Sidewinder Conveyor Design Software

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

System Information

Calculation method ..... DIN / ISO
Conveyor Length / Height ..... 2116 / 17.8 ft
Material lift ..... 27.9 ft
Ambient temperature range ..... 32 to 95 °F
Kt factor at minimum temperature 1.02

Material Properties

Type ..... Rock, crushed
Design Tonnage ..... 8818 tph
Density ..... 125 lb/ft^3
Maximum lump size ..... 3.3 in
Surcharge angle ..... 20 deg

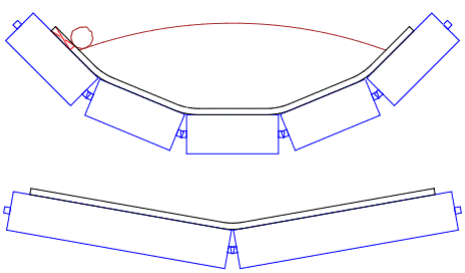
Belt Properties

Manufacture ..... Fabric 2000/5
Type ..... Fabric (5-Ply)
Width ..... 63.0 in
Rating ..... 1142 PIW
Speed ..... 787 fpm
Top / bottom cover thickness ..... 0.39 x 0.12 in
Total thickness ..... 1.0 in
Weight (new / worn) ..... 29.7 / 24.5 lb/ft
Modulus ..... 89,490 PIW
Tape length ..... 4,290 ft
Belt cycle time ..... 5.4 min

Tension Summary	Running	Momentary
Maximum tension (kip)	54.2	57.8
Minimum safety factor	13.27	12.44
Minimum tension (kip)	16.0	16.0
Maximum belt sag (%)	0.89	0.89

Cross Sectional Loading

Material mass (w_m) ..... 373.3 lb/ft
Combined mass ($w_m + w_b$) ..... 403.0 lb/ft
Edge distance (required / actual) ..... 4.1 / 5.1 in
Cross sectional area ..... 2.990 ft²
Cross sectional loading (utility / total) ..... 91 % / 65 %
Bed depth ..... 13.1 in



Flooded belt tonnage ..... 13,481 tph
Flooded ($w_m + w_b$) ..... 600.4 lb/ft

Idler Set Data

	Carry	Return
Series name	Series 25	Series 25
Bearing	6305	6305
Number of rolls	5	2
Trough angle (deg)	45	10
Type	Inline	Inline
Idler spacing (ft)	3.28	6.56
Number of idler sets	670	322
Roll diameter	6.0	6.0
Roll rpm	503	503
Total drag (lbf)	3.3	1.3
Roll length	14.1	34.0
Shaft diameter (in)	0.98	0.98
Dynamic capacity (kip)	23.4	23.4
L10 life[1] (1000 hrs)	139.8 / 101.0	350.0
Shaft deflection (min)	3.96 / 6.26	4.08

[1] *L_{10} life above which 95% of idlers exceed*

Drive Station

Type ..... Variable speed
Synchronous RPM ..... 1500 RPM
Motor quantity / rating ..... 2 / 536 hp
Total installed power ..... 1073 hp
Nominal empty / full power ..... (13 / 77%) 140 / 830 hp
Min / max demand power ..... (13 / 98%) 140 / 1048 hp
Frame Size ..... NEMA 585T
Motor Voltage ..... Not Specified
Efficiency ..... 91.5 to 95.5%
Maximum starting torque 136%
Inertia - Motor ..... 211.2 lb·ft²
Pulley lagging type ..... Ceramic
Motor wrap angles 204
Lagging friction factor (run / accel) ..... 0.35 / 0.40

Take-up Data

Type ..... Gravity
Location ..... Tail / Pulley #5
Required belt line tension ..... 18.0 kip
Cable reeving ratio (trolley:counterweight) 4:4
Counterweight mass ..... 18.0 tons

Required pulley displacement ..... 41.60 ft
Dynamic displacement (incl thermal) ..... 3.68 ft
Permanent elongation ..... 27.89 ft
Splice length (2 included) ..... 8.04 ft
Clearance ..... 2.00 ft

Backstops

Location ..... Head on Pulley #3
Backstop (quantity x type) ..... 2 x High speed
Torque rating at high speed shaft ..... 2 x 2,950 lbf·ft
Torque rating at low speed shaft ..... 2 x 59,684 lbf·ft
Reducer Ratio 20.230:1
Total Installed Power Multiplier 1.36
Pulley diameter ..... 41.2 in

Brakes

Brake type ..... None installed

Reducer Information

Manufacture ..... N/A
Frame size ..... N/A
Reducer ratio 20.230
Catalog reducer ratio 0.000
RPM (High Speed) ..... 1500 RPM
RPM (Low Speed) ..... 74.1 RPM
Configuration ..... Shaft Mount
Number of stages 3
Service factor 1.4
Power rating 0

Motor Torque

100% Motor Torque - High Speed ..... 1,907 lbf·ft
Motor Shaft Torque - Running (FN) ..... 1,476 lbf·ft
Motor Shaft Torque - Starting (FN) ..... 1,766 lbf·ft
100% Motor Torque - Low Speed ..... 38,574 lbf·ft
Low Speed Shaft Torque - Running (FN) ..... 28,287 lbf·ft
Low Speed Shaft Torque - Running (Max) ..... 36,005 lbf·ft
Low Speed Shaft Torque - Starting (FN) ..... 34,029 lbf·ft
Low Speed Shaft Torque - Starting (Max) ..... 50,604 lbf·ft

Starting and Stopping

Start control ..... Controlled
Start time ..... 0.0 s
Operational stop control ..... Fixed time
Operational stop time ..... 0.0 s
O-Stop distance ..... 0 ft
Emergency stop control ..... Drift
Emergency stop time ..... 0.0 s
Material buildup in chute ..... 160.0 ft^3

Tension Ratios

Allowable (running) 3.48
Running tension ratio 3.40
Allowable (dynamic) 4.20
Starting tension ratio 0.00

Transition Lengths

Transition method ..... DIN 22101
Tail transition length (inline) ..... 9.00 ft
Head transition length (elevated 4.25 in) ..... 6.50 ft

Estimated Splice Data

Splice type 4-Step
Splice step length ..... 17.7 in
22 degree bias angle ..... 25.6 in
Total splice length ..... 96.5 in

Take-Up Cable

Counterweight mass ..... 18.0 tons
Cable reeving ratio (trolley:counterweight) 4:4
Take-up cable tension ..... 9.0 kip
Cable diameter ..... 0.63 in
Cable breaking strength (261 MPa) ..... 38.7 kip
Safety factor 4.3
Number of clips (crosby clamps) 3
Turnback / free end length ..... 310.0 / 65.0 in
Sheave Root Diam ..... 11.0 in

Other Information

Loaded beltline mass (excluding motors) ..... 987,413 lb
Total inertia (ref HS shaft) ..... 7,104 $lb·ft^2$

Demand Power (hp)

Case	Demand power	% Motor Nameplate
Empty - Normal Frict.	140	13.0
Full - Normal Frict.	830	77.4
Full - Low Frict.	658	61.4
Full - High Frict.	1028	95.8
Full - With Pullout - Normal Frict.	1048	97.7

Din Factor and Total Equivalent Mass

Case	Din factor	Belt line mass (lb)
Empty - Normal Frict.	0.0200	262,433
Full - Normal Frict.	0.0200	1,046,119
Full - Low Frict.	0.0150	1,023,978
Full - High Frict.	0.0250	1,051,655
Full - With Pullout - Normal Frict.	0.0200	1,046,119

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Maximum Belt Tensions (kip)

Case	Running	Dynamic
Empty - Normal Frict.	21.2	21.2
Full - Normal Frict.	48.8	48.8
Full - Low Frict.	42.7	42.7
Full - High Frict.	54.2	54.2
Full - With Pullout - Normal Frict.	57.8	57.8

Belt Safety Factor

Case	Running	Dynamic
Empty - Normal Frict.	33.94	33.94
Full - Normal Frict.	14.74	14.74
Full - Low Frict.	16.85	16.85
Full - High Frict.	13.27	13.27
Full - With Pullout - Normal Frict.	12.44	12.44

Splice Safety Factor

Case	Running	Dynamic
Empty - Normal Frict.	27.15	27.15
Full - Normal Frict.	11.79	11.79
Full - Low Frict.	13.48	13.48
Full - High Frict.	10.61	10.61
Full - With Pullout - Normal Frict.	9.96	9.96

Minimum Belt Tensions (kip)

Case	Running	Dynamic
Empty - Normal Frict.	16.7	0.00
Full - Normal Frict.	16.6	0.00
Full - Low Frict.	17.1	0.00
Full - High Frict.	16.0	0.00
Full - With Pullout - Normal Frict.	16.6	0.00

Maximum Belt Sag (%)

Case	Running	Dynamic
Empty - Normal Frict.	0.15	0.15
Full - Normal Frict.	0.87	0.87
Full - Low Frict.	0.89	0.89
Full - High Frict.	0.86	0.86
Full - With Pullout - Normal Frict.	0.59	0.59

