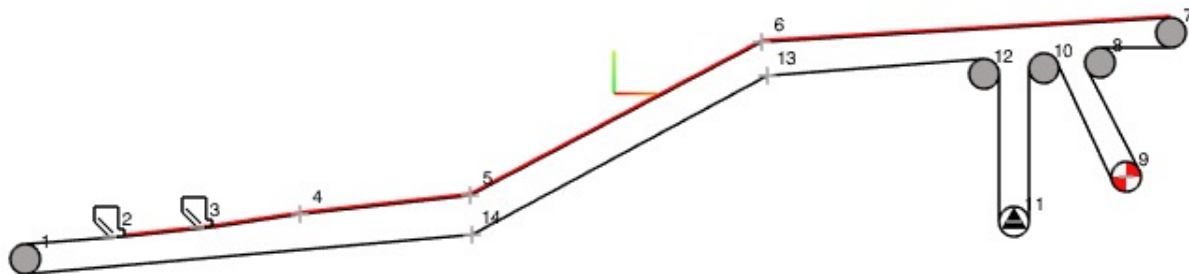


Project	Demo 02 Conveyor High Lift	Client	ABC Iron
Project No.	P9823	Prepared By	Peter Burrow
Conveyor No.	C223	Design Date	01 Oct 2019



C223



#### Conveyor Material

Material	<b>Iron ore, Lump &amp; Fines Product</b>	Surcharge Angle	<b>15 °</b>
Low Bulk Density	<b>1860 kg/m<sup>3</sup></b>	Angle of Repose	<b>34 °</b>
High Bulk Density	<b>2400 kg/m<sup>3</sup></b>	Material Lump size	<b>31.5 mm</b>

#### Conveyor Data

Conveying Distance	<b>287.57 m</b>	Design Capacity	<b>9400 tonnes/hr</b>
Nett Lift / Lower(-)	<b>33.44 m</b>	Belt Speed	<b>4.3 m/s</b>

#### Belt Details

Belt Width	<b>1800 mm</b>	Calculated Belt % Full	<b>93.85 %</b>
Belt Class & Run Safety Factor	<b>ST-1800 7.59</b>	Top Cover Thickness	<b>22 mm</b>
Belt Rated Tension	<b>253 kN/m</b>	Bottom Cover Thickness	<b>7 mm</b>
Belt Total Length	<b>628.5 m</b>	Belt Mass	<b>81.7 kg</b>

#### Belt Tensions and Power Calculations ISO

Effective Tens. Fully Loaded	<b>296.76 kN</b>	Belt Power - Empty Belt	<b>106.2 kW</b>
Maximum Tension Tmax	<b>427.08 kN</b>	Belt Power - Inclines Loaded	<b>1276.24 kW</b>
Minimum Tension Tmin	<b>119.29 kN</b>	Belt Power - Declines Loaded	<b>230.82 kW</b>
Sag Tension	<b>1.1% 76.78 kN</b>	Belt Power - Fully Loaded	<b>1276.05 kW</b>
Takeup Type	<b>Vertical Gravity</b>	Drive Efficiency	<b>95.00 %</b>
Takeup Mass	<b>26700 kg</b>	Absorbed Power Fully Loaded	<b>1343.23 kW</b>
Takeup Pulley Belt Tension	<b>130.92 kN</b>	Installed Motor Power	<b>1260 kW</b>

#### Carry and Return Idlers

Carry Idler Trough Angle	<b>35 °</b>	Return Idler Trough Angle	<b>0 °</b>
Carry Idler Spacing	<b>1 m</b>	Return Idler Spacing	<b>3 m</b>
Carry Idler No Rolls x Dia	<b>3 x 152 mm</b>	Return Idler No Rolls x Dia	<b>1 x 152 mm</b>

#### Dynamics and Miscellaneous Data

Startup Factor - Fully Loaded	<b>122.00 %</b>	CEMA Temperature Factor Kt	<b>1</b>
Startup Factor - Empty	<b>122.00 %</b>	Total Braking Torque LSS	<b>26.50 kNm</b>
Starting Time - Fully Loaded	<b>34.66 sec</b>	Stop Time - Loaded, Braking	<b>4.26 sec</b>
Starting Time - Empty	<b>2.33 sec</b>	Stop Time - Loaded, Coasting	<b>5.01 sec</b>

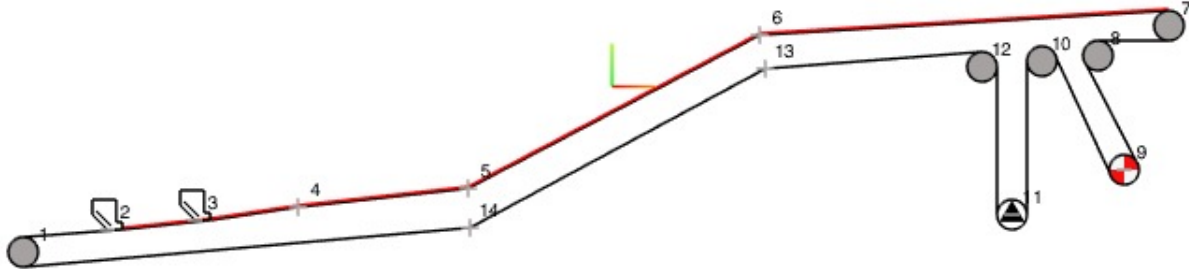
#### Designers Comments

C223 at 9400tph capacity existing case.

Project	Demo 02 Conveyor High Lift	Client	ABC Iron
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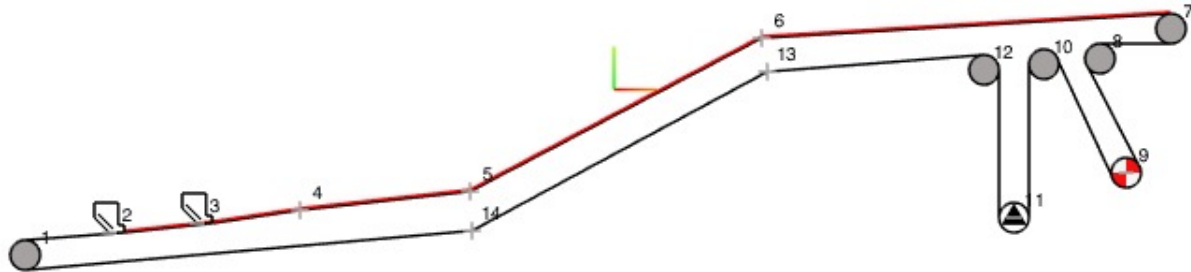
**Station / Section**

Station	Description	Section Length m	Section Lift m	X co- ord m	Y co- ord m	Z co- ord m	Cap- acity tph	Ten Adj. kN	Idler Spacing m	Skirt Length m	No. of Scrapers	Friction Factor Input
1 Tail	Tail	6.85	0.33	0.00	0.00	-10.20	0		1			0.00000
2 Hopper		8.16	0.35	6.82	0.00	-9.44	9400		0.45	8.20		0.00000
3 Hopper		10.91	0.30	14.97	0.00	-9.10	9400		0.45	10.90		0.00000
4 Int. Pt		33.74	1.15	25.88	0.00	-8.80	9400		1.5	1.90		0.00000
5 Int. Pt	Mid belt	164.30	26.16	59.60	0.00	-7.65	9400		1.5			0.00000
6 Int. Pt	0	70.46	5.50	221.80	0.00	18.50	9400		1.2			0.00000
7 Head	Head	39.32	-2.70	292.08	0.00	23.50	0		3		2	0.00000
8 Bend	HT Bend	10.56	-6.95	252.90	0.00	19.80	0		3			0.00000
9 Drive	Drive	12.33	8.12	260.09	0.00	12.19	0		3			0.00000
10 Bend	Lt Bend 1	6.45	-6.45	250.11	0.00	19.70	0		3			0.00000
11 Takeup	Takeup	6.35	6.35	249.20	0.00	13.25	0		3			0.00000
12 Bend	LT Bend 2	26.55	-2.06	248.29	0.00	19.60	0		2.4			0.00000
13 Int. Pt		164.30	-26.16	221.80	0.00	17.97	0		3			0.00000
14 Int. Pt		59.64	-2.44	59.60	0.00	-8.19	0		3		2	0.00000
<b>Totals:</b>		<b>619.90</b>	<b>1.49</b>					<b>0.00</b>		<b>21.00</b>	<b>4.00</b>	

Project	Demo 02 Conveyor High Lift	Client	ABC Iron
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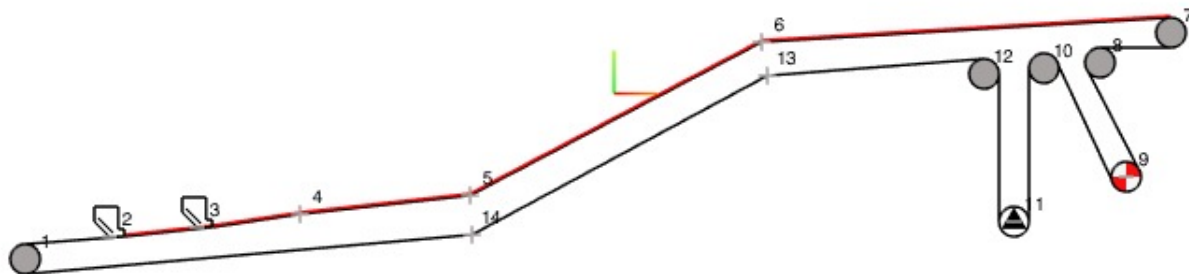
Drive Torque Start-up Factor Loaded	<b>122.00 %</b>	Takeup Pulley Belt Tension	<b>130.92 kN</b>
Drive Torque Start-up Factor Empty	<b>122.00 %</b>	Takeup Mass	<b>26700 kg</b>

Drive / Brake Number	Running		Starting		Braking	
	Fully Loaded	Empty Belt	Fully Loaded	Empty Belt	Fully Loaded	Empty Belt
Drive No. <b>1</b> Type: <b>Drive</b>	Drive					
Pulley No. <b>9</b> Lagging Type:	Ceramic					
Wrap Angle	180	180	180	180	180	180
Co-efficient of Friction	0.35	0.35	0.45	0.45	0.45	0.45
Drive Factor Cw	0.499	0.499	0.321	0.321	0.321	0.321
Calculated Belt Tension T1	kN 421.64	150.93	451.75	276.46	176.78	120.46
Calculated Belt Tension T2	kN 127.82	127.81	127.45	122.33	133.19	128.75
Minimum Required T2	kN 146.62	11.54	104.10	49.48	13.99	2.66
Surplus T2 Tension (T1-T2)	kN -18.80	116.27	23.35	72.85	119.20	117.80
Additional Takeup Mass Required	3834 kg		Limiting Case: <b>Running Full</b>			
Required Friction Factor	0.380		<b>Warning: Insufficient Drive Traction</b>			
Required Wrap Angle	195.4 °					

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Drive Torque Start-up Factor Loaded	<b>122 %</b>	Takeup Pulley Belt Tension	<b>130.92 kN</b>
Drive Torque Start-up Factor Empty	<b>122 %</b>	Takeup Mass	<b>26700 kg</b>

Station No	Running				Starting		Braking		Coasting	
	Fully Loaded Tension kN	Empty Tension kN	Inclines Loaded Tension kN	Declines Loaded Tension kN	Fully Loaded Tension kN	Empty Tension kN	Fully Loaded Tension kN	Empty Tension kN	Fully Loaded Tension kN	Empty Tension kN
1 Tail	119.62	119.62	119.62	119.62	122.85	167.55	93.39	107.99	97.29	115.87
2 Hopper	121.40	121.40	121.40	121.40	124.87	172.91	93.20	108.89	97.39	117.36
3 Hopper	142.78	121.88	142.78	139.75	147.02	175.76	108.29	108.80	113.41	117.65
4 Int. Pt	155.17	122.39	155.17	149.09	160.44	179.42	112.27	108.54	118.64	117.92
5 Int. Pt	169.73	123.86	169.73	152.10	177.98	187.36	102.62	108.44	112.59	118.88
6 Int. Pt	371.50	147.48	371.50	175.72	394.26	242.65	186.42	124.37	213.90	140.02
7 Head	418.40	153.10	418.40	181.34	447.43	262.60	182.32	126.52	217.38	144.51
8 Bend	422.63	154.64	422.63	183.17	452.36	274.62	180.81	125.51	216.72	145.23
9 Drive	421.64	150.93	421.64	179.76	451.75	276.46	176.78	120.46	213.15	141.09
10 Bend	134.48	134.47	134.45	134.47	134.27	131.32	138.57	134.85	140.17	135.43
11 Takeup	130.92	130.92	130.92	130.92	130.92	130.92	130.92	130.92	130.92	130.92
12 Bend	137.58	137.58	137.58	137.58	137.79	140.77	135.83	136.80	136.09	137.33
13 Int. Pt	137.89	137.89	137.89	137.89	138.56	147.74	132.51	135.51	133.31	137.12
14 Int. Pt	119.29	119.29	119.29	119.29	121.84	157.08	98.61	110.12	101.69	116.33
Minimum Tension	<b>119.29</b>	<b>119.29</b>	<b>119.29</b>	<b>119.29</b>	<b>121.84</b>	<b>130.92</b>	<b>93.20</b>	<b>107.99</b>	<b>97.29</b>	<b>115.87</b>
Maximum Tension	<b>422.63</b>	<b>154.64</b>	<b>422.63</b>	<b>183.17</b>	<b>452.36</b>	<b>276.46</b>	<b>186.42</b>	<b>136.80</b>	<b>217.38</b>	<b>145.23</b>
Effective Tension	<b>296.76</b>	<b>24.70</b>	<b>296.80</b>	<b>53.68</b>						
Ave. Belt Tension	<b>222.07</b>	<b>134.20</b>	<b>222.07</b>	<b>149.11</b>	<b>232.75</b>	<b>192.38</b>	<b>135.27</b>	<b>120.06</b>	<b>148.22</b>	<b>129.66</b>
Belt Elong. m	<b>0.261</b>	<b>0.025</b>	<b>0.261</b>	<b>0.065</b>	<b>0.290</b>	<b>0.181</b>	<b>0.028</b>	<b>-0.013</b>	<b>0.063</b>	<b>0.013</b>
T/up Travel m	<b>0.131</b>	<b>0.012</b>	<b>0.131</b>	<b>0.032</b>	<b>0.145</b>	<b>0.091</b>	<b>0.014</b>	<b>-0.007</b>	<b>0.031</b>	<b>0.006</b>

