

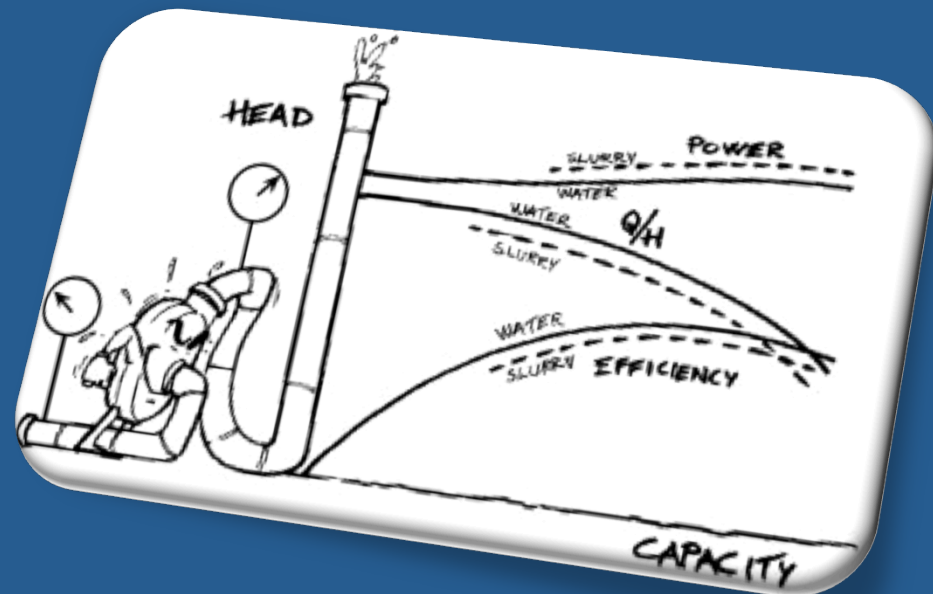
How Can Commissioning Improve Long Term Reliability?



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Who Has Dealt with Equipment/System which doesn't Operate as Designed?



What are the Primary Considerations During Construction Projects?

- Budget
- Schedule
- Maintenance of operations
- Change orders
- Design/field changes
- Hazardous materials
- Unforeseen conditions
- Safety
- Permits



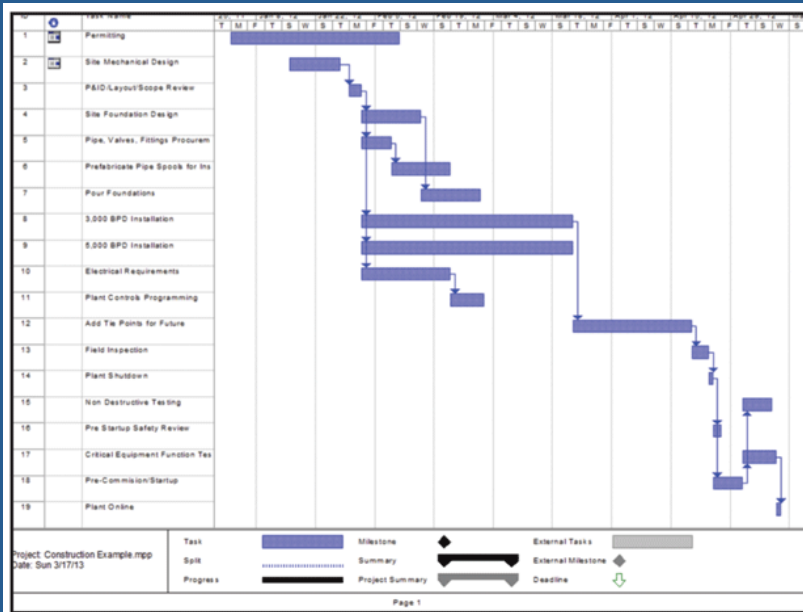
Construction Phases

- Plan
- Budget/finance
- Design
- Bid
- Build
- Start-up
- Operation
- Maintenance



What is the Most Critical Phase or Aspect of Construction?

