



**Customer  
Project  
Date**

**Sample  
Typical 1.0 m seam with mid-seam CM  
23-Oct-13**

Cutter Module Type  
Steep dip; PB string holding device  
Safety gates; Australian provision  
System

Mid  
No  
Yes  
Metric

**Production Estimate Input Data**

*Input data for estimation of Cat HW300 Highwall Miner production*

Mine Working days per year  
Missed mining days per year  
Time for relocation to other area's or sites, per year  
Miner Working days per year

363 days  
10 days (-/-)  
0 days (-/-)  
353 days

Weather, waiting for highwall, external causes

Shifts per day  
Hours per shift  
Availability with scheduled maintenance  
Availability due to unscheduled maint.

3  
8 hour

Efficiency when up  
Stand-off distance from highwall  
True entry depth average

83%  
90%  
75%  
10 m  
280 m

Waiting times for crew change, highwall, fuel, parts, advice 75%

Depending on highwall and local rules. Australia: 10 m (drop zone)

Used for calculation of coal production per drive

Used for production time for one drive. To be less than 305 m

Push-out distance  
Specific mass coal  
Cutter Module production )\*)  
Cutter Module width )\*)  
Seam Height

290 m  
1.4 t/m3  
250 m3/hr  
3.5 m  
2.0 m

Cat Mid Seam Cutter Module, cutting height 1.1 m to 3.05 m  
From ground stability calculations /mining plans

Estimated recovery rate

60 %

**Calculated cutter module performance and and cutter module width: )\*)**

*Cat Low Seam Cutter Module, Cutting height 0.8 m to max 1.5 m*

Cutter Module production (2 x 123 kW)  
Cutter Module Width

175 m3/hr  
2.9 m

approximately

*Cat Mid Seam Cutter Module, cutting height 1.1 m to 3.05 m*

Cutter Module production (2 x 175 kW)  
Cutter Module Width

250 m3/hr  
3.5 m

approximately, also max auger capacity

All tons are metric tons



**Production Estimate Pushbeam in / out**

Calculation of cycle time in and out for a single pushbeam

*Cycle in:*

String free	0 sec	5 seconds in steep dip situation
Start Augers	5 sec	
Start push	2 sec	
Push	606 sec	
Stop push	2 sec	
Stop Augers	3 sec	
String hold	0 sec	5 seconds in steep dip situation
Power Head release	4 sec	
Power Head retract	30 sec	
PB insert	15 sec	
PB hold	0 sec	5 seconds in steep dip situation
Power Head push & connect	5 sec	
PB free	0 sec	5 seconds in steep dip situation
PB push & connect to string	5 sec	
Gate in	10 sec	Australian safety provision
Lock pins in	15 sec	
Gate out	10 sec	Australian safety provision
Total cycle in:	<u>712</u> sec/beam	

**11.9 minutes/beam**

*Cycle out:*

String free	0 sec	5 seconds in steep dip situation
PB retract	40 sec	
String hold	0 sec	5 seconds in steep dip situation
Gate in	10 sec	Australian safety provision
Lock pins remove	10 sec	
Gate out	15 sec	Australian safety provision
PB string side release	4 sec	
Power Head retract to unload position	5 sec	
PB hold	0 sec	5 seconds in steep dip situation
Power Head release & retract	5 sec	
PB grip	5 sec	
PB free	0 sec	5 seconds in steep dip situation
PB take-out	10 sec	
Power Head push & connect	15 sec	
Total cycle out:	<u>119</u> sec/beam	

**2.0 minutes/beam**

**Production Estimate***Calculation of cycle time for shifting to next drive position and make one complete drive*

Nr of beams	48	pcs.	
De-anchoring	0	sec	300 sec. during last 5 pb's
Move to next position	60	sec	
Set-up/ Entry aligning	600	sec	
Check Cutter Module	1800	sec	Including other maintenance checks
Anchoring	0	sec	900 sec while checking cutter module
String in	34,347	sec	
String out	5,742	sec	
Total time per entry	42,549	sec	
Total time per entry	11.8	hour	with 100% efficiency
Coal output per entry	2,744	tons	
Coal output per entry	1,960	m3	
Average production during cycle	232	ton/hr	with 100% efficiency

*Calculation of efficient production hours per year, taking in account availability, efficiency, time for relocations.*

Total shift time per year	8,472	hours	Hours personnel is at work
Total availability per year	6,329	hours	Running hours Generator Set (incl. stationary)
Total efficient production hours	4,746	hours	Hours running Miner (pump set)

*Calculation of production per shift/month/year taking in account availability and efficiency, time for relocations*

