

# PAPER MILL GRADE COSTING



Learn how leading paper companies use **ImpactECS** to calculate standard and actual grade costs, analyze variances, and explore forward-looking business scenarios.



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# Pulp and Paper Industry Challenges

The pulp and paper industry plays a critical role in the local economies of virtually all regions of the United States. Yet during the last decade and a half, the industry has been overcome with economic, financial, and organizational dislocations that firms have found difficult to address. Among these are chronic problems of over-capacity, weak prices, poor profit outlooks and deteriorating shareholder value.

*Today's business climate has made it more important than ever for paper mill operations to improve efficiencies; including throughput as well as direct and indirect expenses.*

The ability to plan and measure operating parameters including product cost, on a consistent, detailed, accurate, and timely basis is critical to the survival of any facility.



ImpactECS from 3C Software provides mill management and shop floor operators with a modeling tool that can:

- Establish and maintain grade specific standards by machine.
- Forecast cost, consumption, loading, and profitability at the paper machine, mill, and enterprise level.
- Analyze operational variances by comparing actual results with standards for each run.

# Costing Capabilities Paper Companies Need

Some of the world's leading paper companies use ImpactECS because it is a dynamic modeling tool that can handle any complex business scenario. It can serve as a stand-alone system or tightly integrate with existing ERPs, shop floor systems, databases and business intelligence tools.

ImpactECS capabilities for paper companies include:

- **Detailed grade costing by paper machine.** Calculate standard and/or actual costs in ImpactECS with data from roll-tracking and mill management systems including PI.
- **Grade run and roll specific analysis.** Quickly analyze run-by-run actual costing to provide immediate feedback to machine operators and production managers on how their decisions impact the cost of production.
- **Recipe and Bill-of-Material management.** Manage quantities and types of raw materials and analyzing the effect of raw material substitutions.
- **Full integration of cost analysis.** Determine the cost of each processing stage from the wood yard through post-machine processing. ImpactECS can model costs for pulp, paperboard, tissue, energy (electricity and steam), converting, and any other process.
- **Machine/Cost Center allocations and rate building.** Unlimited allocations support specific to each machine and each product running through the machine.
- **Automated budgeting and earned production.** Replicate models in the ImpactECS sandbox to see the influence on volume and mix for budgeting and forecasting.
- **Estimating and quoting.** Use ImpactECS to quickly evaluate the costs of developing new grades while setting business rules limiting the variable a sales rep can modify or select.
- **Costing scenarios and decision support analysis.** ImpactECS' sandbox allows users to analyze scenarios using any variable that exists in the model. Some common scenarios include capacity utilization, overhead absorption and raw material price changes.



# One Paper Company's Story

Let's take an example of a paper company with four unique mills and a diverse product line including coated wood-free paper, uncoated paper and paperboards of all different weights, colors and specialty grades. When considering a cost system, they came up with the following set of needs:

1. One cost system with the flexibility to handle different products and processes and is able to calculate run-by-run costs for a specific grade.
2. Drill down capabilities that make it possible to easily move from cost summaries to component level costs.
3. Mill-balancing calculations to identify potential production red-flags that could occur when a particular sales budget is selected.
4. Scenario analysis capabilities to uncover the effect of changing inputs or production efficiencies.
5. Fast calculation engine to quickly process data and generate results.

By selecting ImpactECS, the company was able to take advantage of the object-oriented design approach that offers the greatest level of flexibility to create models that align with their specific business definitions and production processes. With help from 3C Software, the company brought together both finance and production experts within their organization to define a common costing methodology. This methodology was the basis of the logic used to design the cost models in ImpactECS.

## **So, what were the benefits?**

### *Competitive advantage.*

While opportunities exist to improve the paper-making process, the competitive advantage in this industry lies with how to manage assets and understand their financial position.

### *Marginal cost analysis.*

Increasingly, the company relied on marginal (or incremental) cost analysis to make strategic decisions regarding future production. One of the biggest assets of incremental costing is the ability to identify expensive production bottlenecks so they are able to reduce or eliminate them.

### *Sales and marketing alignment.*

The sales and marketing teams at the company were able to focus their revenue-generating efforts on high yield products to improve overall profitability.

### *Improved business decisions.*

The company discovered that as their leaders became more informed, they also became more productive and made better operating decisions.

### *Grade costing by run.*

With the ability to understand their costs at the most basic level – a specific run of a paper grade – mill managers and machine operators had a deeper understanding of their performance and how they could make improvements.

# Inside ImpactECS

No two models in ImpactECS are alike because their design is based on the unique business requirements of the company. In the paper industry, the foundation of most cost models includes the grade, basis weight, color, and machine standards for each paper machine. As we take a look inside ImpactECS in this section, we've focused our discussion on run-level grade costing to show the potential of the tool in a mill environment.