What gets the Most Attention?



Whats Happening During Construction

- Equipment installation
- Pay requisitions
- Concrete/structural
- Civil site work
- Piping
- Electrical instrumentation
- Changes/modifications – retrofit projects
- Scheduling
- Submittal review



What are the QA/QC Checks?

- ◉ Drawings
- ◉ Specifications
- ◉ Shop drawing/submittal review
- ◉ Inspector
- ◉ Engineering disciplines
- ◉ Special inspections
- ◉ Regulatory agencies
- ◉ Contractor



What is Commissioning?

“Comprises the integrated application of a set of engineering techniques and procedures to check, inspect and test every operational component of the project, from individual functions, such as instruments and equipment, up to complex amalgamations such as modules, subsystems and systems.”



What is Commissioning?

“The main objective of commissioning is to effect the safe and orderly handover of the unit from the constructor to the owner, guaranteeing its operability in terms of performance, reliability, safety and information traceability”



What Normally Happens During Start-Up & Commissioning?

- End of the project (if construction projects were a work week, start-up occur at ~5:30 on Friday)
- Manufacturers/ reps perform site visits
- Inspectors



What Normally Happens During Start-Up & Commissioning?

- ◉ Multiple activities at once
- ◉ Electrical portions being completed
- ◉ Instrumentation & controls tie ins/check outs
- ◉ Operations manuals/documentation
- ◉ Training



Potential Issues

- Scheduling of start-up activities
- Manufacturers reps – when do they show up/who knows they are going to be there
- What should they be doing?



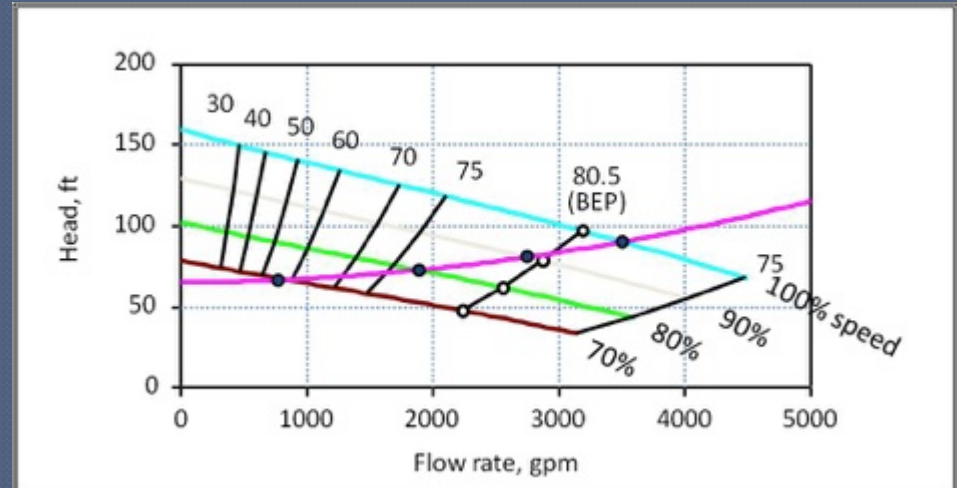
Potential Issues

- ◉ Inspection/oversight – too many activities at once
- ◉ Controls and instrumentation integration
- ◉ Documentation – who signs off on what
- ◉ Training – when/how many/who

