

Team 6- Shelby Clearwater

Reducing Fiber Costs: Using an APMP Process for Bamboo Fiber to be Used in Tissue & Towel Production



<https://photos.clearskyimages.com/clearwater-paper-heli-08-2013/h62463C92>

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Modeling Results

	<u>Units</u>	<u>Current Mill</u>	<u>Modified Mill</u>	<u>% Change</u> <u>(show + or -)</u>
<u>Inputs</u>				
Softwood Pulp	ODT/D	258.0	236.6	-8.29
Hardwood Pulp	ODT/D	213.8	197.7	-7.52
Bamboo Chips	ODT/D	N/A	37.5	N/A
NaOH, as 100 %	ODT/D	N/A	3.68	N/A
H2O2, as 100%	ODT/D	N/A	1.19	N/A
DTPA, as 100%	ODT/D	N/A	0.24	N/A
Freshwater	MM gal/D	1.10	1.19	+8.18
Total Purchased Energy	MW*hr/D	1880.4	2244.4	+19.4
Natural Gas	MMBTU/D	3907.2	3934.4	+0.70
<u>Outputs</u>				
Paper	ODT/D	442.7	442.7	0
Effluent	MMgal/D	0.13	0.16	+20.6
BOD	kg/hr	78.4	689.4	+778.8

Base Case	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Revenue	\$245,265,197	\$246,980,373	\$248,681,504	\$250,603,063	\$252,111,855	\$253,698,805	\$255,207,597	\$256,794,547	\$258,317,383	\$259,776,106	\$261,234,830	\$262,551,283
FCF	-\$36,556,909	-\$38,451,893	-\$39,791,714	-\$39,052,799	-\$40,068,716	-\$40,730,588	-\$41,073,093	-\$41,057,426	-\$40,692,339	-\$40,510,413	-\$40,009,877	-\$39,373,138
EBITDA	-\$52,224,155	-\$54,931,275	-\$56,845,306	-\$55,789,713	-\$57,241,023	-\$58,186,555	-\$58,675,848	-\$58,653,465	-\$58,131,913	-\$57,872,019	-\$57,156,968	-\$56,247,340
Annual Cost, less Depreciation	\$297,489,353	\$301,911,648	\$305,526,810	\$306,392,776	\$309,352,879	\$311,885,359	\$313,883,445	\$315,448,012	\$316,449,296	\$317,648,125	\$318,391,797	\$318,798,623
Cost per FT	\$1,798	\$1,825	\$1,847	\$1,852	\$1,870	\$1,885	\$1,897	\$1,907	\$1,913	\$1,920	\$1,925	\$1,927
Incremental												
Revenue	\$0	-\$4,640,841	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
FCF	-\$222,895	\$10,992,435	\$10,203,977	\$9,294,292	\$8,553,787	\$8,041,221	\$7,917,011	\$7,763,459	\$7,027,359	\$6,290,777	\$6,054,595	\$5,790,985
EBITDA	-\$342,915	\$14,246,451	\$11,104,296	\$10,962,648	\$10,720,113	\$10,568,296	\$10,358,116	\$10,098,301	\$9,776,921	\$9,461,775	\$9,094,092	\$8,684,124
Annual Cost, less Depreciation	\$0	-\$21,689,514	-\$11,104,296	-\$10,962,648	-\$10,720,113	-\$10,568,296	-\$10,358,116	-\$10,098,301	-\$9,776,921	-\$9,461,775	-\$9,094,092	-\$8,684,124
Cost per Incremental FT	\$0	-\$97	-\$88	-\$87	-\$87	-\$87	-\$86	-\$85	-\$84	-\$82	-\$81	-\$79
Proposed												
Revenue	\$245,265,197	\$242,339,532	\$248,681,504	\$250,603,063	\$252,111,855	\$253,698,805	\$255,207,597	\$256,794,547	\$258,317,383	\$259,776,106	\$261,234,830	\$262,551,283
FCF	-\$36,779,804	-\$27,459,458	-\$29,587,737	-\$29,758,507	-\$31,514,929	-\$32,689,368	-\$33,156,082	-\$33,293,966	-\$33,664,980	-\$34,219,636	-\$33,955,282	-\$33,582,153
EBITDA	-\$52,567,070	-\$40,684,824	-\$45,741,010	-\$44,827,065	-\$46,520,910	-\$47,618,258	-\$48,317,731	-\$48,555,164	-\$48,354,992	-\$48,410,244	-\$48,062,875	-\$47,563,216
Annual Cost, less Depreciation	\$297,489,353	\$280,222,135	\$294,422,514	\$295,430,128	\$298,632,765	\$301,317,063	\$303,525,329	\$305,349,710	\$306,672,375	\$308,186,350	\$309,297,705	\$310,114,499
Cost per FT	\$1,798	\$1,728	\$1,759	\$1,765	\$1,783	\$1,799	\$1,811	\$1,822	\$1,829	\$1,838	\$1,844	\$1,848

