

Model Report

Project: Example

Circuit: Xstrata Stnd

Date Generated: 2018-03-07T16:52:59+0000

User: Alex Doll

Percentiles selected for display: 0 20 40 60 80 100 (list sorting: *tph asc*)

Project Settings

Reference N°. 001

Project Name: Example

Table Of Contents

- Project Settings 1
- Model Results 2
- Circuit Settings 3
- 0th percentile sample 4
- Circuit flowsheet 4
- Primary Mill(s) 5
- Detail Of 0th Percentile Sample Operating Conditions 5
- Tent Diagram 6
- Crusher(s) 7
- Detail Of 0th Percentile Sample Operating Conditions 7
- Ball Mill(s) 8
- Detail Of 0th Percentile Sample Operating Conditions 8
- Tent Diagram 9
- 20th percentile sample 10
- Circuit flowsheet 10
- Primary Mill(s) 11
- Detail Of 20th Percentile Sample Operating Conditions 11
- Tent Diagram 12
- Crusher(s) 13
- Detail Of 20th Percentile Sample Operating Conditions 13
- Ball Mill(s) 14
- Detail Of 20th Percentile Sample Operating Conditions 14
- Tent Diagram 15
- 40th percentile sample 16
- Circuit flowsheet 16
- Primary Mill(s) 17
- Detail Of 40th Percentile Sample Operating Conditions 17
- Tent Diagram 18
- Crusher(s) 19
- Detail Of 40th Percentile Sample Operating Conditions 19
- Ball Mill(s) 20
- Detail Of 40th Percentile Sample Operating Conditions 20
- Tent Diagram 21
- 60th percentile sample 22
- Circuit flowsheet 22
- Primary Mill(s) 23
- Detail Of 60th Percentile Sample Operating Conditions 23
- Tent Diagram 24
- Crusher(s) 25
- Detail Of 60th Percentile Sample Operating Conditions 25
- Ball Mill(s) 26
- Detail Of 60th Percentile Sample Operating Conditions 26
- Tent Diagram 27
- 80th percentile sample 28

Circuit flowsheet	28
Primary Mill(s)	29
Detail Of 80th Percentile Sample Operating Conditions	29
Tent Diagram	30
Crusher(s)	31
Detail Of 80th Percentile Sample Operating Conditions	31
Ball Mill(s)	32
Detail Of 80th Percentile Sample Operating Conditions	32
Tent Diagram	33
100th percentile sample	34
Circuit flowsheet	34
Primary Mill(s)	35
Detail Of 100th Percentile Sample Operating Conditions	35
Tent Diagram	36
Crusher(s)	37
Detail Of 100th Percentile Sample Operating Conditions	37
Ball Mill(s)	38
Detail Of 100th Percentile Sample Operating Conditions	38
Tent Diagram	39
Model Results Plot	40
t/h	40
t/d	41
T80, μm	42
P80, μm	43
BM Speed %	44
Etotal	45
Easag	46
Ebm	47

Model Results

- % -	- + -	Name	t/h	t/d	T ₈₀ , μm	P ₈₀ , μm	BM Speed %	E _{total}	E _{asag}	E _{bm}	E _{peb}	E _{ssbm}	BM W _{io}
0%		Antapaccay UGM 1	3183.3	70287	2443	180	75.0	15.00	5.75	9.07	0.18	13.63	16.70
20%		Antapaccay UGM 2	3376.1	74545	2748	180	75.0	14.14	5.42	8.55	0.17	12.86	15.42
40%		Antapaccay UGM 6	3786.1	83597	4251	180	75.0	12.61	4.84	7.63	0.15	11.46	12.88
60%		Antapaccay UGM 3	3831.2	84592	2652	180	75.0	12.46	4.78	7.54	0.15	11.33	13.67
80%		Antapaccay UGM 4	3938.2	86956	3257	180	75.0	12.12	4.65	7.33	0.14	11.02	12.86
100%		Antapaccay UGM 5	5919.7	130707	6325	180	75.0	8.06	3.09	4.88	0.09	7.33	7.87

Circuit Settings

Name : Xstrata Stnd

Model : Optimized Bond/Barratt SABC model (incl. phantom cyclone)

Description : Xstrata standard concentrator design

F_{80} , μm : 127000

P_{80} , μm : 180

Availability : 0.92

Maximum t/h limit : ---

Comment : ---

0th percentile sample

Circuit flowsheet

Circuit flowsheet:

SABC-AB

Model:

Optimized Bond/Barratt SABC model (incl. phantom cyclone)

Sample:

Antapaccay UGM 1

Circuit Feed

F_{80} , μm : 127000 μm

Transfer

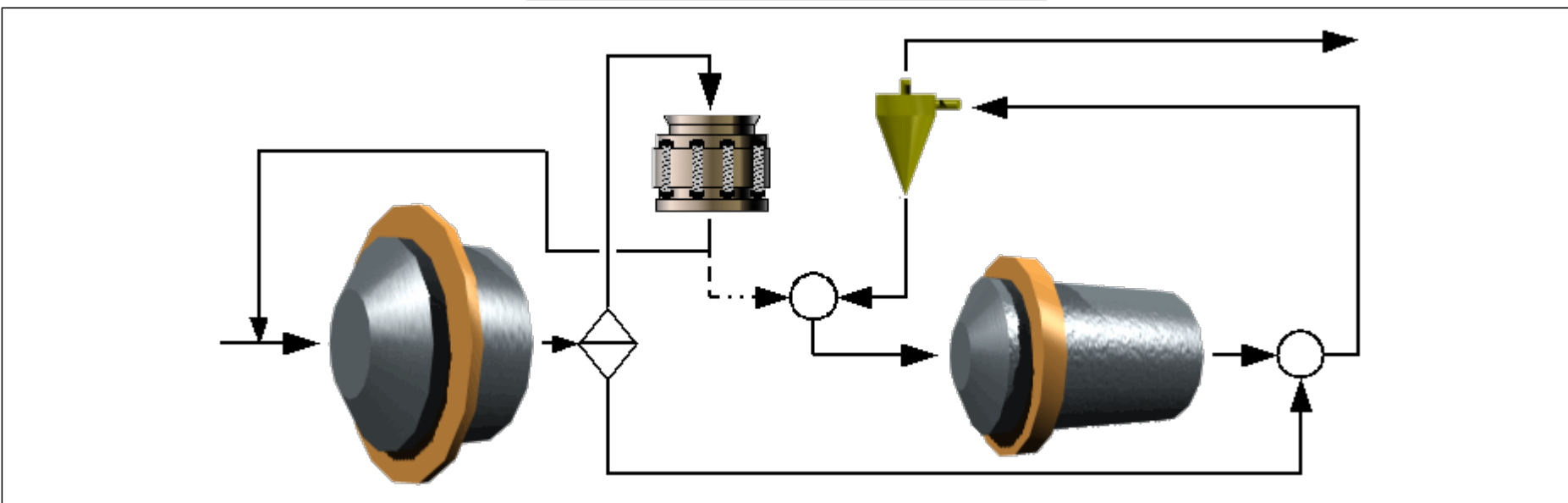
T_{80} , μm : 2443

T_{80} min: 400

T_{80} max: 10000

Product

P_{80} , μm : 180 μm



Primary Mill(s)

Usable shell power: 18,310 kW

1. Xstrata Stnd SAG, 40 \emptyset \times 22 EGL

Crusher(s)

Usable shell power: 559 kW

1. 1000 HP crusher, 1000 HP
2-spare-1000-HP-crusher

Ball Mill(s)

Usable shell power: 28,871 kW

1a. Xstrata stnd BM, 26 \emptyset \times 40 EGL
1b. Xstrata stnd BM, 26 \emptyset \times 40 EGL

E_{asag} : 5.75 kW h/t

E_{peb} : 0.18 kW h/t

E_{bm} : 9.07 kW h/t

W_{ic} : 5.6 kW·h/t
Density: 0 t/m³

W_{RM} : 13.5 kW·h/t

W_{BM} : 17.6 kW·h/t

$E_{\text{total}} = E_{\text{asag}} + E_{\text{peb}} + E_{\text{bm}} = 15 \text{ kW h/t}$

E_{ssbm} : 13.63 kW h/t ($E_{\text{total}} = E_{\text{ssbm}} + 10\%$)

$E_{\text{BondStandard}}$: 11.04 kW h/t (74% of E_{total}) ($E_{\text{total}} = E_{\text{BondStandard}} + 36\%$)

Circuit operating W_{io} : 20.91 kW h/t (119% of W_{BM})

Primary stage operating W_{io} : 33.01 kW h/t (188% of W_{BM})

Secondary stage operating W_{io} : 16.70 kW h/t (95% of W_{BM})

Estimated circuit throughput: 3183 t/h \times 24 h/d \times 92% = 70,287 t/d

Primary Mill(s)

Detail Of 0th Percentile Sample Operating Conditions

Name : Xstrata Stnd SAG

Mill Stage : Primary

Mill Class : Austin SAG model

Motor power : 24,000 kW [32,185 HP]

Power available at shell : 24,000 kW [32,185 HP]

Proportion of available power drawn : 76.3%

Drawn power at mill shell : 18,310 kW [24,554 HP]

Drawn torque at mill shell : 18,276 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 40.0' Ø x 22.0' EGL [12191 mm Ø x 6705 mm]

Speed : 9.57 RPM (78.0% critical)

Total load : 25 % v/v total, 12 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 11887 mm Ø x 6705 mm

Critical speed is at : 12.3 RPM

Motor rated speed is at : 9.2 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 80% solids, w/w

Charge density : 3.64 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 18,310 kW [24,554 HP]

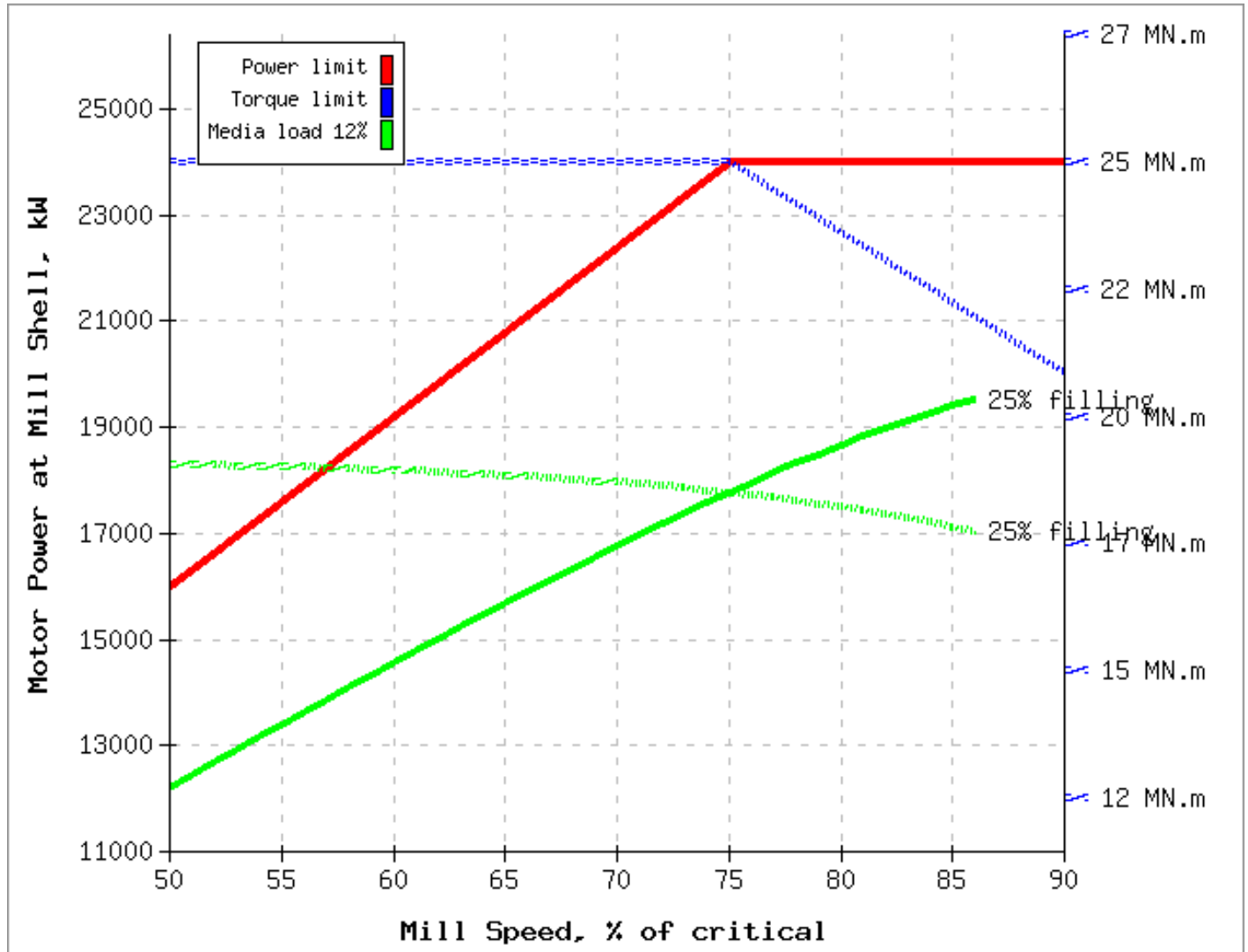
Cone angle : 15°

Tent Diagram

Tent diagram for 40' Ø × 22' EGL

Motor cumulative output power 24,000 kW. Usable shell power 24,000 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



Crusher(s)

Detail Of 0th Percentile Sample Operating Conditions

Name : 1000 HP crusher

Mill Stage : Crusher

Mill Class : Secondary, tertiary or pebble crusher

Motor power : 746 kW [1,000 HP]

Nominal power draw : 746 kW [1,000 HP]

Proportion of available power drawn : 75.0%

Power at the DCS : 746 kW [1,000 HP]

Ball Mill(s)

Detail Of 0th Percentile Sample Operating Conditions

Name : Xstrata std BM

Mill Stage : Secondary

Mill Class : Overflow ball mill using simplified Morrell C-model

Motor power : 16,400 kW [21,993 HP]

Power available at shell : 16,400 kW [21,993 HP]

Proportion of available power drawn : 88.0%

Drawn power at mill shell : 14,435 kW [19,358 HP]

Drawn torque at mill shell : 23,994 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 26.0' Ø x 40.0' EGL [7924 mm Ø x 12191 mm]