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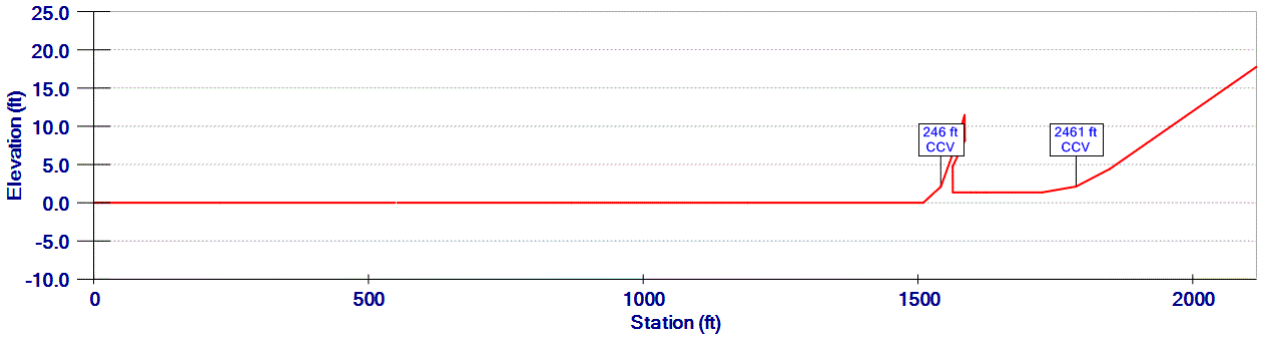
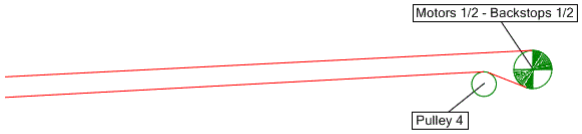
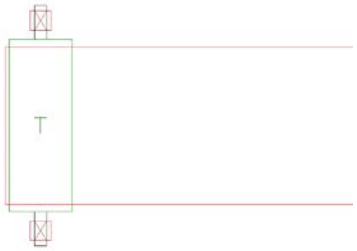
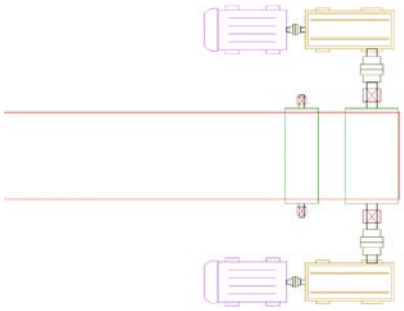
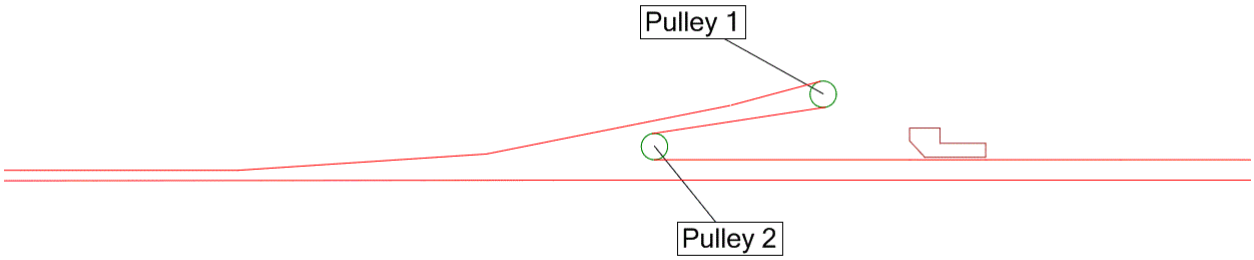
Conveyor Profile

Overall length = 2116 ft - Overall height = 17.8 ft - True Length = 2168.2 ft



Tail Arrangement	*Head Arrangement*
	
	

Middle Arrangement



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Maximum Pulley Tensions (without any additional safety factors)

Pulley	Type	Wrap (deg)	Steady State Tensions (kip)			Momentary Tensions (kip)		
			T1	T2	Resultant Force	T1	T2	Resultant Force
Pulley 1	1-HT	186	40.7		81.6	45.9		91.9
Pulley 2	1-HT	171	40.9		81.9	46.0		91.9
Mtrs 1/2 - Bstps 1/2	1-HT	204	54.2	17.3	69.1	57.8	17.3	73.2
Pulley 4	3-SN	24	17.3		7.28	17.3		7.28
Take-up Pulley	2-MT	180	18.0		36.5	18.0		36.5

T1 & T2 values may not be from the same load cases. Therefore the max resultant force is not the vector sum of these values.

Pulley Shaft Results

Pulley #	Safety Factor	Shaft Slope at Hub (min)	Shaft Deflection at Center (% span)	Bearing L10 Life 1000 hrs	Design T1 Tension (kip)	Design T2 Tension (kip)	Pulley & Shaft Mass (lb)	Resultant Force (kip)	Resultant Angle (deg)	Resultant Torque (kip·ft)	Bending Moment (kip·ft)
1	1.66	6.55	0.066	91	44.8	45.1	5027	90.9	195	0.6	49.2
2	1.68	6.47	0.065	95	45.0	45.4	5027	89.9	1	0.6	48.7
3	1.76	5.47	0.055	166	59.7	17.6	5027	75.9	181	36.1	41.1
4	3.48	7.47	0.067	500	19.0	19.1	1671	9.66	262	0.1	3.2
5	2.24	6.60	0.063	309	19.8	20.3	3208	40.2	355	0.8	18.0

Design tensions for shaft fatigue are based on all design level 1 cases. Running tensions have an added pulley multiplier of 1.10.

Pulley Geometry Details (Pulley Types)

Type	Lagging Type	Diameter (in)	Lagging Thickness (in)	Diameter with Lagging (in)	Face Width (in)	Shaft Center Diameter (in)	Bearing Diameter (in)	Bearing Center Distance (in)	Plummer Block	Bearing Series	Pulley Shaft Bearing Mass (lb)
1	Ceramic	39.4	0.79	40.9	69.0	9.00	7 1/2	88.0	3044	23044	5,699
2	Rubber	31.5	0.79	33.1	69.0	7.00	6.00	84.0	3036	23036	3,552
3	Rubber	24.8	0.79	26.4	69.0	4 7/16	3 15/16	80.0	522	23222	1,768

Pulley Shaft Information

Type	Locking Device	Shaft Material	Yield Strength (ksi)	Tensile Strength (ksi)	Fatigue Strength (ksi)	Hub Diameter (in)	Hub Center Distance (in)	Bearing to Fillet Distance (in)	Fillet Radius (in)	Overhung Load (kip)	Overhung Moment Arm (in)
1	XT-100	SAE 1018	31.9	64.5	29.0	9.00	62.0	5.7	2.3	0.0	0.0
2	XT-80	SAE 1018	31.9	64.5	29.0	7.00	62.5	4.7	1.5	0.0	0.0
3	XT-45	SAE 1018	31.9	64.5	29.0	4 7/16	64.0	3.6	0.8	0.0	0.0

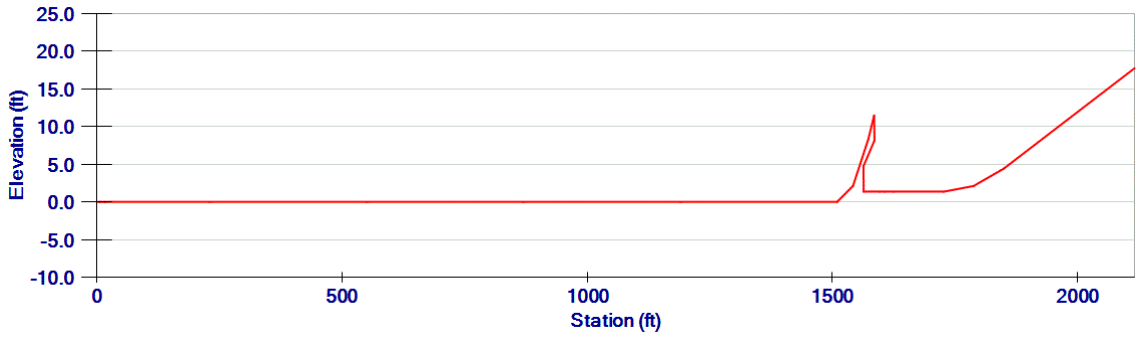
Conveyor Load Cases

During the course of operation, the conveyor experiences different operating conditions at various frequencies. Normal operating conditions, such as steady state running, loading and unloading, and other common load cases are designated as Design Level 1. Unusual operating conditions, such as when all incline or decline section are simultaneously loaded, are defined as Design Level 2. These design levels allow easy summarization of the various possible loading conditions.

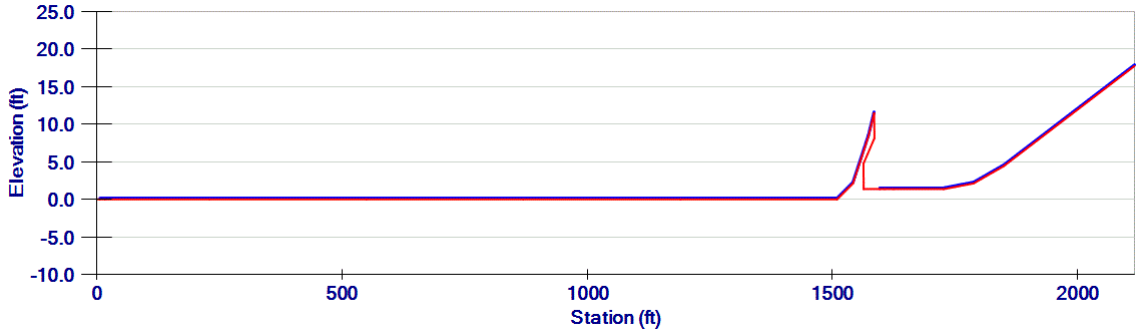
For this conveyor, there are two Design Level 1 loads, which are:

1. Empty
2. Fully Loaded

In the load case figures, the red line is the conveyor profile and the blue line indicates positions that are loaded.



Empty



Fully Loaded (Material Lift = 27.9 ft)

There are one Design Level 2 loads, which are:

1. Fully Loaded - With Pullout

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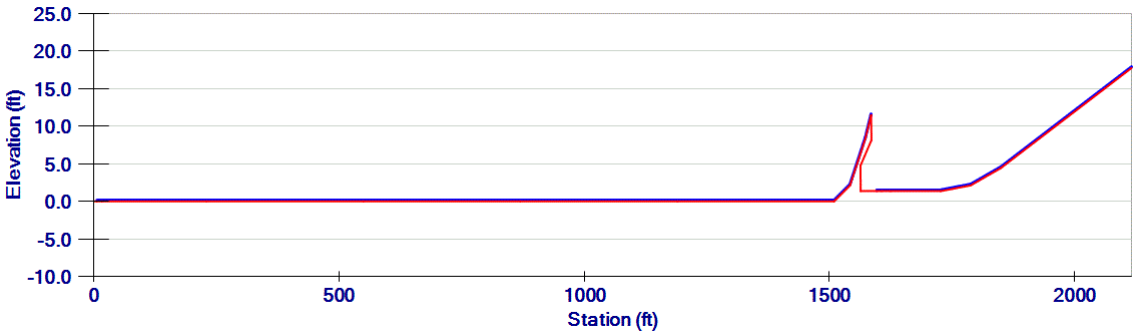


Fully Loaded - With Pullout

Take-up Displacement Summary

1. Type ..... Gravity
2. Location ..... Tail / Pulley #5
3. Belt line tension ..... 18.0 kip
4. Take-up pulley displacement range
   a. Running ..... -2.41 to 0.00 ft
   b. Momentary ..... -3.68 to 0.00 ft