## Helix Technologies Pty Ltd

Project	Demo 02 Conveyor High Lift	Client	ABC Iron
Project No.	P9823	Prepared By	Peter Burrow
Conveyor No.	C223	Design Date	01 Oct 2019



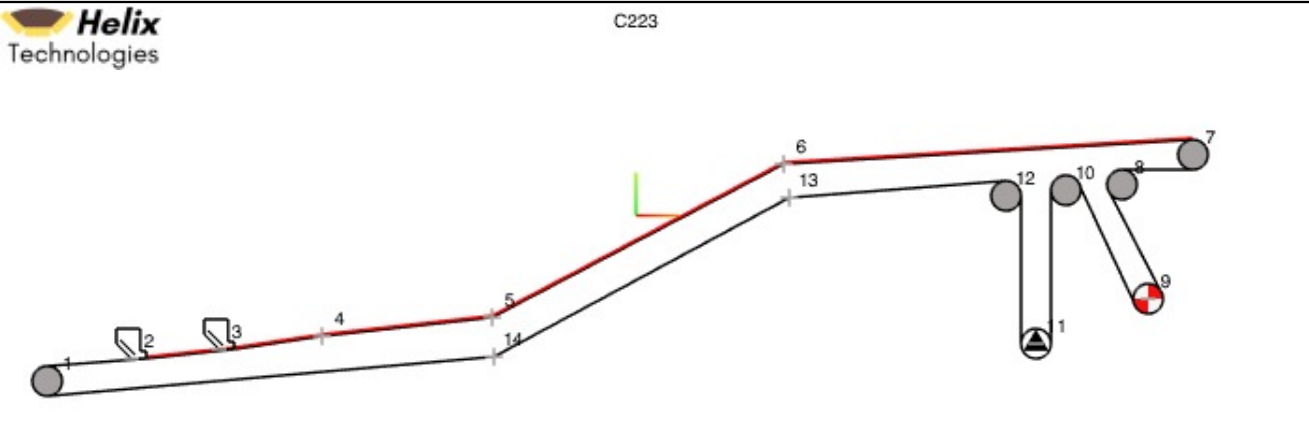
Low Bulk Density: 1860 kg/m3



High Bulk Density: 2400 kg/m3

Conveyed Material		Belt Speed & Capacity	
Material Description	<b>Iron ore, Lump &amp; Fines Product</b>	Belt Speed	<b>4.3 m/s</b>
Low Bulk Density	<b>1860 kg/m3</b>	Belt Design Capacity Input	<b>9400 tonnes/hr</b>
High Bulk Density	<b>2400 kg/m3</b>	Section Loading Max Capacity	<b>9400 tonnes/hr</b>
Surcharge Angle	<b>15 °</b>	Carry Idler Trough Angle	<b>35 °</b>
Angle of Repose	<b>34 °</b>	<b>Belt Dimensions</b>	
Material Lump Size	<b>31.5 mm</b>	Top Cover Thickness	<b>22 mm</b>
<b>Belt Make &amp; Class</b>		Bottom Cover Thickness	<b>7 mm</b>
Belt Category	<b>Bando Steel</b>	Belt Carcass Thickness	<b>4.4 mm</b>
Belt Description	<b>BANDO STEEL CORD</b>	Belt Total Thickness	<b>33.4 mm</b>
Belt Class / Plies	<b>ST-1800</b>	Total Belt (Tape) Length	<b>628.5 m</b>
Belt Reinforcement Fibre	<b>Steel</b>	Time for 1 Revolution	<b>146.2 sec</b>
Belt Width	<b>1800 mm</b>	<b>Belt Load Area &amp; Capacity at 1860kg/m3</b>	
Belt Modulus	<b>129600 kN/m</b>	Minimum Rec. Edge Distance	<b>122 mm</b>
Cord Diameter	<b>4.4 mm</b>	Actual Edge Distance	<b>149 mm</b>
Cord Pitch	<b>10 mm</b>	Load Burden Depth	<b>338 mm</b>
Number of Cords	<b>0</b>	Load Burden Width	<b>1345 mm</b>
<b>Belt Tensions</b>		Belt Load Area at Minimum Recommended Edge Distance	<b>0.3479 m2</b>
Belt Rated Tension / m width	<b>253 kN/m</b>	Belt Load Area utilised at Low Bulk Density	<b>0.3265 m2</b>
Calculated Tension / m width	<b>237.3 kN/m</b>	Belt Actual % Full at Low BD	<b>93.8 %</b>
Belt Rated Tension for width	<b>455.4 kN</b>	<b>Belt Load Area &amp; Capacity at 2400 kg/m3</b>	
Calculated Max Run Tension	<b>427.1 kN</b>	Minimum Recommended Edge Distance	<b>122 mm</b>
Minimum Tension Tmin	<b>119.3 kN</b>	Actual Edge Distance High BD	<b>229 mm</b>
Allowable Tension Rise, Starting	<b>150 %</b>	Belt Load Area Utilised at High Bulk Density	<b>0.2530 m2</b>
Allowable Belt Tension, Starting	<b>683.1 kN</b>	Belt Actual % Full at High BD	<b>72.7 %</b>
Actual Belt Tension, Starting	<b>457.1 kN</b>	<b>Flooded Belt Capacity at 2400 kg/m3</b>	
<b>Belt and Material Mass</b>		Flooded Belt Load Area at Zero Edge Distance	<b>0.4830 m2</b>
Belt Top Cover Mass	<b>44.7 kg/m</b>	Flooded Belt Capacity	<b>17944 tonnes/hr</b>
Belt Bottom Cover Mass	<b>14.2 kg/m</b>	Flooded Belt Material Mass	<b>1159.2 kg/m</b>
Belt Carcass Mass	<b>21.1 kg/m</b>		
Belt Mass Wb (per linear m)	<b>81.7 kg/m</b>		
Material Mass Wm (per linear m)	<b>607.2 kg/m</b>		
Total Mass (Wb + Wm)	<b>688.9 kg/m</b>		
Total Belt Mass (Wb x L)	<b>51,348 kg</b>		

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Allowable Belt Sag % Running	<b>1.1 %</b>	Takeup Pulley Belt Tension	<b>130.92 kN</b>
Allowable Belt Sag % Start / Stop	<b>5 %</b>	Takeup Mass	<b>26700 kg</b>

Station No	Running				Starting		Braking		Coasting	
	Fully Loaded Tension kN	Empty Tension kN	Inclines Loaded Tension kN	Declines Loaded Tension kN	Fully Loaded Tension kN	Empty Tension kN	Fully Loaded Tension kN	Empty Tension kN	Fully Loaded Tension kN	Empty Tension kN
1 Tail	119.62	119.62	119.62	119.62	122.85	167.55	93.39	107.99	97.29	115.87
Idler Spacing m	1.00									
Belt Sag %	0.08	0.08	0.08	0.08	0.08	0.06	0.11	0.09	0.10	0.09
2 Hopper	121.40	121.40	121.40	121.40	124.87	172.91	93.20	108.89	97.39	117.36
Idler Spacing m	0.45									
Belt Sag %	0.31	0.04	0.31	0.04	0.30	0.03	0.41	0.04	0.39	0.04
3 Hopper	142.78	121.88	142.78	139.75	147.02	175.76	108.29	108.80	113.41	117.65
Idler Spacing m	0.45									
Belt Sag %	0.27	0.04	0.27	0.03	0.26	0.03	0.35	0.04	0.34	0.04
4 Int. Pt	155.17	122.39	155.17	149.09	160.44	179.42	112.27	108.54	118.64	117.92
Idler Spacing m	1.50									
Belt Sag %	0.82	0.12	0.82	0.10	0.79	0.08	1.13	0.14	1.07	0.13
5 Int. Pt	169.73	123.86	169.73	152.10	177.98	187.36	102.62	108.44	112.59	118.88
Idler Spacing m	1.50									
Belt Sag %	0.75	0.12	0.75	0.10	0.71	0.08	1.23	0.14	1.13	0.13
6 Int. Pt	371.50	147.48	371.50	175.72	394.26	242.65	186.42	124.37	213.90	140.02
Idler Spacing m	1.20									
Belt Sag %	0.27	0.08	0.27	0.07	0.26	0.05	0.54	0.10	0.47	0.09
7 Head	418.40	153.10	418.40	181.34	447.43	262.60	182.32	126.52	217.38	144.51
Idler Spacing m	3.00									
Belt Sag %	0.07	0.20	0.07	0.17	0.07	0.11	0.16	0.24	0.14	0.21
8 Bend	422.63	154.64	422.63	183.17	452.36	274.62	180.81	125.51	216.72	145.23
Idler Spacing m	3.00									
Belt Sag %	0.07	0.19	0.07	0.16	0.07	0.11	0.17	0.24	0.14	0.21

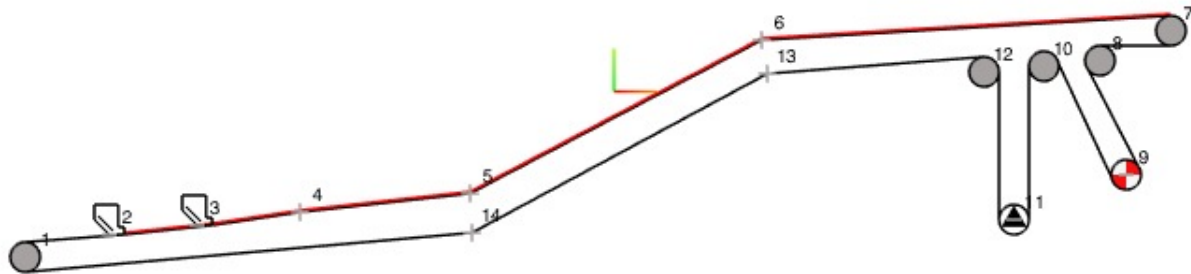
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Station No	Running				Starting		Braking		Coasting	
	Fully Loaded Tension kN	Empty Tension kN	Inclines Loaded Tension kN	Declines Loaded Tension kN	Fully Loaded Tension kN	Empty Tension kN	Fully Loaded Tension kN	Empty Tension kN	Fully Loaded Tension kN	Empty Tension kN
9 Drive	421.64	150.93	421.64	179.76	451.75	276.46	176.78	120.46	213.15	141.09
Idler Spacing m	3.00									
Belt Sag %	0.07	0.20	0.07	0.17	0.07	0.11	0.17	0.25	0.14	0.21
10 Bend	134.48	134.47	134.45	134.47	134.27	131.32	138.57	134.85	140.17	135.43
Idler Spacing m	3.00									
Belt Sag %	0.22	0.22	0.22	0.22	0.22	0.23	0.22	0.22	0.21	0.22
11 Takeup	130.92	130.92	130.92	130.92	130.92	130.92	130.92	130.92	130.92	130.92
Idler Spacing m	3.00									
Belt Sag %	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
12 Bend	137.58	137.58	137.58	137.58	137.79	140.77	135.83	136.80	136.09	137.33
Idler Spacing m	2.40									
Belt Sag %	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.18	0.18	0.18
13 Int. Pt	137.89	137.89	137.89	137.89	138.56	147.74	132.51	135.51	133.31	137.12
Idler Spacing m	3.00									
Belt Sag %	0.22	0.22	0.22	0.22	0.22	0.20	0.23	0.22	0.23	0.22
14 Int. Pt	119.29	119.29	119.29	119.29	121.84	157.08	98.61	110.12	101.69	116.33
Idler Spacing m	3.00									
Belt Sag %	0.25	0.25	0.25	0.25	0.25	0.19	0.30	0.27	0.30	0.26
Minimum Tension	<b>119.29</b>	<b>119.29</b>	<b>119.29</b>	<b>119.29</b>	<b>121.84</b>	<b>130.92</b>	<b>93.20</b>	<b>107.99</b>	<b>97.29</b>	<b>115.87</b>
Maximum Sag %	<b>0.82</b>	<b>0.25</b>	<b>0.82</b>	<b>0.25</b>	<b>0.79</b>	<b>0.23</b>	<b>1.23</b>	<b>0.27</b>	<b>1.13</b>	<b>0.26</b>

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**Run Fully Loaded**

Takeup Mass **26700 kg**      Takeup Pulley Belt Tension **130.92 kN**

Station	Section Length m	Section Lift m	Tensions		CEMA-5(1) Tp Pulley kN	Drive Te kN	Tension Adj. kN	Material Accel. kN	Skirt Friction kN	Scraper Friction kN	Section Effective Tension kN	ISO Friction Factor
			T1 Run kN	T2 Run kN								
1 Tail	6.84	0.33	119.62	121.01	1.39						0.39	0.0160
2 Hopper	8.16	0.35	121.40	121.40			11.23	6.64			3.51	0.0192
3 Hopper	10.91	0.30	142.78	142.78				8.83			3.56	0.0189
4 Int. Pt	33.74	1.15	155.17	155.17				1.54			13.02	0.0224
5 Int. Pt	164.30	26.16	169.73	169.73							201.77	0.0221
6 Int. Pt	70.46	5.50	371.50	371.50							46.90	0.0197
7 Head	39.32	-2.70	418.40	422.81	4.41					1.42	-1.60	0.0160
8 Bend	10.55	-6.95	422.63	427.08	4.45						-5.44	0.0160
9 Drive	12.33	8.12	421.64	127.82	2.94	293.82					6.66	0.0160
10 Bend	6.45	-6.45	134.48	136.02	1.53						-5.10	0.0160
11 Takeup	6.35	6.35	130.92	132.42	1.50						5.16	0.0160
12 Bend	26.55	-2.06	137.58	139.14	1.57						-1.25	0.0160
13 Int. Pt	164.30	-26.16	137.89	137.89							-18.60	0.0160
14 Int. Pt	59.64	-2.44	119.29	119.29						1.42	-1.09	0.0160