## Cost Model

The example in Figure 1 shows the Total Cost Run for a specific paper grade for a particular customer or manufacturing order. ImpactECS integrates with a wide range of systems including ERPs, roll tracking systems, mill automation tools, data warehouses and business intelligence tools to automatically load relevant data into the model.

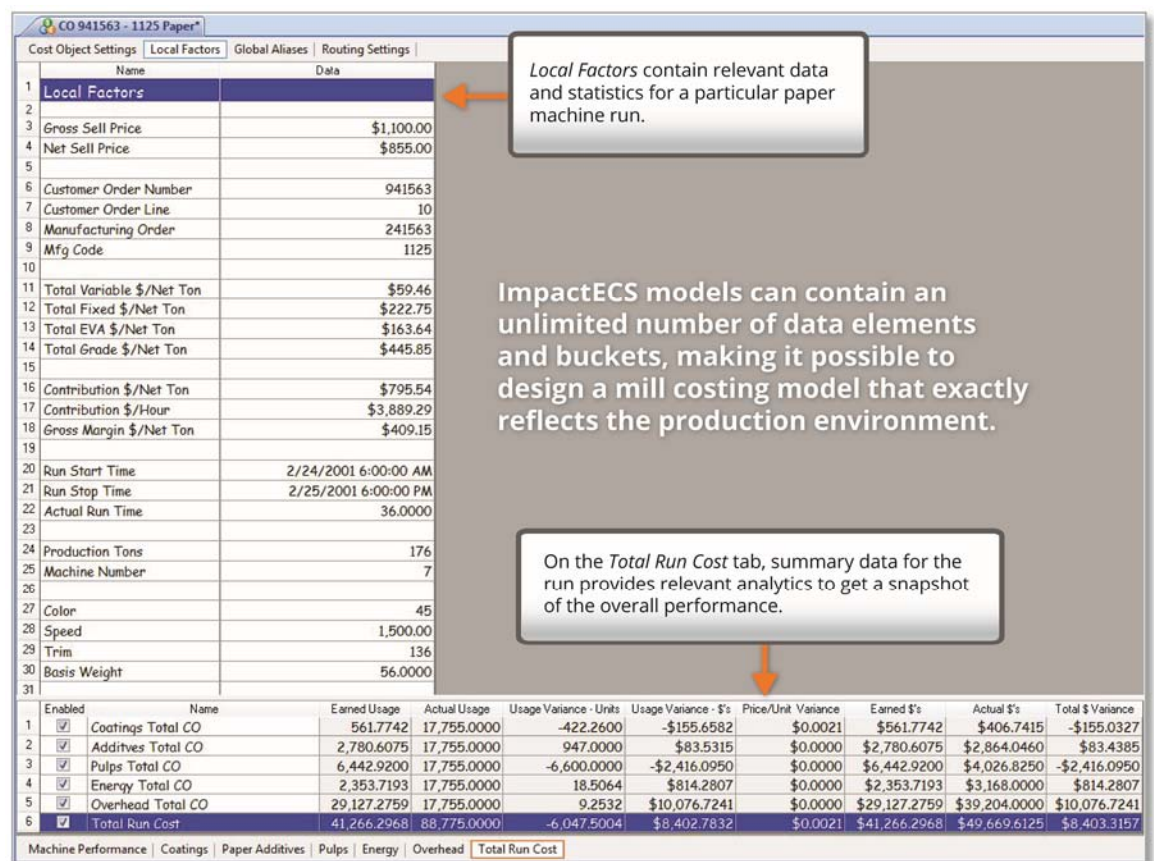


Figure 1

The logic is defined behind the scenes through Calculations based on the mill's specific business rules. Once the model is calculated, results are populated in user-defined cost buckets to provide a view of the grade's performance. In Figure 1, the Total Run Cost summary shows actual usage and cost results and compares them to the earned statistics to provide a quick variance analysis.



One of the benefits of ImpactECS is the ability to access detailed cost results with just a few clicks. In this example, the mill manager can review the cost performance of each component of the grade run – machine performance, coatings, paper additives, pulps, energy and overhead – as indicated by the tabs at the bottom of the screen.

The screenshot displays a multi-tabbed interface. The top tab, 'Total Run Cost', shows a summary table with columns for Enabled, Name, Earned Usage, Actual Usage, Usage Variance - Units, Usage Variance - \$'s, Price/Unit Variance, Earned \$'s, Actual \$'s, and Total \$ Variance. Below this is a navigation bar with tabs for Machine Performance, Coatings, Paper Additives, Pulps, Energy, Overhead, and Total Run Cost. The 'Coatings' tab is selected, showing a detailed table with columns for Name, Std Lbr/Ton, Earned Usage, Actual Usage, Usage Variance - Units, Usage Variance - \$'s, Std Price/Lb, Current Price/Lb, Price/Lb Variance, Earned \$'s, Actual \$'s, and Total \$ Variance. An explanatory text block states: 'The Coatings tab shows each of the pigments and coatings used in this grade. The user-defined cost buckets are a mix of standard and actual production values and their accompanying variances for comparison.' Below this, the 'Machine Performance' tab is selected, showing a table with columns for Enabled, Name, Standard, Actual, and Variance. A final explanatory text block states: 'From the Machine Performance tab, mill management and paper machine operators can evaluate the performance of the machine for the specific grade and run.'