Speed : 11.49 RPM (75.0% critical)

Total load : 32 % v/v total, 32 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 7620 mm Ø x 12191 mm

Critical speed is at : 15.3 RPM

Motor rated speed is at : 11.49 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 70% solids, w/w

Charge density : 5.40 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 14,435 kW [19,358 HP]

Cone angle : 15°

Trunnion diameter : 9 ft (2.74 m)

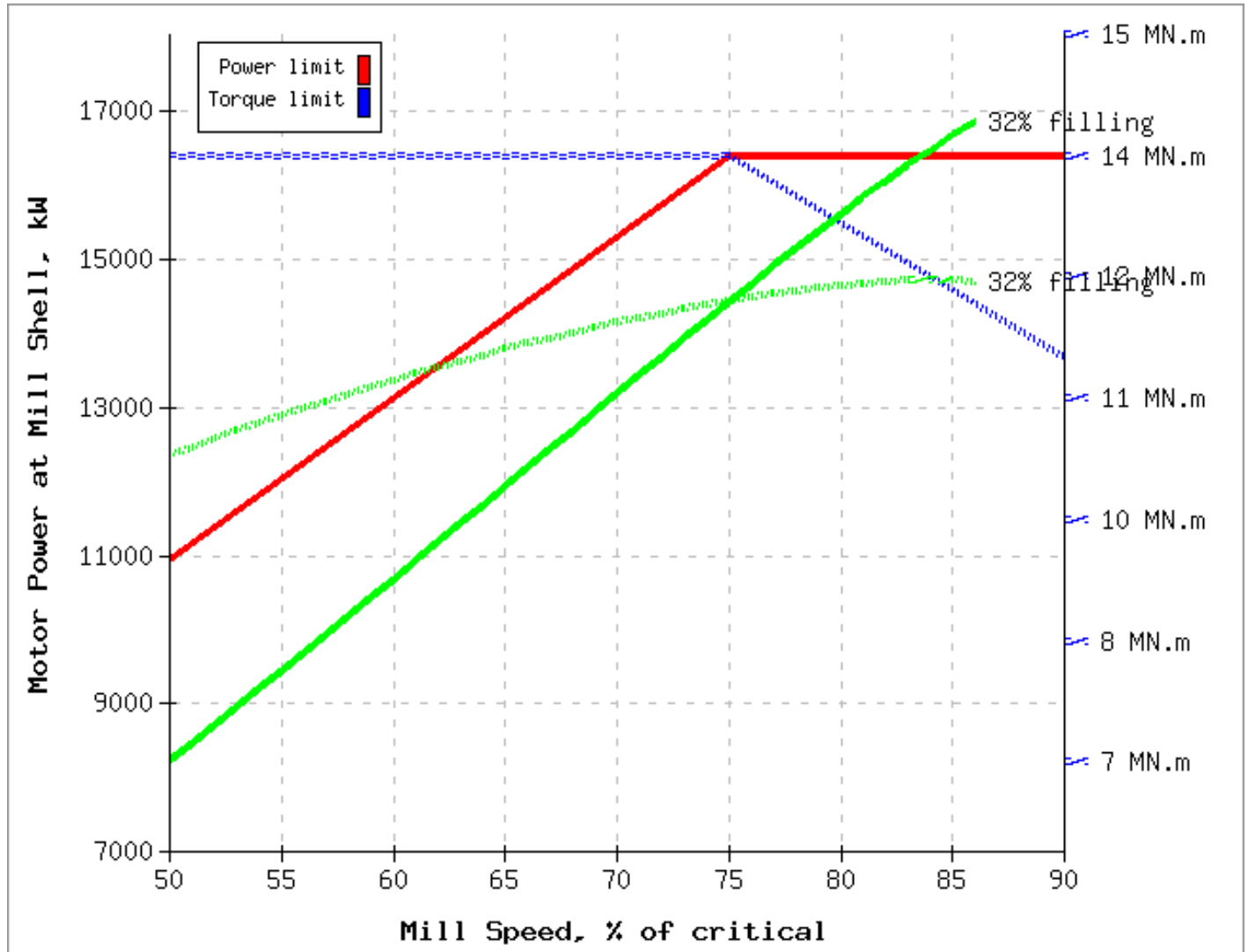
k - Net power to gross power factor : 1.26

Tent Diagram

Tent diagram for 26' Ø × 40' EGL

Motor cumulative output power 16,400 kW. Usable shell power 16,400 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



20th percentile sample

Circuit flowsheet

Circuit flowsheet:

SABC-AB

Model:

Optimized Bond/Barratt SABC model (incl. phantom cyclone)

Sample:

Antapaccay UGM 2

Circuit Feed

F_{80} , μm : 127000 μm

Transfer

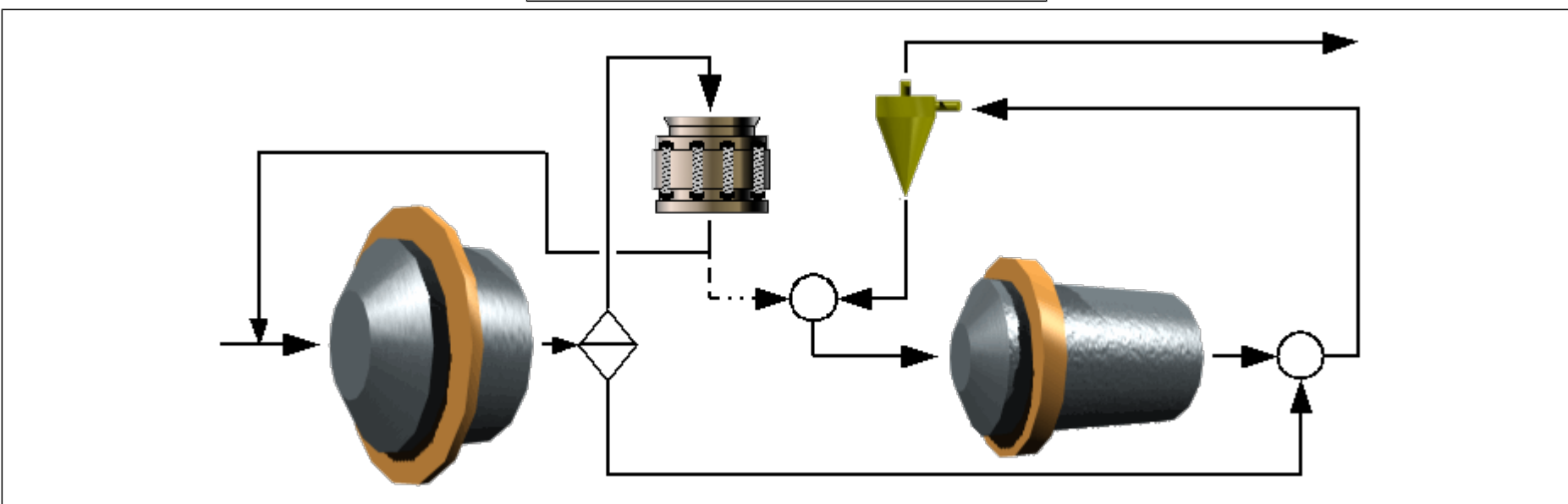
T_{80} , μm : 2748

T_{80} min: 400

T_{80} max: 10000

Product

P_{80} , μm : 180 μm



Primary Mill(s)

Usable shell power: 18,310 kW

1. Xstrata Stnd SAG, 40 \emptyset \times 22 EGL

Crusher(s)

Usable shell power: 559 kW

1. 1000 HP crusher, 1000 HP
2- spare 1000-HP-crusher

Ball Mill(s)

Usable shell power: 28,871 kW

1a. Xstrata stnd BM, 26 \emptyset \times 40 EGL
1b. Xstrata stnd BM, 26 \emptyset \times 40 EGL

E_{asag} : 5.75 kW h/t

E_{peb} : 0.18 kW h/t

E_{bm} : 9.07 kW h/t

W_{ic} : 5.7 kW·h/t

Density: 0 t/m³

W_{RM} : 13.5 kW·h/t

W_{BM} : 16.7 kW·h/t

$E_{\text{total}} = E_{\text{asag}} + E_{\text{peb}} + E_{\text{bm}} = 14.14$ kW h/t

E_{ssbm} : 12.86 kW h/t ($E_{\text{total}} = E_{\text{ssbm}} + 10\%$)

$E_{\text{BondStandard}}$: 10.66 kW h/t (75% of E_{total}) ($E_{\text{total}} = E_{\text{BondStandard}} + 33\%$)

Circuit operating W_{io} : 19.71 kW h/t (118% of W_{BM})

Primary stage operating W_{io} : 33.34 kW h/t (200% of W_{BM})

Secondary stage operating W_{io} : 15.42 kW h/t (92% of W_{BM})

Estimated circuit throughput: 3376 t/h \times 24 h/d \times 92% = 74,545 t/d

Primary Mill(s)

Detail Of 20th Percentile Sample Operating Conditions

Name : Xstrata Stnd SAG

Mill Stage : Primary

Mill Class : Austin SAG model

Motor power : 24,000 kW [32,185 HP]

Power available at shell : 24,000 kW [32,185 HP]

Proportion of available power drawn : 76.3%

Drawn power at mill shell : 18,310 kW [24,554 HP]

Drawn torque at mill shell : 18,276 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 40.0' Ø x 22.0' EGL [12191 mm Ø x 6705 mm]

Speed : 9.57 RPM (78.0% critical)

Total load : 25 % v/v total, 12 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 11887 mm Ø x 6705 mm

Critical speed is at : 12.3 RPM

Motor rated speed is at : 9.2 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 80% solids, w/w

Charge density : 3.64 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 18,310 kW [24,554 HP]

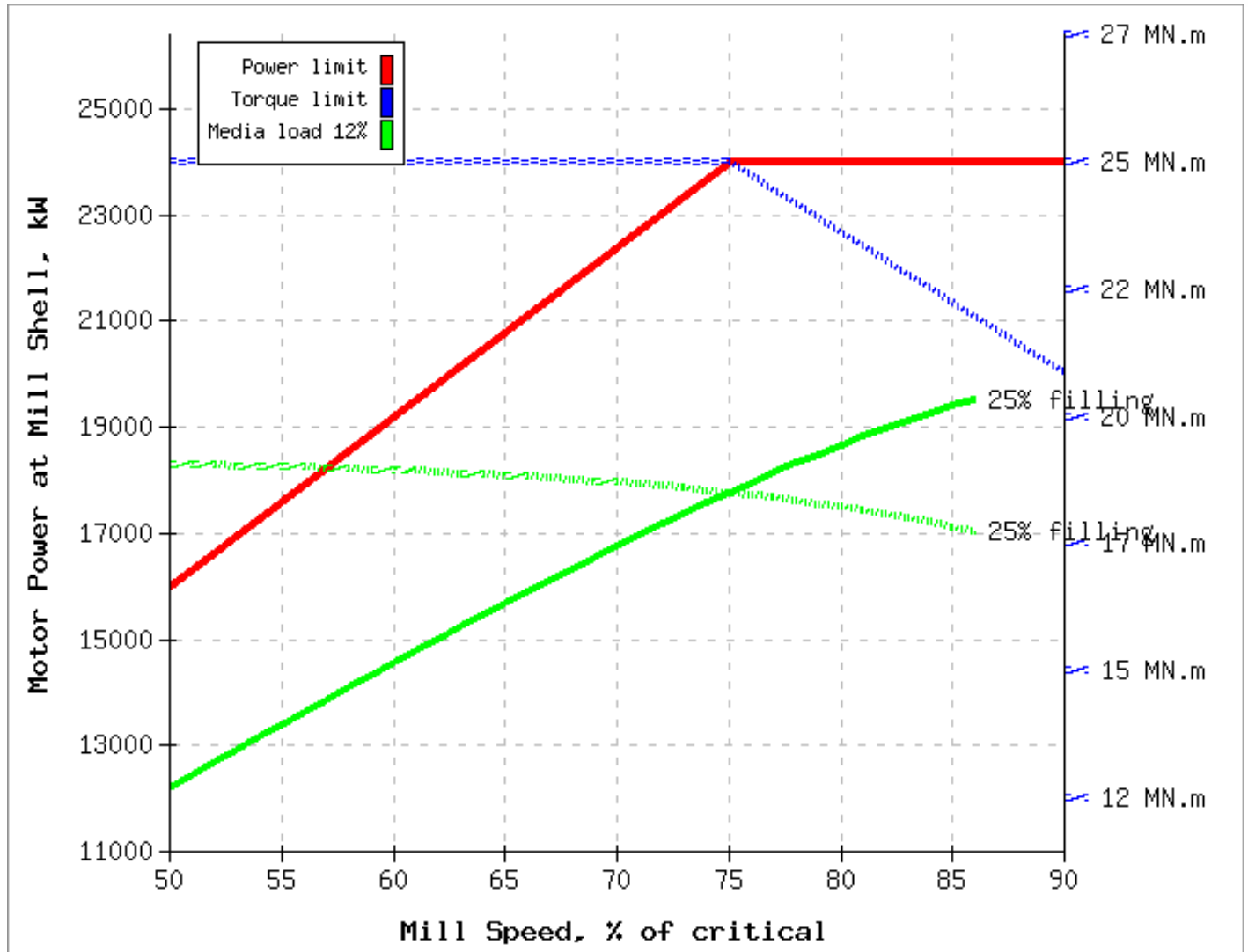
Cone angle : 15°

Tent Diagram

Tent diagram for 40' Ø × 22' EGL

Motor cumulative output power 24,000 kW. Usable shell power 24,000 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



Crusher(s)

Detail Of 20th Percentile Sample Operating Conditions

Name : 1000 HP crusher

Mill Stage : Crusher

Mill Class : Secondary, tertiary or pebble crusher

Motor power : 746 kW [1,000 HP]

Nominal power draw : 746 kW [1,000 HP]

Proportion of available power drawn : 75.0%

Power at the DCS : 746 kW [1,000 HP]

Ball Mill(s)

Detail Of 20th Percentile Sample Operating Conditions

Name : Xstrata std BM

Mill Stage : Secondary

Mill Class : Overflow ball mill using simplified Morrell C-model

Motor power : 16,400 kW [21,993 HP]

Power available at shell : 16,400 kW [21,993 HP]

Proportion of available power drawn : 88.0%

Drawn power at mill shell : 14,435 kW [19,358 HP]

