

Helix Technologies Pty Ltd

Project	Demo QA	Client	Helix QA
Project No.	4567	Design Date	08/06/2017
Category	Demo Slurry QA	Atmos. Press	101.33 kPa
Network Type	Liquid	Calc. Method	Darcy
Description	GIW Slysyl Calculation check		

Quality Assurance Check using GIW Industries Slysyl program version 20080228 example.
 A pumping system with 4.6m long 350mm dia suction pipe and 1000m long 350mm delivery pipe
 with pump 6m below suction tank and delivery 10m above pump. Slurry details as in model above.
 GIW Slysyl Calculation check. Helix results compared to Slysyl published results.

Flow Rate m3/hr	GIW Slysyl Results		Helix Results		
	Losses in m		Losses in m		
	Suction	Delivery	Suction	Delivery	Slurry
1200	0.1	32.3	0.16	35.25	
14.66					
1330	0.1	34.5	0.17	36.01	
10.94					
1460	0.2	37.2	0.17	37.72	
7.77					
1590	0.2	40.6	0.19	40.40	
5.12					
1720	0.2	44.4	0.20	44.05	
3.02					
1850	0.2	48.7	0.22	48.66	
1.47					
1980	0.2	53.4	0.25	54.25	
0.46					
2110	0.3	58.5	0.28	60.81	
0.00					
2240	0.3	64.1	0.31	68.26	
0.00					
2370	0.3	70.0	0.35	76.13	
0.00					

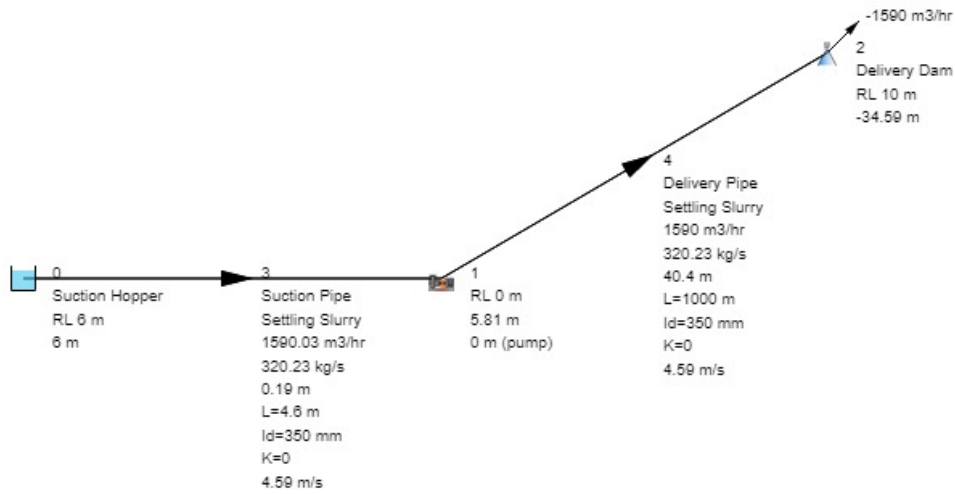
Click on the Discharge nozzle and the Node tab and then in the Ext Flow in/out enter the flow rate required.

For example enter -1590 m3/hr. Then press the Solve Network button. After the network has solved, click on the Delivery pipe and the Graph node to see the system curve.

Differences in the calculated system head, especially at the higher flow rates are probably due to the Slysyl program using a fixed friction factor of 0.012. The Helix program re-calculates the friction factor based on the Reynolds number at the duty point.