Per Shift	1,041	ton	approximately
Per Month	91,830	ton	approximately
Per Year	1,101,961	ton	approximately
Entries per year	402		approximately
Required highwall per year	2,343	m	approximately

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**Financial Costs**  
Pricing 2013

		Year										Totals				
		1	2	3	4	5										
Production (metric ton) from		0	1,101,961	2,203,921	3,305,882	4,407,842										
upto		1,101,960	2,203,920	3,305,881	4,407,841	5,509,802										
Running hours (Hr) from		0	6,329	12,657	18,986	25,314										
upto		6,328	12,656	18,985	25,313	31,642										
		Price in USD	Imp. Duties USD	Price incl. Imp. Duties USD	Price in AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD
<b>General</b>																
Running Hours / Year		6,329														
Production / Year	Metric Ton	1,101,961														
Depreciation *	Years	5.0														
Interest	Percentage	0.0%														
Currency	Name	AUD														
Exchange Rate 1 USD = ....	AUD	1.05														
<b>Investment / Capital</b>																
Investment Budgetary	Imp. Duties															
Complete HWM system without generator set	0%		0													
Diesel-Generator set (0 if N/A)	0%		0													
Spare parts stock "site"	0%		0													
Inert Gas System 600 m3/hr and monitoring shield	0%		0													
Mobilisation	0%		0													
Wheel Loader, quick conn., PB grapple, bucket	0%		0													
Stacker Belt	0%		0													
Other	0%		0													
<b>Total</b>		17,000,000	0	17,000,000	17,850,000	14,280,000	10,710,000	7,140,000	3,570,000	0						
Depreciation	Years	5				3,570,000	3,570,000	3,570,000	3,570,000	3,570,000						17,850,000
Interest	Percentage	0.0%				0	0	0	0	0						0
<b>Total Investment / Capital costs</b>						3,570,000	3,570,000	3,570,000	3,570,000	3,570,000						17,850,000
<b>Insurance</b>																
Insurance Premium	Percentage	1.0%			178,500	178,500	178,500	178,500	178,500	178,500						
<b>Total Cost per Year Financials</b>																
						3,748,500	3,748,500	3,748,500	3,748,500	3,748,500						3,748,500
<b>Total Cost per Metric Ton Financials</b>																
						3.40	3.40	3.40	3.40	3.40						3.40

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**Personnel Costs**

Pricing 2013

Periodically paid	Period	AUD	Bonus	Bonus	Salary	Additional Costs*	Costs / Period	Periods / Year	Costs / Year
Project Manager	Month	0	10%	0	0	25%	0	1	0
Engineer	Month	0	10%	0	0	25%	0	1	0
<b>Total Periodically Paid / Year</b>									0

Hourly paid**	Hours	AUD	Additional Costs*	Total / Hr	Tot.Cost / Year
Crew member # 1 Operator	8,472	56	30%	73	616,762
Crew member # 2 Groundsman	8,472	56	30%	73	616,762
Crew member # 3 Pushbeam Loader	8,472	56	30%	73	616,762
Crew member # 4 Maintenance/Welder	8,472	56	30%	73	616,762
Crew member # 5 Maintenance / Welder	8,472	56	30%	73	616,762
<b>Total Shift Paid / Year</b>					3,083,808

**Notes:**  
 Fill in all grey colored fields as applicable.  
 The hourly rate for crew member 1 is also used for maintenance and service purposes in LLC tab.

\* Additional cost to the company, such as boarding and lodging, traveling, insurances, pension, ...  
 \*\* Assumption: same crew operates and maintains the Miner. Total nr of crew depending on shift systems.

<b>Total Personnel Cost per Year</b>	3,083,808	AUD
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Year	0	1	2	3	4	5
Production (metric ton) from	0	0	1,101,961	2,203,921	3,305,882	4,407,842
upto	0	1,101,960	2,203,920	3,305,881	4,407,841	5,509,802
Running hours (Hr) from	0	0	6328,584	12657,168	18985,752	25314,336
upto	0	6327,584	12656,168	18984,752	25313,336	31641,92

	Price in														Totals
	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD
<b>Total Personnel Costs / Year</b>				3,083,808	3,083,808	3,083,808	3,083,808	3,083,808	3,083,808						15,419,040

<b>Total Cost per Year Personnel</b>				3,083,808	3,083,808	3,083,808	3,083,808	3,083,808							15,419,040
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<b>Total Cost per Metric Ton Personnel</b>				2.80	2.80	2.80	2.80	2.80							2.80
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**Running Costs Fuel, Fluids, Parts**  
Pricing 2013