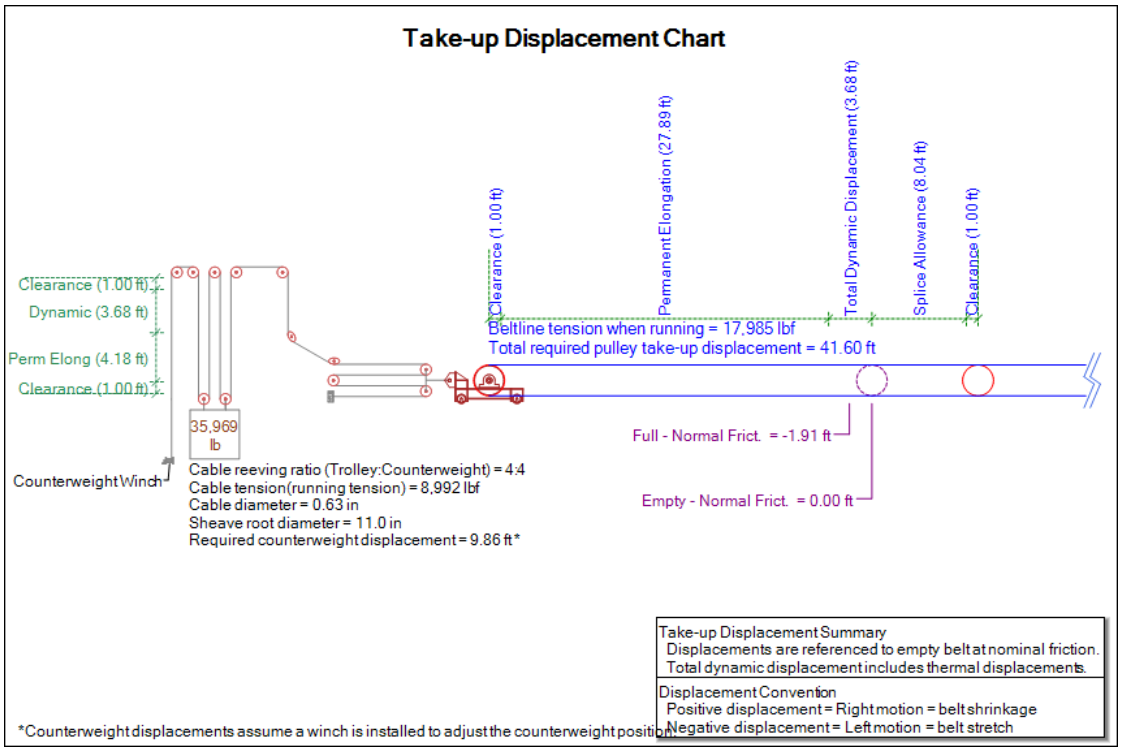
Take-up Pulley Displacement Summary

1. Dynamic displacement (incl thermal) ..... 3.68 ft
2. Permanent elongation ..... 27.89 ft
3. Splice length (2 included) ..... 8.04 ft
4. Clearance ..... 2.00 ft
5. Required displacement ..... 41.60 ft

Counterweight Displacement Summary (4:4 Cable Reeving Ratio)

1. Dynamic displacement ..... 3.68 ft
2. Permanent elongation ..... 4.18 ft
3. Splice length (2 included) ..... 0.00 ft
4. Clearance ..... 2.00 ft
5. Required displacement ..... 9.86 ft

**Counterweight displacements assume a winch is installed to adjust the counterweight position. As such the splice length requirement and most of the permanent elongation can be removed from the total displacement (assuming the counterweight location is repositioned periodically).*



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Pulley Details

The following table lists recommended pulley design tensions. The first column lists belt tensions for bearing L10 life and pulley fatigue stress calculations. Belt tensions for the fatigue design criterion are based on all design level 1 cases and dynamic conditions. Running tensions have an added pulley multiplier of 1.10.

Pulleys are also to be design for the structural design tensions. For structural design tensions, the pulley manufacturer is to ensure that the pulleys will be adequate to meet these worst case conditions.

Pulley Design Tensions (added safety factors as described above)

Pulley	Type	Wrap (deg)	Fatigue Design Tensions (kip)			Structural Design Tension (kip)		
			T1	T2	Resultant Force	T1	T2	Resultant Force
Pulley 1	1-HT	186	44.8		90.9	65.4		132
Pulley 2	1-HT	171	45.0		89.9	65.8		131
Motors 1/2 - Backstops 1/2	1-HT	204	59.7	17.6	75.9	88.2	21.0	108
Pulley 4	3-SN	24	19.0		9.66	21.1		10.6
Take-up Pulley	2-MT	180	19.8		40.2	19.8		40.3

Required Pulley Diameter (Tension based on a safety factor of 10)

Pulley	Location	Pulley Type	Wrap (deg)	Diameter (in)	Required Pulley Diameter (in)	% Running Tension	% Momentary tension
Pulley 1	Middle (10)	1 - HT	186	39.4	42.0	57	64
Pulley 2	Middle (12)	1 - HT	171	39.4	42.0	57	64
Motors 1/2 - Backstops 1/2	Head (20)	1 - HT	204	39.4	42.0	75	80
Pulley 4	Head (22)	3 - SN	24	24.8	24.0	24	24
Take-up Pulley	Tail (33)	2 - MT	180	31.5	30.0	26	26

Pulley Shaft Stress Analysis (Individual Pulleys)

Pulley #	Type	Safety Factor	Shaft Slope at Hub (min)	Hub Bending Stress (ksi)	Hub Torsion Stress (ksi)	Fillet Bending Stress (ksi)	Fillet Torsion Stress (ksi)	Fillet Von Mises Stress (ksi)	Hub Von Mises Stress (ksi)	Overhung Von Mises Stress (ksi)
1	1	1.66	6.55	8.3	0.0	8.4	0.1	8.3	8.4	0.0
2	1	1.68	6.47	8.2	0.0	8.3	0.1	8.2	8.3	0.0
3	1	1.76	5.47	6.9	3.0	7.0	5.2	8.7	11.5	0.0
4	3	3.48	7.47	4.5	0.0	4.1	0.1	4.5	4.1	0.0
5	2	2.24	6.60	6.4	0.1	6.1	0.2	6.4	6.1	0.0

Running Drive Tensions by Load Case (kip)

Load Case	*Motors 1/2 - Backstops 1/2*		
	T1	T2	Resultant Force
Empty - Normal Frict.	21.2	16.8	37.1
Full - Normal Frict.	48.8	16.6	64.3
Full - Low Frict.	42.7	17.3	58.9
Full - High Frict.	54.2	16.0	69.1
Full - With Pullout - Normal Frict.	57.8	16.6	73.2

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Pulley Tension Summary - All Load Cases and Conditions

Load Case		Pulley	Running		Starting		O-Stop		E-Stop	
ID	Description		T1 (kip)	T2 (kip)	T1 (kip)	T2 (kip)	T1 (kip)	T2 (kip)	T1 (kip)	T2 (kip)
EM-N	Empty - Normal Frict.	Pulley 1	20.2	20.2	20.8	20.7	19.0	19.0	18.4	18.3
		Pulley 2	20.1	20.0	20.6	20.6	18.9	18.8	18.2	18.1
		Mtrs 1 / 2 - Bstps 1 / 2	21.2	16.8	22.0	16.2	19.5	17.9	18.6	18.6
		Pulley 4	16.8	16.9	16.3	16.3	18.0	18.0	18.6	18.7
		Take-up Pulley	18.0	18.1	18.0	18.1	18.0	18.1	18.0	18.1
FL-N	Full - Normal Frict.	Pulley 1	36.9	37.1	41.5	41.7	27.5	27.7	15.0	15.1
		Pulley 2	37.0	37.2	41.6	41.8	27.6	27.7	15.0	15.1
		Mtrs 1 / 2 - Bstps 1 / 2	48.8	16.6	54.9	16.0	36.0	17.7	19.3	19.3
		Pulley 4	16.6	16.9	16.0	16.3	17.7	18.0	19.3	19.5
		Take-up Pulley	18.0	18.3	18.0	18.3	18.0	18.3	18.0	18.3
FL-L	Full - Low Frict.	Pulley 1	32.8	32.8	37.3	37.3	23.7	23.6	15.3	15.2
		Pulley 2	32.7	32.7	37.2	37.2	23.5	23.5	15.1	15.0
		Mtrs 1 / 2 - Bstps 1 / 2	42.7	17.3	48.7	16.8	30.4	18.3	19.2	19.2
		Pulley 4	17.3	17.4	16.8	16.9	18.3	18.3	19.2	19.2
		Take-up Pulley	18.0	18.1	18.0	18.1	18.0	18.1	18.0	18.1
FL-H	Full - High Frict.	Pulley 1	40.7	41.0	45.3	45.6	31.2	31.4	13.9	14.2
		Pulley 2	40.9	41.2	45.5	45.9	31.4	31.6	14.1	14.3
		Mtrs 1 / 2 - Bstps 1 / 2	54.2	16.0	60.4	15.4	41.2	17.1	18.2	19.3
		Pulley 4	16.0	16.4	15.4	15.8	17.2	17.6	19.4	19.8
		Take-up Pulley	18.0	18.5	18.0	18.5	18.0	18.5	18.0	18.4
PO-N	Full - With Pullout - Normal Frict.	Pulley 1	45.9	46.1	60.8	61.0	32.0	32.2	16.6	16.7
		Pulley 2	46.0	46.2	60.9	61.1	32.1	32.2	16.6	16.7
		Mtrs 1 / 2 - Bstps 1 / 2	57.8	16.6	74.2	16.0	40.5	17.7	19.9	19.6
		Pulley 4	16.6	16.9	16.0	16.3	17.7	18.0	19.7	19.9
		Take-up Pulley	18.0	18.3	18.0	18.3	18.0	18.3	18.0	18.3

#1 - Pulley 1

Pulley Location and Geometry

1. Name (Type-1) ..... Pulley 1
2. Pulley Diameter ..... 39.4 in
3. Face Width ..... 69.0 in

Lagging

4. Lagging Type ..... Ceramic
5. Lagging Thickness ..... 0.8 in
6. Diameter with lagging ..... 40.9 in

Shaft Specification

7. Shaft Center Diameter ..... 9.0 in
8. Shaft Material ..... SAE 1018
9. Yield Strength ..... 31.9 ksi
10. Fatigue Strength ..... 29.0 ksi

Locking Device

11. Hub Center Distance ..... 62.0 in
12. Shaft diameter at hub ..... 9.0 in
13. Turndown radius at hub ..... 0.0 in
14. Locking Device XT-100
15. Size ..... 9.00 x 17.50
16. Hub width ..... 4.1 in
17. Hub pressure ..... 0 psi
18. Maximum torque ..... 0 lbf·ft
19. Hub outer diameter ..... 17.5 in

Bearing Specifications

20. Bearing Center Distance ..... 88.0 in
21. Shaft diameter at bearing ..... 7.5 in
22. Bearing to Fillet Distance ..... 5.7 in
23. Turndown radius at bearing ..... 2.3 in
24. Bearing 23044
25. SNL Plummer Block 3044
26. Dynamic Capacity ..... 274 kip
27. Bearing L10 ..... 91,232 hours

