



Client Name	Sidewinder 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 / Height2116 / 17.8 ft
 Material lift27.9 ft
 Ambient temperature range32 to 95 °F
 Kt factor at minimum temperature..... 1.02

Material Properties

Type.....Rock, crushed
 Design Tonnage..... 8818 tph
 Density.....125 lb/ft³
 Maximum lump size 3.3 in
 Surcharge angle20 deg

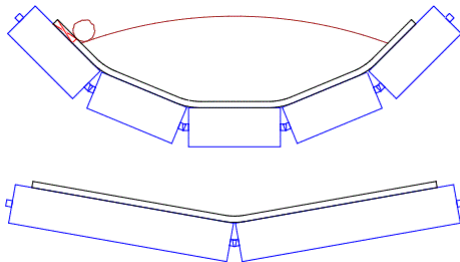
Belt Properties

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 length4,290 ft
 Belt cycle time 5.4 min

Tension Summary	Running	Momentary
Maximum tension (kip)	54.2	57.8
Minimum safety factor	13.27	12.45
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 area2.990 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	662	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)	4.49 / 6.69	4.08

¹ L₁₀ life above which 95% of idlers exceed

Drive Station

Type Variable speed
 Synchronous RPM1500 RPM
 Motor quantity / rating 2 / 536 hp
 Total installed power..... 1073 hp
 Nominal empty / full power (13 / 77%) 139 / 830 hp
 Min / max demand power..... (13 / 98%) 139 / 1048 hp
 Frame Size.....NEMA 585T
 Motor Voltage Not Specified
 Efficiency91.5 to 95.5%
 Maximum starting torque136%
 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 displacement41.61 ft
 Dynamic displacement (incl thermal)3.68 ft
 Permanent elongation27.89 ft
 Splice length (2 included)8.04 ft
 Clearance2.00 ft

Backstops



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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) 1,475 lbf-ft
 Motor Shaft Torque - Starting (FN) 1,764 lbf-ft
 100% Motor Torque - Low Speed 38,574 lbf-ft
 Low Speed Shaft Torque - Running (FN) 28,266 lbf-ft
 Low Speed Shaft Torque - Running (Max) .. 35,984 lbf-ft
 Low Speed Shaft Torque - Starting (FN) 34,002 lbf-ft
 Low Speed Shaft Torque - Starting (Max) 50,577 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 159.8 ft³

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 (inline) 9.00 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) 986,361 lb
 Total inertia (ref HS shaft) 7,096 lb-ft²

Demand Power (hp)

Case	Demand power	% Motor Nameplate
Empty - Normal Frict.	139	13.0
Full - Normal Frict.	830	77.4
Full - Low Frict.	658	61.3
Full - High Frict.	1027	95.7
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	261,381
Full - Normal Frict.	0.0200	1,045,067
Full - Low Frict.	0.0150	1,022,926
Full - High Frict.	0.0250	1,050,603
Full - With Pullout - Normal Frict.	0.0200	1,045,067



Sidewinder Conveyor
Design Software

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Maximum Belt Tensions (kip)

<i>Case</i>	<i>Running</i>	<i>Dynamic</i>
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

<i>Case</i>	<i>Running</i>	<i>Dynamic</i>
Empty - Normal Frict.	33.98	33.98
Full - Normal Frict.	14.75	14.75
Full - Low Frict.	16.86	16.86
Full - High Frict.	13.27	13.27
Full - With Pullout - Normal Frict.	12.45	12.45

Splice Safety Factor

<i>Case</i>	<i>Running</i>	<i>Dynamic</i>
Empty - Normal Frict.	27.18	27.18
Full - Normal Frict.	11.80	11.80
Full - Low Frict.	13.48	13.48
Full - High Frict.	10.62	10.62
Full - With Pullout - Normal Frict.	9.96	9.96

Minimum Belt Tensions (kip)

<i>Case</i>	<i>Running</i>	<i>Dynamic</i>
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 (%)