Totals **17.79    293.82    0.00    11.23    17.01    2.84    247.89**

Maximum Tension	<b>427.08</b> kN	Total Effective Tension	<b>296.76</b> kN
Minimum Tension	<b>119.29</b> kN	Total Belt Power	<b>1276.07</b> kW
Average Tension Fully Loaded	<b>222.07</b> kN	Belt Modulus	<b>129600</b> kN/m
Average Tension Belt Stationary	<b>125.02</b> kN	Total Belt Length	<b>628.50</b> m
Average Tension Difference	<b>97.05</b> kN	Belt Elastic Elongation	<b>0.261</b> m
		Takeup Movement	<b>0.131</b> m

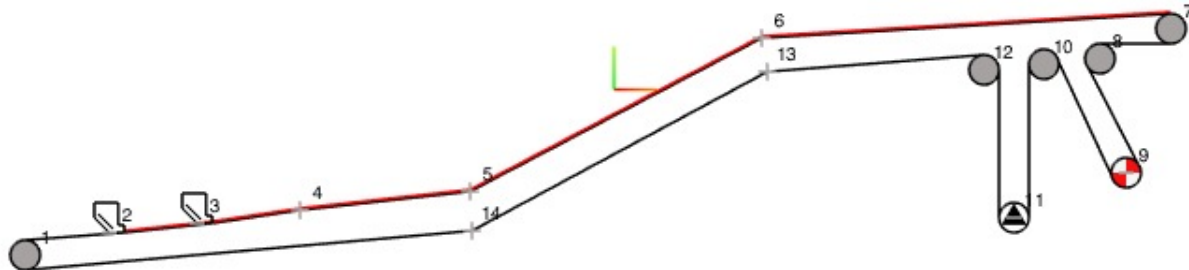




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#### Run Inclines Loaded

Takeup Mass	<b>26700 kg</b>	Takeup Pulley Belt Tension	<b>130.92 kN</b>
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Station	Section Length m	Section Lift m	Tensions			Drive Te kN	Tension Adj. kN	Material Accel. kN	Skirt Friction kN	Scrapper Friction kN	Section Effective Tension kN	ISO Friction Factor
			T1 Run kN	T2 Run kN	CEMA-5(1) Tp Pulley kN							
1 Tail	6.84	0.33	119.62	121.01	1.39						0.39	0.0160
2 Hopper	8.16	0.35	121.40	121.40			11.23	6.64			3.51	0.0192
3 Hopper	10.91	0.30	142.78	142.78				8.83			3.56	0.0189
4 Int. Pt	33.74	1.15	155.17	155.17				1.54			13.02	0.0224
5 Int. Pt	164.30	26.16	169.73	169.73							201.77	0.0221
6 Int. Pt	70.46	5.50	371.50	371.50							46.90	0.0197
7 Head	39.32	-2.70	418.40	422.81	4.41					1.42	-1.60	0.0160
8 Bend	10.55	-6.95	422.63	427.08	4.45						-5.44	0.0160
9 Drive	12.33	8.12	421.64	127.79	2.96	293.85					6.66	0.0160
10 Bend	6.45	-6.45	134.45	136.02	1.56						-5.10	0.0160
11 Takeup	6.35	6.35	130.92	132.42	1.50						5.16	0.0160
12 Bend	26.55	-2.06	137.58	139.14	1.57						-1.25	0.0160
13 Int. Pt	164.30	-26.16	137.89	137.89							-18.60	0.0160
14 Int. Pt	59.64	-2.44	119.29	119.29						1.42	-1.09	0.0160

Totals	<b>17.83</b>	<b>293.85</b>	<b>0.00</b>	<b>11.23</b>	<b>17.01</b>	<b>2.84</b>	<b>247.89</b>
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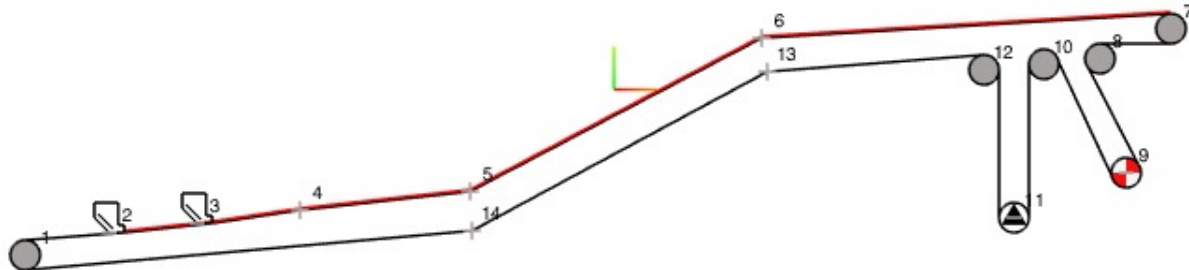
Maximum Tension	<b>427.08</b> kN	Total Effective Tension	<b>296.80</b> kN
Minimum Tension	<b>119.29</b> kN	Total Belt Power	<b>1276.24</b> kW
Average Tension Incl. Loaded	<b>222.07</b> kN	Belt Modulus	<b>129600</b> kN/m
Average Tension Belt Stationary	<b>125.02</b> kN	Total Belt Length	<b>628.50</b> m
Average Tension Difference	<b>97.05</b> kN	Belt Elastic Elongation	<b>0.261</b> m
		Takeup Movement	<b>0.131</b> m

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## Run Declines Loaded

Takeup Mass **26700 kg**      Takeup Pulley Belt Tension **130.92 kN**

Station	Section Length m	Section Lift m	Tensions		CEMA-5(1) Tp Pulley kN	Drive Te kN	Tension Adj. kN	Material Accel. kN	Skirt Friction kN	Scrapper Friction kN	Section Effective Tension kN	ISO Friction Factor	
			T1 Run kN	T2 Run kN									
1 Tail	6.84	0.33	119.62	121.01	1.39						0.39	0.0160	
2 Hopper	8.16	0.35	121.40	121.40				11.23	6.64		0.48	0.0160	
3 Hopper	10.91	0.30	139.75	139.75					8.83		0.51	0.0160	
4 Int. Pt	33.74	1.15	149.09	149.09					1.54		1.47	0.0160	
5 Int. Pt	164.30	26.16	152.10	152.10							23.62	0.0160	
6 Int. Pt	70.46	5.50	175.72	175.72							5.62	0.0160	
7 Head	39.32	-2.70	181.34	183.35	2.01						1.42	-1.60	0.0160
8 Bend	10.55	-6.95	183.17	185.20	2.03							-5.44	0.0160
9 Drive	12.33	8.12	179.76	127.81	1.73	51.95						6.66	0.0160
10 Bend	6.45	-6.45	134.47	136.02	1.55							-5.10	0.0160
11 Takeup	6.35	6.35	130.92	132.42	1.50							5.16	0.0160
12 Bend	26.55	-2.06	137.58	139.14	1.57							-1.25	0.0160
13 Int. Pt	164.30	-26.16	137.89	137.89								-18.60	0.0160
14 Int. Pt	59.64	-2.44	119.29	119.29						1.42		-1.09	0.0160

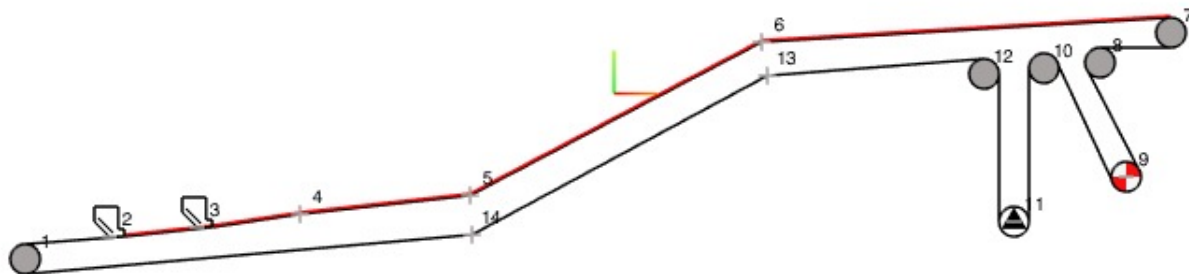
Totals **11.77**      **51.95**      **0.00**      **11.23**      **17.01**      **2.84**      **10.83**

Maximum Tension	<b>185.20</b> kN	Total Effective Tension	<b>53.68</b> kN
Minimum Tension	<b>119.29</b> kN	Total Belt Power	<b>230.82</b> kW
Average Tension Decl Loaded	<b>149.11</b> kN	Belt Modulus	<b>129600</b> kN/m
Average Tension Belt Stationary	<b>125.02</b> kN	Total Belt Length	<b>628.50</b> m
Average Tension Difference	<b>24.09</b> kN	Belt Elastic Elongation	<b>0.065</b> m
		Takeup Movement	<b>0.033</b> m

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#### System Masses

Mass of Belt	<b>51,371 kg</b>
Mass of Material	<b>174,621 kg</b>
Carry Idler Equivalent Mass	<b>8,208 kg</b>
Return Idler Equivalent Mass	<b>3,508 kg</b>
Pulley Equivalent Mass	<b>9,717 kg</b>
Drive Equivalent Mass	<b>98,069 kg</b>
Total System Equivalent Mass	<b>345,494 kg</b>
Conveyor load inertia at HSS	<b>600.41 kgm<sup>2</sup></b>

#### Input Data

Belt Speed	<b>4.3 m/s</b>
Belt Rated Tension	<b>253 kN/m</b>
Allowable Belt Start Tension Rise	<b>150 %</b>
Drive Inertia	<b>170.43 kg-m<sup>2</sup></b>
Total Braking Torque	<b>26.50 kNm</b>
Start Up Factor - Full	<b>122 %</b>
Start Up Factor - Empty	<b>122 %</b>

#### Tensions and Accelerating Forces

Effective Tension Fully Loaded	<b>296.76 kN</b>
Effective Tension Empty	<b>24.70 kN</b>
Total Braking Force	<b>51.76 kN</b>
Tension Available to Accelerate conveyor	
Accelerating Tension - Loaded	<b>42.86 kN</b>
Accelerating Tension - Empty	<b>314.92 kN</b>

Installed Power	<b>1260 kW</b>
Drive Efficiency (Average)	<b>95.00 %</b>

#### Stopping Times & Deceleration Rates

Stopping Time Loaded Braking	<b>4.26 s</b>
Stopping Time Loaded Coasting	<b>5.01 s</b>
Stopping Time Empty Braking	<b>9.61 s</b>
Stopping Time Empty Coasting	<b>29.75 s</b>
Deceleration - Loaded Braking	<b>-1.01 m/s<sup>2</sup></b>
Deceleration - Loaded Coasting	<b>-0.86 m/s<sup>2</sup></b>
Deceleration - Empty Braking	<b>-0.45 m/s<sup>2</sup></b>
Deceleration - Empty Coasting	<b>-0.14 m/s<sup>2</sup></b>

#### Starting Times & Acceleration Rates

Starting Time - Fully Loaded	<b>34.66 s</b>
Starting Time - Empty	<b>2.33 s</b>
Acceleration Rate - Loaded	<b>0.12 m/s<sup>2</sup></b>
Acceleration Rate - Empty	<b>1.84 m/s<sup>2</sup></b>

#### Belt Tension Rise Starting / Braking

Max Belt Tension Start / Brake	<b>457.06 kN</b>
Belt Width	<b>1800 mm</b>
Max Belt Tension / Width	<b>253.92 kN/m</b>
Belt Rated Tension / Width	<b>253 kN/m</b>
Actual Max Tension Start/Brake	<b>100.4 %</b>
Allowable Tension Rise Start/Brake	<b>150 %</b>

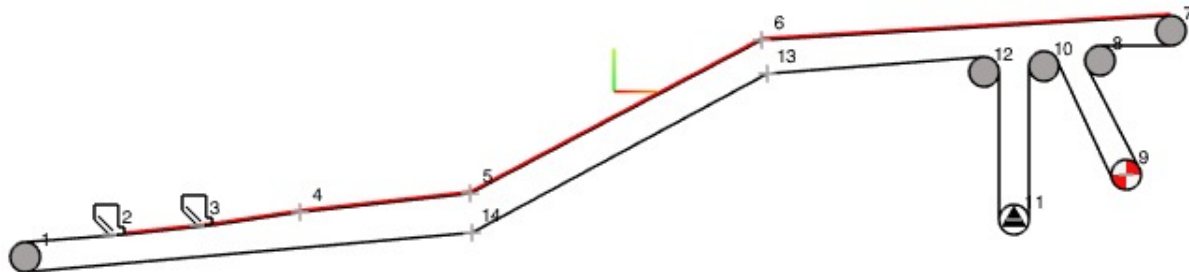
#### Stopping distances & Discharge Volumes

Stopping Distance Loaded Braking	<b>9.16 m</b>
Stopping Distance Loaded Coasting	<b>10.76 m</b>
Stopping Distance Empty Braking	<b>20.66 m</b>
Stopping Distance Empty Coasting	<b>63.96 m</b>
Discharge Mass Braking	<b>5,565 kg</b>
Discharge Mass Coasting	<b>6,536 kg</b>
Discharge Volume Braking	<b>2.99 m<sup>3</sup></b>
Discharge Volume Coasting	<b>3.51 m<sup>3</sup></b>