Design Tensions and Loads

28. Running T1 Tension ..... 36.9 kip
29. Running T2 Tension ..... 37.1 kip
30. Design T1 Tension ..... 44.8 kip
31. Design T2 Tension ..... 45.1 kip
32. Wrap angle ..... 186 deg
33. Design Resultant Tension ..... 90.9 kip
34. Resultant Angle ..... 195 deg
35. Resultant Moment ..... 49.2 kip·ft
36. Resultant Torque ..... 0.59 kip·ft
37. Estimated Pulley & Shaft Mass ..... 5,027 lb
38. Estimated Mass with Bearings ..... 5,699 lb

Shaft Stresses & Deflections

39. Shaft slope at hub ..... 0.0019 in/in
40. Shaft slope at bearing ..... 0.0024 in/in
41. Shaft deflection at center ..... 0.058 in
42. Shaft deflection at center (%) 0.066
43. Shaft Safety Factor (CEMA) 1.66
44. Shaft Safety Factor (AS1403) 1.54
45. Bending Stress ..... 8.3 ksi
46. Torsional Stress ..... 0.0 ksi
47. Von Mises Stress ..... 8.3 ksi
48. Fillet Von Mises Stress ..... 8.4 ksi

Shell Dimension and Stresses

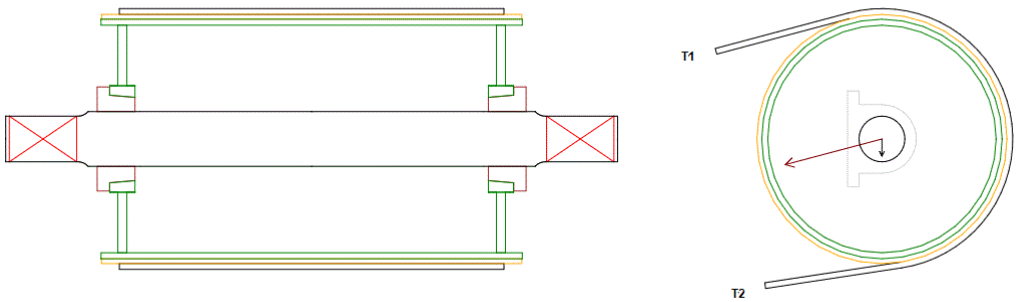
49. Shell thickness ..... 1.0 in
50. Sitzwohl reqd shell thickness[1] ..... 0.9 in
51. Sitzwohl shell stress ..... 4.6 ksi
52. Shell stress at 180 wa ..... 4.0 ksi

[1] Assumes 180 deg wrap and allowable stress of 4.9 ksi

End Disk Dimension and Stresses

53. End disk thickness ..... 1.5 in
54. End disk stress ..... 14.4 ksi

Pulley 1



#2 - Pulley 2

Pulley Location and Geometry

1. Name (Type-1) ..... Pulley 2
2. Pulley Diameter ..... 39.4 in
3. Face Width ..... 69.0 in

Lagging

4. Lagging Type ..... Ceramic
5. Lagging Thickness ..... 0.8 in
6. Diameter with lagging ..... 40.9 in

Shaft Specification

7. Shaft Center Diameter ..... 9.0 in
8. Shaft Material ..... SAE 1018
9. Yield Strength ..... 31.9 ksi
10. Fatigue Strength ..... 29.0 ksi

Locking Device

11. Hub Center Distance ..... 62.0 in
12. Shaft diameter at hub ..... 9.0 in
13. Turndown radius at hub ..... 0.0 in
14. Locking Device XT-100
15. Size ..... 9.00 x 17.50
16. Hub width ..... 4.1 in
17. Hub pressure ..... 0 psi
18. Maximum torque ..... 0 lbf·ft
19. Hub outer diameter ..... 17.5 in

Bearing Specifications

20. Bearing Center Distance ..... 88.0 in
21. Shaft diameter at bearing ..... 7.5 in
22. Bearing to Fillet Distance ..... 5.7 in
23. Turndown radius at bearing ..... 2.3 in
24. Bearing 23044
25. SNL Plummer Block 3044
26. Dynamic Capacity ..... 274 kip
27. Bearing L10 ..... 94,737 hours

Design Tensions and Loads

28. Running T1 Tension ..... 37.0 kip
29. Running T2 Tension ..... 37.2 kip
30. Design T1 Tension ..... 45.0 kip
31. Design T2 Tension ..... 45.4 kip
32. Wrap angle ..... 171 deg
33. Design Resultant Tension ..... 89.9 kip
34. Resultant Angle ..... 1 deg
35. Resultant Moment ..... 48.7 kip·ft
36. Resultant Torque ..... 0.59 kip·ft
37. Estimated Pulley & Shaft Mass ..... 5,027 lb
38. Estimated Mass with Bearings ..... 5,699 lb

Shaft Stresses & Deflections

39. Shaft slope at hub ..... 0.0019 in/in
40. Shaft slope at bearing ..... 0.0024 in/in
41. Shaft deflection at center ..... 0.057 in
42. Shaft deflection at center (%) 0.065
43. Shaft Safety Factor (CEMA) 1.68
44. Shaft Safety Factor (AS1403) 1.56
45. Bending Stress ..... 8.2 ksi
46. Torsional Stress ..... 0.0 ksi
47. Von Mises Stress ..... 8.2 ksi
48. Fillet Von Mises Stress ..... 8.3 ksi

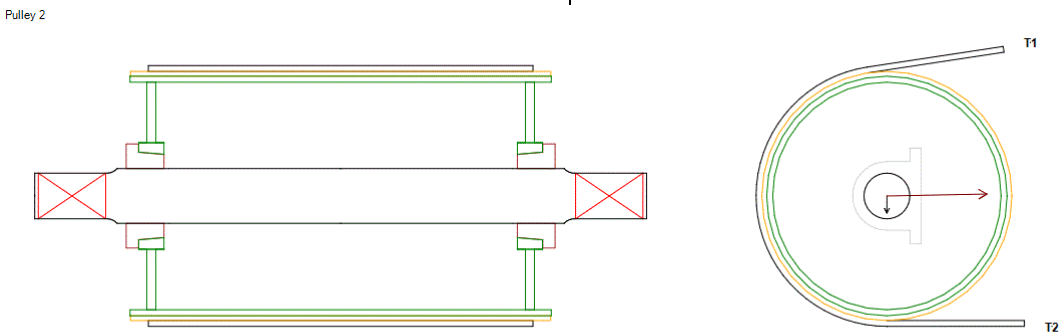
Shell Dimension and Stresses

49. Shell thickness ..... 1.0 in
50. Sitzwohl reqd shell thickness[1] ..... 0.9 in
51. Sitzwohl shell stress ..... 4.9 ksi
52. Shell stress at 180 wa ..... 4.0 ksi

[1] Assumes 180 deg wrap and allowable stress of 4.9 ksi

End Disk Dimension and Stresses

53. End disk thickness ..... 1.5 in
54. End disk stress ..... 14.2 ksi



Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

#3 - Motors 1/2 - Backstops 1/2

Pulley Location and Geometry

1. Name (Type-1)..... Motors 1/2 - Backstops 1/2
2. Pulley Diameter .....39.4 in
3. Face Width.....69.0 in

Lagging

4. Lagging Type..... Ceramic
5. Lagging Thickness.....0.8 in
6. Diameter with lagging .....40.9 in

Shaft Specification

7. Shaft Center Diameter .....9.0 in
8. Shaft Material ..... SAE 1018
9. Yield Strength..... 31.9 ksi
10. Fatigue Strength..... 29.0 ksi

Locking Device

11. Hub Center Distance.....62.0 in
12. Shaft diameter at hub .....9.0 in
13. Turndown radius at hub .....0.0 in
14. Locking Device..... XT-100
15. Size .....9.00 x 17.50
16. Hub width .....4.1 in
17. Hub pressure ..... 0 psi
18. Maximum torque .....0 lbf·ft
19. Hub outer diameter .....17.5 in

Bearing Specifications

20. Bearing Center Distance .....88.0 in
21. Shaft diameter at bearing .....7.5 in
22. Bearing to Fillet Distance .....5.7 in
23. Turndown radius at bearing .....2.3 in
24. Bearing.....23044
25. SNL Plummer Block.....3044
26. Dynamic Capacity .....274 kip
27. Bearing L10 ..... 166,197 hours

Design Tensions and Loads

28. Running T1 Tension..... 48.8 kip
29. Running T2 Tension..... 16.6 kip
30. Design T1 Tension ..... 59.7 kip
31. Design T2 Tension ..... 17.6 kip
32. Wrap angle .....204 deg
33. Design Resultant Tension..... 75.9 kip
34. Resultant Angle.....181 deg
35. Resultant Moment ..... 41.1 kip·ft
36. Resultant Torque ..... 36.1 kip·ft
37. Estimated Pulley & Shaft Mass..... 5,027 lb
38. Estimated Mass with Bearings ..... 5,699 lb

Shaft Stresses & Deflections

39. Shaft slope at hub ..... 0.0016 in/in
40. Shaft slope at bearing ..... 0.0020 in/in
41. Shaft deflection at center..... 0.048 in
42. Shaft deflection at center (%)..... 0.055
43. Shaft Safety Factor (CEMA)..... 1.76
44. Shaft Safety Factor (AS1403) 1.47
45. Bending Stress.....6.9 ksi
46. Torsional Stress .....3.0 ksi
47. Von Mises Stress.....8.7 ksi
48. Fillet Von Mises Stress .....11.5 ksi

Shell Dimension and Stresses

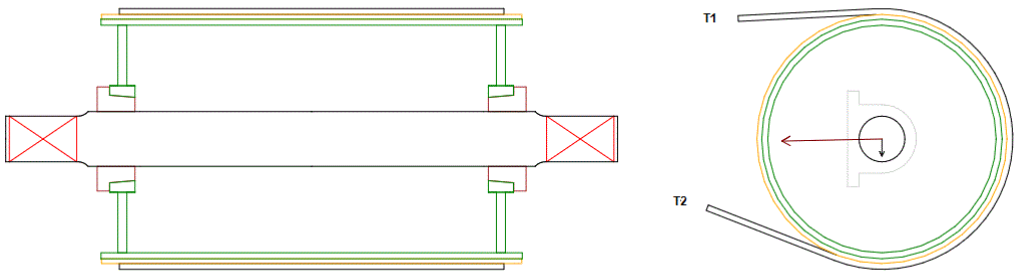
49. Shell thickness..... 1.0 in
50. Sitzwohl reqd shell thickness[1] ..... 0.8 in
51. Sitzwohl shell stress .....5.9 ksi
52. Shell stress at 180 wa .....3.4 ksi