Drawn torque at mill shell : 23,994 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 26.0' Ø x 40.0' EGL [7924 mm Ø x 12191 mm]

Speed : 11.49 RPM (75.0% critical)

Total load : 32 % v/v total, 32 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 7620 mm Ø x 12191 mm

Critical speed is at : 15.3 RPM

Motor rated speed is at : 11.49 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 70% solids, w/w

Charge density : 5.40 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 14,435 kW [19,358 HP]

Cone angle : 15°

Trunnion diameter : 9 ft (2.74 m)

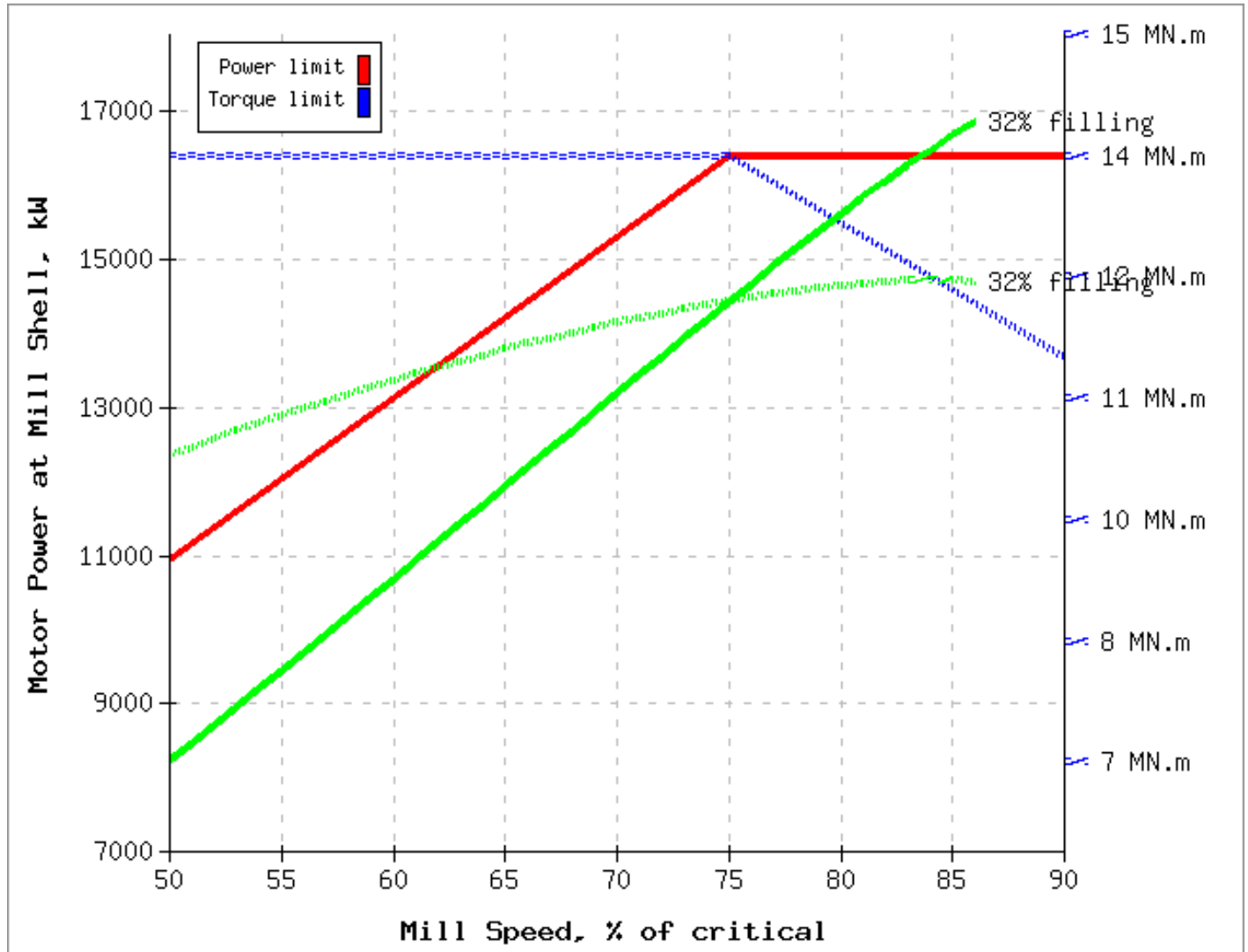
k - Net power to gross power factor : 1.26

Tent Diagram

Tent diagram for 26' Ø × 40' EGL

Motor cumulative output power 16,400 kW. Usable shell power 16,400 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



40th percentile sample

Circuit flowsheet

Circuit flowsheet:

SABC-AB

Model:

Optimized Bond/Barratt SABC model (incl. phantom cyclone)

Sample:

Antapaccay UGM 6

Circuit Feed

F_{80} , μm : 127000 μm

Transfer

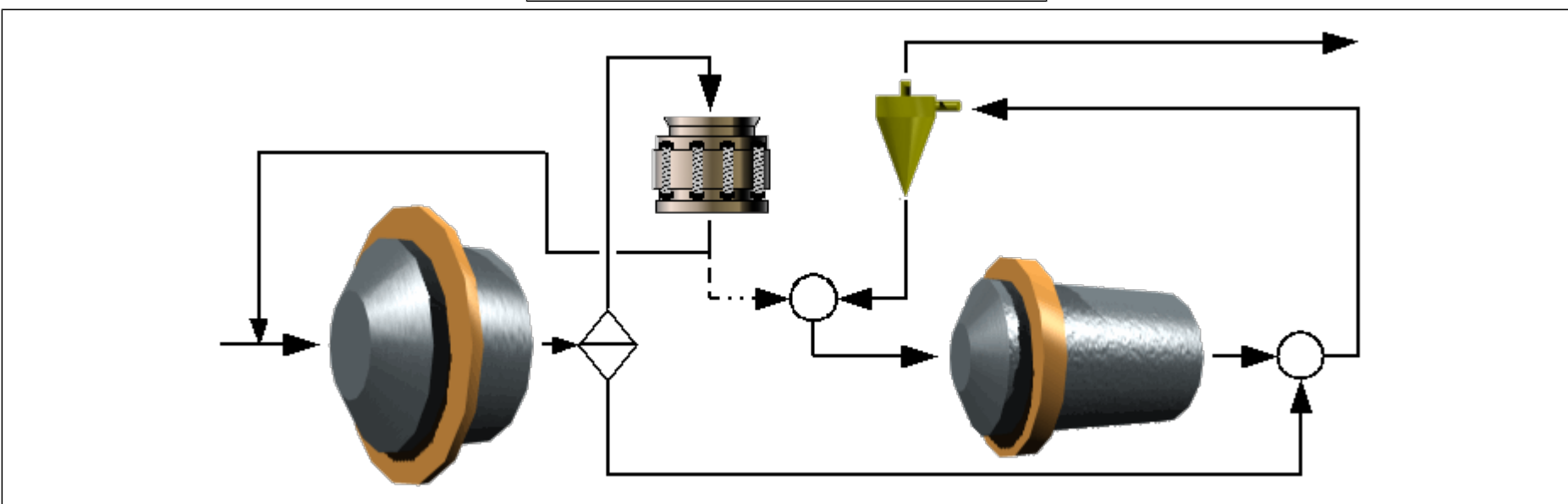
T_{80} , μm : 4252

T_{80} min: 400

T_{80} max: 10000

Product

P_{80} , μm : 180 μm



Primary Mill(s)

Usable shell power: 18,310 kW

1. Xstrata Stnd SAG, 40 \emptyset \times 22 EGL

Crusher(s)

Usable shell power: 559 kW

1. 1000 HP crusher, 1000 HP
2-spare-1000-HP-crusher

Ball Mill(s)

Usable shell power: 28,871 kW

1a. Xstrata stnd BM, 26 \emptyset \times 40 EGL
1b. Xstrata stnd BM, 26 \emptyset \times 40 EGL

E_{asag} : 5.75 kW h/t

E_{peb} : 0.18 kW h/t

E_{bm} : 9.07 kW h/t

W_{i_c} : 8.2 kW·h/t
Density: 0 t/m³

$W_{i_{RM}}$: 14.3 kW·h/t

$W_{i_{BM}}$: 14.6 kW·h/t

$E_{\text{total}} = E_{\text{asag}} + E_{\text{peb}} + E_{\text{bm}} = 12.61 \text{ kW h/t}$

E_{ssbm} : 11.46 kW h/t ($E_{\text{total}} = E_{\text{ssbm}} + 10\%$)

$E_{\text{BondStandard}}$: 10.07 kW h/t (80% of E_{total}) ($E_{\text{total}} = E_{\text{BondStandard}} + 25\%$)

Circuit operating W_{i_o} : 17.58 kW h/t (120% of $W_{i_{BM}}$)

Primary stage operating W_{i_o} : 38.59 kW h/t (264% of $W_{i_{BM}}$)

Secondary stage operating W_{i_o} : 12.88 kW h/t (88% of $W_{i_{BM}}$)

Estimated circuit throughput: 3786 t/h \times 24 h/d \times 92% = 83,597 t/d

Primary Mill(s)

Detail Of 40th Percentile Sample Operating Conditions

Name : Xstrata Stnd SAG

Mill Stage : Primary

Mill Class : Austin SAG model

Motor power : 24,000 kW [32,185 HP]

Power available at shell : 24,000 kW [32,185 HP]

Proportion of available power drawn : 76.3%

Drawn power at mill shell : 18,310 kW [24,554 HP]

Drawn torque at mill shell : 18,276 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 40.0' Ø x 22.0' EGL [12191 mm Ø x 6705 mm]

Speed : 9.57 RPM (78.0% critical)

Total load : 25 % v/v total, 12 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 11887 mm Ø x 6705 mm

Critical speed is at : 12.3 RPM

Motor rated speed is at : 9.2 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 80% solids, w/w

Charge density : 3.64 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 18,310 kW [24,554 HP]

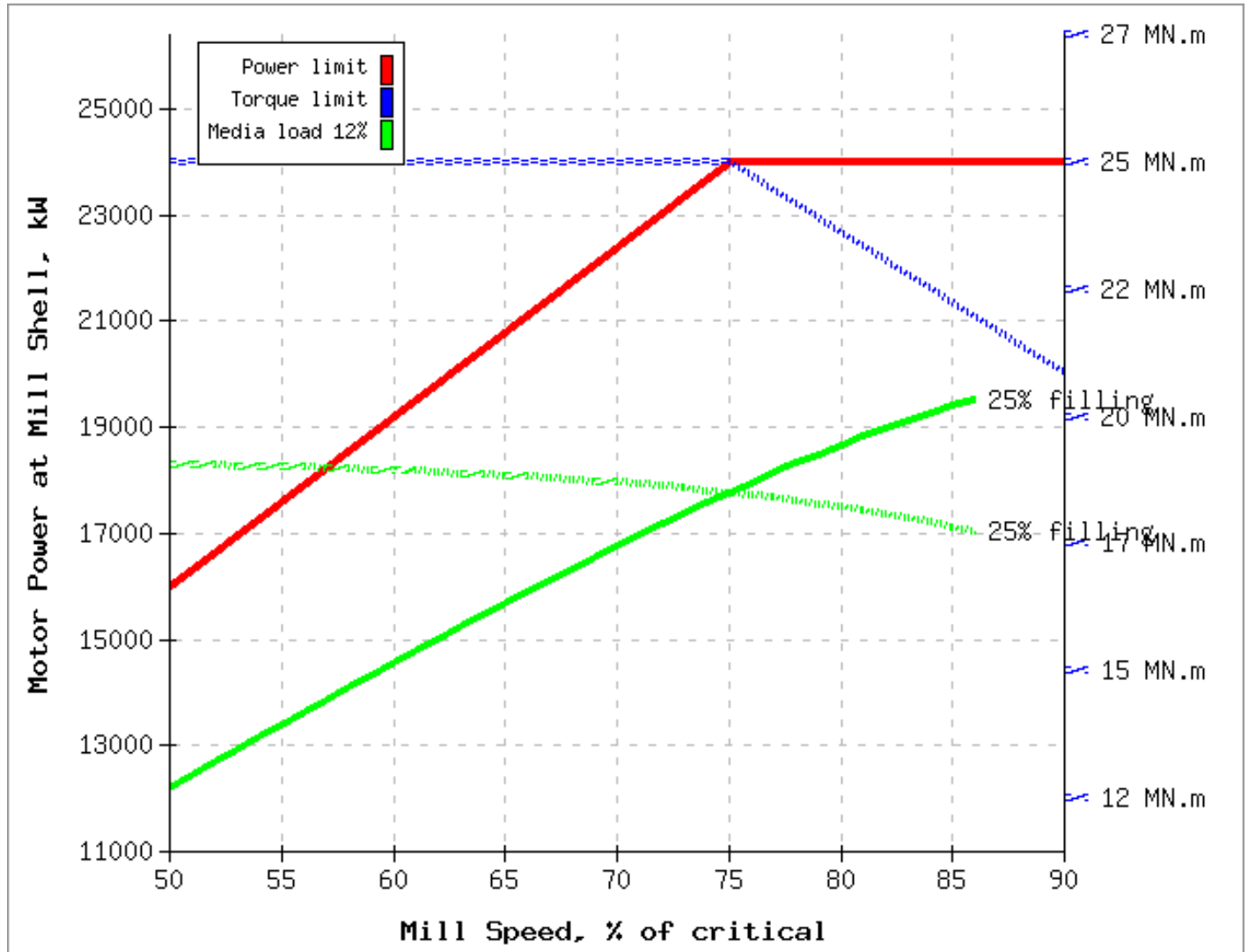
Cone angle : 15°

Tent Diagram

Tent diagram for 40' Ø × 22' EGL

Motor cumulative output power 24,000 kW. Usable shell power 24,000 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



Crusher(s)

Detail Of 40th Percentile Sample Operating Conditions

Name : 1000 HP crusher

Mill Stage : Crusher

Mill Class : Secondary, tertiary or pebble crusher

Motor power : 746 kW [1,000 HP]

Nominal power draw : 746 kW [1,000 HP]

Proportion of available power drawn : 75.0%

Power at the DCS : 746 kW [1,000 HP]

Ball Mill(s)

Detail Of 40th Percentile Sample Operating Conditions

Name : Xstrata std BM

Mill Stage : Secondary

Mill Class : Overflow ball mill using simplified Morrell C-model

Motor power : 16,400 kW [21,993 HP]

