Helix Technologies Pty Ltd

Project	Helix Demo QA	Client	Helix Demo QA
Project No.	4567	Design Date	08/06/2017
Category	Demo Slurry QA	Atmos. Press	100.19 psi
Network Type	Liquid	Calc. Method	Darcy
Description	Slurry Transport Example 7.1		

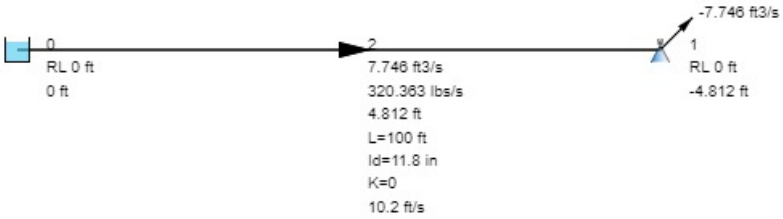
Slurry Transport Using Centrifugal Pumps 3rd Edition, 2006, Springer, Wilson, Addie, Sellgren and Clift, Pg 405, example 7.1
Slurry with S = 2.65, Cv = 25% and d50 = 0.4mm is pumped in horizontal pipe 11.8" diameter

Calculation Results	Publication	Helix deltaQ	
Hydraulic gradient im (ft water/ft pipe)	0.068	0.06799	
Hyd Gradient water iw	0.0226	0.023	(read from system curve graph)
Slurry losses is	0.0454	0.0450	

Helix head loss is 4.812 ft of slurry / 100 ft of pipe = 4.812 * sm = 4.812 * 1.413 = 6.799 ft / 100 = 0.06799 ft water / ft pipe.
Results are almost identical.