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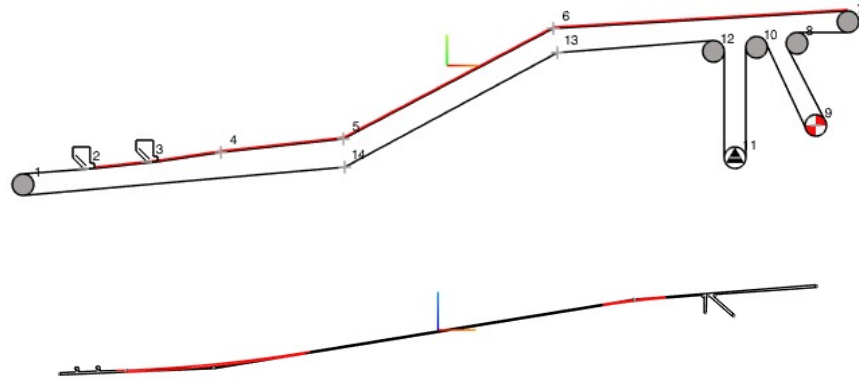
Carry Side Idlers		Return Side Idlers	
Idler Category	<b>Prok Carry</b>	<b>Prok Flat Return</b>	
Idler Description	<b>Series 55 3 Roll Carry 152 Plain Inline</b>	<b>Series 45 1 Roll Flat Carry 152 Dia</b>	
Idler Design Belt Width	<b>1800</b> mm	<b>1800</b> mm	
Idler Series	<b>55</b>	<b>45</b>	
Drawing Number			
Nominal Idler Spacing	<b>1</b> m	<b>3</b> m	
Total Number of Idlers	<b>240</b>	<b>111</b>	
Troughing Angle	<b>35</b> deg	<b>0</b> deg	
Idler Shaft Diameter	<b>45</b> mm	<b>45</b> mm	
Idler Bearing Diameter	<b>45</b> mm	<b>35</b> mm	
Number of Idler Rolls	<b>3</b>	<b>1</b>	
Idler Centre Roll Diameter	<b>152</b> mm	<b>152</b> mm	
Idler Wing Roll Diameter	<b>152</b> mm	<b>152</b> mm	
Idler Rotation Speed	<b>540</b> rpm	<b>540</b> rpm	
Centre Roll Face Width	<b>633</b> mm	<b>2050</b> mm	
Wing Roll Face Width	<b>633</b> mm	<b>2050</b> mm	
Roll Bearing Centres	<b>535.9</b> mm	<b>1976.2</b> mm	
Shaft Support Centres	<b>659.5</b> mm	<b>2078</b> mm	
Idler Support Fixing Width	<b>2200</b> mm	<b>2200</b> mm	
Idlerset Rotating Mass	<b>34.2</b> kg	<b>31.6</b> kg	
Idlerset Total Mass	<b>117.4</b> kg	<b>67.6</b> kg	
Idler Vertical Misalignment Allowance	<b>4</b> mm	<b>36</b> mm	
Dynamic Load Factor	<b>1.26</b>	<b>1.40</b>	
Belt Deviation Load	<b>667</b> N	<b>500</b> N	
Total Load on Centre Roll	<b>6092</b> N	<b>4680</b> N	
Type of Bearing	<b>Ball</b>	<b>Ball</b>	
Bearing Designation	<b>6309</b>	<b>6307</b>	
Bearing Dynamic Load Rating C	<b>52,700</b> N	<b>33,200</b> N	
Bearing L10h Life	<b>159,750</b> hrs	<b>88,120</b> hrs	
Allowable Shaft deflection At Bearing	<b>8</b> min	<b>10</b> min	
Actual Shaft deflection At Bearing	<b>4.1</b> min	<b>9.57</b> min	

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Belt Width	<b>1800</b> mm	% Belt Mass for Lift off Calculation	<b>75</b> %
Belt Mass - New Belt	<b>81.70</b> kg/m	Curve Tension Safety Factor	<b>1</b>
Top Cover Mass - New Belt	<b>44.75</b> kg/m	Average Drive Torque safety Factor - Loaded	<b>122</b> %
Bottom Cover Mass	<b>14.24</b> kg/m	Average Drive Torque safety Factor - Empty	<b>122</b> %
Worn Belt Mass	<b>61.28</b> kg/m	Belt Modulus	<b>129,600</b> kN/m
Reduction of Top Cover Mass	<b>45.6</b> %	Belt Rated Tension	Running: <b>253</b> kN/m Starting: <b>455.4</b> kN
Conveyed Material Mass	<b>607.24</b> kg/m	Allowable Edge Tension	Running: <b>105</b> % Starting: <b>150</b> %

Station / Section Information				Running				Starting				Braking				Minimum Required Radius m
Station	Curve Type	Load Capacity tph	Design Curve Radius m	Fully Loaded		Empty		Fully Loaded		Empty		Fully Loaded		Empty		
				Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	
1	Tail			119.62		119.62		122.85		167.55		93.39		107.99		
2	Hopper	9,400		121.40		121.40		124.87		172.91		93.20		108.89		
3	Hopper	9,400		142.78		121.88		147.02		175.76		108.29		108.80		

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Station / Section Information				Running				Starting				Braking				Minimum Required Radius m
Station	Curve Type	Load Capacity tph	Design Curve Radius m	Fully Loaded		Empty		Fully Loaded		Empty		Fully Loaded		Empty		
				Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	
4	Int. Pt	9,400		155.17		122.39		160.44		179.42		112.27		108.54		
5	Int. Pt	Concave	9,400	600	169.73		123.86		177.98		187.36		102.62		108.44	
		Min Concave Lift Off Radius			282		206		296		312		171		180	
		Min Edge Tension Radius			118		162		113		107		196		185	
		Max Centre Tension Radius			87		75		89		92		71		72	
6	Int. Pt	Convex	9,400	300	371.50		147.48		394.26		242.65		186.42		124.37	
		Min Edge Tension Radius			501		162		637		227		183		151	
		Max Buckling Radius			77		214		72		122		163		263	
		Belt Edge Tension Rise at Curve kN			200.71		200.71		200.71		200.71		200.71		200.71	
		Total Edge Tension at Curve kN and %			572.2	126 %	348.19	76 %	594.96	131 %	443.36	97 %	387.12	85 %	325.08	71 %
		Centre Tension at Curve kN			304.6		214.38		327.36		175.75		119.52		57.47	
7	Head				418.40		153.10		447.43		262.60		182.32		126.52	
8	Bend				422.63		154.64		452.36		274.62		180.81		125.51	
9	Drive				421.64		150.93		451.75		276.46		176.78		120.46	
10	Bend				134.48		134.47		134.27		131.32		138.57		134.85	
11	Takeup				130.92		130.92		130.92		130.92		130.92		130.92	
12	Bend				137.58		137.58		137.79		140.77		135.83		136.80	
13	Int. Pt	Convex		300	137.89		137.89		138.56		147.74		132.51		135.51	
		Min Edge Tension Radius			0		0		0		0		0		0	
		Max Buckling Radius			0		0		0		0		0		0	
		Belt Edge Tension Rise at Curve kN			Flat Belt		Flat Belt		Flat Belt		Flat Belt		Flat Belt		Flat Belt	
		Total Edge Tension at Curve kN and %			%		%		%		%		%		%	
		Centre Tension at Curve kN														
14	Int. Pt	Concave		600	119.29		119.29		121.84		157.08		98.61		110.12	

**Vertical Curve Radius Calculations**  
**Helix Technologies Pty Ltd**

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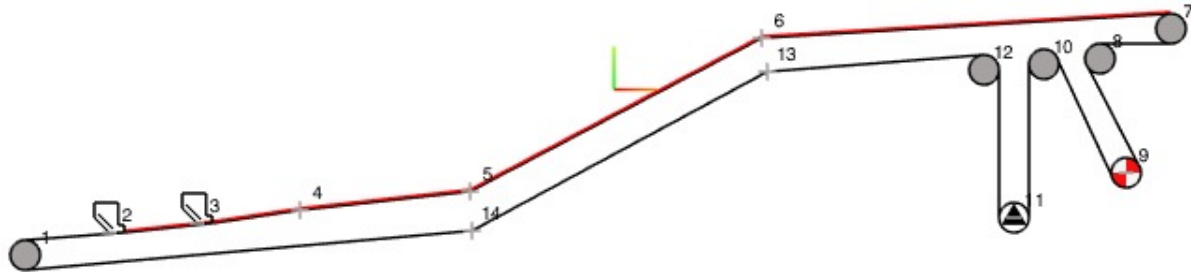
Station / Section Information				Running				Starting				Braking				Minimum Required Radius m
Station	Curve Type	Load Capacity tph	Design Curve Radius m	Fully Loaded		Empty		Fully Loaded		Empty		Fully Loaded		Empty		
				Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	Tension kN	Radius m	
	Min Concave Lift Off Radius				199		199		203		261		164		183	261
	Min Edge Tension Radius				168		168		165		128		204		182	
	Max Centre Tension Radius				0		0		0		0		0		0	



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**Viscoelastic Calculations Input Data**

Belt Rubber Description	<b>Low Loss Rubber</b>	Carry Idler Centre Roll Dia	152 mm
Top Cover Dynamic Modulus E'	4.41 N/mm2	Carry Idler Centre Roll Drag	1.7 N
Top Cover Dynamic Loss Factor Tan(delta)	0.1	Carry Idler Wing Roller Dia	152 mm
Belt Top Cover Temperature	40 deg C	Carry Idler Wing Roller Dia	1.7 N
Rolling Resistance Factor Top: 0.072 Bottom: 0.072		Return Idler Centre Roll Dia	152 mm
Bottom Cover Dynamic Modulus E	4.41 N/mm2	Return Idler Centre Roll Drag	1.7 N
Bottom Cover Dynamic Loss Factor Tan(delta)	0.1	Return Idler Wing Roll Dia	152 mm
Belt Bottom Cover Temperature	40 deg C	Return Idler Wing Roll Drag	1.7 N
Belt & Material Flexure Adjustment Factor	1	Idlerset Skew Angle	0.1 deg
Belt has Turnover on return run	No	Idlerset Forward Tilt Angle	0.1 deg

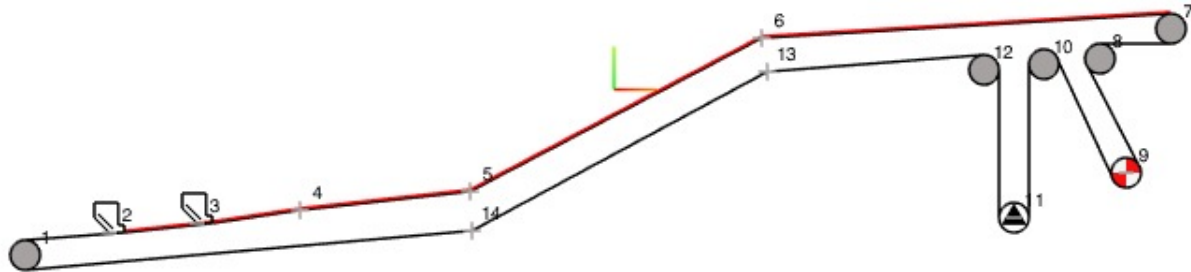
Station	Section Length m	Idler Spacing m	Loaded										Empty friction factor f
			Total Loaded friction factor f	Indent factor fi	Indent factor %	Freq- uency rad/s	Matl. & Belt Flexure friction fm	Flexure friction %	Idler Drag factor fr	Drag factor %	Idler Skew & Tilt friction ft	Tilt friction %	
1 Tail	6.84	1.00	0.0160	0.00723	46.2	1530	0.00074	4.7	0.00637	40.7	0.00131	8.4	0.0160
2 Hopper	8.16	0.45	0.0192	0.00874	39.4	820	0.01076	48.5	0.00168	7.6	0.00102	4.6	0.0160
3 Hopper	10.91	0.45	0.0189	0.00874	40.9	820	0.00996	46.5	0.00168	7.8	0.00102	4.8	0.0160
4 Int. Pt	33.74	1.50	0.0224	0.01306	55.4	549	0.00899	38.1	0.00050	2.1	0.00102	4.3	0.0160
5 Int. Pt	164.30	1.50	0.0221	0.01306	56.9	549	0.00835	36.4	0.00050	2.2	0.00102	4.4	0.0160
6 Int. Pt	70.46	1.20	0.0197	0.01212	63.1	591	0.00545	28.3	0.00063	3.3	0.00102	5.3	0.0160
7 Head *	39.32	3.00	0.0160	0.00721	82.8	770	0.00018	2.1	0.00071	8.1	0.00061	7.0	0.0160
8 Bend *	10.55	3.00	0.0160	0.00721	82.9	770	0.00017	2.0	0.00071	8.1	0.00061	7.0	0.0160
9 Drive *	12.33	3.00	0.0160	0.00721	82.9	770	0.00017	2.0	0.00071	8.1	0.00061	7.0	0.0160
10 Bend *	6.45	3.00	0.0160	0.00721	80.3	770	0.00045	5.1	0.00071	7.9	0.00061	6.8	0.0160
11 Takeup*	6.35	3.00	0.0160	0.00721	80.3	770	0.00045	5.0	0.00071	7.9	0.00061	6.8	0.0160
12 Bend *	26.55	2.40	0.0160	0.00669	77.6	829	0.00044	5.1	0.00088	10.2	0.00061	7.1	0.0160
13 Int. Pt *	164.30	3.00	0.0160	0.00721	80.5	770	0.00043	4.8	0.00071	7.9	0.00061	6.8	0.0160
14 Int. Pt *	59.64	3.00	0.0160	0.00721	80.2	770	0.00046	5.1	0.00071	7.9	0.00061	6.8	0.0160

\* Indicates Return conveyor section

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**Running Fully Loaded Belt Resonance**

Carry Roll Diameter	<b>152 mm</b>	Belt Speed	<b>4.3 m/s</b>
Return Roll Diameter	<b>152 mm</b>	Takeup Mass	<b>26700 kg</b>
		Belt Resonance +/- Tolerance	<b>2 %</b>