Power available at shell : 16,400 kW [21,993 HP]

Proportion of available power drawn : 88.0%

Drawn power at mill shell : 14,435 kW [19,358 HP]

Drawn torque at mill shell : 23,994 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 26.0' Ø x 40.0' EGL [7924 mm Ø x 12191 mm]

Speed : 11.49 RPM (75.0% critical)

Total load : 32 % v/v total, 32 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 7620 mm Ø x 12191 mm

Critical speed is at : 15.3 RPM

Motor rated speed is at : 11.49 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 70% solids, w/w

Charge density : 5.40 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 14,435 kW [19,358 HP]

Cone angle : 15°

Trunnion diameter : 9 ft (2.74 m)

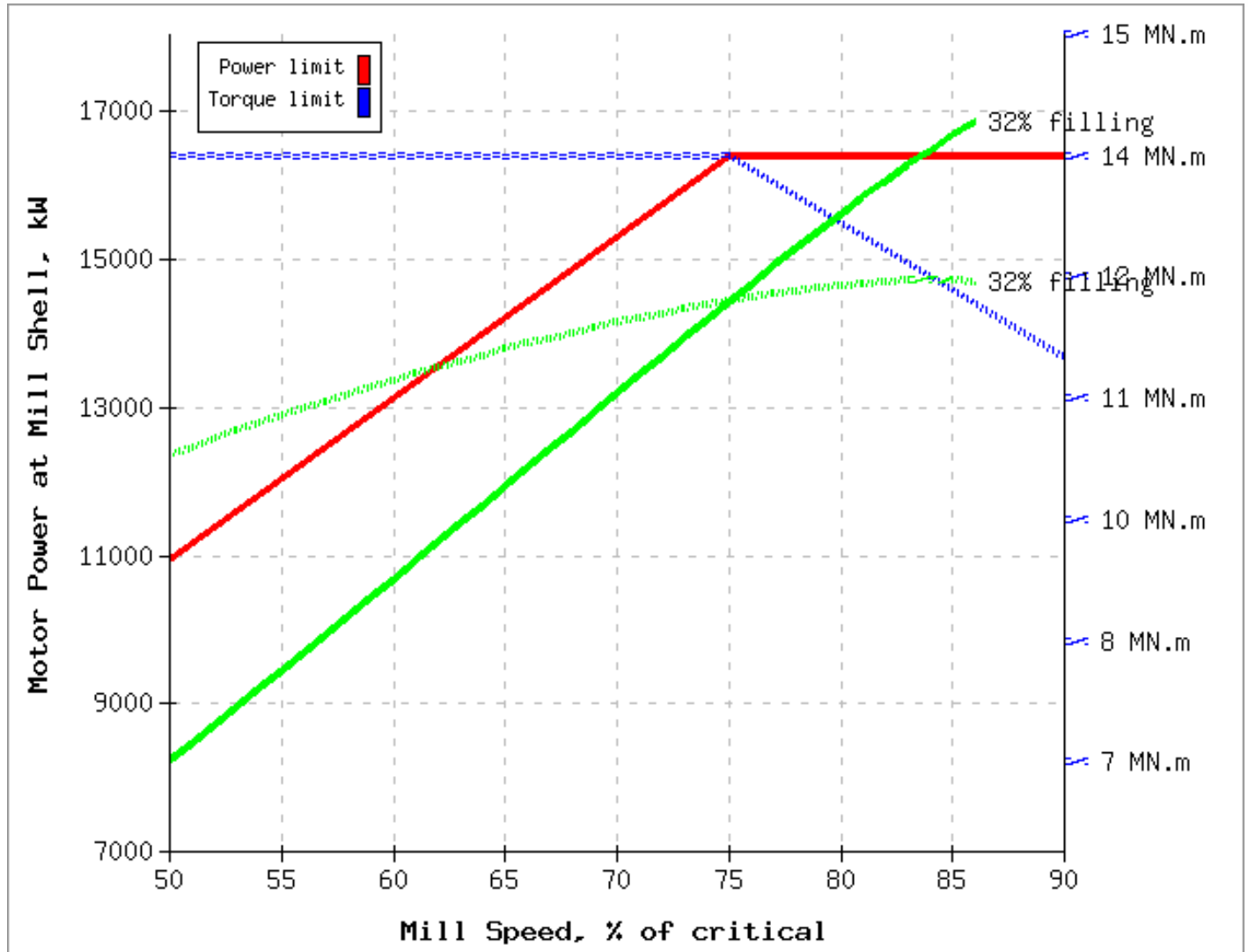
k - Net power to gross power factor : 1.26

Tent Diagram

Tent diagram for 26' Ø × 40' EGL

Motor cumulative output power 16,400 kW. Usable shell power 16,400 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



60th percentile sample

Circuit flowsheet

Circuit flowsheet:

SABC-AB

Model:

Optimized Bond/Barratt SABC model (incl. phantom cyclone)

Sample:

Antapaccay UGM 3

Circuit Feed

F_{80} , μm : 127000 μm

Transfer

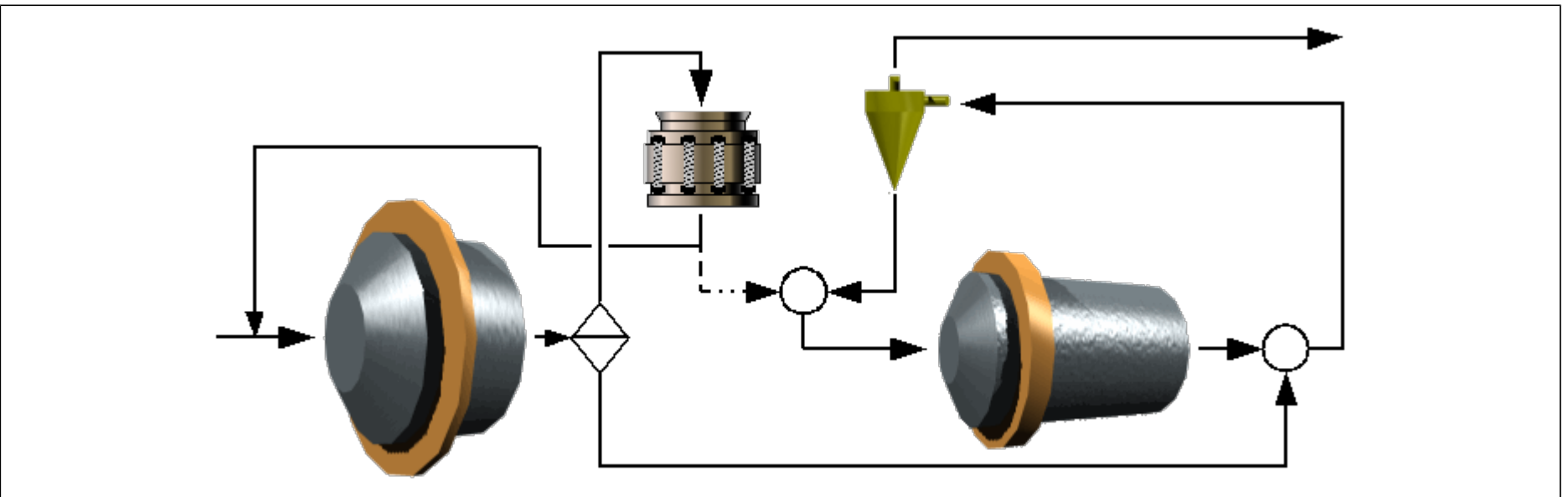
T_{80} , μm : 2652

T_{80} min: 400

T_{80} max: 10000

Product

P_{80} , μm : 180 μm



Primary Mill(s)

Usable shell power: 18,310 kW

1. Xstrata Stnd SAG, 40 \emptyset \times 22 EGL

Crusher(s)

Usable shell power: 559 kW

1. 1000 HP crusher, 1000 HP
2-spare-1000-HP-crusher

Ball Mill(s)

Usable shell power: 28,871 kW

1a. Xstrata stnd BM, 26 \emptyset \times 40 EGL
1b. Xstrata stnd BM, 26 \emptyset \times 40 EGL

E_{asag} : 5.75 kW h/t

E_{peb} : 0.18 kW h/t

E_{bm} : 9.07 kW h/t

W_{ic} : 5.2 kW·h/t

Density: 0 t/m³

W_{RM} : 11.6 kW·h/t

W_{BM} : 15.5 kW·h/t

$E_{\text{total}} = E_{\text{asag}} + E_{\text{peb}} + E_{\text{bm}} = 12.46 \text{ kW h/t}$

E_{ssbm} : 11.33 kW h/t ($E_{\text{total}} = E_{\text{ssbm}} + 10\%$)

$E_{\text{BondStandard}}$: 9.67 kW h/t (78% of E_{total}) ($E_{\text{total}} = E_{\text{BondStandard}} + 29\%$)

Circuit operating W_{io} : 17.37 kW h/t (112% of W_{BM})

Primary stage operating W_{io} : 28.77 kW h/t (186% of W_{BM})

Secondary stage operating W_{io} : 13.67 kW h/t (88% of W_{BM})

Estimated circuit throughput: 3831 t/h \times 24 h/d \times 92% = 84,592 t/d

Primary Mill(s)

Detail Of 60th Percentile Sample Operating Conditions

Name : Xstrata Stnd SAG

Mill Stage : Primary

Mill Class : Austin SAG model

Motor power : 24,000 kW [32,185 HP]

Power available at shell : 24,000 kW [32,185 HP]

Proportion of available power drawn : 76.3%

Drawn power at mill shell : 18,310 kW [24,554 HP]

Drawn torque at mill shell : 18,276 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 40.0' Ø x 22.0' EGL [12191 mm Ø x 6705 mm]

Speed : 9.57 RPM (78.0% critical)

Total load : 25 % v/v total, 12 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 11887 mm Ø x 6705 mm

Critical speed is at : 12.3 RPM

Motor rated speed is at : 9.2 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 80% solids, w/w

Charge density : 3.64 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 18,310 kW [24,554 HP]

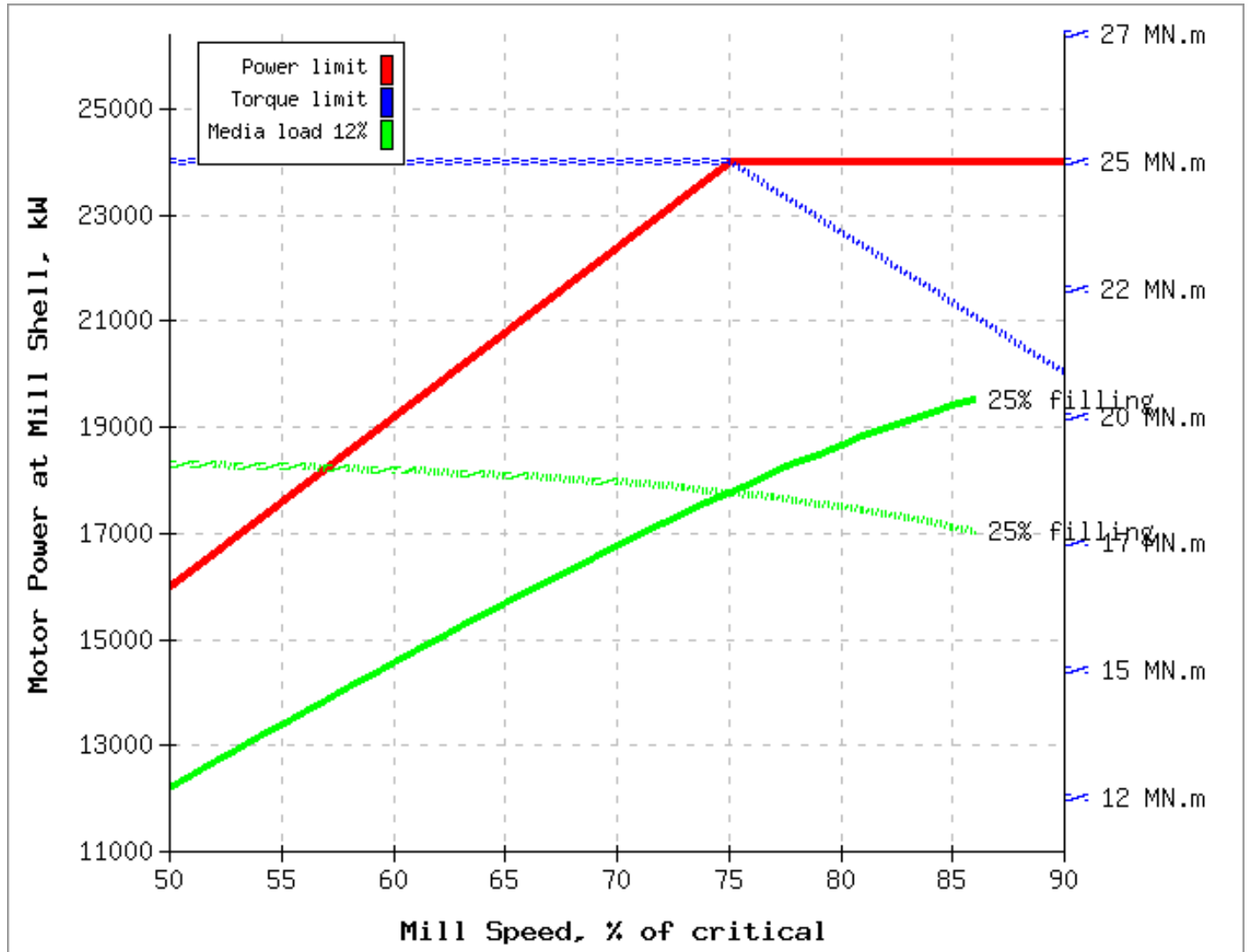
Cone angle : 15°

Tent Diagram

Tent diagram for 40' Ø × 22' EGL

Motor cumulative output power 24,000 kW. Usable shell power 24,000 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



Crusher(s)

Detail Of 60th Percentile Sample Operating Conditions

Name : 1000 HP crusher

Mill Stage : Crusher

Mill Class : Secondary, tertiary or pebble crusher

Motor power : 746 kW [1,000 HP]

Nominal power draw : 746 kW [1,000 HP]

Proportion of available power drawn : 75.0%

Power at the DCS : 746 kW [1,000 HP]

Ball Mill(s)

Detail Of 60th Percentile Sample Operating Conditions

Name : Xstrata std BM

Mill Stage : Secondary

Mill Class : Overflow ball mill using simplified Morrell C-model

Motor power : 16,400 kW [21,993 HP]