[1] Assumes 180 deg wrap and allowable stress of 4.9 ksi

End Disk Dimension and Stresses

53. End disk thickness..... 1.5 in
54. End disk stress.....12.0 ksi

Motors 1/2 - Backstops 1/2



#4 - Pulley 4

Pulley Location and Geometry

1. Name (Type-3) ..... Pulley 4
2. Pulley Diameter ..... 24.8 in
3. Face Width ..... 69.0 in

Lagging

4. Lagging Type ..... Rubber
5. Lagging Thickness ..... 0.8 in
6. Diameter with lagging ..... 26.4 in

Shaft Specification

7. Shaft Center Diameter ..... 4.4 in
8. Shaft Material ..... SAE 1018
9. Yield Strength ..... 31.9 ksi
10. Fatigue Strength ..... 29.0 ksi

Locking Device

11. Hub Center Distance ..... 64.0 in
12. Shaft diameter at hub ..... 4.4 in
13. Turndown radius at hub ..... 0.0 in
14. Locking Device XT-45
15. Size ..... 4 7/16 x 8.00
16. Hub width ..... 2.1 in
17. Hub pressure ..... 0 psi
18. Maximum torque ..... 0 lbf·ft
19. Hub outer diameter ..... 8.0 in

Bearing Specifications

20. Bearing Center Distance ..... 80.0 in
21. Shaft diameter at bearing ..... 3.9 in
22. Bearing to Fillet Distance ..... 3.6 in
23. Turndown radius at bearing ..... 0.8 in
24. Bearing 23222
25. SNL Plummer Block 522
26. Dynamic Capacity ..... 135 kip
27. Bearing L10 ..... 500,000 hours

Design Tensions and Loads

28. Running T1 Tension ..... 16.6 kip
29. Running T2 Tension ..... 16.9 kip
30. Design T1 Tension ..... 19.0 kip
31. Design T2 Tension ..... 19.1 kip
32. Wrap angle ..... 24 deg
33. Design Resultant Tension ..... 9.66 kip
34. Resultant Angle ..... 262 deg
35. Resultant Moment ..... 3.22 kip·ft
36. Resultant Torque ..... 0.06 kip·ft
37. Estimated Pulley & Shaft Mass ..... 1,671 lb
38. Estimated Mass with Bearings ..... 1,768 lb

Shaft Stresses & Deflections

39. Shaft slope at hub ..... 0.0022 in/in
40. Shaft slope at bearing ..... 0.0025 in/in
41. Shaft deflection at center ..... 0.054 in
42. Shaft deflection at center (%) 0.067
43. Shaft Safety Factor (CEMA) 3.48
44. Shaft Safety Factor (AS1403) 2.97
45. Bending Stress ..... 4.5 ksi
46. Torsional Stress ..... 0.0 ksi
47. Von Mises Stress ..... 4.5 ksi
48. Fillet Von Mises Stress ..... 4.1 ksi

Shell Dimension and Stresses

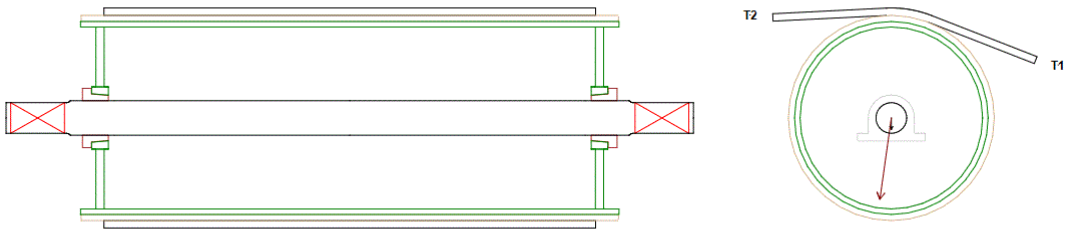
49. Shell thickness ..... 0.7 in
50. Sitzwohl reqd shell thickness[1] ..... 0.5 in
51. Sitzwohl shell stress ..... 3.8 ksi
52. Shell stress at 180 wa ..... 2.7 ksi

[1] Assumes 180 deg wrap and allowable stress of 4.9 ksi

End Disk Dimension and Stresses

53. End disk thickness ..... 1.1 in
54. End disk stress ..... 6.1 ksi

Pulley 4



#5 - Take-up Pulley

Pulley Location and Geometry

1. Name (Type-2)..... Take-up Pulley
2. Pulley Diameter .....31.5 in
3. Face Width.....69.0 in

Lagging

4. Lagging Type.....Rubber
5. Lagging Thickness.....0.8 in
6. Diameter with lagging .....33.1 in

Shaft Specification

7. Shaft Center Diameter .....7.0 in
8. Shaft Material ..... SAE 1018
9. Yield Strength..... 31.9 ksi
10. Fatigue Strength..... 29.0 ksi

Locking Device

11. Hub Center Distance.....62.5 in
12. Shaft diameter at hub .....7.0 in
13. Turndown radius at hub .....0.0 in
14. Locking Device..... XT-80
15. Size .....7.00 x 14.75
16. Hub width .....3.6 in
17. Hub pressure ..... 0 psi
18. Maximum torque .....0 lbf·ft
19. Hub outer diameter .....14.8 in

Bearing Specifications

20. Bearing Center Distance .....84.0 in
21. Shaft diameter at bearing .....6.0 in
22. Bearing to Fillet Distance .....4.7 in
23. Turndown radius at bearing .....1.5 in
24. Bearing.....23036
25. SNL Plummer Block.....3036
26. Dynamic Capacity .....187 kip
27. Bearing L10 .....309,084 hours

Design Tensions and Loads

28. Running T1 Tension..... 18.0 kip
29. Running T2 Tension..... 18.3 kip
30. Design T1 Tension ..... 19.8 kip
31. Design T2 Tension ..... 20.3 kip
32. Wrap angle .....180 deg
33. Design Resultant Tension..... 40.2 kip
34. Resultant Angle.....355 deg
35. Resultant Moment ..... 18.0 kip·ft
36. Resultant Torque ..... 0.77 kip·ft
37. Estimated Pulley & Shaft Mass..... 3,208 lb
38. Estimated Mass with Bearings ..... 3,552 lb

Shaft Stresses & Deflections

39. Shaft slope at hub ..... 0.0019 in/in
40. Shaft slope at bearing ..... 0.0023 in/in
41. Shaft deflection at center..... 0.053 in
42. Shaft deflection at center (%)..... 0.063
43. Shaft Safety Factor (CEMA)..... 2.24
44. Shaft Safety Factor (AS1403) 2.00
45. Bending Stress.....6.4 ksi
46. Torsional Stress .....0.1 ksi
47. Von Mises Stress.....6.4 ksi
48. Fillet Von Mises Stress .....6.1 ksi

Shell Dimension and Stresses

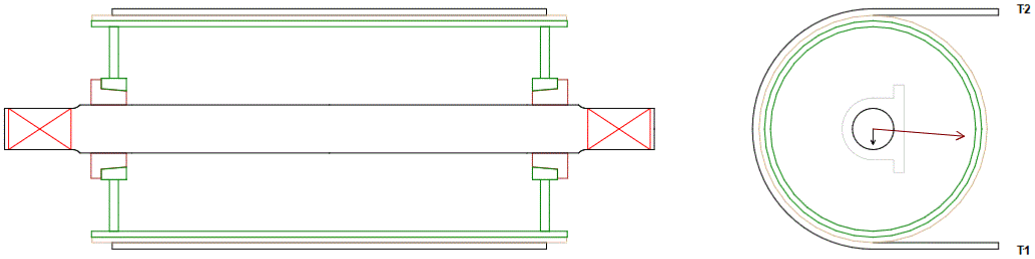
49. Shell thickness..... 0.9 in
50. Sitzwohl reqd shell thickness[1] ..... 0.5 in
51. Sitzwohl shell stress .....2.1 ksi
52. Shell stress at 180 wa .....2.1 ksi

[1] Assumes 180 deg wrap and allowable stress of 4.9 ksi

End Disk Dimension and Stresses

53. End disk thickness..... 1.3 in
54. End disk stress.....9.4 ksi

Take-up Pulley



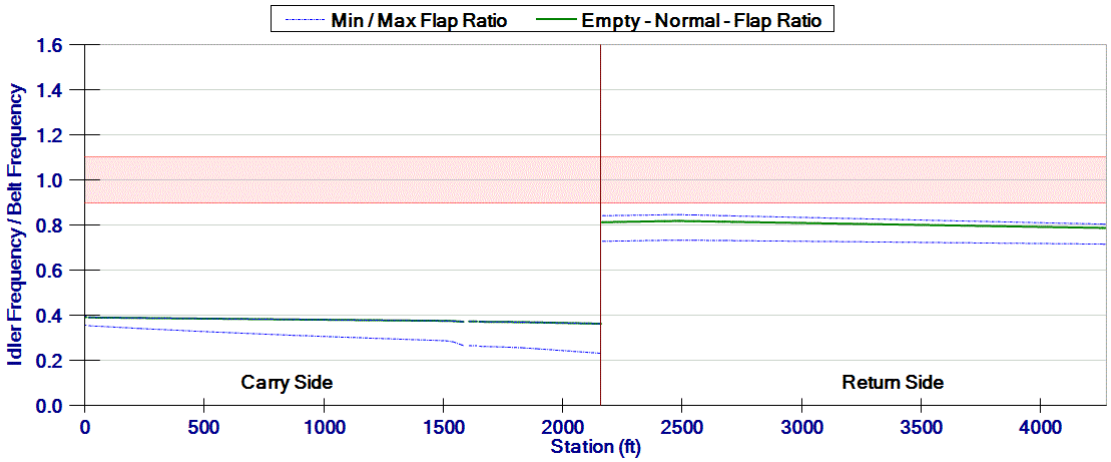
Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Belt Flap Summary

Belt flap may occur when the natural frequency of the belt matches the rotational frequency of the idlers. If belt flap is severe, it can destroy the idlers and increase the demand power of the conveyor. Belt flap should be avoided.

The belt flap ratio is defined as the rotational frequency of the idler divided by the natural frequency of the belt. If this ratio is equal to an integer (i.e. 1, 2, 3) then the idler may induce transverse vibrations at the natural frequency mode and result in resonance.

The chart below shows the flap ratio along the length of the conveyor. The solid green line shows flap mode of the empty belt under the normal friction case. The shaded pink areas should be avoided.