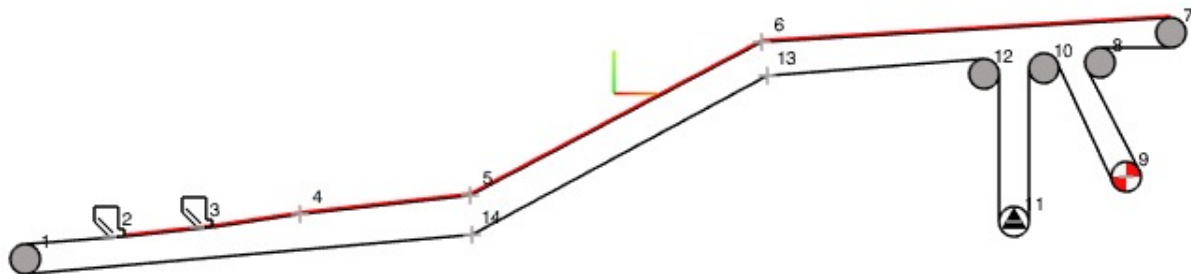
<u>Station / Section</u>		Start Belt Tension kN	End Belt Tension kN	Belt Transverse Wave Frequency Range		Idler Roll Excitation Frequency Hz	Section Idler Spacing m	Critical Idler Spacing Start m	Critical Idler Spacing End m	Idler Spacing Within +/- 2% m	Mode
Station	Description			Hz	to Hz						
1	Tail	121.01	121.4	19	19.03	9	1	2.11	2.11	OK	
2	Hopper	121.4	142.78	13.2	14.57	9	0.45	0.66	0.73	OK	
3	Hopper	142.78	155.17	14.57	15.31	9	0.45	0.73	0.76	OK	
4	Int. Pt	155.17	169.73	4.59	4.84	9	1.5	0.76	0.81	Warning	2
5	Int. Pt	169.73	371.5	4.84	7.48	9	1.5	0.81	1.25	OK	
6	Int. Pt	371.5	418.4	9.34	9.96	9	1.2	1.25	1.33	OK	
7	Head	422.81	422.63	11.95	11.94	9	3	3.98	3.98	OK	
8	Bend	427.08	421.64	12.01	11.93	9	3	4	3.97	OK	
9	Drive	127.82	134.48	6.51	6.69	9	3	2.17	2.23	OK	
10	Bend	136.02	130.92	6.72	6.59	9	3	2.24	2.2	OK	
11	Takeup	132.42	137.58	6.63	6.76	9	3	2.21	2.25	OK	
12	Bend	139.14	137.89	8.5	8.47	9	2.4	2.27	2.26	OK	
13	Int. Pt	137.89	119.29	6.77	6.29	9	3	2.26	2.09	OK	
14	Int. Pt	119.29	119.62	6.29	6.3	9	3	2.09	2.1	OK	

**All Figures are Running Fully Loaded Scenario**

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**Takeup Travel**

Takeup Type	<b>Vertical Gravity</b>
Takeup Mass Calculation Method	<b>Manual</b>
Takeup Mass Step Increment	<b>500 kg</b>
Max number of calc Increments	<b>100</b>
Takeup Mass kg (manual input)	<b>26,700 kg</b>
Takeup Tension (manual input)	<b>130.92 kN</b>
Takeup Mass calculated	<b>26,700 kg</b>

**Takeup Travel Estimate**

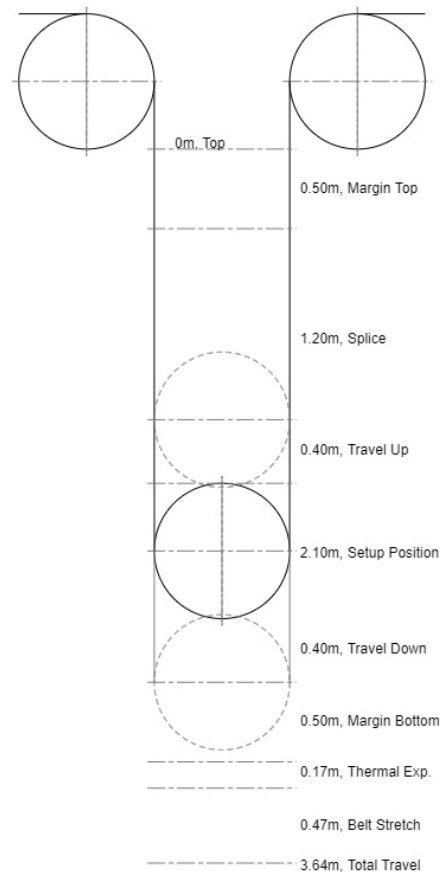
Safety Margin Top	+	<b>0.50 m</b>
Belt Splice Allowance	+	<b>1.20 m</b>
Dynamic Travel Up	+	<b>0.40 m</b>
Dynamic Travel Down	+	<b>0.40 m</b>
Safety Margin Bottom	+	<b>0.50 m</b>

**Thermal Expansion Distance**

Minimum Site Temperature	<b>0 °C</b>	
Maximum Site Temperature	<b>45 °C</b>	
Belt Expansion Coefficient mm per °C	<b>0.0000117 mm/°C</b>	
Total Belt Length	<b>628.50 m</b>	
Thermal Expansion Distance	+	<b>0.165 m</b>

**Permanent Belt Stretch**

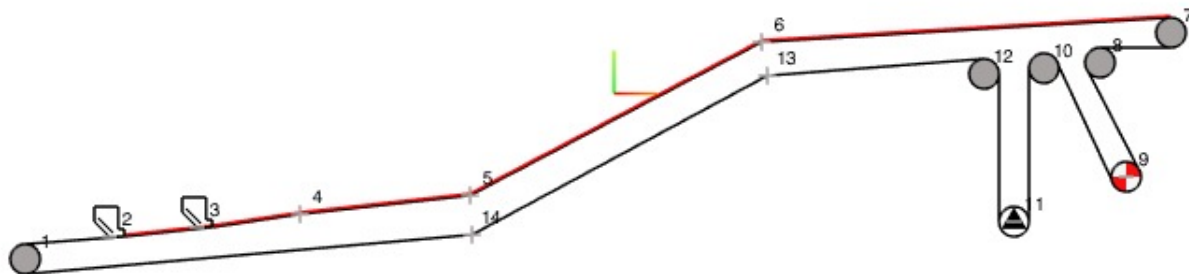
Permanent Stretch Co-efficient % of belt Length	<b>0.15 %</b>	
Permanent Belt Stretch Distance	+	<b>0.471 m</b>
Total Takeup Travel Distance	=	<b>3.64 m</b>



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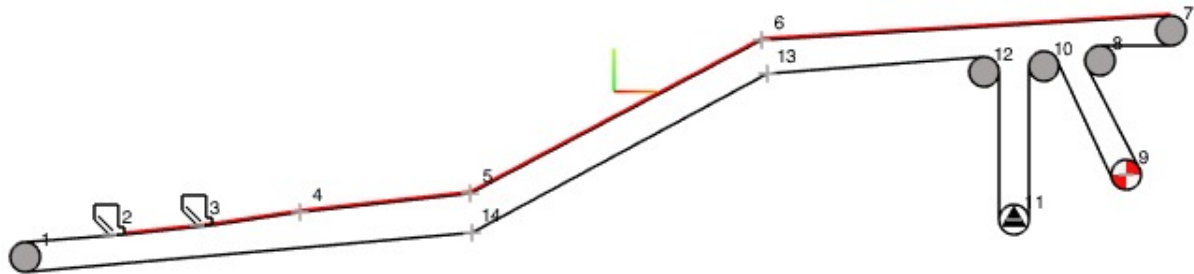
Drive Number	1	Drive	Pulley Number	9
Drive Description		<b>Head</b>	Pulley Condition	<b>Moist</b>
Load Share on Drive Pulley		<b>100 %</b>	Pulley Lagging Type	<b>Ceramic</b>
Starting Torque Factor Fully Loaded		<b>122 %</b>	Belt Wrap Angle	<b>180 °</b>
Starting Torque Factor Empty		<b>122 %</b>	Coefficient of Friction Running	<b>0.35</b>
Number of Motors on Drive Pulley		<b>2</b>	Drive Factor Cw Running	<b>0.50</b>
Motor Description		<b>Toshiba Wound Rotor TIM</b>	Coefficient of friction Starting	<b>0.45</b>
Motor Power Rating		<b>630 kW</b>	Drive Factor Cw Starting	<b>0.32</b>
Motor Voltage		<b>6600 V</b>	<b>Pulley and Shaft Dimensions</b>	
Gearbox Description		<b>Falk M505AB2</b>	Pulley Shell Diameter	<b>1000 mm</b>
Drive Efficiency		<b>95 %</b>	Pulley Lagging Thickness	<b>12 mm</b>
<b>Fluid Coupling</b>			Pulley Outside Diameter	<b>1024 mm</b>
Fluid Coupling		<b>No Selection - Direct Drive</b>	Pulley Shaft Diameter at Hub	<b>320 mm</b>
Fluid Coupling Size			Pulley Shaft Diameter at Bearing	<b>240 mm</b>
<b>High Speed Coupling</b>			<b>Pulley and Belt Speed</b>	
HS Coupling Make		<b>Falk</b>	Motor Full Load Speed	<b>985 rpm</b>
HS Coupling Model		<b>1120T35</b>	Required Gearbox Ratio	<b>12.282 :1</b>
<b>Low Speed Coupling</b>			Selected Gearbox Ratio	<b>12.21 :1</b>
LS Coupling Make		<b>Falk</b>	Required Pulley Speed	<b>80.2 rpm</b>
LS Coupling Model		<b>1080 / 505 MCFAS</b>	Calculated Pulley Speed for Reducer	<b>80.67 rpm</b>
<b>Brake</b>			Required Belt Speed	<b>4.3 m/s</b>
Brake Location		<b>High Speed</b>	Calculated Belt Speed	<b>4.33 m/s</b>
Low Speed Brake Torque Input		<b>26.5 kNm</b>	<b>Drive Inertia</b>	
Equivalent HS Brake Torque		<b>2271 kN</b>	Motor Inertia	<b>74.1 kg-m2</b>
<b>HoldBack</b>			High Speed Coupling Inertia	<b>0.514 kg-m2</b>
Static Analysis RunBack Force Fv		<b>199,153 N</b>	High Speed Brake Disc Inertia	<b>8.8 kg-m2</b>
Static Analysis Horizontal Force Fh		<b>97,607 N</b>	FlyWheel Inertia	<b>0 kg-m2</b>
Calculated HoldBack Torque		<b>76,979 Nm</b>	Gearbox Inertia HSS	<b>1.8 kg-m2</b>
HoldBack Required (Yes/No) Fv>Fh/2		<b>Yes</b>	Total Drive Inertia	<b>170.428 kg-m2</b>
HoldBack Req Torque 3x Motor FLT		<b>450,117 Nm</b>	Total Drive Equivalent Mass	<b>98,069 kg</b>
HoldBack Make		<b>Ringspann®</b>		
HoldBack Model		<b>FXRT 290-70UX</b>		
HoldBack Rated Torque		<b>42500 Nm</b>		

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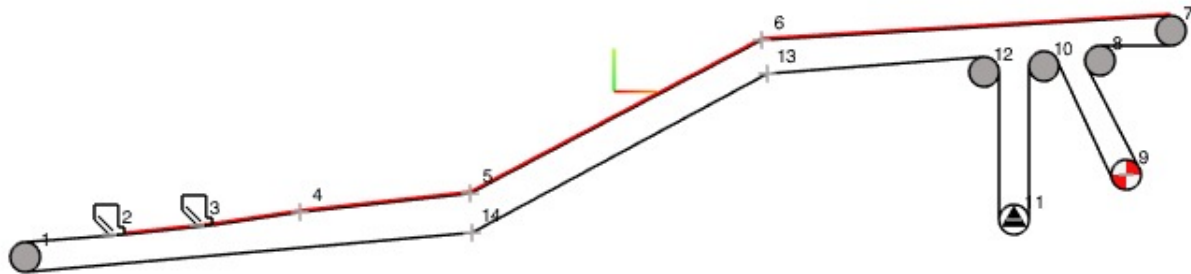


Drive Number	1	Drive	Pulley Number	9
Drive Description		<b>Head</b>	Total Motor Power on Drive	<b>1260 kW</b>
Number of Motors on Drive Pulley		<b>2</b>	Absorbed Power at Pulley	<b>1276.07 kW</b>
Motor Category		<b>Toshiba</b>	Drive Efficiency	<b>95 %</b>
Motor Description		<b>Toshiba Wound Rotor TIM</b>	Absorbed Power at Motor	<b>671.62 kW</b>
Motor Power Rating		<b>630 kW</b>	Motor Full Load Speed	<b>985 rpm</b>
Motor Voltage		<b>6600 V</b>	Motor Full Load Torque	<b>6108 Nm</b>
Number of Poles		<b>6</b>	Motor Full Load Current	<b>63 Amps</b>
Motor Frame Size		<b>FCKNW500-1250</b>	Motor Efficiency at Duty Point	<b>95.32 %</b>
Motor Shaft Diameter		<b>0 mm</b>	Motor Power Factor at Duty Point	<b>0.92</b>
Motor Shaft Height		<b>0 mm</b>	Mass of Motor	<b>5500 kg</b>
Motor Inertia		<b>74.10 kgm<sup>2</sup></b>	Selection Mode	<b>Manual</b>

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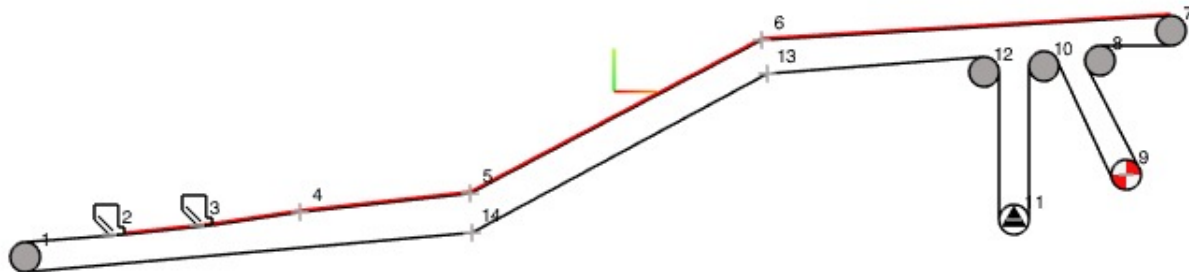