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Description	GIW Slysel Calculation check		
Pipe No	3	From node to node	0 - 1
Description	Suction Pipe	Equipment No	
Slurry Type	Settling Slurry		
Slurry Description	Settling Slurry		
Slurry Reference	GIW Slysel example		
SG Carrier Liquid Sl	1	Liquid Viscosity	0.9815 cP
SG of Dry Solids	2.65	SG of Mixture	1.45
Conc. by Mass Cw	50 % w/w	Concentration by Vol	27.36 % v/v
Solids Flow Rate	320.23 kg/s	Particle Size d50	0.26 mm
Durand co-eff. FI	1.36	Settling Velocity VI	4.59 m/s
Grading	Closely Graded	Settling Flow Rate	1589.04 m3/hr
Pump Wear Factor Pw	0.9	Pump Head Ratio HR	0.84
Pipe Description	Steel Pipes AS1836 (ANSI B36.10)	Pipe Class	
Nominal Diameter	350 mm	Inside Diameter	350 mm
Outside Diameter	356 mm	Pipe Length	4.6 m
Pipe Roughness	0.01524 mm	Allowable Press.	3390 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1590.03 m3/hr	Velocity	4.59 m/s
Friction Loss	0.19 m	Fitting Losses	0 m
Slurry Losses	0.02 m	Orifice Losses	0 m
Fixed Head Loss	0 m	Booster Pump Head	0 m
Total Head Loss	0.19 m	Total Pressure Drop	2.64 kPa
Entry Total Head	6 m	Exit Total Head	5.81 m
Entry Gauge Head	0 m	Exit Gauge Head	5.81 m
Reynolds No.	2373588.35	Friction Factor	0.01149 (Darcy f)

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Description	GIW Slysel Calculation check		
Pipe No	4	From node to node	1 - 2
Description	Delivery Pipe	Equipment No	
Slurry Type	Settling Slurry		
Slurry Description	Settling Slurry		
Slurry Reference	GIW Slysel example		
SG Carrier Liquid Sl	1	Liquid Viscosity	0.9815 cP
SG of Dry Solids	2.65	SG of Mixture	1.45
Conc. by Mass Cw	50 % w/w	Concentration by Vol	27.36 % v/v
Solids Flow Rate	320.23 kg/s	Particle Size d50	0.26 mm
Durand co-eff. FI	1.36	Settling Velocity VI	4.59 m/s
Grading	Closely Graded	Settling Flow Rate	1589.04 m3/hr
Pump Wear Factor Pw	0.9	Pump Head Ratio HR	0.84
Pipe Description	Steel Pipes AS1836 (ANSI B36.10)	Pipe Class	
Nominal Diameter	350 mm	Inside Diameter	350 mm
Outside Diameter	356 mm	Pipe Length	1000 m
Pipe Roughness	0.01524 mm	Allowable Press.	3390 kPa
Orifice Plate Dia	-	Non Return Valve	No
Total Fittings k	0	Total Fittings kf	0
Flow Rate	1590 m3/hr	Velocity	4.59 m/s
Friction Loss	40.4 m	Fitting Losses	0 m
Slurry Losses	5.12 m	Orifice Losses	0 m
Fixed Head Loss	0 m	Booster Pump Head	0 m
Total Head Loss	40.4 m	Total Pressure Drop	574.47 kPa
Entry Total Head	5.81 m	Exit Total Head	-34.59 m
Entry Gauge Head	5.81 m	Exit Gauge Head	-44.59 m
Reynolds No.	2373547.76	Friction Factor	0.01149 (Darcy f)

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Description	GIW Sysel Calculation check		
Node No	0	Node Type	Tank
Description	Suction Hopper	Equipment No	
Rel. Level (RL)	6 m	Pressure Input	0 kPa
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	6 m		

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Node No	1	Node Type	Pump
Description		Equipment No	
Rel. Level (RL)	0 m	Pressure Input	0 kPa
Nozzle K value	-	Ext Flow (+In/-Out)	-
Int.(Gauge) Head	-	Int.(Gauge) Pressure	-
Total Node Head	5.81 m		
Pump Head	0 m	Pump Flow Rate	1590.03 m3/hr
Pump Abs. Power	0 kW	Pump Efficiency	70 %

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Node No	2	Node Type	Nozzle
Description	Delivery Dam	Equipment No	
Rel. Level (RL)	10 m	Pressure Input	0 kPa
Nozzle K value	0	Ext Flow (+In/-Out)	-1590 m3/hr
Int.(Gauge) Head	-44.59 m	Int.(Gauge) Pressure	-633.99 kPa
Total Node Head	-34.59 m		