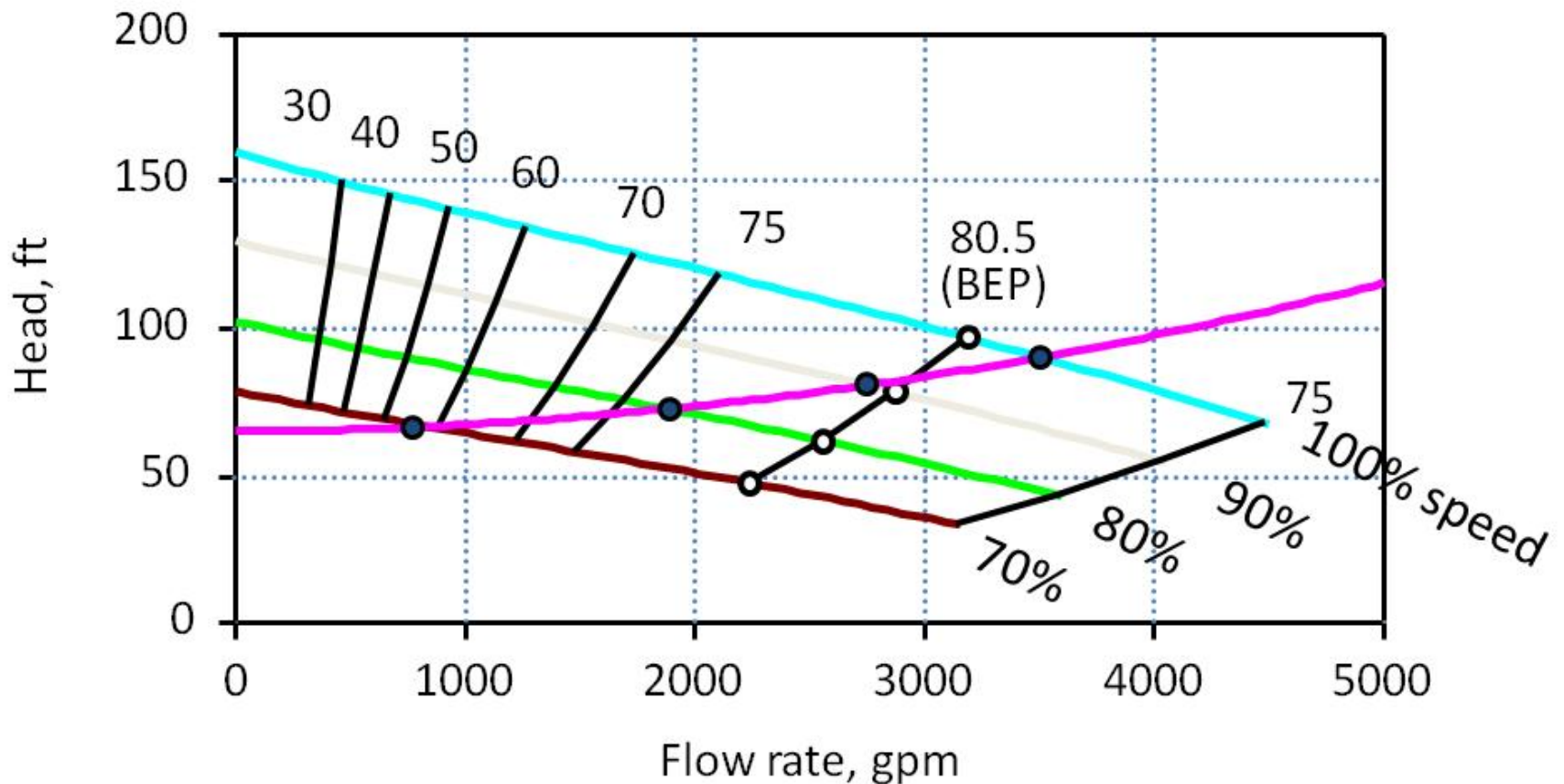


Long Term Impacts

- SCADA instrumentation and automated control
- Pump operating points
- HVAC, ventilation rates, temperature control



Long Term Impacts



Long Term Impacts

- ◉ Energy efficiency
- ◉ Factory/standard set points (VFDs – great guy, doesn't know system)
- ◉ Maintenance costs
- ◉ Operator knowledge



Strategies for Start-Up & Commissioning

- Commissioning during design
 - 01800 specification
 - Manufacturer trips/timing
 - O&M requirements
 - Training sessions and information to be provided
 - Documentation
 - Set points, adjustable



Strategies for Start-Up & Commissioning

- ◉ Dedicated staff to witness testing
- ◉ Who is going to be there (systems integrator, electrician)
- ◉ Scheduling
- ◉ Who is responsible





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