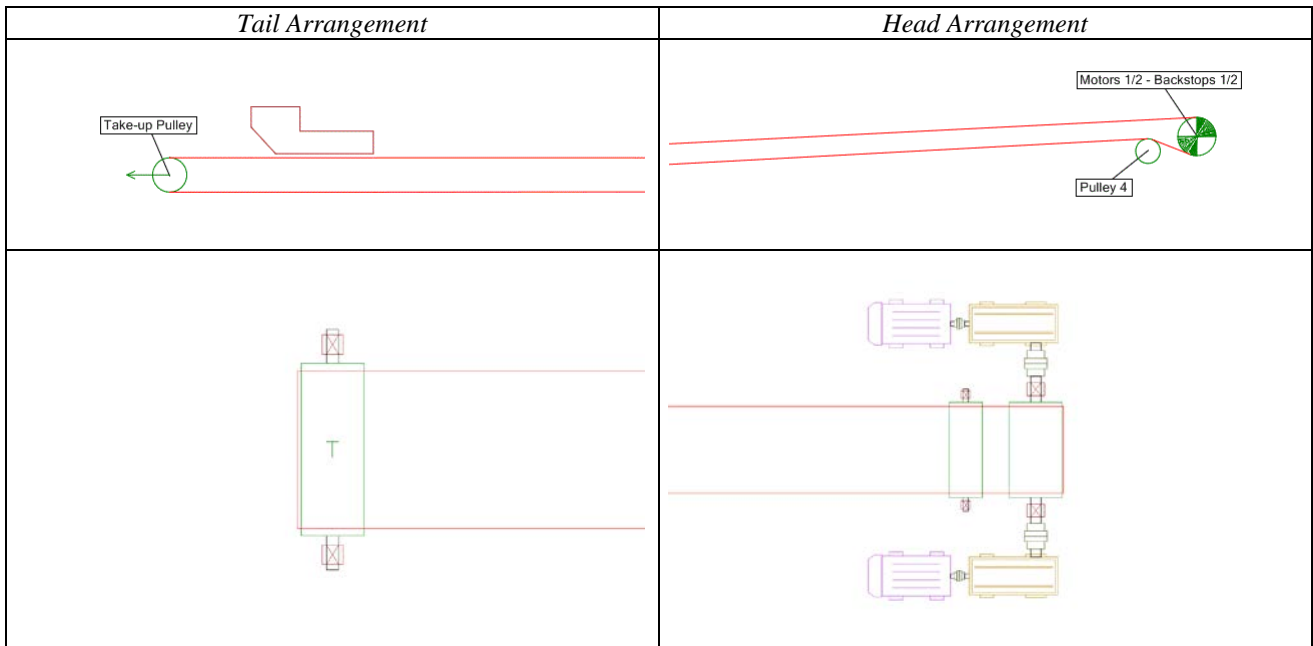
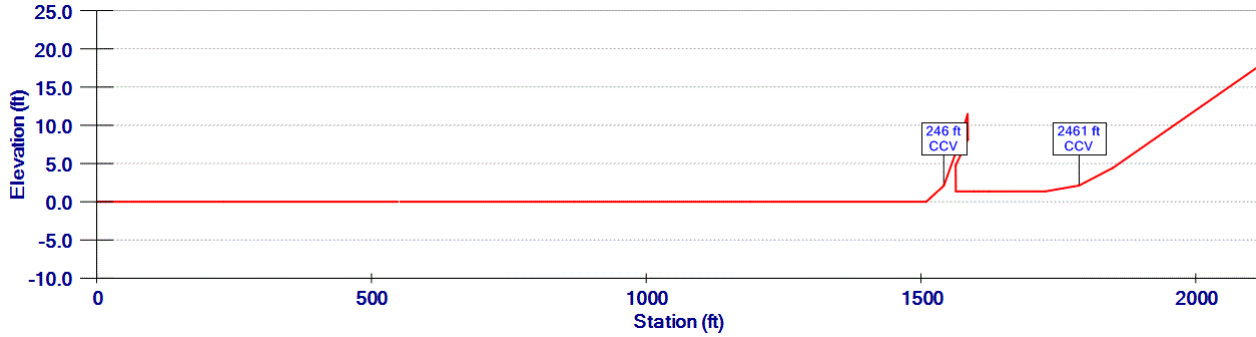
<i>Case</i>	<i>Running</i>	<i>Dynamic</i>
Empty - Normal Frict.	0.15	0.15
Full - Normal Frict.	0.87	0.87
Full - Low Frict.	0.89	0.89
Full - High Frict.	0.86	0.86
Full - With Pullout - Normal Frict.	0.59	0.59



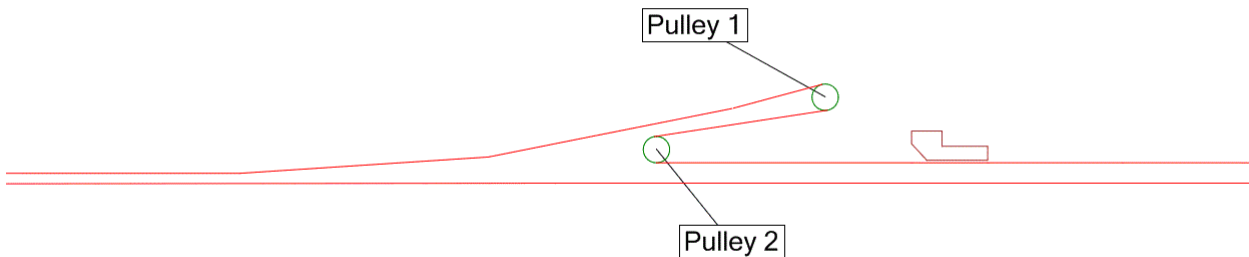
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Conveyor Profile

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



Middle Arrangement





Sidewinder Conveyor
Design Software

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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 #	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	6.54	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	59.6	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.

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

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