Power available at shell : 16,400 kW [21,993 HP]

Proportion of available power drawn : 88.0%

Drawn power at mill shell : 14,435 kW [19,358 HP]

Drawn torque at mill shell : 23,994 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 26.0' Ø x 40.0' EGL [7924 mm Ø x 12191 mm]

Speed : 11.49 RPM (75.0% critical)

Total load : 32 % v/v total, 32 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 7620 mm Ø x 12191 mm

Critical speed is at : 15.3 RPM

Motor rated speed is at : 11.49 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 70% solids, w/w

Charge density : 5.40 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 14,435 kW [19,358 HP]

Cone angle : 15°

Trunnion diameter : 9 ft (2.74 m)

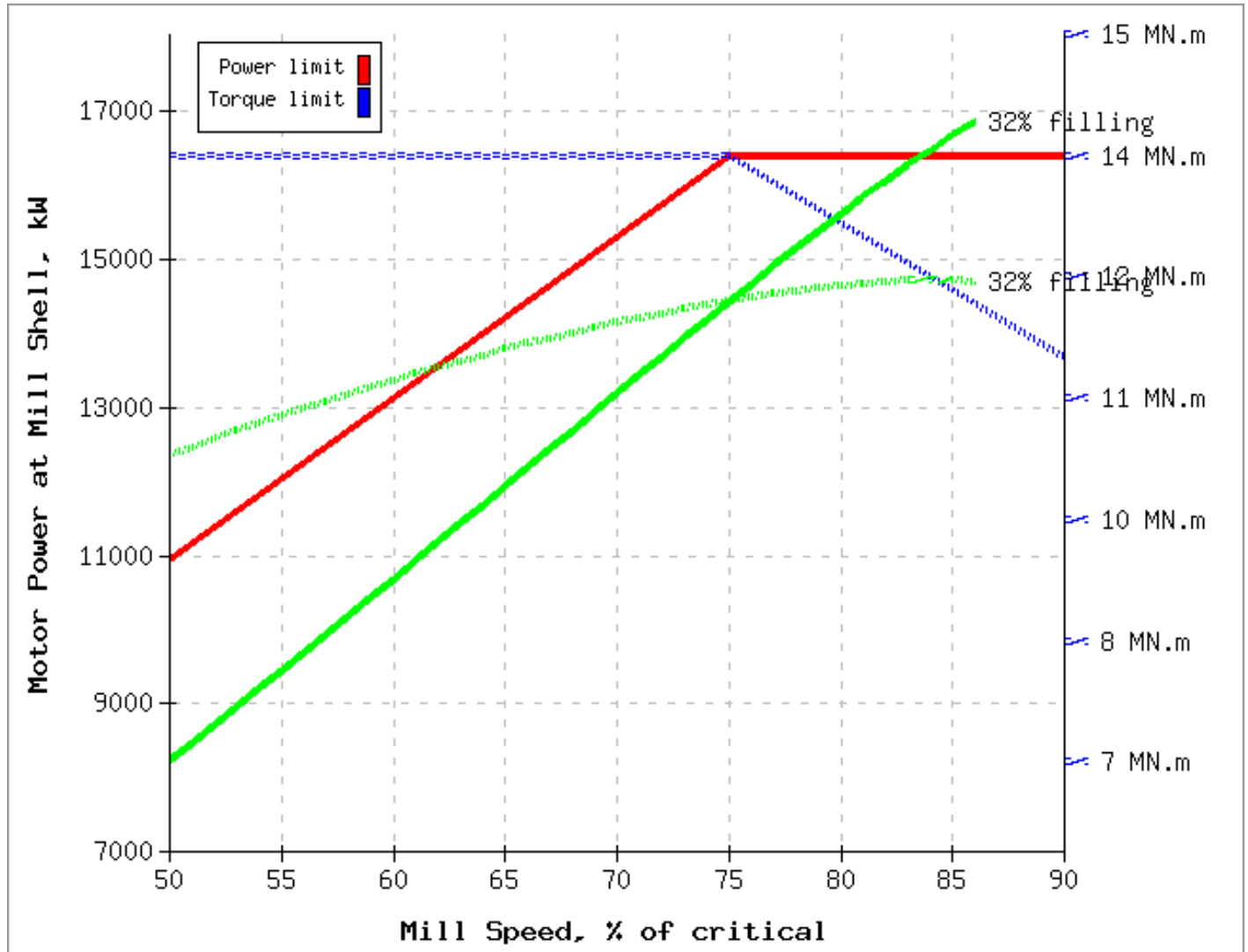
k - Net power to gross power factor : 1.26

Tent Diagram

Tent diagram for 26' Ø × 40' EGL

Motor cumulative output power 16,400 kW. Usable shell power 16,400 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



80th percentile sample

Circuit flowsheet

Circuit flowsheet:

SABC-AB

Model:

Optimized Bond/Barratt SABC model (incl. phantom cyclone)

Sample:

Antapaccay UGM 4

Circuit Feed

F_{80} , μm : 127000 μm

Transfer

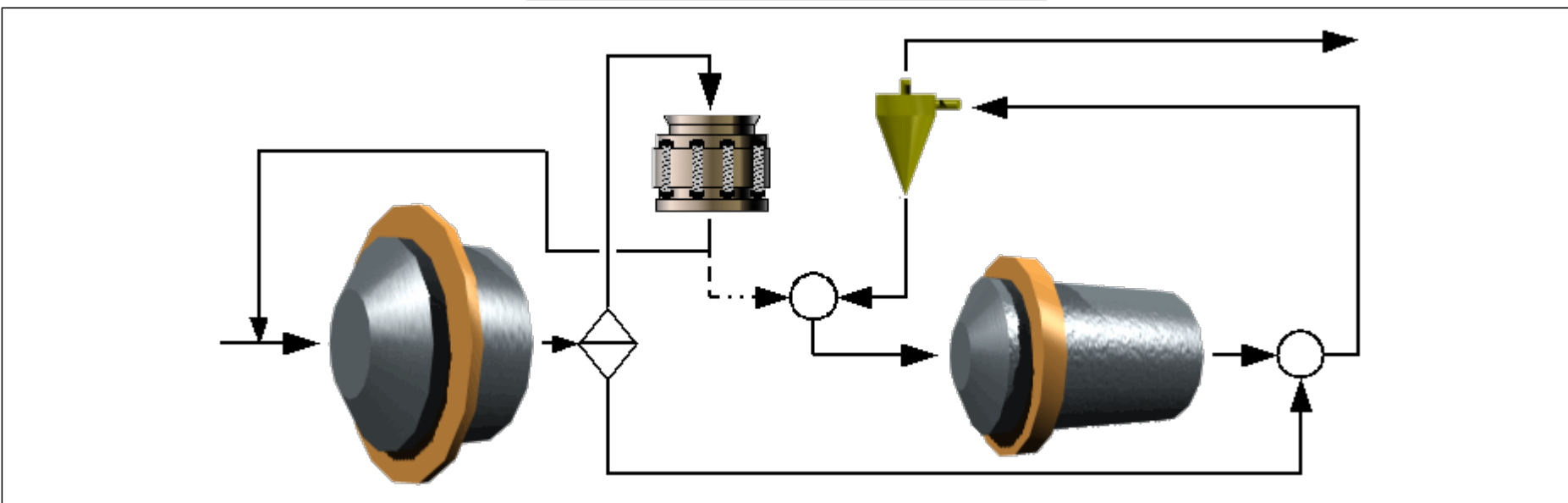
T_{80} , μm : 3257

T_{80} min: 400

T_{80} max: 10000

Product

P_{80} , μm : 180 μm



Primary Mill(s)

Usable shell power: 18,310 kW

1. Xstrata Stnd SAG, 40 \emptyset \times 22 EGL

Crusher(s)

Usable shell power: 559 kW

1. 1000 HP crusher, 1000 HP
2-spare-1000-HP-crusher

Ball Mill(s)

Usable shell power: 28,871 kW

1a. Xstrata stnd BM, 26 \emptyset \times 40 EGL
1b. Xstrata stnd BM, 26 \emptyset \times 40 EGL

E_{asag} : 5.75 kW h/t

E_{peb} : 0.18 kW h/t

E_{bm} : 9.07 kW h/t

W_{i_c} : 7.9 kW·h/t

Density: 0 t/m³

$W_{i_{RM}}$: 12.1 kW·h/t

$W_{i_{BM}}$: 14.7 kW·h/t

$E_{\text{total}} = E_{\text{asag}} + E_{\text{peb}} + E_{\text{bm}} = 12.12 \text{ kW h/t}$

E_{ssbm} : 11.02 kW h/t ($E_{\text{total}} = E_{\text{ssbm}} + 10\%$)

$E_{\text{BondStandard}}$: 9.58 kW h/t (79% of E_{total}) ($E_{\text{total}} = E_{\text{BondStandard}} + 27\%$)

Circuit operating W_{i_o} : 16.90 kW h/t (115% of $W_{i_{BM}}$)

Primary stage operating W_{i_o} : 31.60 kW h/t (215% of $W_{i_{BM}}$)

Secondary stage operating W_{i_o} : 12.86 kW h/t (87% of $W_{i_{BM}}$)

Estimated circuit throughput: 3938 t/h \times 24 h/d \times 92% = 86,956 t/d

Primary Mill(s)

Detail Of 80th Percentile Sample Operating Conditions

Name : Xstrata Stnd SAG

Mill Stage : Primary

Mill Class : Austin SAG model

Motor power : 24,000 kW [32,185 HP]

Power available at shell : 24,000 kW [32,185 HP]

Proportion of available power drawn : 76.3%

Drawn power at mill shell : 18,310 kW [24,554 HP]

Drawn torque at mill shell : 18,276 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 40.0' Ø x 22.0' EGL [12191 mm Ø x 6705 mm]

Speed : 9.57 RPM (78.0% critical)

Total load : 25 % v/v total, 12 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 11887 mm Ø x 6705 mm

Critical speed is at : 12.3 RPM

Motor rated speed is at : 9.2 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 80% solids, w/w

Charge density : 3.64 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 18,310 kW [24,554 HP]

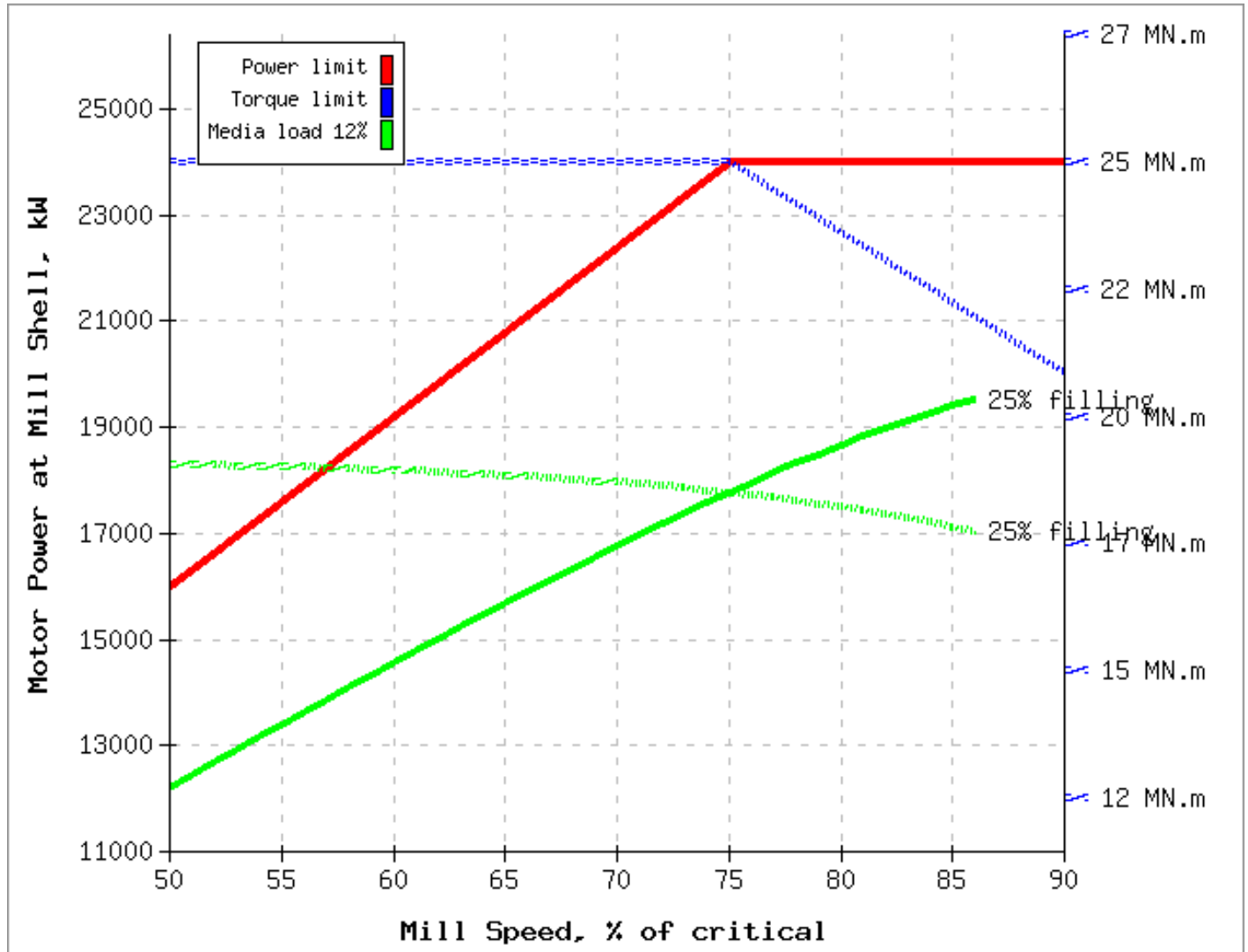
Cone angle : 15°

Tent Diagram

Tent diagram for 40' Ø × 22' EGL

Motor cumulative output power 24,000 kW. Usable shell power 24,000 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



Crusher(s)

Detail Of 80th Percentile Sample Operating Conditions

Name : 1000 HP crusher

Mill Stage : Crusher

Mill Class : Secondary, tertiary or pebble crusher

Motor power : 746 kW [1,000 HP]

Nominal power draw : 746 kW [1,000 HP]

Proportion of available power drawn : 75.0%

Power at the DCS : 746 kW [1,000 HP]