* Belt flap resonance occurs at flap ratios 1, 2, 3, and 4

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
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Belt Transition Length Requirements

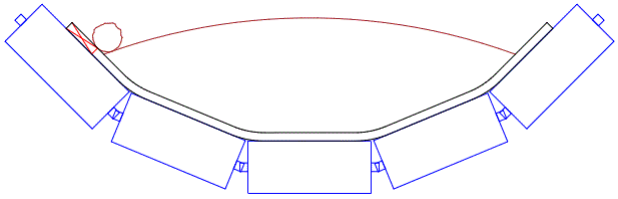
DIN 22101 Transition Lengths

Location (ft)	Transition Length (ft)	Pulley Elevation (in)	Tension Running (kip)	Tension Momentary (kip)	Safety Factor Running	Safety Factor Momentary	Min Stress (PIW)	Required Length Running (ft)	Required Length Buckling (ft)	Required Length Momentary (ft)
0.0	9.00	0.0	18.49	18.49	15.44	15.44	52	9.00	9.00	2.74
563.6	6.50	4.3	54.23	57.81	8.88	8.51	113	6.30	6.00	1.83

Material Loading Profiles

Material Properties

Type.....Rock, crushed
Design Tonnage..... 8818 tph
Density.....125 lb/ft^3
Maximum lump size ..... 3.3 in
Surcharge angle .....20 deg



Tonnage ..... 8818 tph
Belt speed ..... 787 fpm
Material mass.....373.3 lb/ft
Edge distance (required / actual)..... 4.1 / 5.1 in
Cross sectional loading (utility / total).....91 % / 65 %
Bed depth..... 13.1 in

Idler Specifications

Idler Specifications		
Type	5 Equal Rolls	VEE
Number of rolls	5	2
Trough angle (deg)	45	10
Roll diameter (in)	6.0	6.0
Roll length (in)	14.1	34.0
Shaft diameter (in)	0.98	0.98
Bearing series	6305	6305
Maximum roll RPM	503	503
Min Life (1000 hrs)	101	350
95% life[1] (1000 hrs)	101	350
Shaft deflection (min)	6.26	4.08
Mass per Roll (lb)	15.9	34.2
Rotating mass for set (lb)	79.3	68.4
Wk2 for set (lb·in²)	613	555

Idler Spacing and Count Summary		
General	Carry	Return
Idler spacing (ft)	3.28	6.56
Number of idler sets	670	322
Number of rolls	3,350	644
Total drag (lbf)		
Nominal friction	3.3	1.3
High friction	3.3	1.3
Low friction	0.0	0.0

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Idler Life and Shaft Deflection Summary-Carry Side

#	Station (ft)	Length (ft)	Vertical Radius (ft)	Idler Spacing (ft)	Idler Type	Wing L_{10} Life (hours)	Center L_{10} Life (hours)	Wing Shaft Deflection (min)	Center Shaft Deflection (min)
1	0.0	6.6		3.28	1	350,000	350,000	0.53	0.56
2	6.6	9.8		0.50	1	335,588	350,000	2.97	4.33
3-7	16.4	1,493.2		3.28	1	148,996	106,065	3.85	6.15
8-9	1,509.6	64.4	-246	3.28	1	285,314	184,839	2.94	5.04
10	1,573.3	12.0		3.28	1	155,633	113,479	3.79	6.02
14	1,563.5	33.0		3.28	1	350,000	350,000	0.69	0.74
15	1,596.5	9.8		0.50	1	218,796	245,736	3.51	4.91
16-17	1,606.3	120.0		3.28	1	141,797	102,025	3.93	6.24
18-19	1,726.4	122.9	-2,461	3.28	1	150,649	106,925	3.84	6.14
20	1,849.2	267.0		3.28	1	139,810	101,018	3.96	6.26

Idler Life and Shaft Deflection Summary-Return Side

#	Station (ft)	Length (ft)	Vertical Radius (ft)	Idler Spacing (ft)	Idler Type	Wing L_{10} Life (hours)	Center L_{10} Life (hours)	Wing Shaft Deflection (min)	Center Shaft Deflection (min)
24-25	2,111.6	262.7		6.56	2	350,000		4.04	
26-27	1,849.2	122.9	-2,461	6.56	2	350,000		3.44	
28-33	1,726.4	1,726.4		6.56	2	350,000		4.08	

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Structural Loads

The live load structural design tensions should be based on the maximum dynamic tensions plus 10% (to account for misalignment and abnormalities in the belt, pulleys, and structures). Additionally they must include any other external loads (wind & snow loads, seismic, etc.) that the system will encounter. These forces must then be multiplied by the required live load structural design safety factor requirements (typically 1.6) to meet the specific structural design codes for the project.

The dead load structural design loads must be calculated from the masses of the pulleys, drives, reducers, and other components. These loads are not included in this report as they will depend on the specific manufacture selection and other details. These forces must then be multiplied by the required dead load structural design safety factor requirements (typically 1.2) to meet the specific structural design codes for the project. The live and dead loads are then added together to obtain the total structural design forces.

The table below includes the belt tensions from all current load cases. Additionally, steady state and dynamic tensions for the high friction case with 10,299 tph have also been included. This specific load case results in 100% nameplate motor power, excluding any reducer losses. The starting torque has been set to 150% for this case. The maximum tension values have been multiplied by 110% and the pulley shaft calculations shown in the table reflect these values. The minimum tensions have been reduced by 10%. The resultant force values include the vertical weight of the pulley.

Structural Live Loads - Includes case with 10,299 tph under steady state and dynamic conditions + 110% multiplier

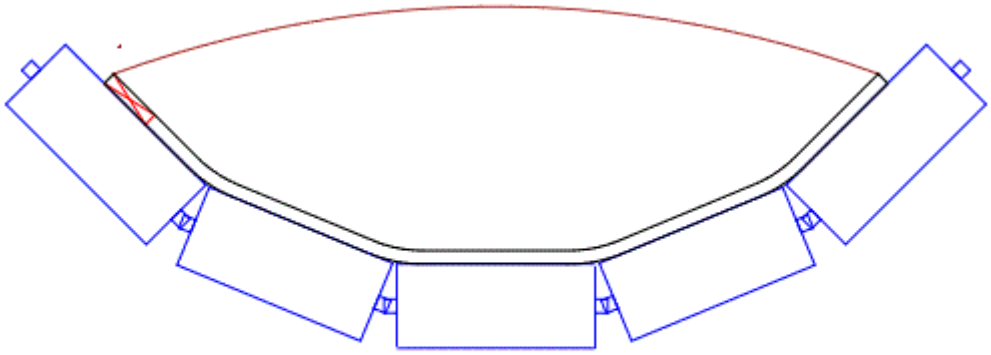
Pulley	Type	Wrap (deg)	Shaft Hub Slope (min)	Shaft stress safety factor	Shaft Center Def. (in)	Minimum Tensions (kip)			Maximum Tensions (kip)		
						T1	T2	Resultant Force	T1	T2	Resultant Force
Pulley 1	1	186	9.51	1.66	2.13	13.3		28.2	65.4		132
Pulley 2	1	171	9.45	1.68	2.12	13.5		27.2	65.8		131
Motors 1/2 - Backstops 1/2	1	204	7.76	1.49	1.74	18.2	12.8	30.1	88.2	21.0	108
Pulley 4	3	24	8.20	3.47	1.50	12.8		7.12	21.1		10.6
Take-up Pulley	2	180	6.61	2.24	1.35	16.2		32.6	19.8		40.3

Bearing Reaction Forces (excluding any overhung loads)

Pulley	Wrap (deg)	Entry Vector Angle (deg)	Exiting Vector Angle (deg)	Pulley, Shaft & Bearings Mass (lb)	Bearing Horizontal Direction (kip)			Bearing Vertical Direction (kip)		
					Structural Min Tension	FL-N Case	Structural Max Tension	Structural Min Tension	FL-N Case	Structural Max Tension
Pulley 1	186	195	189	5,699	-26.2	-72.4	-128	-11.2	-20.8	-32.5
Pulley 2	171	9	0	5,699	27.0	73.8	131	-3.68	-0.13	4.19
Motors 1/2 - Backstops 1/2	204	183	159	5,699	-30.0	-64.2	-108	-1.96	-2.10	-2.44
Pulley 4	24	339	183	1,768	-1.31	-1.40	-1.91	-7.10	-8.66	-10.5
Take-up Pulley	180	0	0	3,552	32.5	36.3	40.2	-3.55	-3.55	-3.55

The idler stringer loading should be based on the flooded belt surge capacity of 13,481 tph and 600.4 lb/ft plus the idler and frame masses. Additionally, all other loads (hood covers, wind loads, etc.) must also be taken into consideration.

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

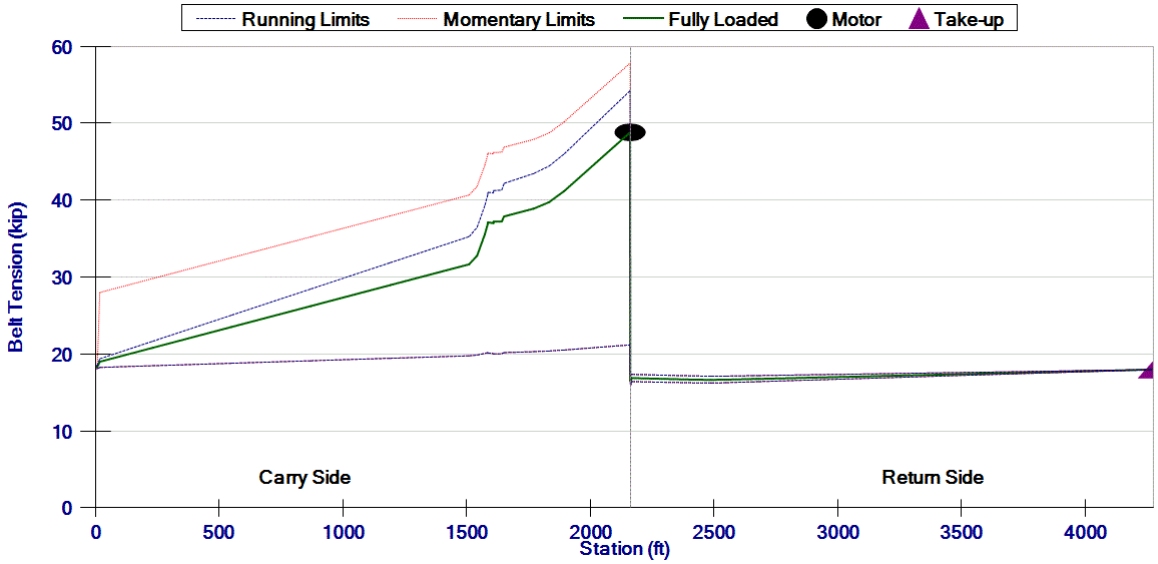


Required Edge Distance = 4.1 in
Actual Edge Distance = 0.0 in
Cross Sectional Area = 4.571 ft²
% Area (utility / total) = 139% / 100%
Material Height = 17.4 in

