

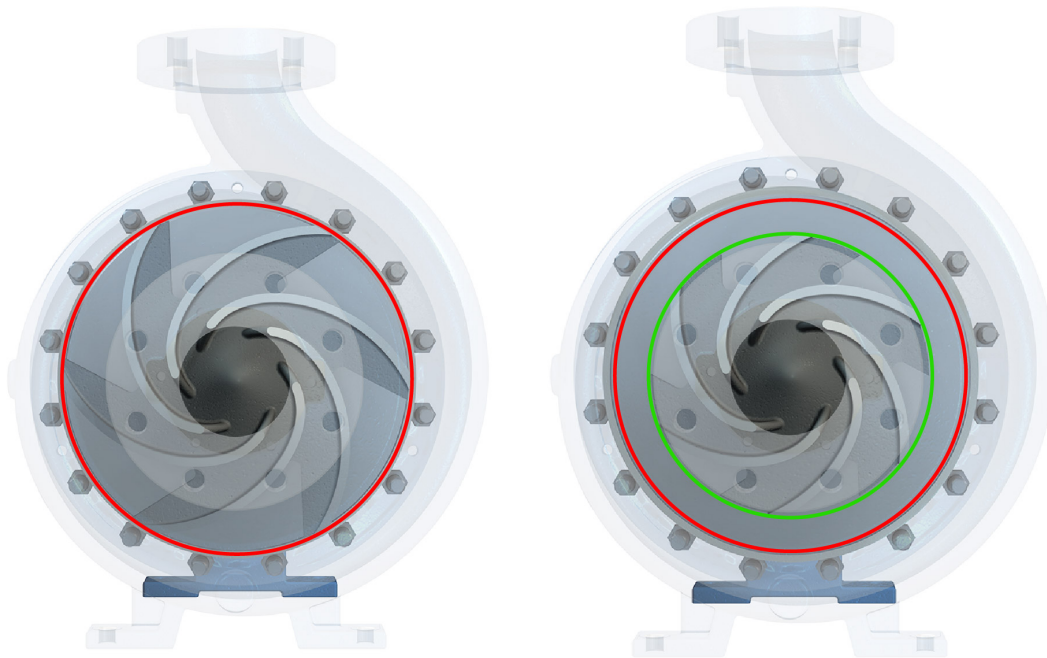


NPSH_R and Impeller Diameter

Okay, this may take longer than 60 seconds.

Prior to computerized software for pump selection, manufacturers simply drew one NPSH_R curve for the pump on the head versus capacity curve. It was used regardless of the impeller diameter chosen. This is not a good idea for the smaller diameter selections.

NPSH_R for a fixed flow rate is less for the larger diameter impeller than the smaller diameter impeller. Or stated in another way, at a given flow rate the NPSH_R increases as the diameter of the impeller decreases. (Note the head changes but the flow rate remains at some fixed value.)



Full Trim Impeller

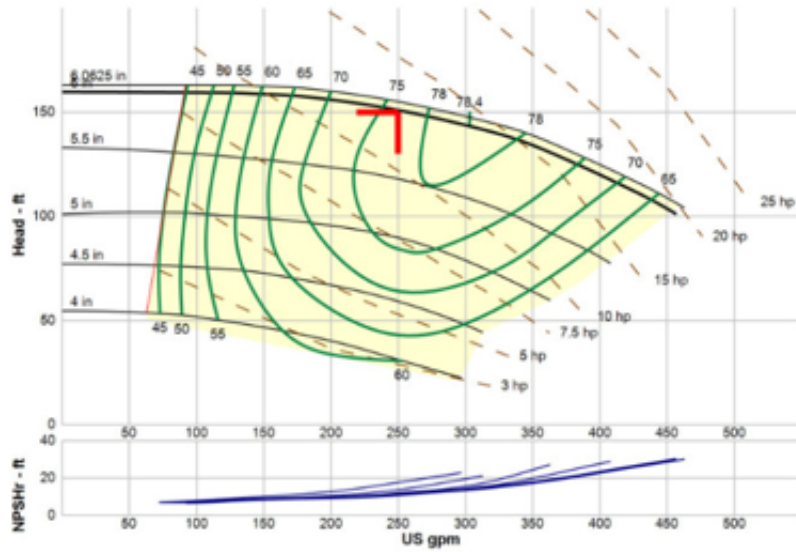
Trimmed Impeller

As an alternative method to thinking about the science behind this, open your [Summit Select](#) program and select a Summit Pump model as below:

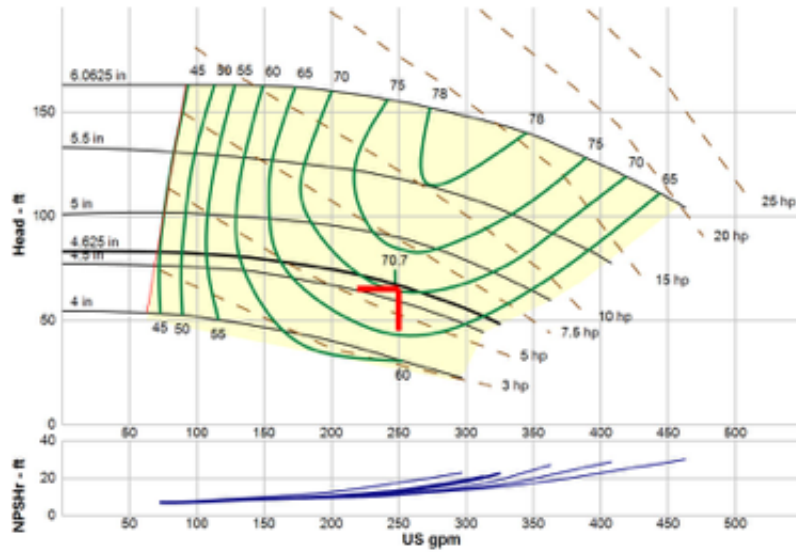
- 2196 in 60 hertz
- Perform a Design Point Search for ambient temperature water
- 250 GPM at 65 feet TDH
- Select the pump size 2 x 3 - 6 at 3500 RPM
- Open the curve

You will note that for 250 GPM the 6.00 inch impeller will require about 11 feet $NPSH_R$, the 4.63 inch impeller will require 13.3 feet $NPSH_R$ and the minimum 4.00 inch impeller will be 18 feet $NPSH_R$.