Ball Mill(s)

Detail Of 80th Percentile Sample Operating Conditions

Name : Xstrata std BM

Mill Stage : Secondary

Mill Class : Overflow ball mill using simplified Morrell C-model

Motor power : 16,400 kW [21,993 HP]

Power available at shell : 16,400 kW [21,993 HP]

Proportion of available power drawn : 88.0%

Drawn power at mill shell : 14,435 kW [19,358 HP]

Drawn torque at mill shell : 23,994 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 26.0' Ø x 40.0' EGL [7924 mm Ø x 12191 mm]

Speed : 11.49 RPM (75.0% critical)

Total load : 32 % v/v total, 32 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 7620 mm Ø x 12191 mm

Critical speed is at : 15.3 RPM

Motor rated speed is at : 11.49 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 70% solids, w/w

Charge density : 5.40 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 14,435 kW [19,358 HP]

Cone angle : 15°

Trunnion diameter : 9 ft (2.74 m)

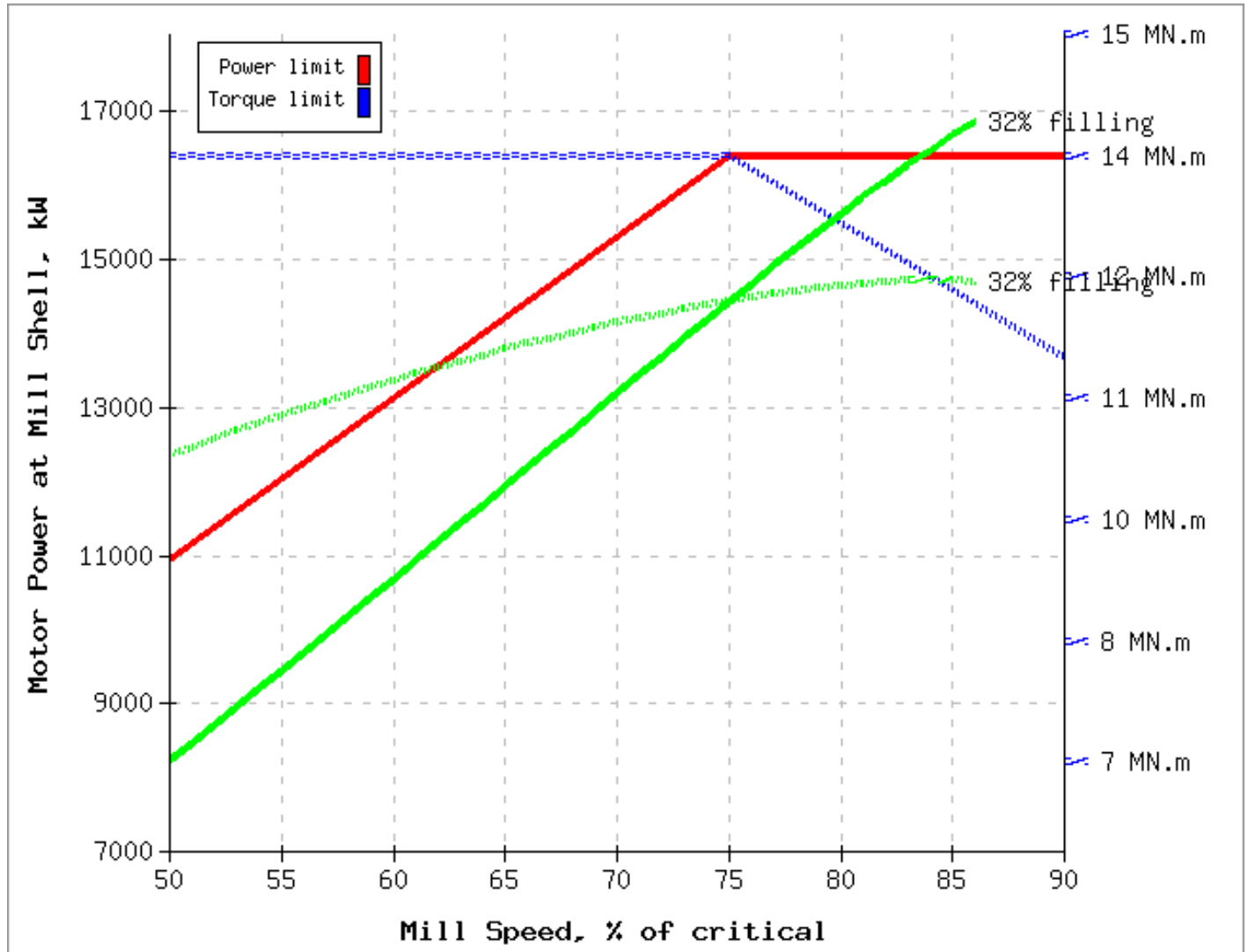
k - Net power to gross power factor : 1.26

Tent Diagram

Tent diagram for 26' Ø × 40' EGL

Motor cumulative output power 16,400 kW. Usable shell power 16,400 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



100th percentile sample

Circuit flowsheet

Circuit flowsheet:

SABC-AB

Model:

Optimized Bond/Barratt SABC model (incl. phantom cyclone)

Sample:

Antapaccay UGM 5

Circuit Feed

F_{80} , μm : 127000 μm

Transfer

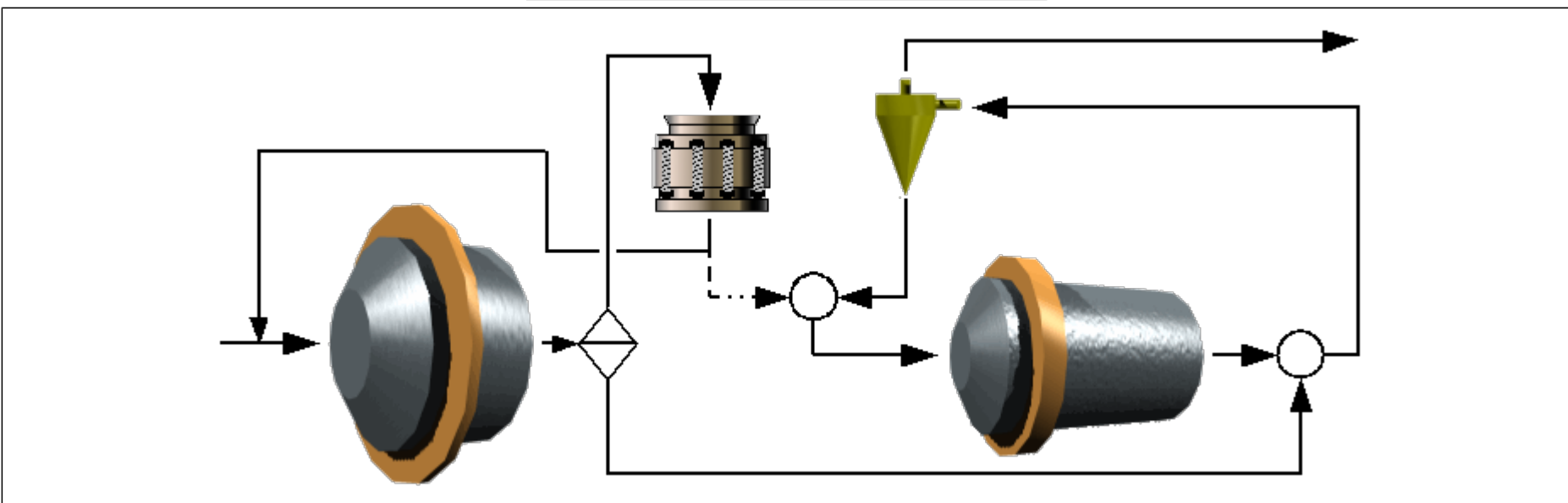
T_{80} , μm : 6325

T_{80} min: 400

T_{80} max: 10000

Product

P_{80} , μm : 180 μm



Primary Mill(s)

Usable shell power: 18,310 kW

1. Xstrata Stnd SAG, 40 \emptyset \times 22 EGL

Crusher(s)

Usable shell power: 559 kW

1. 1000 HP crusher, 1000 HP
2-spare-1000-HP-crusher

Ball Mill(s)

Usable shell power: 28,871 kW

1a. Xstrata stnd BM, 26 \emptyset \times 40 EGL
1b. Xstrata stnd BM, 26 \emptyset \times 40 EGL

E_{asag} : 5.75 kW h/t

E_{peb} : 0.18 kW h/t

E_{bm} : 9.07 kW h/t

W_{ic} : 7.3 kW·h/t

Density: 0 t/m³

W_{RM} : 10.8 kW·h/t

W_{BM} : 10 kW·h/t

$E_{\text{total}} = E_{\text{asag}} + E_{\text{peb}} + E_{\text{bm}} = 8.06 \text{ kW h/t}$

E_{ssbm} : 7.33 kW h/t ($E_{\text{total}} = E_{\text{ssbm}} + 10\%$)

$E_{\text{BondStandard}}$: 7.22 kW h/t (90% of E_{total}) ($E_{\text{total}} = E_{\text{BondStandard}} + 12\%$)

Circuit operating W_{io} : 11.24 kW h/t (112% of W_{BM})

Primary stage operating W_{io} : 31.66 kW h/t (317% of W_{BM})

Secondary stage operating W_{io} : 7.87 kW h/t (79% of W_{BM})

Estimated circuit throughput: 5920 t/h \times 24 h/d \times 92% = 130,707 t/d

Primary Mill(s)

Detail Of 100th Percentile Sample Operating Conditions

Name : Xstrata Stnd SAG

Mill Stage : Primary

Mill Class : Austin SAG model

Motor power : 24,000 kW [32,185 HP]

Power available at shell : 24,000 kW [32,185 HP]

Proportion of available power drawn : 76.3%

Drawn power at mill shell : 18,310 kW [24,554 HP]

Drawn torque at mill shell : 18,276 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 40.0' Ø x 22.0' EGL [12191 mm Ø x 6705 mm]

Speed : 9.57 RPM (78.0% critical)

Total load : 25 % v/v total, 12 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 11887 mm Ø x 6705 mm

Critical speed is at : 12.3 RPM

Motor rated speed is at : 9.2 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 80% solids, w/w

Charge density : 3.64 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 18,310 kW [24,554 HP]

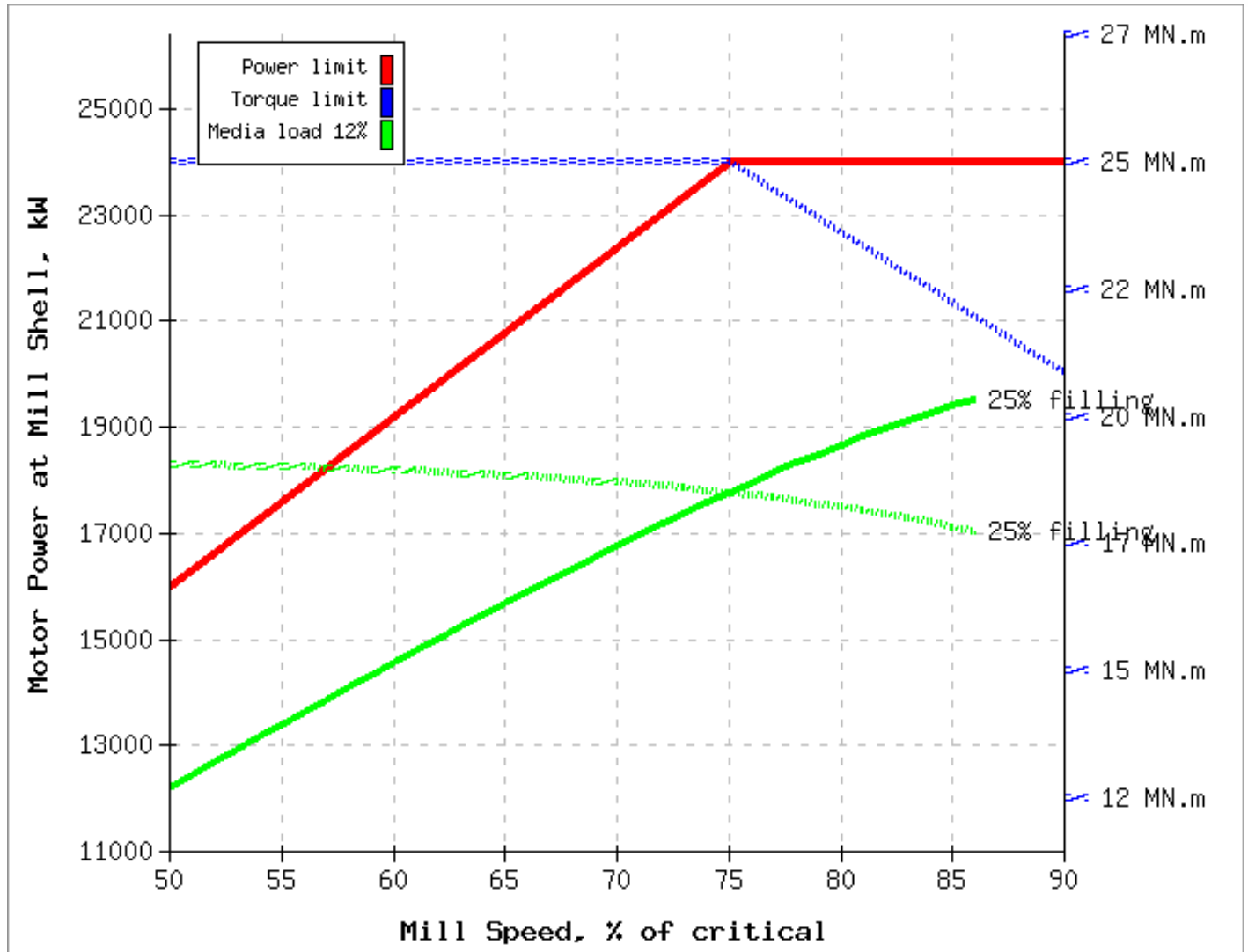
Cone angle : 15°

Tent Diagram

Tent diagram for 40' Ø × 22' EGL

Motor cumulative output power 24,000 kW. Usable shell power 24,000 kW.

Liner thickness: 6.00". Ore density: 2.7 t/m³.