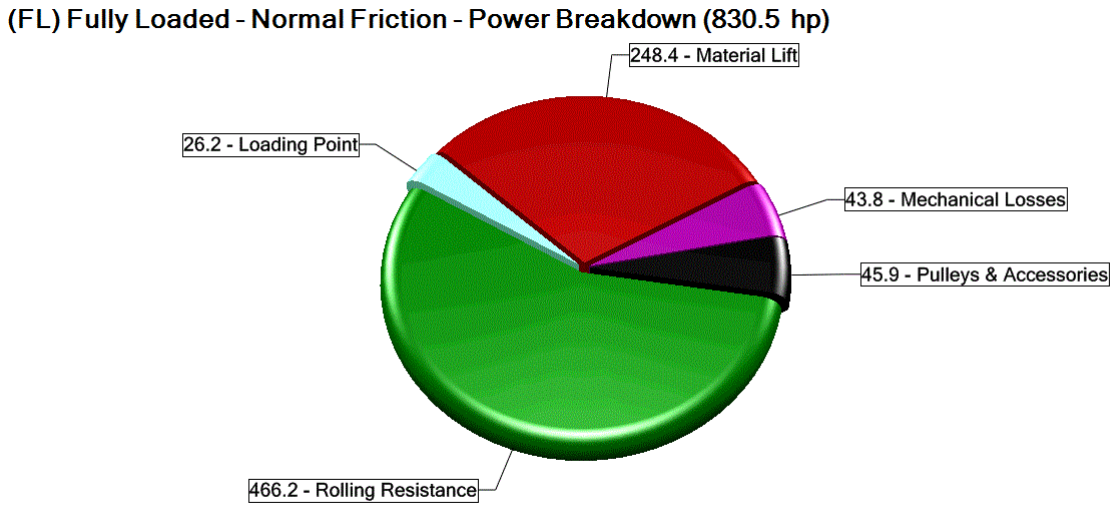
Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Element Summary Details

Tension Summary



Power Summary



Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Vertical Curve Summary

Summary of Vertical Curve on Carry Strand

Elements	Station (ft)	Type	Radius (ft)	Running Tension		Momentary Tension	
				Req'd Radius (ft)	Reason	Req'd Radius (ft)	Reason
8-10	1,510 - 1,573	concave	-246	-1315	Lift Off	-1537	Lift Off
18-20	1,726 - 1,849	concave	-2461	-1487	Lift Off	-1692	Lift Off

Summary of Vertical Curve on Return Strand

Elements	Station (ft)	Type	Radius (ft)	Running Tension		Momentary Tension	
				Req'd Radius (ft)	Reason	Req'd Radius (ft)	Reason
26-28	1,726 - 1,849	concave	-2461	-699	Lift Off	-699	Lift Off

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Element Summary Details

Summary of Conveyor Elements

#	Name	Station (ft)	Elevation (ft)	Length (ft)	Height (ft)	Slope (deg)	Vertical Radius (ft)	Idler Spacing (ft)	Idler Type
1		0.0	0.00	6.6	0.00	0.00		3.28	1
2	Loading Point	6.6	0.00	9.8	0.00	0.00		0.50	1
3		16.4	0.00	213.3	0.00	0.00		3.28	1
4		229.7	0.00	320.0	0.00	0.00		3.28	1
5		549.6	0.00	320.0	0.00	0.00		3.28	1
6		869.6	0.00	320.0	0.00	0.00		3.28	1
7		1,189.6	0.00	320.0	0.00	0.00		3.28	1
8		1,509.6	0.00	32.2	2.11	3.75	-246	3.28	1
9		1,541.7	2.11	32.2	6.28	11.24	-246	3.28	1
10		1,573.3	8.38	12.0	3.10	15.00		3.28	1
11	Pulley 1	1,584.9	11.48	3.4	-3.33	---			
12		1,585.5	8.15	22.6	-3.40	-8.65			
13	Pulley 2	1,563.2	4.75	3.4	-3.39	---			
14		1,563.5	1.36	33.0	0.00	0.00		3.28	1
15	Loading Point	1,596.5	1.36	9.8	0.00	0.00		0.50	1
16		1,606.3	1.36	17.5	0.00	0.00		3.28	1
17		1,623.8	1.36	102.6	0.00	0.00		3.28	1
18		1,726.4	1.36	61.5	0.77	0.72	-2,461	3.28	1
19		1,787.8	2.12	61.5	2.30	2.15	-2,461	3.28	1
20		1,849.2	4.43	267.0	13.33	2.86		3.28	1
21	Motors 1/2 - Backstops 1/2	2,115.9	17.76	3.3	-3.29	---			
22		2,115.4	14.47	3.6	1.31	21.36			
23	Pulley 4	2,112.0	15.78	0.5	0.07	---			
24		2,111.6	15.85	3.3	-0.16	-2.86		6.56	2
25		2,108.3	15.69	259.4	-13.89	-3.07		6.56	2
26		1,849.2	1.80	61.5	-2.30	-2.15	-2,461	6.56	2
27		1,787.8	-0.50	61.5	-0.77	-0.72	-2,461	6.56	2
28		1,726.4	-1.27	102.6	0.00	0.00		6.56	2
29		1,623.8	-1.27	17.5	0.00	0.00		6.56	2
30		1,606.3	-1.27	9.8	0.00	0.00		6.56	2
31		1,596.5	-1.27	33.0	0.00	0.00		6.56	2
32		1,563.5	-1.27	1,547.1	-1.49	-0.06		6.56	2
33		16.4	-2.76	16.4	0.00	0.00		6.56	2
34	Take-up Pulley	0.0	-2.76	2.8	2.76	---			

Min/Max Tension Summary per Element

Element Tension (kip)

#	Name	Running			Momentary		
		Maximum	Minimum	%Sag	Maximum	Minimum	%Sag
1		18.5	18.1	0.07	18.5	18.1	0.07
2	Loading Point	18.5	18.1	0.14	18.5	18.1	0.14
3		19.4	18.3	0.89	28.0	18.3	0.89
4		21.7	18.5	0.83	29.8	18.5	0.83
5		25.1	18.8	0.75	32.5	18.8	0.75
6		28.5	19.1	0.69	35.2	19.1	0.69
7		31.9	19.5	0.63	37.9	19.5	0.63
8		35.3	19.8	0.59	40.7	19.8	0.59
9		36.5	19.9	0.57	41.8	19.9	0.57
10		39.3	20.1	0.52	44.6	20.1	0.52
11	Pulley 1	40.7	20.2	0.00	45.9	20.2	0.00
12		41.0	20.2	0.00	46.1	20.2	0.00
13	Pulley 2	40.9	20.1	0.00	46.0	20.1	0.00
14		41.2	20.0	0.06	46.2	20.0	0.06
15	Loading Point	41.3	20.1	0.08	46.2	20.1	0.08
16		42.2	20.2	0.49	46.9	20.2	0.49
17		42.4	20.2	0.49	47.0	20.2	0.49
18		43.5	20.3	0.48	47.9	20.3	0.48
19		44.4	20.4	0.47	48.7	20.4	0.47
20		46.0	20.5	0.46	50.2	20.5	0.46
21	Motors 1/2 - Backstops 1/2	54.2	21.2	0.00	57.8	21.2	0.00
22		17.3	16.0	0.00	17.3	16.0	0.00
23	Pulley 4	17.3	16.0	0.00	17.3	16.0	0.00
24		17.4	16.4	0.15	17.4	16.4	0.15
25		17.4	16.4	0.15	17.4	16.4	0.15
26		17.2	16.3	0.16	17.2	16.3	0.16
27		17.1	16.2	0.16	17.1	16.2	0.16
28		17.1	16.3	0.16	17.1	16.3	0.16
29		17.2	16.4	0.15	17.2	16.4	0.15
30		17.2	16.4	0.15	17.2	16.4	0.15
31		17.2	16.4	0.15	17.2	16.4	0.15
32		17.2	16.5	0.15	17.2	16.5	0.15
33		18.0	18.0	0.14	18.0	18.0	0.14
34	Take-up Pulley	18.0	18.0	0.00	18.0	18.0	0.00

Te Tension Summary per Load Cases

Belt Tension Summary per Load Case (lbf)					
	EM-N	FL-N	FL-L	FL-H	PO-N
Total (Beltline)	4,310	32,147	25,337	38,162	41,142
Total (Power)	5,859	34,806	27,586	43,073	43,943
Lift Force	0	10,411	10,411	10,411	10,411
Frictional Drag	4,310	21,736	14,926	27,752	30,731
Motor Pulley/Reducer Drag	1,549	2,659	2,249	4,911	2,801
Rolling Resistance	3,874	19,537	14,322	24,559	19,537
Material+Belt Flexure	0	0	0	0	0
Idler Bearing Drag	0	0	0	0	0
Idler Alignment	0	0	0	0	0
Pulleys & Accessories	218	1,099	201	1,672	1,099
Loading Point	218	1,099	403	1,520	10,095
Mechanical Losses	1,386	1,834	2,098	3,657	1,976
Motor Pulley Drag Componets	164	825	151	1,254	825

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Pulley Summary Table - All Cases

Pulley Geometry Details			
Type	1	2	3
Lagging Type	Ceramic	Rubber	Rubber
Diameter (in)	39.4	31.5	24.8
Lagging Thickness (in)	0.79	0.79	0.79
Diameter with Lagging (in)	40.9	33.1	26.4
Face Width (in)	69.0	69.0	69.0
Shaft Center Diameter (in)	9.00	7.00	4 7/16
Bearing Diameter (in)	7 1/2	6.00	3 15/16
Bearing Center Distance (in)	88.0	84.0	80.0
Plummer Block	3044	3036	522
Pulley & Shaft Mass (lb)	2,280	1,455	758
Locking Device	XT-100	XT-80	XT-45
Hub Center Distance (in)	62.0	62.5	64.0
Hub Diameter (in)	9.00	7.00	4 7/16
Bearing to Fillet Distance (in)	5.7	4.7	3.6
Fillet Radius (in)	2.3	1.5	0.8
Shaft Material	SAE 1018	SAE 1018	SAE 1018
Yield Strength (ksi)	31.9	31.9	31.9
Fatigue Strength (ksi)	29.0	29.0	29.0