Power Supply	
Generating set:	Yes
Grid supply:	No
Power Price in local currency	AUD
Diesel per liter	1.50
kWh	0.00
Pick life T/pick	50
Operating Conditions	Medium
Cutter Module Type	Mid

Year	1	2	3	4	5
Production (metric ton) from	0	1,101,961	2,203,921	3,305,882	4,407,842
upto	1,101,960	2,203,920	3,305,881	4,407,841	5,509,802
Running hours (Hr) from	0	6,329	12,657	18,986	25,314
upto	6,328	12,656	18,985	25,313	31,642

Part	Part Number	Life metric ton or Hr	Life Unit ton or Hr	Man hours Hr	Total costs per compo-nent		1		2		3		4		5		Totals AUD		
					AUD	Pcs	AUD	AUD											
Fuel																			
Diesel (1000 liter)		909	metric ton	0	1,500	1	1,818,000		1,818,000		1,818,000		1,819,500		1,818,000			9,091,500	
Electricity																			
Electricity (1000 kWh)		250	metric ton	0	0	1	0		0		0		0		0			0	
Bits																			
Bits *)		50	metric ton	0	27	1	596,111		596,111		596,111		596,111		596,138			2,980,581	
Service																			
250 hours service		250	Hr																
Contingency small parts, labour		250	Hr																
4000 hours service diesel engine "C"		4,000	Hr																
8000 hours service diesel engine "D"		8,000	Hr																
995 V Generator set																			
MOTOR FAN MAIN 90KW	470-3441	18,000	Hr																
Alternator Marell	470-3509	16,000	Hr																
Starter Motor		7,500	Hr																
Diesel engine KTA50 Cummins		16,000	Hr																
Filters 995 Cummins Engine																			
Diesel, Oil Fleetguard	470-0033	250	Hr																
Diesel, Oil Fleetguard	470-0034	250	Hr																
Diesel, Fuel, Fleetguard	470-0035	250	Hr																
Diesel, Oil Water, Fleetguard	470-0036	250	Hr																
CHV, Fleetguard	470-0039	250	Hr																
2" Filter for Generator Doors	470-0040	250	Hr																
Filter Element Type 01830	470-0050	250	Hr																
P64 GENERATOR FILTER	470-7011	3,000	Hr																
480 V Generator																			
480 V diesel-generator set complete	470-0117	12,000	Hr																
Filters 480 Cummins Genset																			
Oil Filter 480 Gen Set	470-0143	250	Hr																
Fuel Filter 480 Gen Set	470-0144	250	Hr																
Fuel Separator Filter 480 Gen	470-0145	250	Hr																
Air Filter 480 Gen Set	470-0146	250	Hr																
Filters BPM and Miner																			
Filter Element for Water Filter 130-0078	130-0304	6,000	Hr																
Magnom Max Magnetic Filter	130-0415	6,000	Hr																
Magnom Midi Magnetic Filter	130-0416	6,000	Hr																
BB25 FILTER ELEMENTS	420-0006	6,000	Hr																
BPM Tank Breather Element (water)	420-0007	250	Hr																
Kidney Filter Element (water)	420-0008	250	Hr																
Kidney Filter Element (dirt)	420-0009	250	Hr																
Filter Element (Servo)	420-0010	3,000	Hr																



