Reducing & Increasing Speed

- Reducing Impeller Speed
- Increasing Impeller Speed

Graph showing the relationship between Total Dynamic Head (m) and Flowrate (m³/s).
Reducing (trimming) your Impeller or replacing with new Larger Impeller

Graph showing the relationship between TDH (Total Dynamic Head) and Q (Flowrate) with arrows indicating the effect of reducing or replacing with a larger impeller diameter.
Pumps in Series

- add head

Second Pump in series

Pumps in Series

One Pump

TDH, Total Dynamic Head (m)
Q, Discharge (m³/s)
Total Dynamic Head

- Total Dynamic Head
  - Is a measure of the energy per unit weight imparted to the water by the pump

- Calculate from:
  - the discharge dynamic head minus the suction dynamic head
  - suction dynamic head – measured relative to the pump centreline
Five key parts involved in pump Total Dynamic Head

- Pressure Head
- Elevation Head
- Velocity Head
- Friction Headloss
- Minor Headloss
Energy or TDH Line

- Energy line is made up of the five components of Head and Headloss just discussed above
- Shows all parts of Total Dynamic Head
- Units of metres head of water
- Graphical way of “seeing” the energy line and change through a pumped system
Pump Total Dynamic Head & Energy Line

MINOR HEADLOSS

MINOR HEADLOSS

FRICTION

T.D.H.
System Resistance Curve = Pipeline Resistance Curve

- Describes the relationship between the head and discharge for a specific pipeline configuration
- Accounts for the static, friction & minor head loss over a wide range of discharge
- Developed for increments of flowrate, calculating headlosses for each
System Resistance and Pump Curve

Pump Curve

TDH

Duty Point

System Resistance Curve

Static Head

Q

Q, Flowrate (m³/s)
Altering System Curve

- Pump Curve
- Duty Point
- TDH
- Static Head
- More System Resistance - Valve Shut or Smaller Pipe
- Q, Flowrate (m³/s)
Altering System Curve

Pump Curve

Duty Point

Less System Resistance
- Valve Open
or Larger pipe

TDH, Total Dynamic Head (m)

Static Head

Q, Flowrate (m³/s)

Q
System Curve

Duty Point

TDH, Total Dynamic Head (m)

High Static Head

Q, Flowrate (m³/s)

Q
Pump Efficiency Curves

Lines of equal pump efficiency

TDH, Total Dynamic Head (m)

Q, Flowrate (m$^3$/s)
Pump Curve + Efficiency

- Highest pump efficiency
- Lower pump efficiency
Giles & Gaskin 180HC Curve

TDH

Q

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Pump Curve + Efficiency

Highest pump efficiency

Lower pump efficiency
Altering Duty Point

Pump Curve

Duty Point

System Resistance Curve

TDH, Total Dynamic Head (m)

Static Head

Q, Discharge (m³/s)
Altering Duty Point

Pump Curve

Less System Resistance - Larger Pipe

TDH, Total Dynamic Head (m)

Q, Discharge (m$^3$/s)

Static Head

Duty Point

Q
Giles & Gaskin 180HC Curve

TDH

Q

A Research Centre of the University of Southern Queensland
Giles & Gaskin 180HC Curve

![Graph showing the relationship between Flowrate (L/s) and Total Dynamic Head (m). The graph depicts a downward curve indicating decreasing head as flowrate increases.]
Giles & Gaskin 180HC Curve

Flowrate (L/s) vs. Total Dynamic Head (m)
Giles & Gaskin 180HC Curve

A Research Centre of the University of Southern Queensland
Giles & Gaskin 180HC Curve
Giles & Gaskin 180HC Curve
Giles & Gaskin 180HC Curve
Giles & Gaskin 180HC Curve
Giles & Gaskin 180HC Curve

Flowrate (L/s)

Total Dynamic Head (m)
Matching a pump to a pipeline system – Burdekin April ’15

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