Drive Number	1	Drive	Pulley Number	9
Drive Description		<b>Head</b>	Coupling Size	
Number of Motors on Drive Pulley		<b>2</b>	Motor Power Rating	<b>630 kW</b>
Selection Mode		<b>Manual</b>	Motor Full Load Speed	<b>985 rpm</b>
Coupling Category		<b>Voith</b>	Coupling Rated Slip	<b>0 %</b>
Coupling Description		<b>No Selection - Direct Drive</b>	Peak Torque	<b>0 % FLT</b>
Coupling Size			Run-up Torque % (2 sec)	<b>0 % FLT</b>
Coupling Power Rating		<b>0 kW</b>	Coupling Output Speed	<b>985 rpm</b>
Min Required Ramping Time		<b>0.69 s</b>	Mass of Coupling	<b>0 kg</b>
Max Starting Time		<b>0 s</b>		

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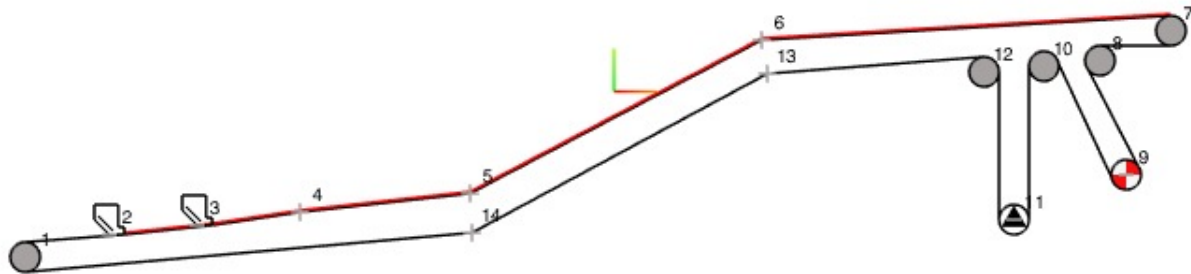


Drive Number	1	Drive	Pulley Number	9
Drive Description		<b>Head</b>	Motor Power Rating	<b>630 kW</b>
Number of Motors on Drive Pulley		<b>2</b>	Motor Full Load Speed	<b>985 rpm</b>
Selection Mode		<b>Manual</b>	Motor Torque @ FL Speed	<b>6108 Nm</b>
Gearbox Category		<b>Falk A-Plus</b>	Motor Torque at Pulley Speed	<b>75019 Nm</b>
Description		<b>Falk M505AB2</b>	Gearbox Rated Torque	<b>111500 Nm</b>
Type		<b>Right Angle Shaft</b>	Service Factor Required	<b>1.5</b>
Size		<b>505</b>	Service Factor Calculated	<b>1.49</b>
Code		<b>AB</b>	Plus Speed Selection Tolerance	<b>5 %</b>
Ratio		<b>12.21</b>	Minus Speed Selection Tolerance	<b>5 %</b>
Number of Stages		<b>2</b>	Fluid Coupling Slip	<b>0 %</b>
Design Efficiency (input)		<b>95 %</b>	Required Gearbox Ratio	<b>12.282 :1</b>
Gearbox actual Efficiency		<b>94 %</b>	Selected Gearbox Ratio	<b>12.21 :1</b>
Maximum Input Shaft Speed		<b>1800 rpm</b>	Required Pulley Speed	<b>80.2 rpm</b>
Minimum Input Shaft Speed		<b>580 rpm</b>	Calculated Pulley Speed for Reducer	<b>80.67 rpm</b>
Input Shaft Diameter		<b>95.25 mm</b>	Required Belt Speed	<b>4.3 m/s</b>
Output Shaft Diameter		<b>235 mm</b>	Calculated Belt Speed	<b>4.33 m/s</b>
Gearbox Inertia		<b>1.773 kg/m2</b>	Mass of Gearbox	<b>4500 kg</b>

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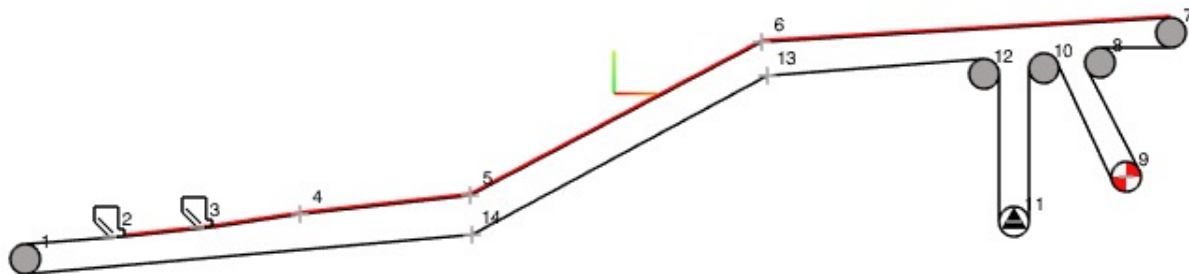
Drive Number	1	Drive	Pulley Number	9
Drive Description		<b>Head</b>	Brake Location	<b>High Speed</b>
Load Share on Drive Pulley		<b>100 %</b>	Disc Material	<b>Mild Steel</b>
Brake Category		<b>Svendborg BSFI 200</b>	Disc Diameter	<b>750 mm</b>
Brake Description		<b>Svendborg - Simon Hydraulics</b>	Disc Thickness	<b>30 mm</b>
Caliper		<b>BSFI 210</b>	Co-eff of Friction (Pad-Disc)	<b>0.4</b>
Number of Motors on Drive Pulley		<b>2</b>		
Selection Mode		<b>Manual</b>		
<b>Brake Selection Input Data</b>			Caliper Clamping Force Minimum	<b>10000 N</b>
Low Speed Brake Torque Input		<b>26.5 kNm</b>	Caliper Clamping Force Maximum	<b>11100 N</b>
Equivalent HS Brake Torque		<b>2271 Nm</b>	Pad Offset Width W	<b>70 mm</b>
Design Braking Torque Input		<b>2350 Nm</b>	Air Gap	<b>3 mm</b>
Selected Brake's Torque Rating		<b>2339 Nm</b>		<i>Recomended working airgap is 1mm</i>
Design Stopping Time		<b>4 sec</b>	Disc Initial Speed	<b>985 rpm</b>
Consecutive number of Stops		<b>3</b>	Disc Moment of Inertia	<b>7.32 kgm<sup>2</sup></b>
Average number of Stops per hour		<b>6</b>	Required Gearbox Ratio	<b>12.282 :1</b>
Ambient Temperature		<b>50 deg C</b>	Drive Efficiency	<b>95 %</b>
Disc Temp after stops		<b>77 deg C</b>	Mass of Caliper	<b>18.5 kg</b>



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Drive Number	1	Drive	Pulley Number	9
Drive Description		<b>Head</b>	Motor Power Rating	<b>630 kW</b>
Load Share on Drive Pulley		<b>100 %</b>	Motor Full Load Speed	<b>985 rpm</b>
Starting Torque Factor Fully Loaded		<b>122 %</b>	Motor Torque at Full Load Speed	<b>6108 Nm</b>
Starting Torque Factor Empty		<b>122 %</b>	Motor Torque at Pulley Speed	<b>75019 Nm</b>
Number of Motors on Drive Pulley		<b>2</b>	Pulley Shaft Diameter at Brg	<b>240 mm</b>
Drive Efficiency		<b>95 %</b>		
<b>High Speed Coupling</b>			<b>Low Speed Coupling</b>	
HS Coupling Category		<b>Falk SteelFlex Grid</b>	LS Coupling Category	<b>Falk G82</b>
HS Coupling Make		<b>Falk</b>	LS Coupling Make	<b>Falk</b>
HS Coupling Model		<b>1120T35</b>	LS Coupling Model	<b>1080 / 505 MCFAS</b>
Coupling Type		<b>Grid</b>	Coupling Type	<b>Rigid Flanged</b>
Coupling Torque Rating		<b>13700 Nm</b>	Coupling Torque Rating	<b>445000 Nm</b>
Service Factor Required		<b>1.5</b>	Service Factor Required	<b>1.5</b>
Service Factor Calculated		<b>2.24</b>	Service Factor Calculated	<b>5.93</b>
Maximum Shaft Bore		<b>140 mm</b>	Maximum Shaft Bore	<b>336.55 mm</b>
Minimum Shaft Bore		<b>0 mm</b>	Minimum Shaft Bore	<b>101.6 mm</b>
Maximum Rotation Speed		<b>2025 rpm</b>	Maximum Rotation Speed	<b>1750 rpm</b>
High Speed Coupling Inertia		<b>0.514 kg-m<sup>2</sup></b>	Low Speed Coupling Inertia	<b>60 kg-m<sup>2</sup></b>
Drawing Number		<b>W312-M-921/2</b>	Drawing Number	
High Speed Coupling Mass		<b>139.7 kg</b>	Low Speed Coupling Mass	<b>1130 kg</b>
High Speed Coupling Price		<b>0</b>	Low Speed Coupling Price	<b>0</b>
<b>Fluid Coupling</b>				
Direct Drive		<b>Yes</b>		
Fluid Coupling		<b>No Selection - Direct Drive</b>		
Fluid Coupling Size				

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<u>Station / Section</u>		Shaft Length mm	Wrap Angle deg	T1 Run kN	T2 Run kN	Resultant Force kN	T1 Start kN	Calculated		Selected			Shaft Mass kg
Station	Description							Defl. Dia mm	Dt. Dia mm	Shaft Dia mm	Brg Dia mm	Brg Ctrs mm	
1 Tail	Tail	* 3200	180.0	119.6	121.0	239.3	122.9	228.6	203.4	280	160	2560	1547
7 Head	Head	* 3520	180.0	418.4	422.8	836.8	447.4	326.1	326.7	380	240	2700	3134
8 Bend	HT Bend	* 3520	128.0	422.6	427.1	759.7	452.4	318.3	316.3	380	240	2700	3134
9 Drive	Drive	* 3460	180.0	421.6	127.8	546.5	451.8	293.1	291.3	320	240	2700	2184
10 Bend	Lt Bend 1	* 3200	139.0	134.5	136.0	251.9	134.3	231.5	207.0	280	160	2560	1547
11 Takeup	Takeup	* 3200	180.0	130.9	132.4	261.8	130.9	233.8	209.6	280	160	2560	1547
12 Bend	LT Bend 2	* 3160	93.0	137.6	139.1	199.6	137.8	218.4	191.5	280	160	2560	1527

\* Indicates Manual pulley shaft dimensions entered

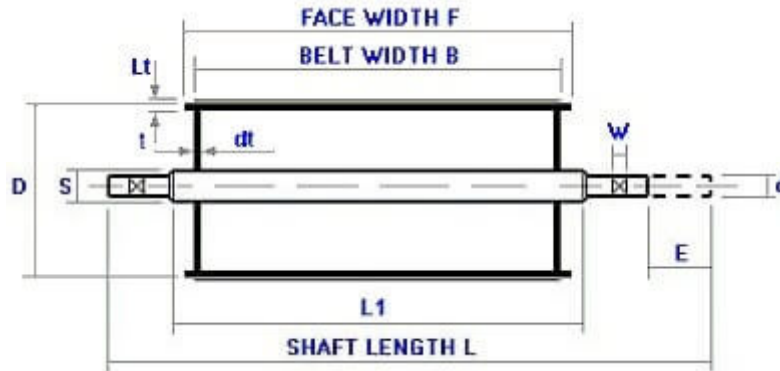
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<u>Station / Section</u>		Shell Dia mm	Lagging mm	Face Width mm	Shaft Length mm	Brg Ctrs mm	Shaft Dia mm	Brg Dia mm	Wrap Angle deg	Pulley Speed RPM	Pulley & Shaft Mass kg	Mom of Inertia kgm2
Station	Description											
1	Tail	* 850	12	2000	3200	2560	280	160	180.0	94.0	2815	197.9
7	Head	* 1000	12	2000	3520	2700	380	240	180.0	80.2	5464	506.1
8	Bend	* 1000	12	2000	3520	2700	380	240	128.0	80.2	5464	506.1
9	Drive	* 1000	12	2000	3460	2700	320	240	180.0	80.2	4414	448.9
10	Bend	* 850	12	2000	3200	2560	280	160	139.0	94.0	2815	197.9
11	Takeup	* 850	12	2000	3200	2560	280	160	180.0	94.0	2815	197.9
12	Bend	* 850	12	2000	3160	2560	280	160	93.0	94.0	2796	197.7

\* Indicates Manual pulley dimensions entered

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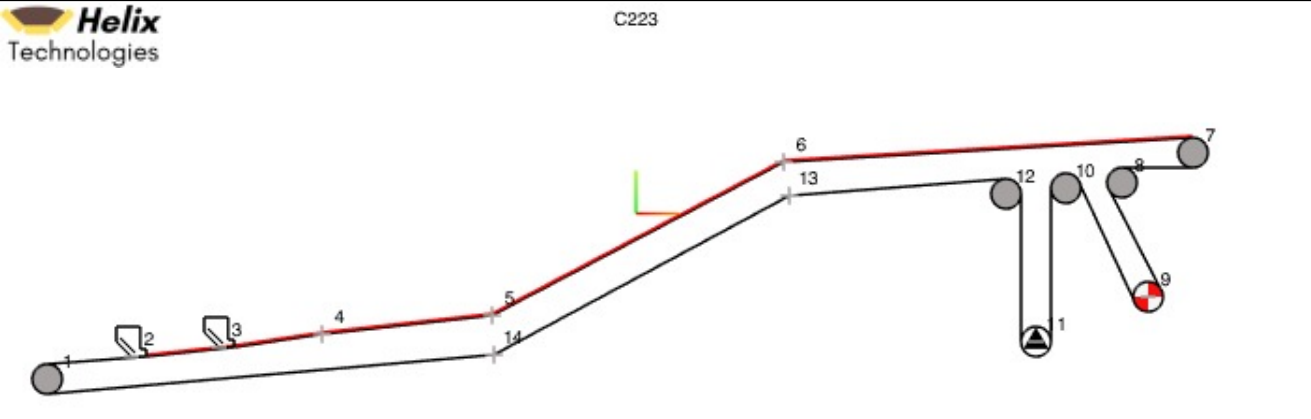


