Reliability measures the capacity of equipment or processes to operate without failure for a specified interval when put into service and used correctly.
Pump Curve Practices & Life-ANSI

ANSI Pump Curve Sensitivity For Pump Reliability

Weibull Characteristic Life ~MTBF

% Flow

% Head

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Optimum

Best Practice
= -10% to +5% of BEP

Reconsider!!

Good (Commercial) Practice
= -30% to +15%

Avoid!!

Better Practice
= -20% to +10%

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Pump Curve Practices & Life-API

API Pump Curve Practices And Effects On Pump Life From Variability About BEP

- **Best Efficiency Point**
- **Lower Impeller Life**
- **Discharge Recirculation**
- **Suction Recirculation**
- **High Temperature Rise**
- **Low Flow Cavitation**
- **Low Bearing & Low Seal Life**

**Reliability Curve**

**Optimum**

- **Best Practice**
  - $-10\%$ to $+5\%$ of BEP

- **Better Practice**
  - $-20\%$ to $+10\%$ of BEP

- **Good Practice**
  - $-30\%$ to $+15\%$ of BEP

**Weibull Characteristic Life ~MTBF**

- $1.00*\eta$
- $0.98*\eta$
- $0.90*\eta$
- $0.75*\eta$

**Avoid!!**

**Reconsider!!**

Life Based On Best Practices For Installation And Use For All Features Except How Close The Pump Operates To BEP
Pump Curve Practices & Life?

High Speed & High Head Pump Curve Practices And Effects On Pump Life From Variability About BEP

Best Efficiency Point

Optimum

Best Practice

-10% to +5% of BEP

Better Practice

-20% to +10% of BEP

Good Practice

-30% to +15% of BEP

Life Based On Best Practices For Installation And Use For All Features Except How Close The Pump Operates To BEP

Avoid!!

Reconsider!!

Optimum

Weibull Characteristic Life ~MTBF

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Reliability practices must be connected with costs to find the lowest long term cost of ownership calculated by net present value.
Summary

• Important impacts on life involve:
  – Equipment grade
  – Installation grade
  – Operation grade
  – Maintenance grade

• No free lunches—someone pays for everything

• Think about the life cycle cost of your actions—engineer the results

Remember effects of abuses are cumulative! You may try to hide your atrocities but the equipment accumulates the history and someone pays in the end.