Incremental 10 Year Cash Flow												
Year	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Project Year	-1	0	1	2	3	4	5	6	7	8	9	10
FT per Year	0	-3,309	0	0	0	0	0	0	0	0	0	0
Revenue	\$0	-\$4,640,841	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Direct Costs	\$0	-\$21,689,514	-\$14,598,805	-\$14,405,621	-\$14,392,289	-\$14,332,799	-\$14,217,358	-\$14,054,762	-\$13,833,145	-\$13,620,377	-\$13,357,757	-\$13,055,610
Indirect Costs	\$0	\$4,949,261	\$12,026,465	\$9,638,891	\$8,202,786	\$7,112,583	\$7,242,773	\$7,383,785	\$5,977,254	\$4,560,382	\$4,673,480	\$4,789,497
Depreciation	\$0	\$4,949,261	\$8,531,956	\$6,195,918	\$4,530,610	\$3,348,080	\$3,383,531	\$3,427,324	\$1,921,030	\$401,780	\$409,815	\$418,012
Startup and Training	\$342,915	\$2,797,537	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
EBITDA	-\$342,915	\$14,246,451	\$11,104,296	\$10,962,648	\$10,720,113	\$10,568,296	\$10,358,116	\$10,098,301	\$9,776,921	\$9,461,775	\$9,094,092	\$8,684,124
Tax at 35%	-\$120,020	\$3,254,017	\$900,319	\$1,668,355	\$2,166,326	\$2,527,076	\$2,441,105	\$2,334,842	\$2,749,562	\$3,170,998	\$3,039,497	\$2,893,139
Cash Flow	-\$222,895	\$10,992,435	\$10,203,977	\$9,294,292	\$8,553,787	\$8,041,221	\$7,917,011	\$7,763,459	\$7,027,359	\$6,290,777	\$6,054,595	\$5,790,985
New Fixed Capital	\$34,291,522	\$342,915	\$349,774	\$356,769	\$363,904	\$371,182	\$378,606	\$386,178	\$393,902	\$401,780	\$409,815	\$418,012
Change in Working Capital	\$0	-\$6,462,437	\$1,538,271	\$10,062	-\$36,048	-\$25,690	-\$12,919	-\$2,384	\$11,081	\$7,539	\$18,632	\$27,103
Free Cash Flow	-\$34,514,417	\$17,111,956	\$8,315,933	\$8,927,461	\$8,225,931	\$7,695,728	\$7,551,324	\$7,379,665	\$6,622,377	\$5,881,458	\$5,626,148	\$43,420,621
15% Discounted FCF	-\$39,691,579	\$17,111,956	\$7,231,246	\$6,750,443	\$5,408,683	\$4,400,057	\$3,754,343	\$3,190,433	\$2,489,597	\$1,922,659	\$1,599,302	\$10,732,913
Net Present Value	\$24,900,054											
Internal Rate of Return	29%											

APMP installation	Factored Equipment Estimate			
	Low	Mid	High	
Direct Cost				
- Purchased Equipment	100%	100%	100%	\$10,476,622
- Purchased Equipment Installation	13%	19%	21%	\$1,396,883
- Instrumentation and Controls	0%	5%	21%	\$523,831
- Piping	5%	22%	26%	\$2,328,138
- Electrical Systems	5%	22%	26%	\$523,831
- Buildings	0%	22%	31%	\$0
- Yard Improvements	0%	7%	10%	\$0
Foundations	10%	30%	41%	\$1,047,662
- Service Facilities	7%	11%	13%	\$698,441
- Land	2%	4%	5%	\$209,532
Sub-Total Direct Cost	167%	257%	292%	\$17,204,941
Indirect Cost				
- Engineering	15%	26%	31%	\$1,571,493
- Construction Expenses	20%	22%	23%	\$2,095,324
- Legal Expenses	0%	4%	5%	\$0
- Contractor Fee	5%	17%	18%	\$523,831
- Inflation	20%	22%	26%	\$2,095,324
- Contingency	20%	24%	26%	\$2,095,324
Sub-Total Indirect Cost	93%	115%	128%	\$8,381,297
Total Installed Cost	\$25,586,238			\$25,586,238
				2.4