Belt Width **1800 mm** Belt Class **ST-1800**

<u>Station / Section</u>		Shell Dia mm	Shell t mm	Calc Shell t mm	Lagging mm	OD mm	Face Width mm	Shaft Length mm	Shaft Dia mm	Brg Dia mm	Pulley & Shaft Mass kg	Mom of Inertia kgm2
Station	Description											
1	Tail	* 850	17	18.3	12	874	2000	3200	280	160	2815	197.9
7	Head	* 1000	28	34.2	12	1024	2000	3520	380	240	5464	506.1
8	Bend	* 1000	28	34.4	12	1024	2000	3520	380	240	5464	506.1
9	Drive	* 1000	25	27.7	12	1024	2000	3460	320	240	4414	448.9
10	Bend	* 850	17	19.4	12	874	2000	3200	280	160	2815	197.9
11	Takeup	* 850	17	19.1	12	874	2000	3200	280	160	2815	197.9
12	Bend	* 850	17	19.6	12	874	2000	3160	280	160	2796	197.7

\* Indicates Manual pulley dimensions entered

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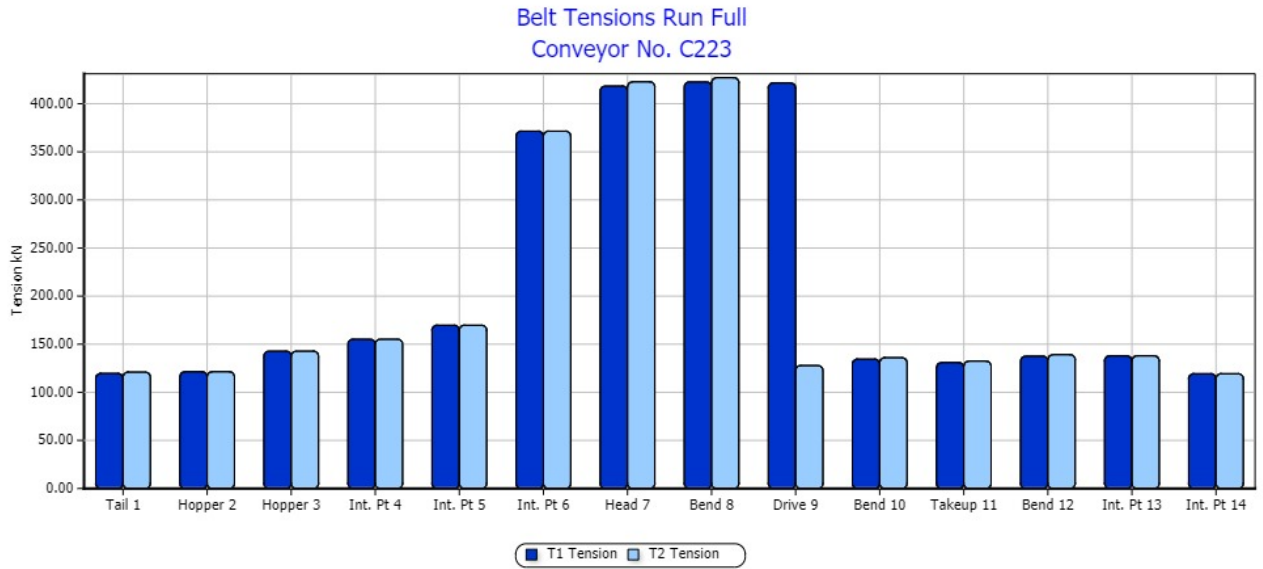
Station / Section		Shell Dia mm	Lagging mm	Face Width mm	Brg Ctrs mm	Drive Power kW	Wrap Angle deg	Pulley Speed rpm	T1 Run kN	T2 Run kN	T1 Start kN	T2 Start kN
1 Tail	Tail	850	12	2000	2560		180.0	94.0	119.62	121.01	167.55	170.85
									Running Full		Starting Empty	
7 Head	Head	1000	12	2000	2700		180.0	80.2	418.40	422.81	447.43	452.08
									Running Full		Starting Full	
8 Bend	HT Bend	1000	12	2000	2700		128.0	80.2	422.63	427.08	452.36	457.06
									Running Full		Starting Full	
9 Drive	Drive	1000	12	2000	2700	1260	180.0	80.2	421.64	127.82	451.75	127.45
									Running Full		Starting Full	
10 Bend	Lt Bend 1	850	12	2000	2560		139.0	94.0	134.48	136.02	140.17	140.81
									Running Full		Coasting Full	
11 Takeup	Takeup	850	12	2000	2560		180.0	94.0	130.92	132.42	130.92	134.33
									Running Full		Starting Empty	
12 Bend	LT Bend 2	850	12	2000	2560		93.0	94.0	137.58	139.14	140.77	144.24
									Running Full		Starting Empty	

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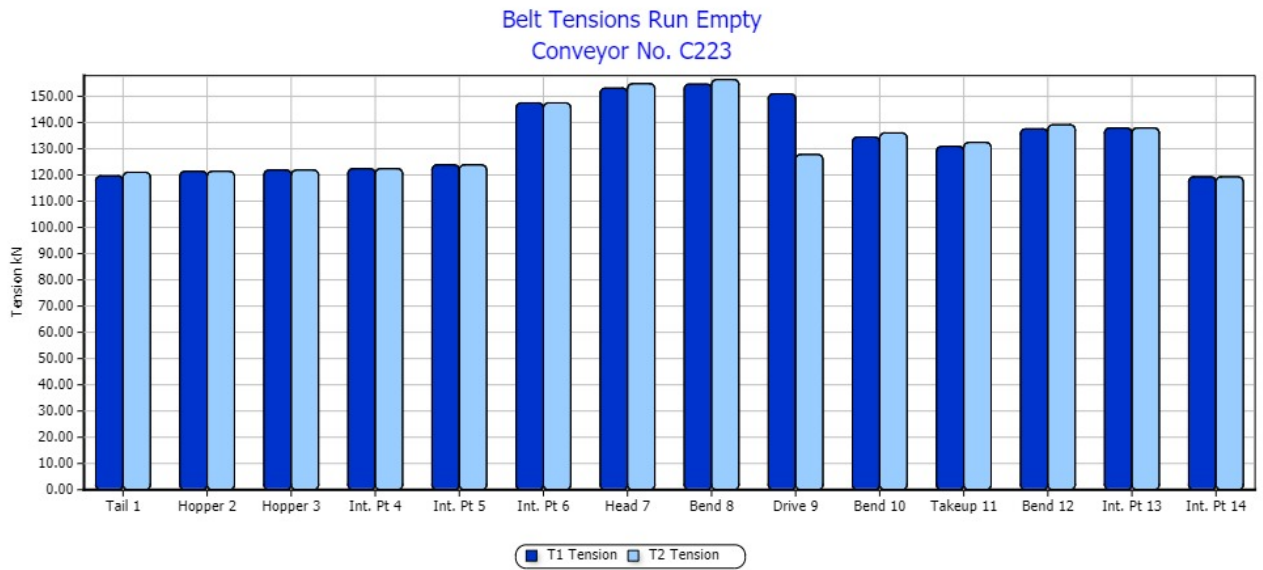
**Conveyor Tension Graphs**

Calculation Method

*ISO*



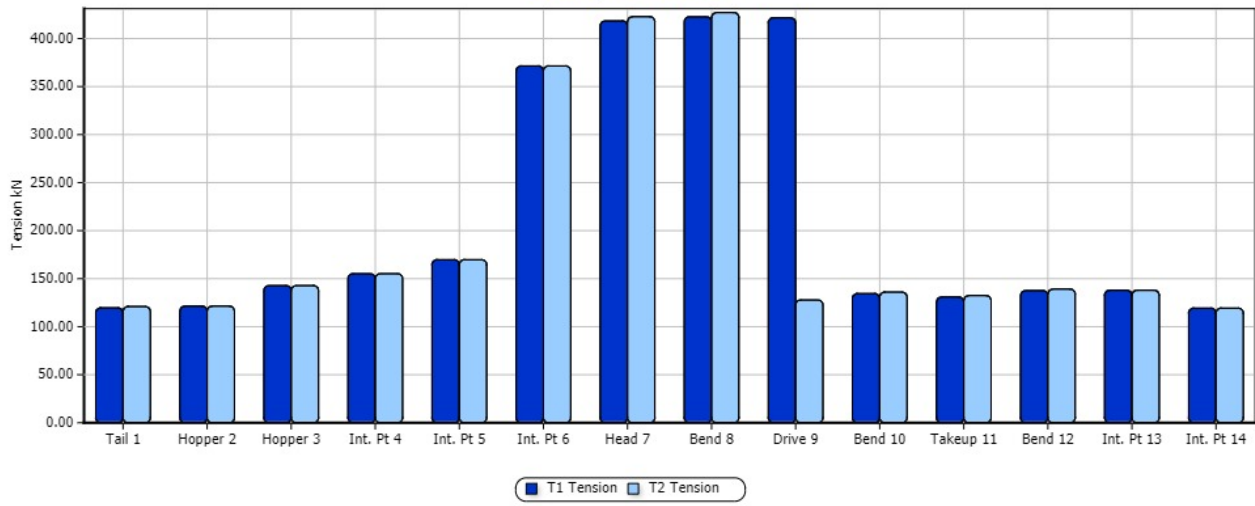
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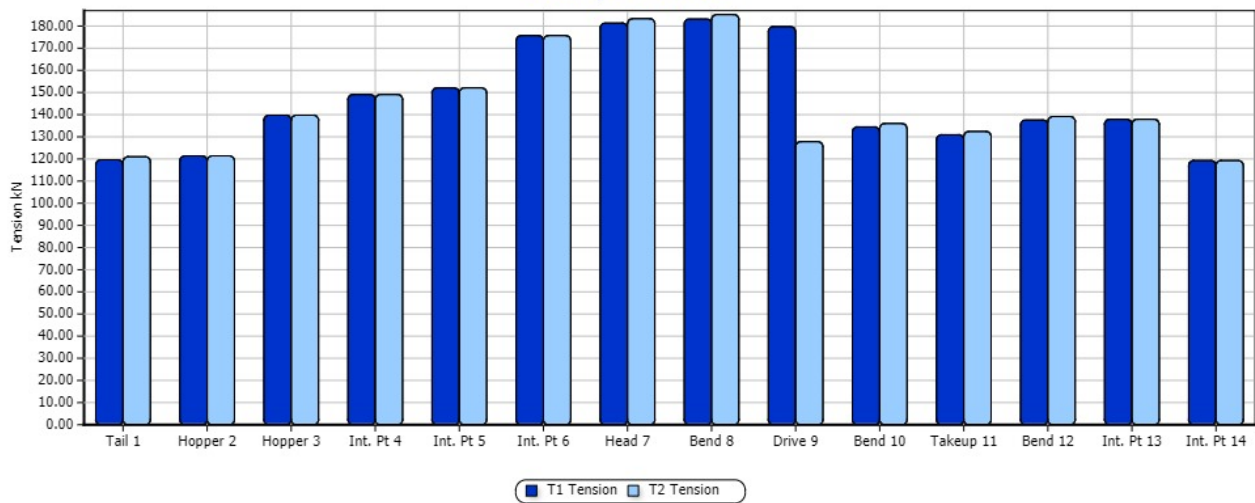
Project	Demo 02 Conveyor High Lift	Client	ABC Iron
Project No.	P9823	Prepared By	Peter Burrow
Conveyor No.	C223	Design Date	01 Oct 2019

Belt Tensions Run Inclines Loaded  
 Conveyor No. C223



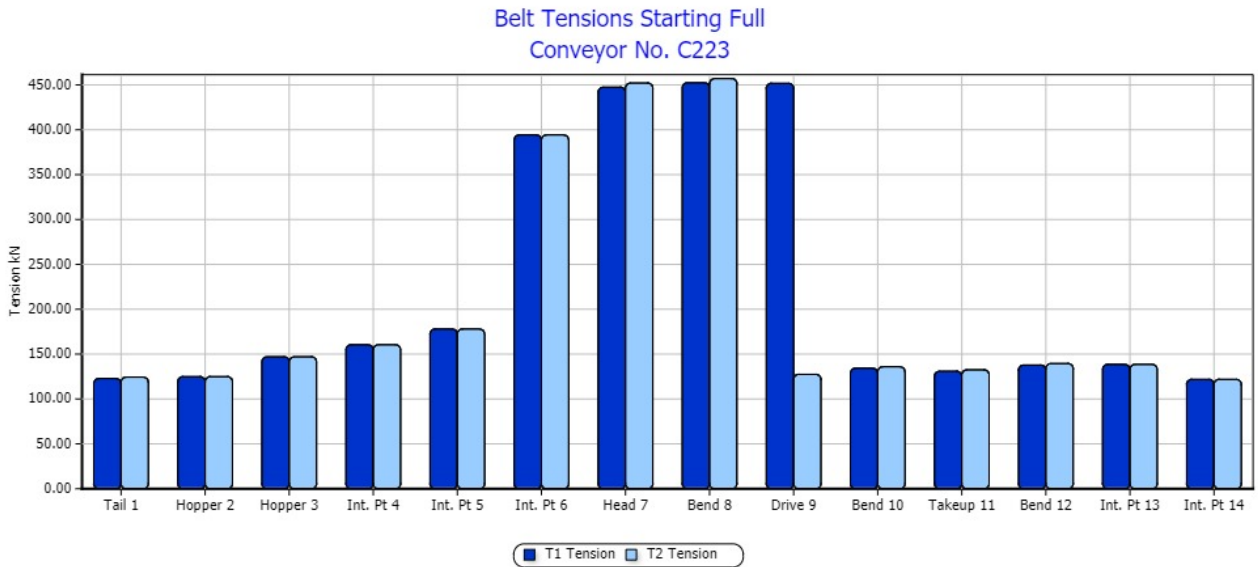
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Belt Tensions Run Declines Loaded  
 Conveyor No. C223