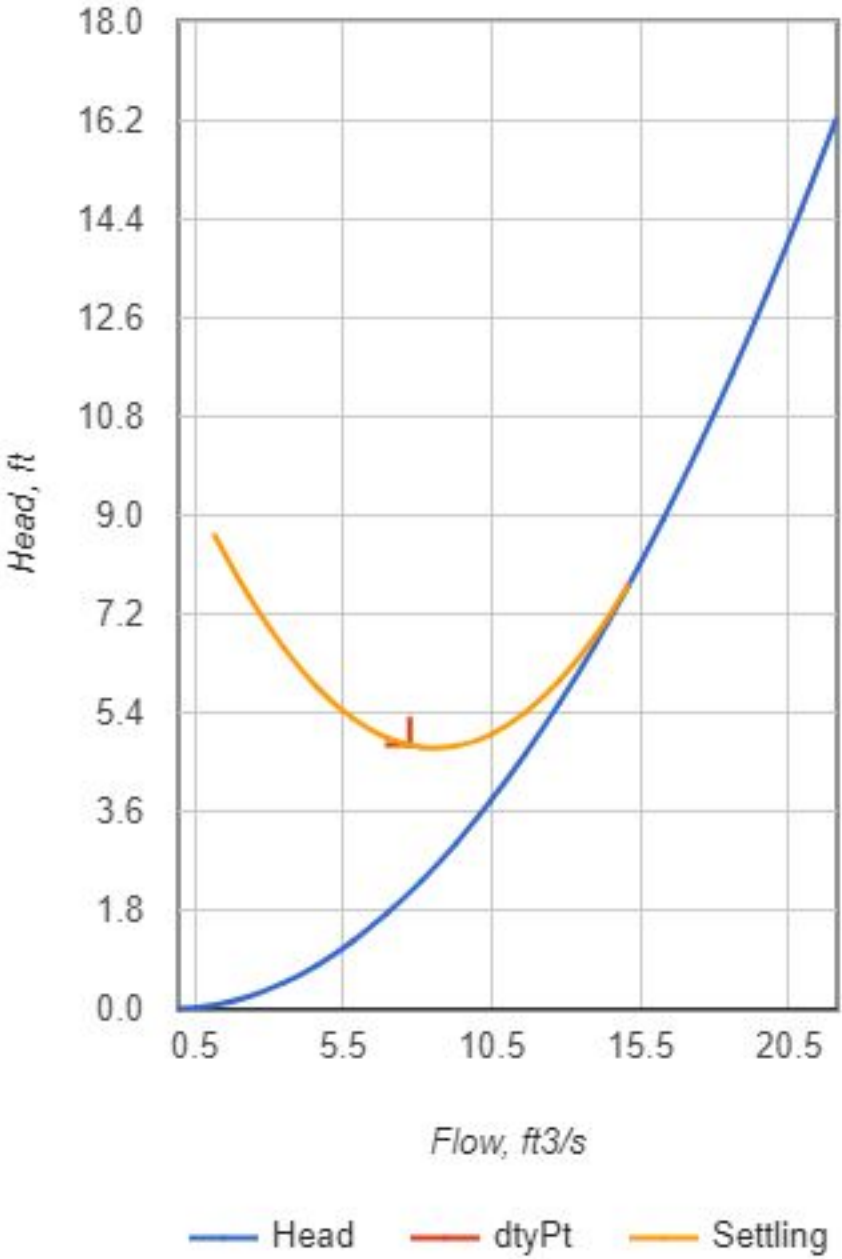
Helix Technologies Pty Ltd

Project	Helix Demo QA	Client	Helix Demo QA
Project No.	4567	Design Date	08/06/2017
Category	Demo Slurry QA	Atmos. Press	100.19 psi
Description	Slurry Transport Example 7.1		



Slurry Transport Example 7.1

System Curve Pipe No 2
11.8 in



Helix Technologies Pty Ltd

Project	Helix Demo QA	Client	Helix Demo QA
Project No.	4567	Design Date	08/06/2017
Category	Demo Slurry QA	Atmos. Press	100.19 psi
Description	Slurry Transport Example 7.1		

Pipe No	2	From node to node	0 - 1
Description		Equipment No	
Slurry Type	Settling Slurry		
Slurry Description	Gravel Slurry	Slurry Reference	Wilson, Addie, Clift Ex 7.1
SG Carrier Liquid Sl	1	Liquid Viscosity	1 cP
SG of Dry Solids	2.65	SG of Mixture	1.413
Conc. by Mass Cw	46.903 % w/w	Concentration by Vol	1.413 % v/v
Solids Flow Rate	320.363 lbs/s	Particle Size d50	0.4 in
Grading	Widely Graded		
Durand co-eff. Fl	1.517	Settling Velocity Vl	15.505 ft/s
Settling Flow Rate	11.775 ft3/s		
Pump Wear Factor Pw	0.99	Pump Head Ratio HR	0.805
Pipe Description	Steel	Pipe Class	150
Nominal Diameter	12 in	Inside Diameter	11.8 in
Outside Diameter	12.5 in	Pipe Length	100 ft
Pipe Roughness	0.001 in	Allowable Press.	1600 psi
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	7.746 ft3/s	Velocity	10.2 ft/s
Friction Loss	4.812 ft	Fitting Losses	0 ft
Slurry Losses	2.689 ft	Orifice Losses	0 ft
Fixed Head Loss	0 ft	Booster Pump Head	0 ft
Total Head Loss	4.812 ft	Total Pressure Drop	2.947 psi
Entry Total Head	0 ft	Exit Total Head	-4.812 ft
Entry Gauge Head	0 ft	Exit Gauge Head	-4.812 ft
Reynolds No.	1316154.092	Friction Factor	0.012906 (Darcy f)

Helix Technologies Pty Ltd

Project	Helix Demo QA	Client	Helix Demo QA
Project No.	4567	Design Date	08/06/2017
Category	Demo Slurry QA	Atmos. Press	100.19 psi
Description	Slurry Transport Example 7.1		

Node No	0	Node Type	Tank
Description		Equipment No	
Rel. Level (RL)	0 ft	Pressure Input	0 psi
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	0 ft		

Helix Technologies Pty Ltd

Project	Helix Demo QA	Client	Helix Demo QA
Project No.	4567	Design Date	08/06/2017
Category	Demo Slurry QA	Atmos. Press	100.19 psi
Description	Slurry Transport Example 7.1		

Node No	1	Node Type	Nozzle
Description		Equipment No	
Rel. Level (RL)	0 ft	Pressure Input	0 psi
Nozzle K value	0	Ext Flow (+In/-Out)	-7.746 ft3/s
Int.(Gauge) Head	-4.812 ft	Int.(Gauge) Pressure	-2.947 psi
Total Node Head	-4.812 ft		