Crusher(s)

Detail Of 100th Percentile Sample Operating Conditions

Name : 1000 HP crusher

Mill Stage : Crusher

Mill Class : Secondary, tertiary or pebble crusher

Motor power : 746 kW [1,000 HP]

Nominal power draw : 746 kW [1,000 HP]

Proportion of available power drawn : 75.0%

Power at the DCS : 746 kW [1,000 HP]

Ball Mill(s)

Detail Of 100th Percentile Sample Operating Conditions

Name : Xstrata std BM

Mill Stage : Secondary

Mill Class : Overflow ball mill using simplified Morrell C-model

Motor power : 16,400 kW [21,993 HP]

Power available at shell : 16,400 kW [21,993 HP]

Proportion of available power drawn : 88.0%

Drawn power at mill shell : 14,435 kW [19,358 HP]

Drawn torque at mill shell : 23,994 kN·m

Motor efficiency, mechanical & electrical : 1.000 & 1.000

Dimensions : 26.0' Ø x 40.0' EGL [7924 mm Ø x 12191 mm]

Speed : 11.49 RPM (75.0% critical)

Total load : 32 % v/v total, 32 % v/v media

Liner thickness : 6.00" [152 mm]

Effective dimensions : 7620 mm Ø x 12191 mm

Critical speed is at : 15.3 RPM

Motor rated speed is at : 11.49 RPM

Ore density : 2.7 tonnes/m³

Percent solids : 70% solids, w/w

Charge density : 5.40 tonnes/m³

Media density : 7.8 tonnes/m³

Power at the DCS : 14,435 kW [19,358 HP]

Cone angle : 15°

Trunnion diameter : 9 ft (2.74 m)

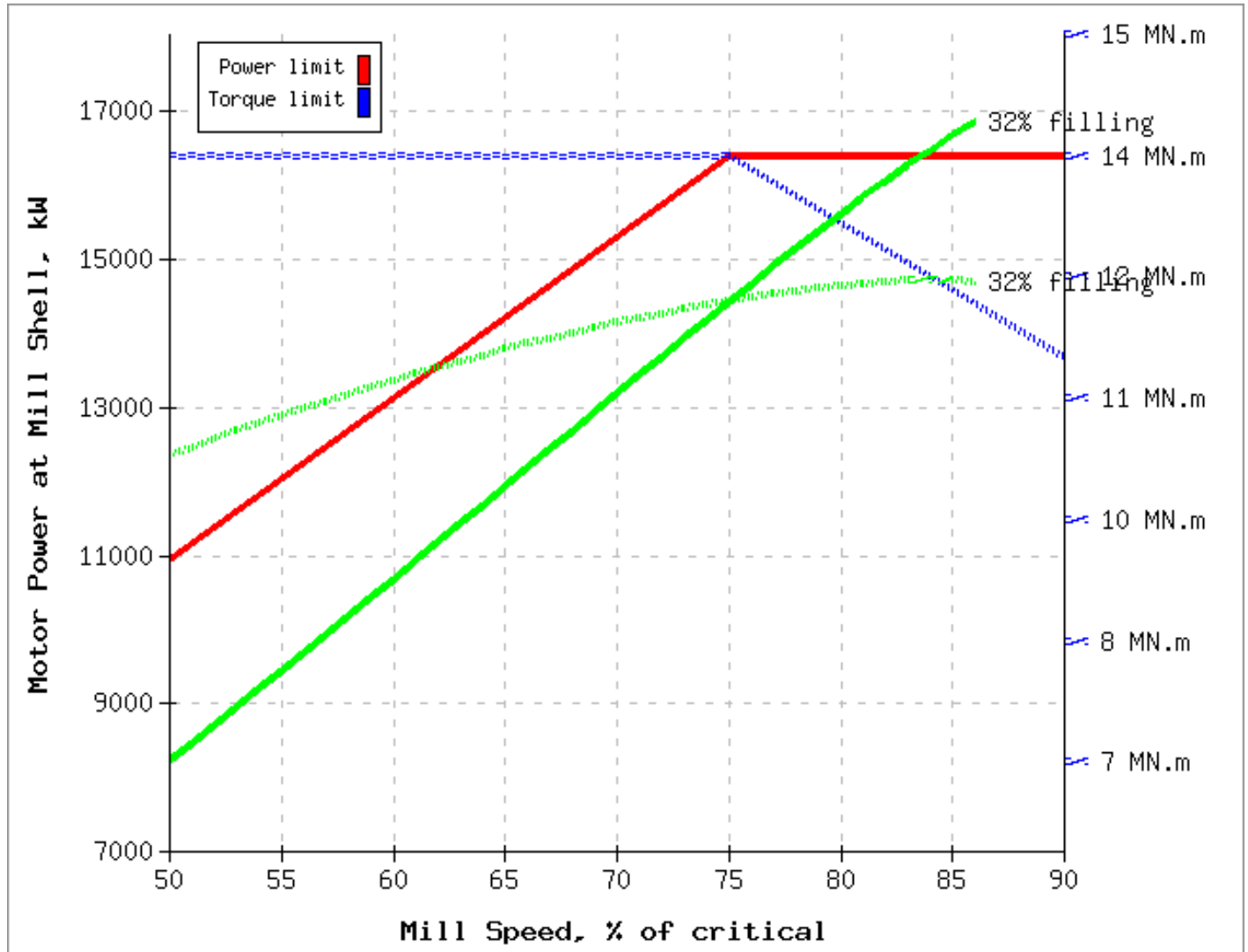
k - Net power to gross power factor : 1.26

Tent Diagram

Tent diagram for 26' Ø × 40' EGL

Motor cumulative output power 16,400 kW. Usable shell power 16,400 kW.

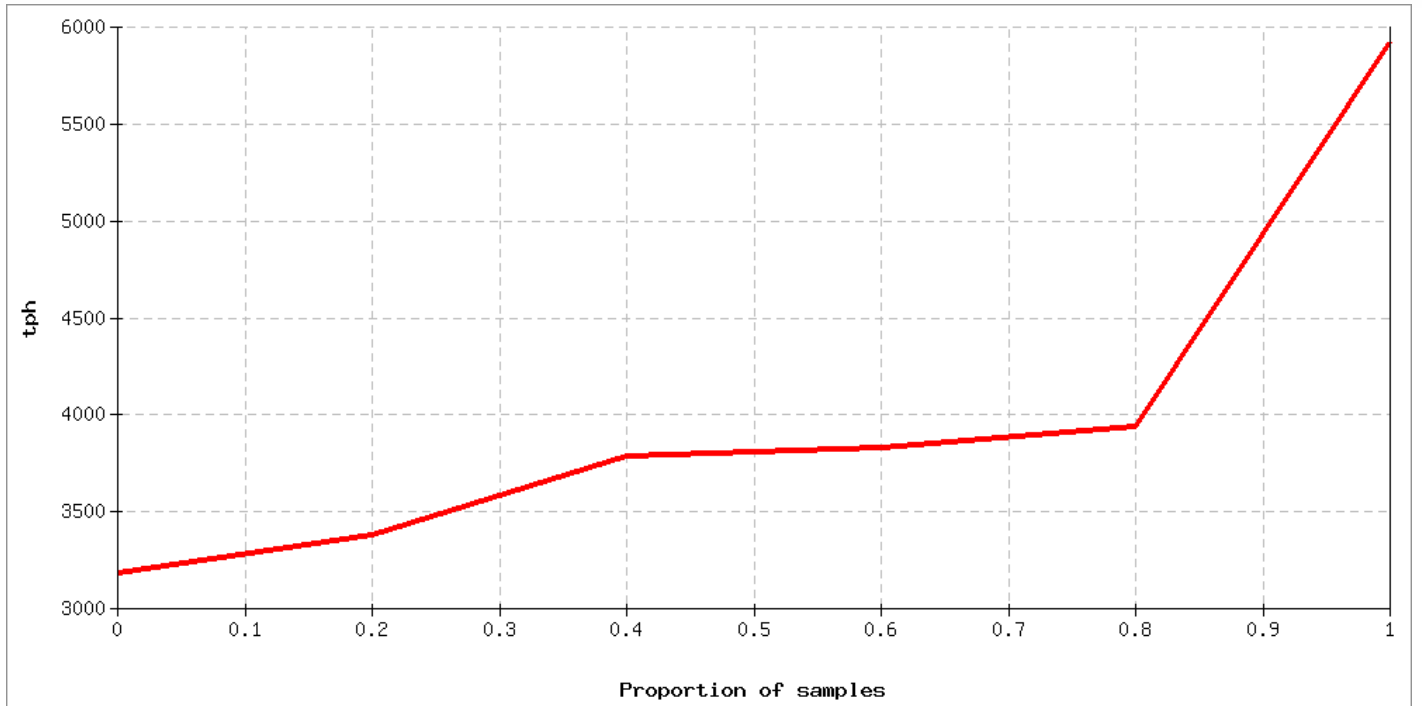
Liner thickness: 6.00". Ore density: 2.7 t/m³.