Element Tension Details per Case

Element Tension Breakdown - (EM) Empty - Normal

Individual drag components per element

#	Running Tension (lbf)	Running Ten Diff (lbf)	Element Tonnage (tph)	Wm+Wb (lb/ft)	Lift Force (lbf)	Belt Force (lbf)	Idler Force (lbf)	Pulley Drag Force (lbf)	Feeder Pt. Force (lbf)	Extra Accessory Force (lbf)
1	18,121	7		29.7		7				
2	18,128	142		29.7		33			109	
3	18,269	216		29.7		216				
4	18,485	323		29.7		323				
5	18,808	323		29.7		323				
6	19,132	323		29.7		323				
7	19,455	323		29.7		323				
8	19,779	95		29.7	62	33				
9	19,874	219		29.7	186	32				
10	20,092	104		29.7	92	12				
11 - P	20,196	-44		29.7	-99			55		
12	20,152	-88		29.7	-101	13				
13 - P	20,064	-46		29.7	-101			55		
14	20,018	33		29.7		33				
15	20,051	142		29.7		33			109	
16	20,193	18		29.7		18				
17	20,211	104		29.7		104				
18	20,314	85		29.7	23	62				
19	20,399	130		29.7	68	62				
20	20,530	665		29.7	396	270				
21 - M	21,195	-4,408		29.7	-98			164		
22	16,787	41		29.7	39	2				
23 - P	16,828	57		29.7	2			55		
24	16,885	-2		29.7	-5	3				
25	16,882	-209		29.7	-412	203				
26	16,673	-20		29.7	-68	48				
27	16,653	25		29.7	-23	48				
28	16,678	80		29.7		80				
29	16,758	14		29.7		14				
30	16,772	8		29.7		8				
31	16,780	26		29.7		26				
32	16,806	1,166		29.7	-44	1,210				
33	17,972	13		29.7		13				
34 - T	17,985	136		29.7	82			55		

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Element Tension Breakdown - (FL) Fully Loaded - Normal

Individual drag components per element

#	Running Tension (lbf)	Running Ten Diff (lbf)	Element Tonnage (tph)	Wm+Wb (lb/ft)	Lift Force (lbf)	Belt Force (lbf)	Idler Force (lbf)	Pulley Drag Force (lbf)	Feeder Pt. Force (lbf)	Extra Accessory Force (lbf)
1	18,341	7		29.7		7				
2	18,348	656	8,818	403.0		106			550	
3	19,004	1,808	8,818	403.0		1,808				
4	20,812	2,713	8,818	403.0		2,713				
5	23,524	2,713	8,818	403.0		2,713				
6	26,237	2,713	8,818	403.0		2,713				
7	28,949	2,713	8,818	403.0		2,713				
8	31,662	1,121	8,818	403.0	848	272				
9	32,783	2,799	8,818	403.0	2,530	268				
10	35,581	1,347	8,818	403.0	1,249	98				
11 - P	36,928	176		29.7	-99			275		
12	37,104	-88		29.7	-101	13				
13 - P	37,017	174		29.7	-101			275		
14	37,191	33		29.7		33				
15	37,224	656	8,818	403.0		106			550	
16	37,880	148	8,818	403.0		148				
17	38,028	869	8,818	403.0		869				
18	38,898	830	8,818	403.0	309	521				
19	39,728	1,449	8,818	403.0	928	521				
20	41,177	7,634	8,818	403.0	5,374	2,261				
21 - M	48,811	-32,244		29.7	-98			825		
22	16,567	41		29.7	39	2				
23 - P	16,608	277		29.7	2			275		
24	16,885	-2		29.7	-5	3				
25	16,882	-209		29.7	-412	203				
26	16,673	-20		29.7	-68	48				
27	16,653	25		29.7	-23	48				
28	16,678	80		29.7		80				
29	16,758	14		29.7		14				
30	16,772	8		29.7		8				
31	16,780	26		29.7		26				
32	16,806	1,166		29.7	-44	1,210				
33	17,972	13		29.7		13				
34 - T	17,985	357		29.7	82			275		

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Element Tension Breakdown - (FL) Fully Loaded - Low

Individual drag components per element

#	Running Tension (lbf)	Running Ten Diff (lbf)	Element Tonnage (tph)	Wm+Wb (lb/ft)	Lift Force (lbf)	Belt Force (lbf)	Idler Force (lbf)	Pulley Drag Force (lbf)	Feeder Pt. Force (lbf)	Extra Accessory Force (lbf)
1	18,103	4		24.5		4				
2	18,107	280	8,818	397.8		79			201	
3	18,388	1,339	8,818	397.8		1,339				
4	19,727	2,010	8,818	397.8		2,010				
5	21,737	2,010	8,818	397.8		2,010				
6	23,746	2,010	8,818	397.8		2,010				
7	25,756	2,010	8,818	397.8		2,010				
8	27,765	1,039	8,818	397.8	837	202				
9	28,805	2,697	8,818	397.8	2,498	199				
10	31,501	1,305	8,818	397.8	1,233	73				
11 - P	32,807	-31		24.5	-82			50		
12	32,776	-75		24.5	-83	8				
13 - P	32,700	-33		24.5	-83			50		
14	32,668	22		24.5		22				
15	32,690	280	8,818	397.8		79			201	
16	32,971	110	8,818	397.8		110				
17	33,080	644	8,818	397.8		644				
18	33,724	691	8,818	397.8	305	386				
19	34,416	1,302	8,818	397.8	916	386				
20	35,718	6,980	8,818	397.8	5,305	1,675				
21 - M	42,697	-25,418		24.5	-81			151		
22	17,280	33		24.5	32	1				
23 - P	17,313	52		24.5	2			50		
24	17,365	-2		24.5	-4	2				
25	17,363	-208		24.5	-340	132				
26	17,154	-25		24.5	-56	31				
27	17,129	12		24.5	-19	31				
28	17,142	52		24.5		52				
29	17,194	9		24.5		9				
30	17,203	5		24.5		5				
31	17,208	17		24.5		17				
32	17,225	752		24.5	-36	788				
33	17,976	8		24.5		8				
34 - T	17,985	118		24.5	68			50		

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Element Tension Breakdown - (FL) Fully Loaded - High

Individual drag components per element

#	Running Tension (lbf)	Running Ten Diff (lbf)	Element Tonnage (tph)	Wm+Wb (lb/ft)	Lift Force (lbf)	Belt Force (lbf)	Idler Force (lbf)	Pulley Drag Force (lbf)	Feeder Pt. Force (lbf)	Extra Accessory Force (lbf)
1	18,488	9		31.0		9				
2	18,497	893	8,818	404.3		133			760	
3	19,390	2,267	8,818	404.3		2,267				
4	21,657	3,401	8,818	404.3		3,401				
5	25,058	3,401	8,818	404.3		3,401				
6	28,459	3,401	8,818	404.3		3,401				
7	31,860	3,401	8,818	404.3		3,401				
8	35,261	1,193	8,818	404.3	851	342				
9	36,453	2,875	8,818	404.3	2,539	336				
10	39,328	1,376	8,818	404.3	1,253	123				
11 - P	40,704	315		31.0	-103			418		
12	41,019	-88		31.0	-105	17				
13 - P	40,931	313		31.0	-105			418		
14	41,244	43		31.0		43				
15	41,286	893	8,818	404.3		133			760	
16	42,180	186	8,818	404.3		186				
17	42,366	1,090	8,818	404.3		1,090				
18	43,456	964	8,818	404.3	310	653				
19	44,419	1,584	8,818	404.3	931	653				
20	46,003	8,225	8,818	404.3	5,391	2,835				
21 - M	54,228	-38,264		31.0	-102			1,254		
22	15,964	43		31.0	41	3				
23 - P	16,007	420		31.0	2			418		
24	16,427	-2		31.0	-5	3				
25	16,426	-168		31.0	-430	262				
26	16,258	-9		31.0	-71	62				
27	16,248	38		31.0	-24	62				
28	16,287	104		31.0		104				
29	16,390	18		31.0		18				
30	16,408	10		31.0		10				
31	16,418	33		31.0		33				
32	16,451	1,517		31.0	-46	1,563				
33	17,968	17		31.0		17				
34 - T	17,985	503		31.0	85			418		

Client Name	*Sidewider Demo*	*Designer*	*AC-Tek*
Project Name	*Tripper Example*	*Company*	*AC-Tek*
Conveyor Name	*Tripper 1*	*Filename*	*Tripper Conveyor*
Location		*Date*	*February 16, 2016*
Description	*Tripper Conveyor Example*		

Element Tension Breakdown - (PO) Fully Loaded - With Pullout - Normal

Individual drag components per element

#	Running Tension (lbf)	Running Ten Diff (lbf)	Element Tonnage (tph)	Wm+Wb (lb/ft)	Lift Force (lbf)	Belt Force (lbf)	Idler Force (lbf)	Pulley Drag Force (lbf)	Feeder Pt. Force (lbf)	Extra Accessory Force (lbf)
1	18,341	7		29.7		7				
2	18,348	9,651	8,818	403.0		106			9,545	
3	27,999	1,808	8,818	403.0		1,808				
4	29,807	2,713	8,818	403.0		2,713				
5	32,520	2,713	8,818	403.0		2,713				
6	35,232	2,713	8,818	403.0		2,713				
7	37,945	2,713	8,818	403.0		2,713				
8	40,657	1,121	8,818	403.0	848	272				
9	41,778	2,799	8,818	403.0	2,530	268				
10	44,577	1,347	8,818	403.0	1,249	98				
11 - P	45,923	176		29.7	-99			275		
12	46,099	-88		29.7	-101	13				
13 - P	46,012	174		29.7	-101			275		
14	46,186	33		29.7		33				
15	46,219	656	8,818	403.0		106			550	
16	46,875	148	8,818	403.0		148				
17	47,023	869	8,818	403.0		869				
18	47,893	830	8,818	403.0	309	521				
19	48,723	1,449	8,818	403.0	928	521				
20	50,172	7,634	8,818	403.0	5,374	2,261				
21 - M	57,806	-41,240		29.7	-98			825		
22	16,567	41		29.7	39	2				
23 - P	16,608	277		29.7	2			275		
24	16,885	-2		29.7	-5	3				
25	16,882	-209		29.7	-412	203				
26	16,673	-20		29.7	-68	48				
27	16,653	25		29.7	-23	48				
28	16,678	80		29.7		80				
29	16,758	14		29.7		14				
30	16,772	8		29.7		8				
31	16,780	26		29.7		26				
32	16,806	1,166		29.7	-44	1,210				
33	17,972	13		29.7		13				
34 - T	17,985	357		29.7	82			275		