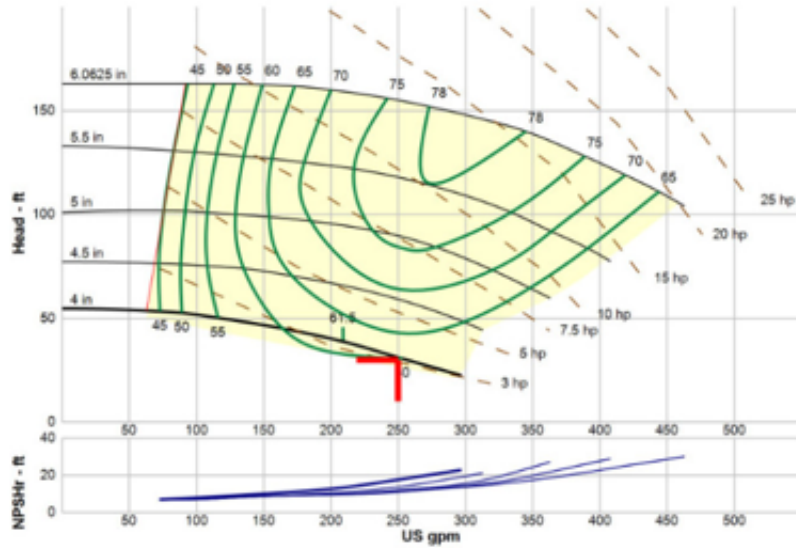
--- Duty Point ---	
Flow:	251 US gpm
Head:	151 ft
Eff:	76%
Power:	12.5 hp
NPSHr:	11.2 ft
Speed:	3550 rpm
--- Design Curve ---	
Shutoff Head:	160 ft
Shutoff dP:	69.2 psi
Min Flow:	90.9 US gpm
BEP:	78.4% @ 303 US gpm
NOL Power:	19.5 hp @ 457 US gpm
--- Max Curve ---	
Max Power:	20.2 hp @ 463 US gpm



--- Duty Point ---	
Flow:	252 US gpm
Head:	66.3 ft
Eff:	71%
Power:	5.99 hp
NPSHr:	13.4 ft
Speed:	3550 rpm
--- Design Curve ---	
Shutoff Head:	83.1 ft
Shutoff dP:	36 psi
Min Flow:	74.2 US gpm
BEP:	70.7% @ 247 US gpm
NOL Power:	6.42 hp @ 326 US gpm
--- Max Curve ---	
Max Power:	20.2 hp @ 463 US gpm



--- Duty Point ---	
Flow:	253 US gpm
Head:	30.7 ft
Eff:	60%
Power:	3.26 hp
NPSHr:	18 ft
Speed:	3550 rpm
--- Design Curve ---	
Shutoff Head:	54.7 ft
Shutoff dP:	23.7 psi
Min Flow:	62.7 US gpm
BEP:	61.5% @ 209 US gpm
NOL Power:	3.33 hp @ 209 US gpm
--- Max Curve ---	
Max Power:	20.2 hp @ 463 US gpm



The 3 condition points for the 2 x 3 - 6 (3500 RPM).

- 250 GPM at 150 feet 6.00 inch and NPSH_R 11.2 feet.
- 250 GPM at 65 feet 4.625 inch and NPSH_R 13.4 feet.
- 250 GPM at 30 feet 4.00 inch and NPSH_R 18 feet

Note your results may vary by a small fraction. Also be aware if you adjust the impeller trim from the original pump search, the flow and head will change due to the Summit Select's predicted system curve at that trim.

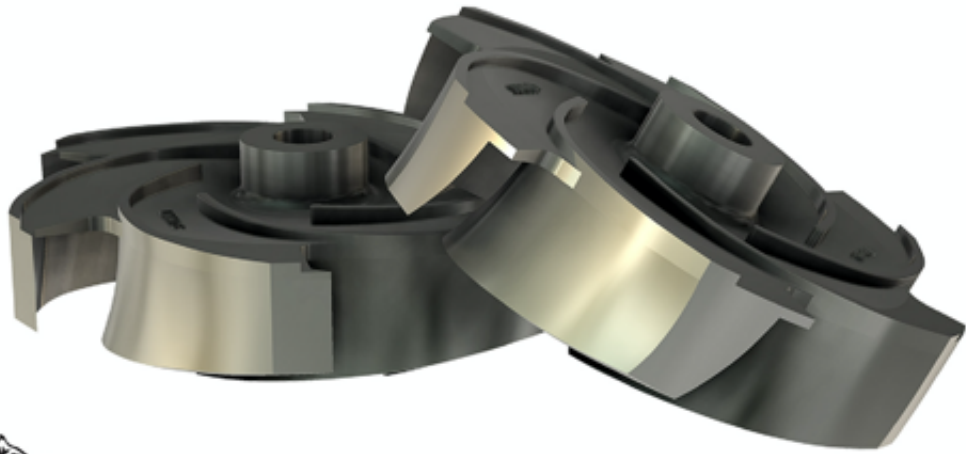
-The Summit Pump Team

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Jim Elsey's Pumps and Systems Articles

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