Model Results Plot

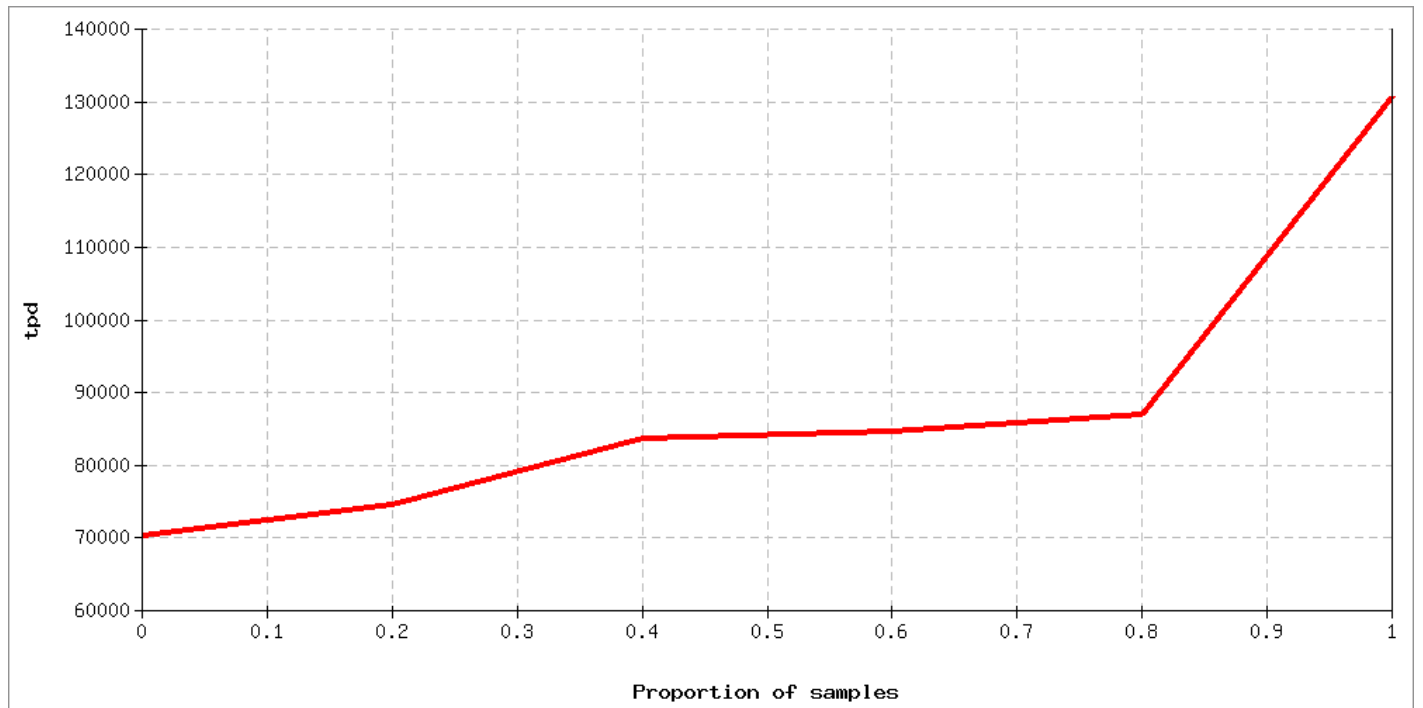
t/h

t/h prediction for entire Example data set



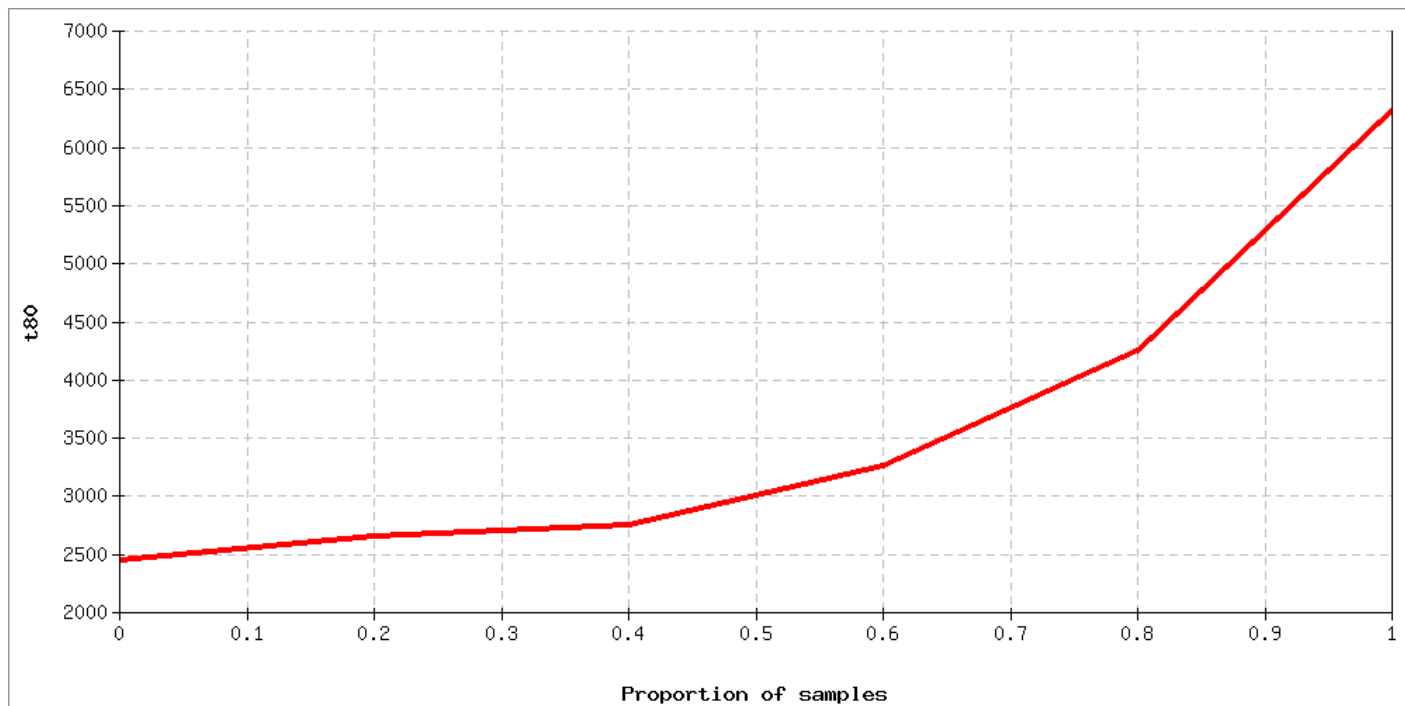
t/d

t/d prediction for entire Example data set



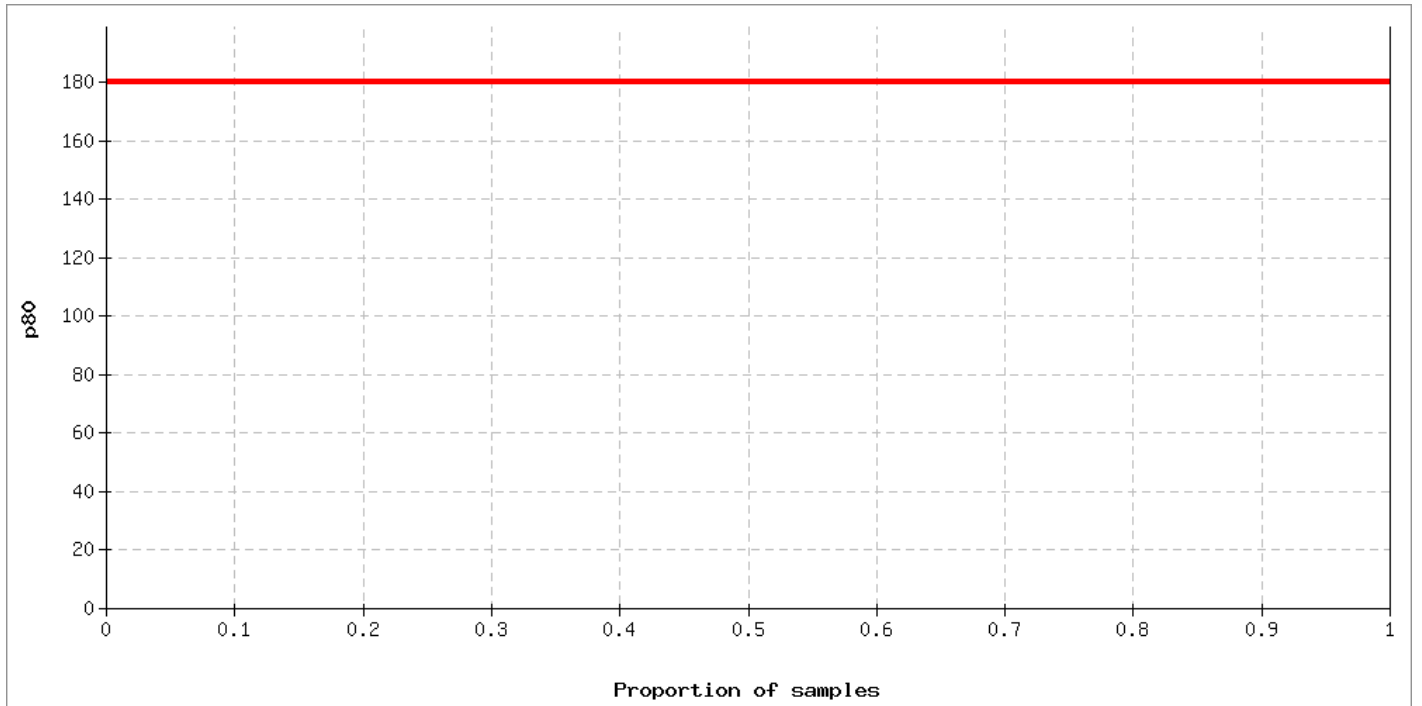
$T_{80}, \mu\text{m}$

$T_{80}, \mu\text{m}$ prediction for entire Example data set



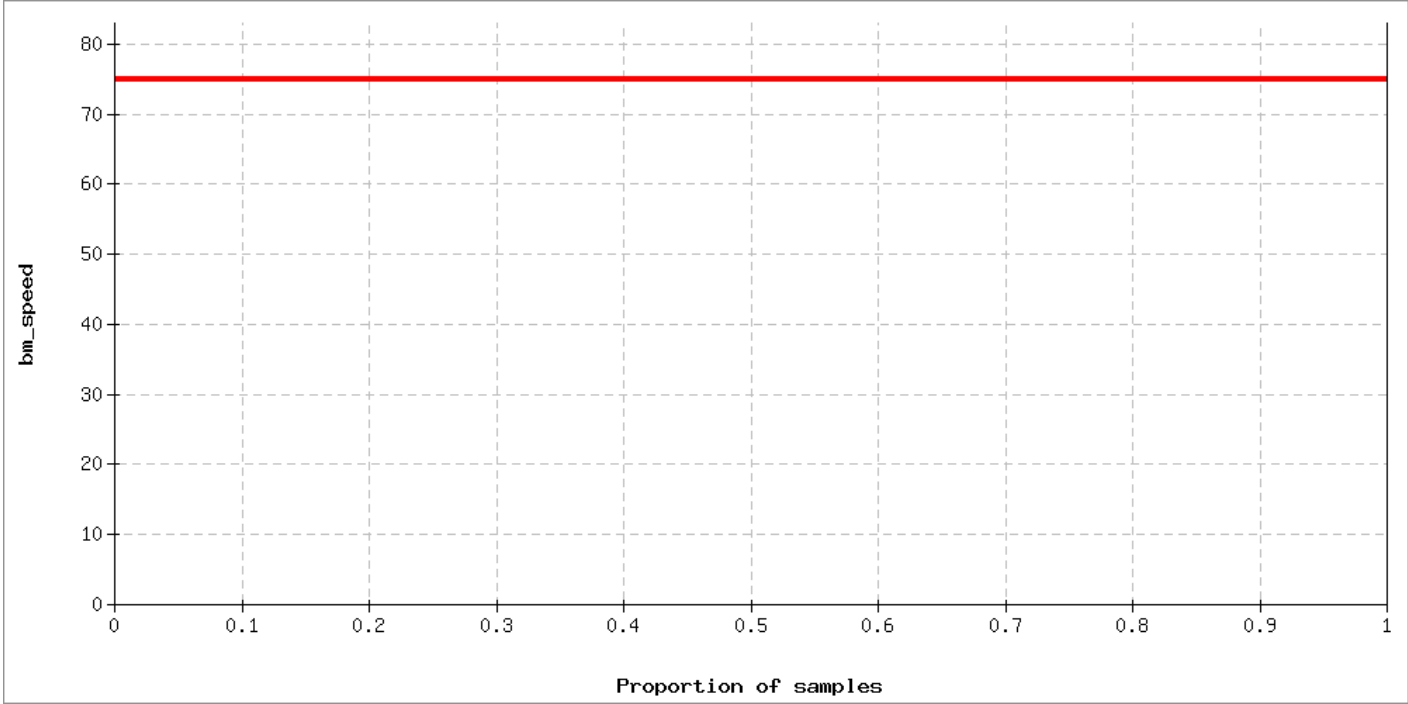
$P_{80}, \mu\text{m}$

$P_{80}, \mu\text{m}$ prediction for entire Example data set



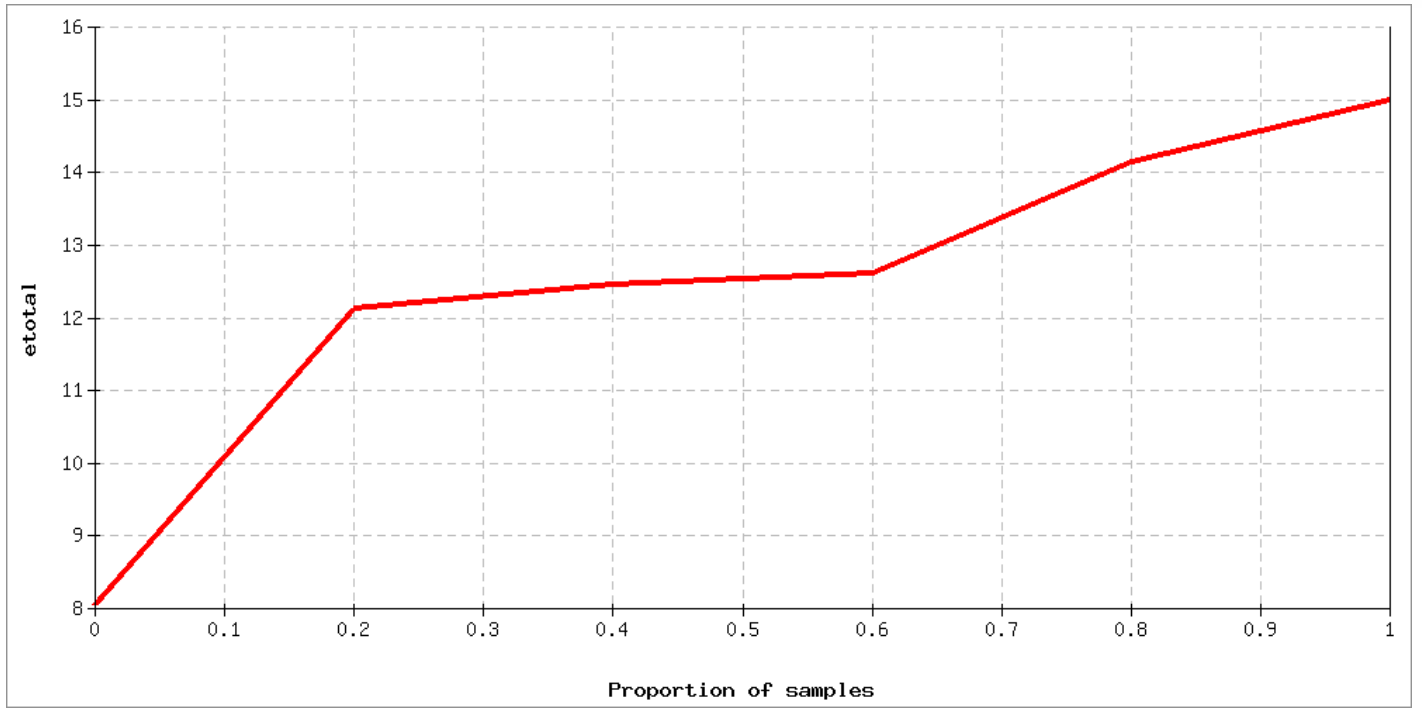
BM Speed %

BM Speed % prediction for entire Example data set



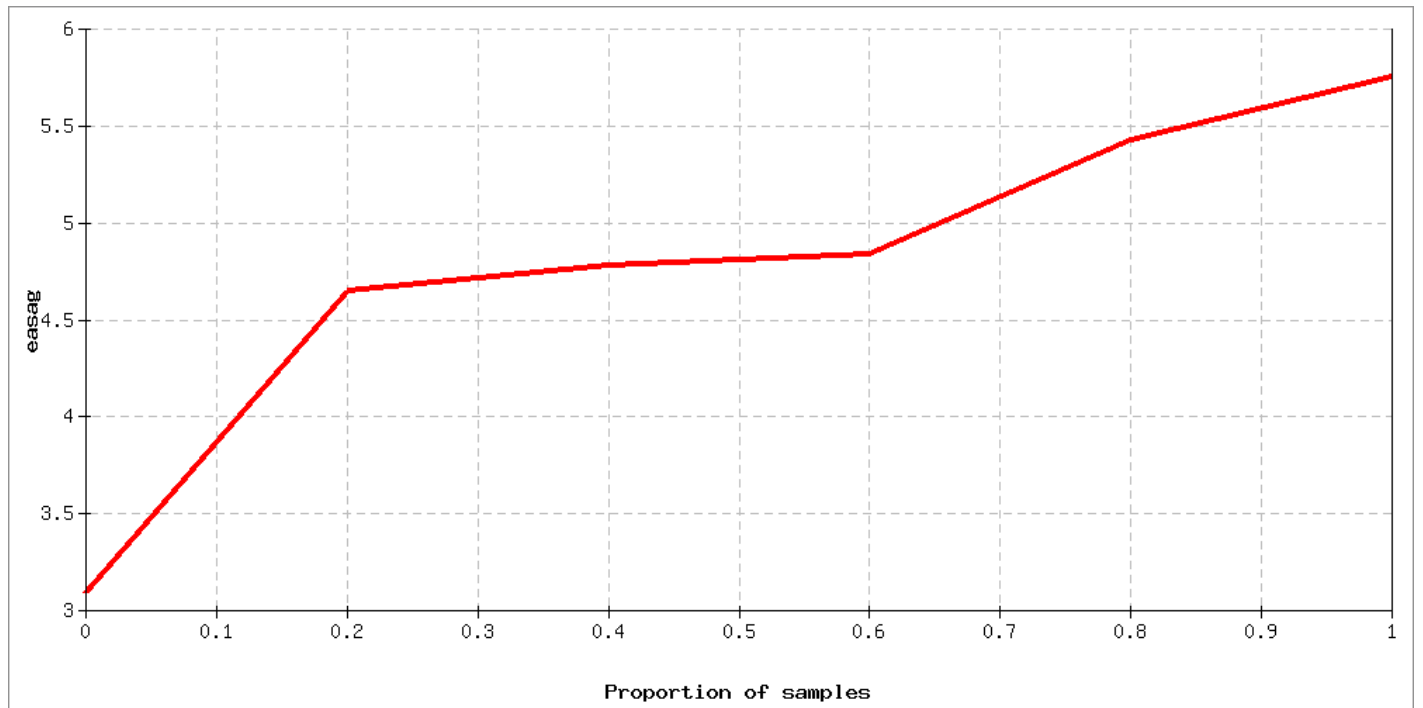
E_{total}

E_{total} prediction for entire Example data set



E_{asag}

E_{asag} prediction for entire Example data set



E_{bm}

E_{bm} prediction for entire Example data set