				Year												
				1	2	3	4	5						Totals		
				Production (metric ton) from upto	1,101,960	2,203,920	3,305,881	4,407,841	5,509,802							
				Running hours (Hr) from upto	6,328	12,656	18,985	25,313	31,642							
Part	Part Number	Life metric ton or Hr	Life Unit ton or Hr	Man hours Hr	Total costs per compo-nent AUD	Nr. Of units on machine Pcs	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD
Filters Gear Boxes																
Filter Breather for Auger Gearboxes	310-0013	250	Hr													
Filter Breather for LSCM	310-0013	250	Hr													
Fluids																
Hydraulic oil 1100 gallons	AW ISO 68	6,000	Hr													
Grease barrel bulk storage		3,000	Hr													
Glycol 140 gallon	50/50	6,000	Hr													
Generator Set Engine Oil Exchange 40 gallon	Mobil	250	Hr													
Generator Set Engine Oil Consumption 40 gallon	Mobil	300	Hr													
Gear Lubrication Oil 150 gallon storage	GM SYN	6,000	Hr													
Hydraulics																
PUMP OIL COOLING	130-0077	9,000	Hr													
PUMP P1 ELECTRO-HYDRAULIC	130-0130	18,000	Hr													
PUMP P2 PRESSURE COMPEN	130-0131	36,000	Hr													
PUMP P3 PRESSURE COMPEN	130-0131	9,000	Hr													
PUMP WATER 10.5 GPM	130-0175	9,000	Hr													
Anchoring																
CYLINDER FEED ANCHOR TYPE II	210-0025	9,000	Hr													
DRILL DRIVE UNIT W/ HYD MOTOR	210-0052	18,000	Hr													
PIN ANCHOR STEEP DIP	210-8092	12,000	Hr													
Belly Chain Conveyor																
REDUCER SPEED FALK 2070FZ2	210-2016	2,000,000	metric ton													
CHAIN LADDER LC-5154-48	210-2029	2,000,000	metric ton													
BAR BRASS INTERMEDIATE	210-7066	4,000,000	metric ton													
BAR BRASS END	210-7067	4,000,000	metric ton													
CYLINDER STOP PUSH BEAM	210-9568	2,000,000	metric ton													
Hose Reel																
MOTOR HOSE REEL	240-0503	18,000	metric ton													
PTM2																
CYLINDER CLAMPING GRIPPER	250-0236	30,000	Hr													
CYLINDER LIFT MOD W/ SENSOR	252-7322	12,000	Hr													
CYLINDER TRANSFER MOD.W SENSOR	252-7345	12,000	Hr													
Power Head																
CYLINDER SEPARATION PUSH BEAM	310-0039	2,000,000	metric ton													
BEARING ASSEMBLY PILLOW BLOCK	310-7118	2,000,000	metric ton													
MOTOR HORIZONTAL AUGER 400 HP	310-1534	2,000,000	metric ton													
COUPLING LOVEJOY SIZE 5	310-7035	2,000,000	metric ton													
AUGER ASSEMBLY TYPE III PH LH	310-7611	3,000,000	metric ton													
AUGER ASSEMBLY TYPE III PH RH	310-7612	3,000,000	metric ton													
CYLINDER SUMP TYPE 3	310-8229	2,000,000	metric ton													
FAIRFIELD GEARBOX	310-2900	1,000,000	metric ton													
Traveling																
CYLINDER LIFT NEW STYLE	220-1005	12,000	Hr													
CYLINDER STEERING MOD.W SENSOR	220-7090	18,000	Hr													
Push Beams																
RH MALE AUGER END*	320-6102	40,000	metric ton													
LH MALE AUGER END*	320-6201	40,000	metric ton													
RH FEMALE AUGER END*	320-6103	40,000	metric ton													
LH FEMALE AUGER END*	320-6203	40,000	metric ton													
AUGER PUSHBEAM RH *	320-6101	200,000	metric ton													
AUGER PUSHBEAM LH *	320-6201	200,000	metric ton													
PEDESTAL MODIFIED MACHINED *	320-7052	30,000	metric ton													
BUSHING WELD ASTRALLOY SPLIT *	320-7053	30,000	metric ton													
PUSHBEAM TYPE IV COMPLETE *	320-7173	100,000	metric ton													



