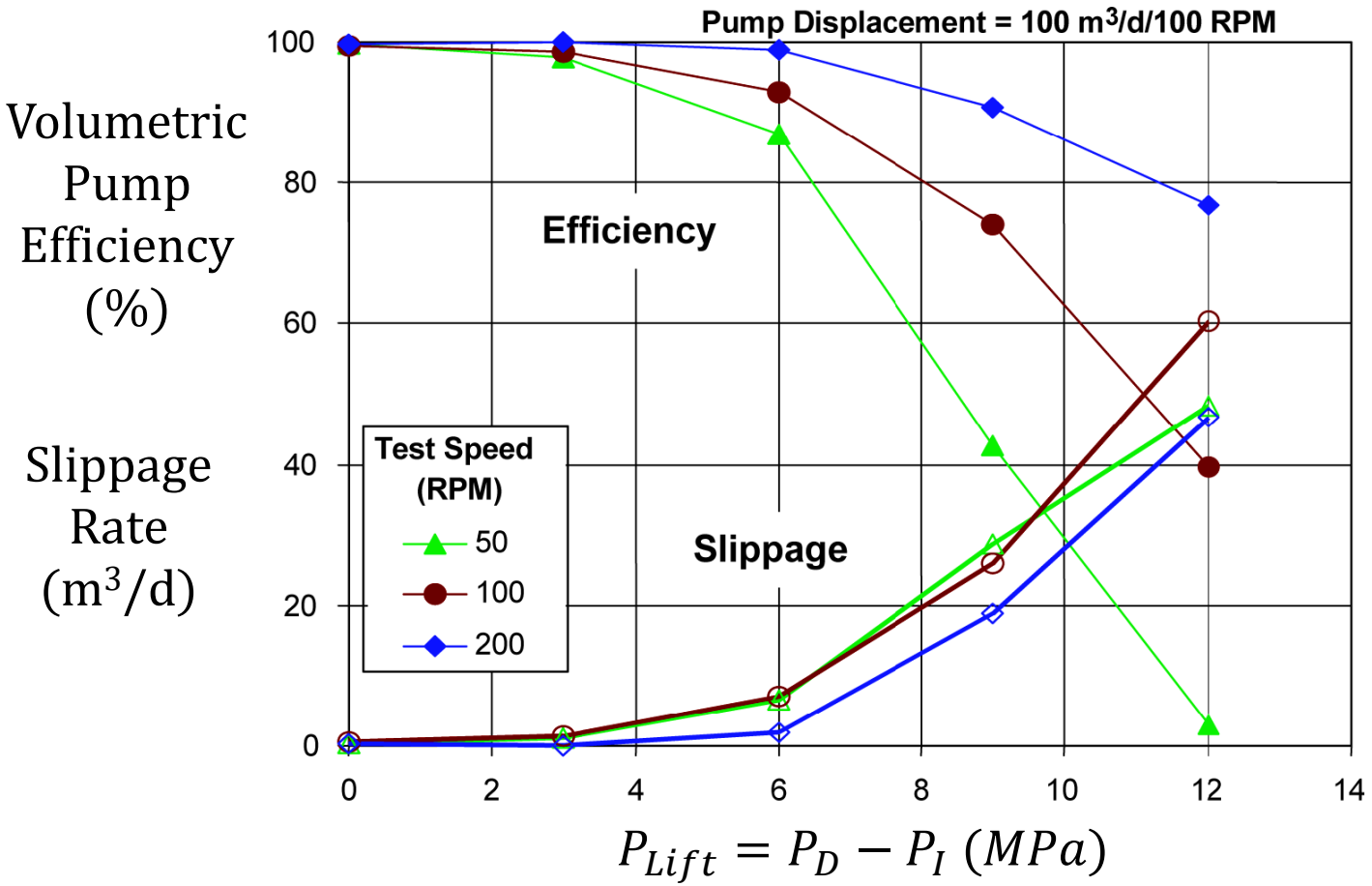
Determine the Flow Rate (Continued)

- Real volumetric flow rate

$$q_{Real} = E_V \, q_{Ideal}$$



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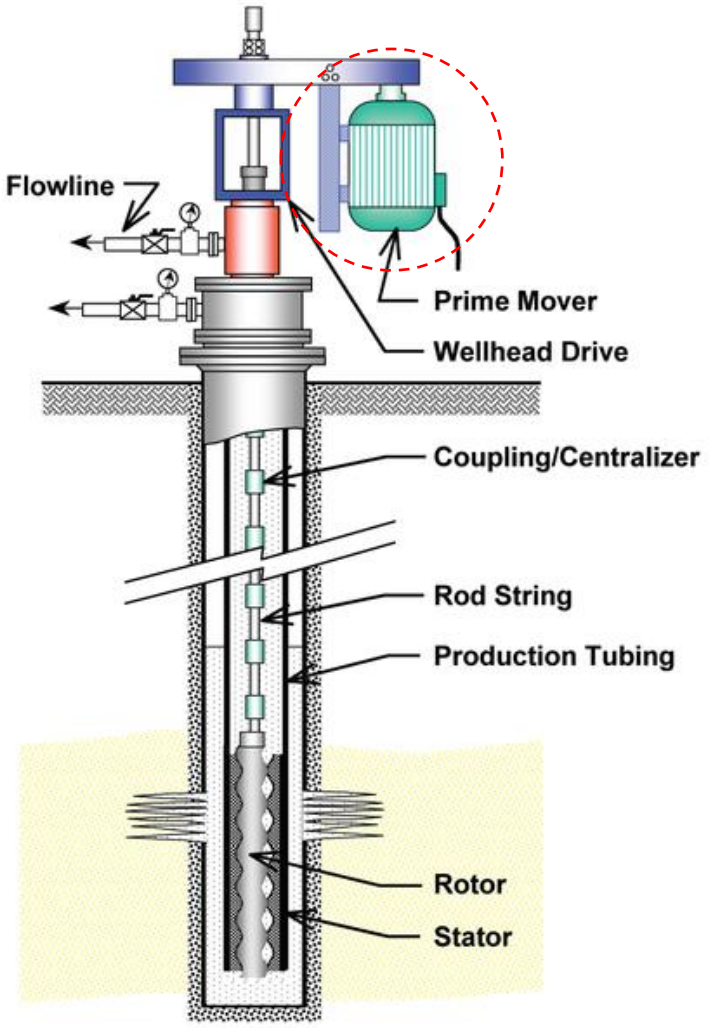
Power the Pump