Peroxide Storage Tank Installation	Factored Equipment Estimate			
	Low	Mid	High	
Direct Cost				
- Purchased Equipment	100%	100%	100%	\$190,851
- Purchased Equipment Installation	13%	19%	21%	\$25,447
- Instrumentation and Controls	0%	5%	21%	\$9,543
- Piping	5%	22%	26%	\$9,543
- Electrical Systems	5%	22%	26%	\$9,543
- Buildings	0%	22%	31%	\$0
- Yard Improvements	0%	7%	10%	\$0
Foundations	5%	30%	41%	\$9,543
- Service Facilities	7%	11%	13%	\$12,723
- Land	2%	4%	5%	\$7,069
Sub-Total Direct Cost	167%	257%	292%	\$274,260
Indirect Cost				
- Engineering	15%	26%	31%	\$28,628
- Construction Expenses	20%	22%	23%	\$42,411
- Legal Expenses	0%	4%	5%	\$0
- Contractor Fee	5%	17%	18%	\$9,543
- Inflation	20%	22%	26%	\$38,170
- Contingency	20%	24%	26%	\$38,170
Sub-Total Indirect Cost	93%	115%	128%	\$156,922
Total Installed Cost	\$431,182			\$431,182
				2.3

High Density Pulp Storage Tank Installation

Factored Equipment Estimate

	Low	Mid	High	
Direct Cost				
- Purchased Equipment	100%	100%	100%	\$2,727,889
- Purchased Equipment Installation	13%	19%	21%	\$505,165
- Instrumentation and Controls	20%	20%	21%	\$555,681
- Piping	2%	22%	26%	\$54,558
- Electrical Systems	2%	10%	26%	\$54,558
- Buildings	0%	22%	31%	\$0
- Yard Improvements	0%	7%	10%	\$0
- Foundations	0%	2%	41%	\$54,558
- Service Facilities	7%	11%	13%	\$303,099
- Land	0%	4%	5%	\$101,033
Sub-Total Direct Cost	167%	257%	292%	\$4,356,540

Indirect Cost				
- Engineering	20%	26%	31%	\$707,230
- Construction Expenses	20%	22%	23%	\$606,198
- Legal Expenses	0%	4%	5%	\$0
- Contractor Fee	13%	17%	18%	\$454,648
- Inflation	20%	22%	26%	\$606,198
- Contingency	20%	24%	26%	\$656,714
Sub-Total Indirect Cost	93%	115%	128%	\$3,030,988

Total Installed Cost **\$7,387,528** Total to Equipment **\$7,387,528** **2.7**

Storage Bin for Bamboo Chips at Mill Site Installation

Factored Equipment Estimate

	Low	Mid	High	
Direct Cost				
- Purchased Equipment	100%	100%	100%	\$408,142
- Purchased Equipment Installation	13%	19%	21%	\$75,582
- Instrumentation and Controls	20%	20%	21%	\$83,140
- Piping	2%	22%	26%	\$8,163
- Electrical Systems	2%	22%	26%	\$8,163
- Buildings	0%	22%	31%	\$0
- Yard Improvements	0%	7%	10%	\$0
- Foundations	0%	2%	41%	\$8,163
- Service Facilities	7%	11%	13%	\$45,349
- Land	0%	4%	5%	\$15,116
Sub-Total Direct Cost	167%	257%	292%	\$651,817

Indirect Cost				
- Engineering	20%	26%	31%	\$105,814
- Construction Expenses	20%	22%	23%	\$90,698
- Legal Expenses	0%	4%	5%	\$0
- Contractor Fee	13%	17%	18%	\$68,024
- Inflation	20%	22%	26%	\$90,698
- Contingency	20%	24%	26%	\$98,256
Sub-Total Indirect Cost	93%	115%	128%	\$453,491

Total Installed Cost **\$1,105,308** Total to Equipment **\$1,105,308** **2.7**