Part	Part Number	Life metric ton or Hr	Life Unit ton or Hr	Man hours Hr	Total costs per compo-nent AUD	Nr. Of units on machine Pcs	Year					AUD	AUD	AUD	AUD	AUD	AUD	Totals AUD
							1	2	3	4	5							
							Production (metric ton) from upto	1,101,960	2,203,920	3,305,881	4,407,841							
Running hours (Hr) from upto	0	6,329	12,657	18,986	25,314													
							6,328	12,656	18,985	25,313	31,642							
Low Seam Cutter Module																		
SHEAR CYLINDER LPCM	330-7068	1,000,000	metric ton															
CHAIN SEAM CUTTER LH LOW	330-1864	100,000	metric ton															
CHAIN SEAM CUTTER RH LOW	330-1865	100,000	metric ton															
MOTOR CUTTER 165HP	330-2100	1,000,000	metric ton															
SPROCKET 12 TOOTH	330-7061	350,000	metric ton															
AUGER SHORT LH LPCH	330-8165	2,000,000	metric ton															
AUGER SHORT RH LPCH	330-8166	2,000,000	metric ton															
Rebuilding cutter module		3,000,000	metric ton															
Mid Seam Cutter Module																		
CHAIN CONVEYOR	331-0007	1,000,000	metric ton															
CYLINDER SHEAR INVERTED JOYMOD	331-7287	1,000,000	metric ton															
TAKE UP GREASE	331-7370	1,000,000	metric ton															
CYLINDER PAN	332-0012	1,000,000	metric ton															
AUGER TYPE II LH	333-7037	2,000,000	metric ton															
AUGER TYPE II RH	333-7038	2,000,000	metric ton															
Rebuilding cutter module		3,000,000	metric ton															
BPM																		
MOTOR 300HP BPM	420-0023	18,000	Hr															
Electrical Parts																		
SENSOR METHANE STAINLESS STEEL	490-2249	1,000	Hr															
ASSEMBLY SLIP RING	490-2349	30,000	Hr															
CPU 317 DP NEW	490-3060	18,000	Hr															
MODULE OUTPUT ANALOG 4 CHANNEL	490-3071	6,000	Hr															
MODULE OUTPUT ANALOG 8 CHANNEL	490-3160	6,000	Hr															
AIR CONDITIONER/HEATER	500-0005	30,000	Hr															
SCREEN TOUCH PANEL MP370	500-0067	30,000	Hr															
Belt Stackers																		
Belt, Rollers, Tyres		1,500,000	metric ton															
Motor		3,000,000	metric ton															
Gearbox		3,000,000	metric ton															
Various																		
Grapple Attachment		18,000	Hr															
<b>Total Cost per Year Fuel</b>							1,818,000	1,818,000	1,818,000	1,819,500	1,818,000							9,091,500
<b>Total Cost per Year Electricity</b>							0	0	0	0	0							0
<b>Total Cost per Year Bits</b>							596,111	596,111	596,111	596,111	596,138							2,980,581
<b>Total Cost per Year Maintenance</b>							1,217,771	2,024,274	3,067,494	1,936,570	1,393,714							9,639,823
<b>Total Cost per Year</b>							<b>3,631,881</b>	<b>4,438,385</b>	<b>5,481,605</b>	<b>4,352,181</b>	<b>3,807,852</b>							<b>21,711,904</b>
<b>Total Fuel Cost per Metric Ton Coal</b>							1.65	1.65	1.65	1.65	1.65							1.65
<b>Total Electricity Cost per Metric Ton Coal</b>							0.00	0.00	0.00	0.00	0.00						0.00	
<b>Total Bit Cost per Metric Ton Coal</b>							0.54	0.54	0.54	0.54	0.54						0.54	
<b>Total Maintenance Cost per Metric Ton Coal</b>							1.11	1.84	2.78	1.76	1.26						1.75	
<b>Total LCC Cost per Metric Ton Coal</b>							<b>3.30</b>	<b>4.03</b>	<b>4.97</b>	<b>3.95</b>	<b>3.46</b>						<b>3.94</b>	

Notes:  
Cost are based on exchange for new. A cost reduction can be achieved by exchange for refurbished or re-manufactured, if available.

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**Consolidated Costs**

Pricing 2013

Year		1	2	3	4	5					Average
Production (metric ton) from		0	1101961	2203921	3305882	4407842					
upto		1101960	2203920	3305881	4407841	5509802					
Running hours (Hr) from		0	6329	12657	18986	25314					
upto		6328	12656	18985	25313	31642					
		AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD	AUD
<b>Total Cost Financials</b>	<b>Per Year</b>	3,748,500	3,748,500	3,748,500	3,748,500	3,748,500					3,748,500
	<b>Per Metric Ton</b>	3.40	3.40	3.40	3.40	3.40					3.40
<b>Total Cost Personnel</b>	<b>Per Year</b>	3,083,808	3,083,808	3,083,808	3,083,808	3,083,808					3,083,808
	<b>Per Metric Ton</b>	2.80	2.80	2.80	2.80	2.80					2.80
<b>Total LCC</b>	<b>Per Year</b>	3,631,881	4,438,385	5,481,605	4,352,181	3,807,852					4,342,381
	<b>Per Metric Ton</b>	3.30	4.03	4.97	3.95	3.46					3.94

**Including Costs Financials**

<b>Total Cost per Year</b>			10,464,189	11,270,693	12,313,913	11,184,489	10,640,160				11,174,689
<b>Total Cost per Metric Ton</b>			9.50	10.23	11.17	10.15	9.66				10.14

Alternatively only calculate with Operational Cost only (Cost Personnel plus LCC) and calculate if margin between sales revenue and cost justifies the investment (Earn-back time, Nett Present Value).

**Operational Cost only**

<b>Total Cost per Year</b>			6,715,689	7,522,193	8,565,413	7,435,989	6,891,660				7,426,189
<b>Total Cost per Metric Ton</b>			6.09	6.83	7.77	6.75	6.25				6.74

**Disclaimer:**

This is not a quotation  
 All information is supplied to the best of our knowledge, for the purpose of estimating operational cost per metric ton.  
 All data are estimates. Actual production rates and cost are country, site and operator specific, and depend on many variables that are beyond Caterpillars control.  
 All pricing and cost are indicative only, depending on scope of supply and options, and subject to changes without notice. Valid pricing to be obtained through the CAT Dealer.  
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