- Calculate power needed to run pump

$$Power = k_1 \frac{\tau_{Rotor}\, N_{Rotor}}{E_{Power}}$$



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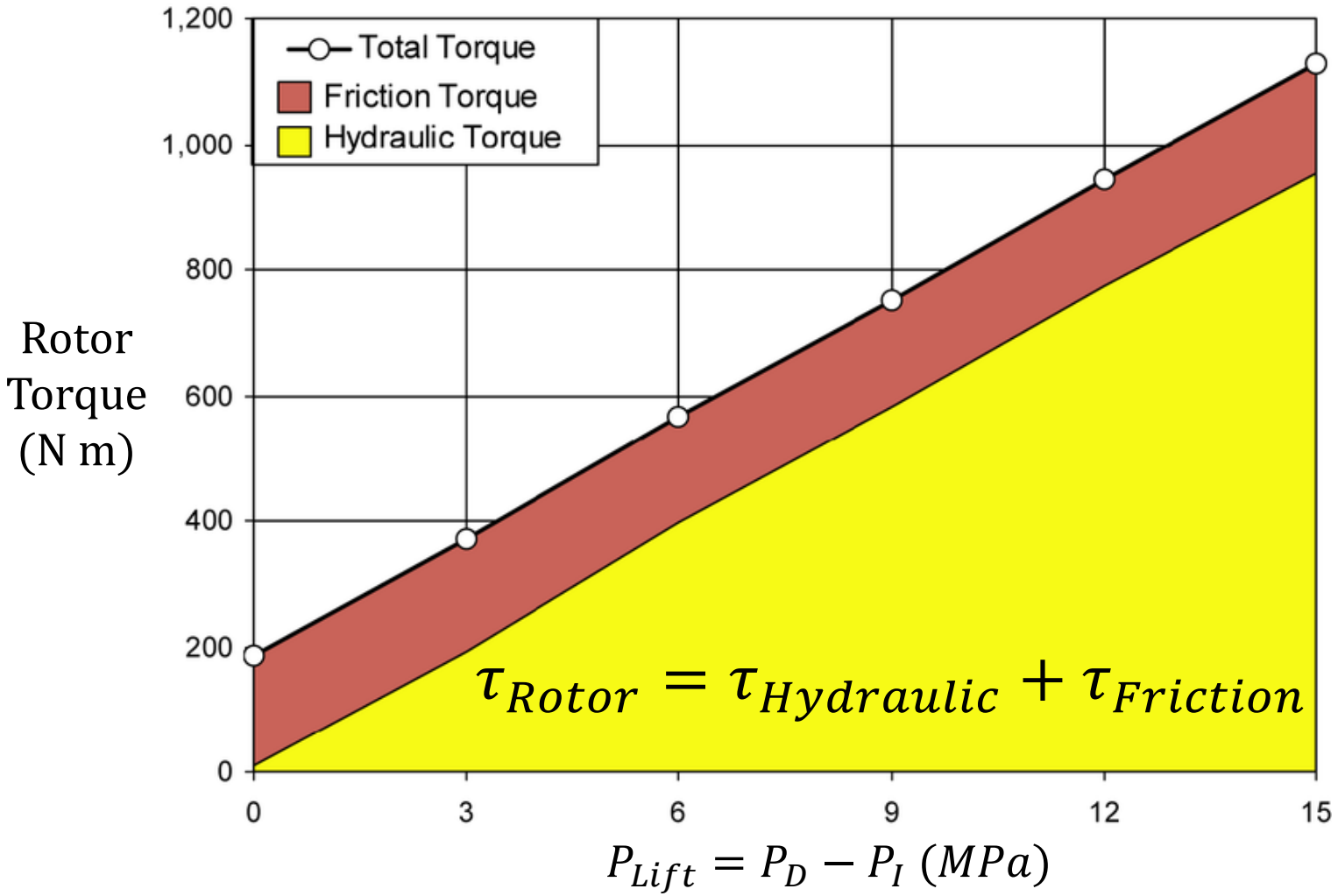
Determine Rotor Torque



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Conclusion

- Use spectrum of analytics
  - Increase pump efficiency
  - Reduce energy and maintenance costs
  - Extend life cycle
  - Improve availability and reliability
- Combine with web applications
  - Build domain knowledge
  - Increase operational intelligence

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