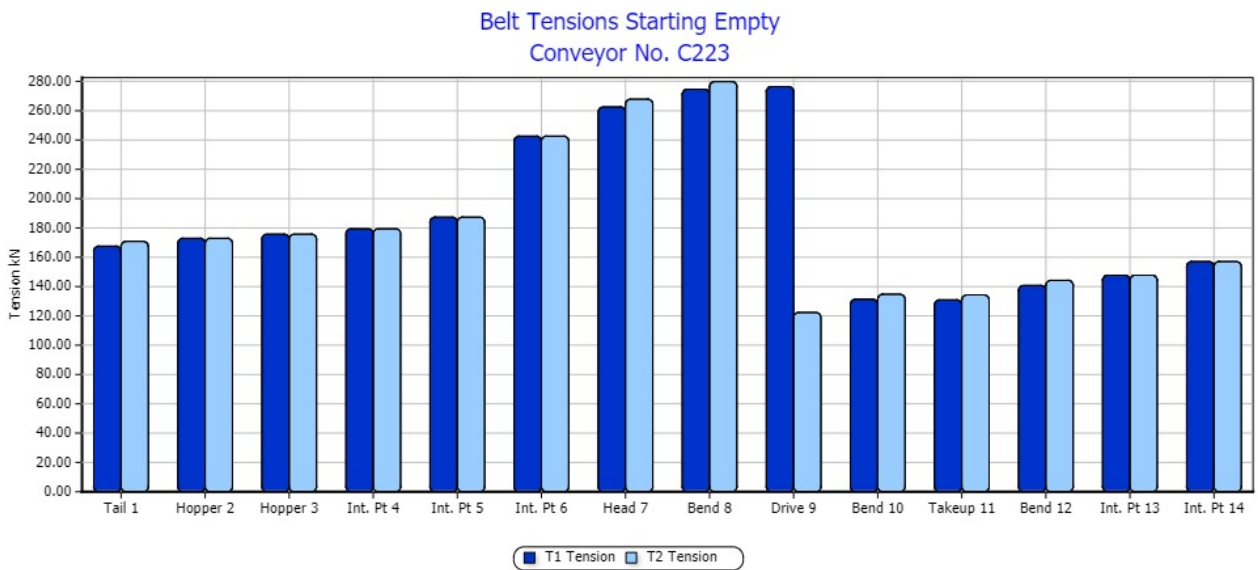


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Conveyor No.	C223	Design Date	01 Oct 2019



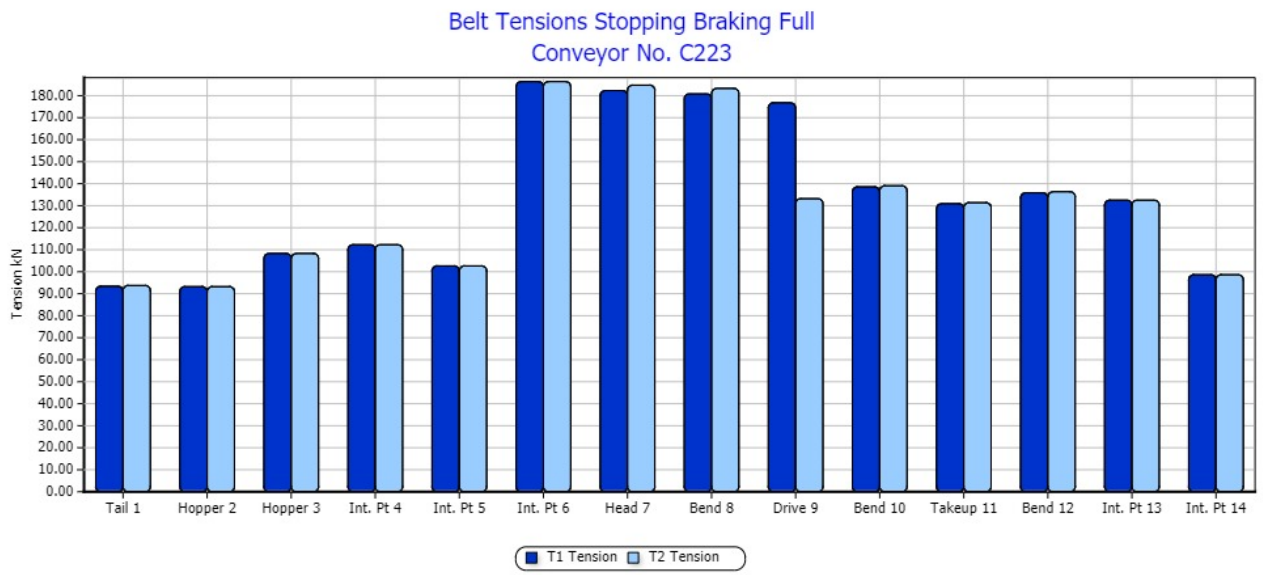
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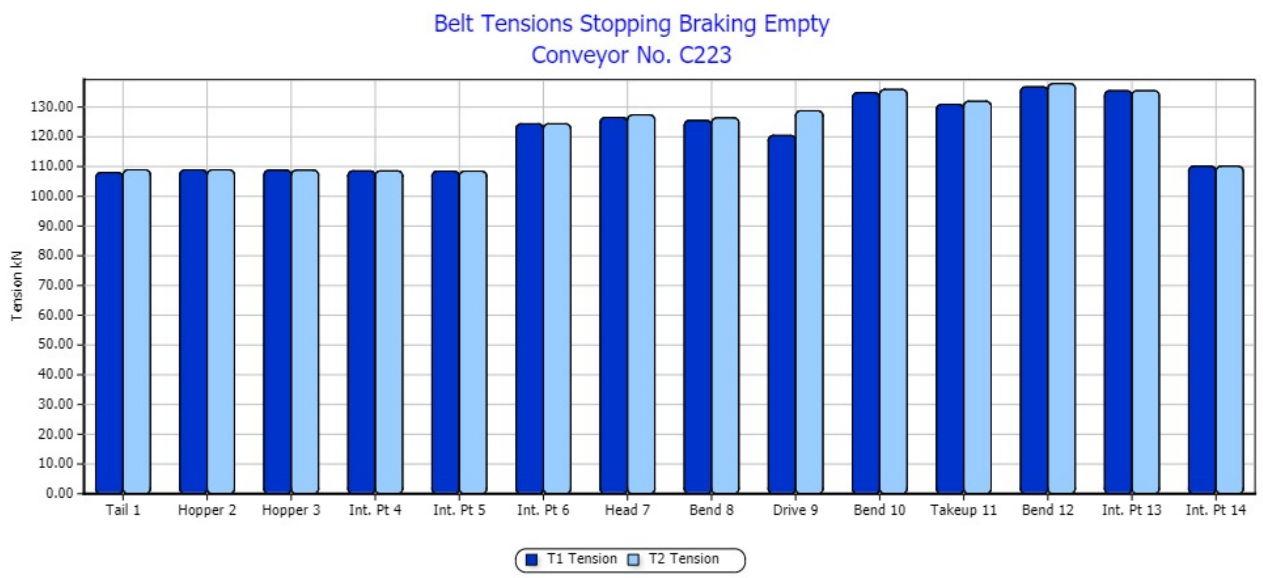
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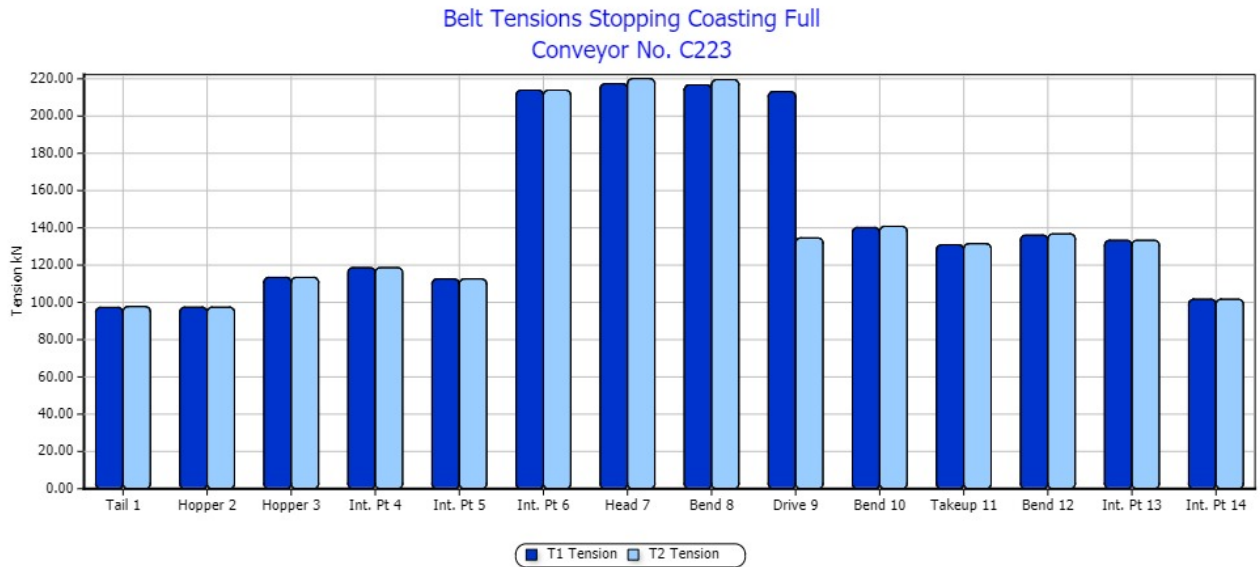


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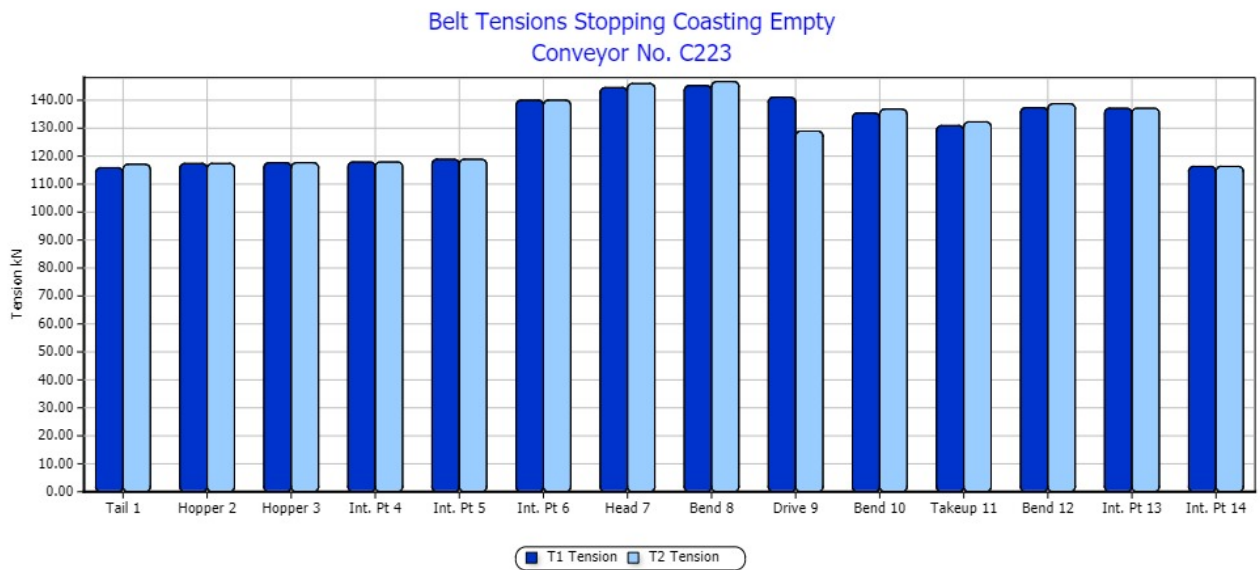


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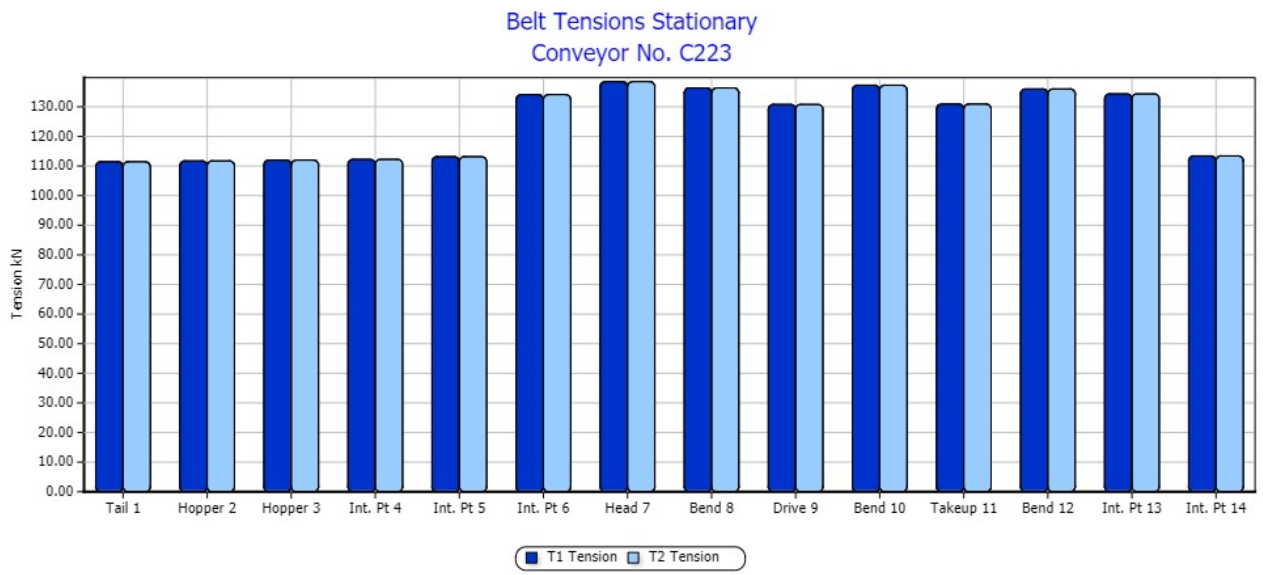


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