Enabled	Name	Earned Usage	Actual Usage	Usage Variance - Units	Usage Variance - \$'s	Price/Unit Variance	Earned \$'s	Actual \$'s	Total \$ Variance
<input checked="" type="checkbox"/>	Coatings Total CO	561.7742	17,755.0000	-422.2600	-\$155.6582	\$0.0021	\$561.7742	\$406.7415	-\$155.0327
<input checked="" type="checkbox"/>	Additives Total CO	2,780.6075	17,755.0000	947.0000	\$83.5315	\$0.0000	\$2,780.6075	\$2,864.0460	\$83.4385
<input checked="" type="checkbox"/>	Pulps Total CO	6,442.9200	17,755.0000	-6,600.0000	-\$2,416.0950	\$0.0000	\$6,442.9200	\$4,026.8250	-\$2,416.0950
<input checked="" type="checkbox"/>	Energy Total CO	2,353.7193	17,755.0000	18.5064	\$814.2807	\$0.0000	\$2,353.7193	\$3,168.0000	\$814.2807
<input checked="" type="checkbox"/>	Overhead Total CO	29,127.2759	17,755.0000	9,2532	\$10,076.7241	\$0.0000	\$29,127.2759	\$39,204.0000	\$10,076.7241
<input checked="" type="checkbox"/>	<b>Total Run Cost</b>	<b>41,266.2968</b>	<b>88,775.0000</b>	<b>-6,047.5004</b>	<b>\$8,402.7832</b>	<b>\$0.0021</b>	<b>\$41,266.2968</b>	<b>\$49,669.6125</b>	<b>\$8,403.3157</b>

Enabled	Name	Std Lbr/Ton	Earned Usage	Actual Usage	Usage Variance - Units	Usage Variance - \$'s	Std Price/Lb	Current Price/Lb	Price/Lb Variance	Earned \$'s	Actual \$'s	Total \$ Variance
<input checked="" type="checkbox"/>	CTG - 551 - Lustru 7525 - R15	2.1100	371.3600	300.0000	-71.3600	-\$5.6742	\$0.0795	\$0.0816	\$0.0021	\$29,5287	\$24,4800	-\$5,0487
<input checked="" type="checkbox"/>	CTG - 560 - Calcium Carb - R15	1.5600	274.5600	180.0000	-94.5600	-\$8.0092	\$0.0847	\$0.0847	\$0.0000	\$23,2552	\$15,2460	-\$8,0092
<input checked="" type="checkbox"/>	CTG - 676 - TiO2 - R15	1.3600	239.3600	201.0000	-38.3600	-\$35.2912	\$0.9200	\$0.9200	\$0.0000	\$220,2112	\$184,9200	-\$35,2912
<input checked="" type="checkbox"/>	<b>Total Pigments</b>	<b>0.0000</b>	<b>885,2800</b>	<b>681,0000</b>	<b>-204,2800</b>	<b>-\$48,9746</b>	<b>\$1,0842</b>	<b>\$1,0843</b>	<b>\$0.0021</b>	<b>\$272,9261</b>	<b>\$224,6460</b>	<b>-\$48,3401</b>
<input checked="" type="checkbox"/>	CTG - 644 - Latex - R15	2.3000	404.8000	250.0000	-154.8000	-\$4.3970	\$0.5452	\$0.5452	\$0.0000	\$220,6970	\$136,3000	-\$84,3970
<input checked="" type="checkbox"/>	CTG - 591 - Starch Pearl - R15	0.2500	44.0000	20.0000	-24.0000	-\$3.6048	\$0.1502	\$0.1502	\$0.0000	\$6,6088	\$3,0040	-\$3,6048
<input checked="" type="checkbox"/>	CTG - 633 - Sumrez Resin - R15	0.4500	79.2000	58.5000	-20.7000	-\$12.5649	\$0.6070	\$0.6070	\$0.0000	\$48,0744	\$35,5095	-\$12,5649
<input checked="" type="checkbox"/>	CTG - 922 - Cal Sterate - R15	0.2300	40.4800	22.0000	-18.4800	-\$6.1169	\$0.3310	\$0.3310	\$0.0000	\$13,3989	\$7,2820	-\$6,1169
<input checked="" type="checkbox"/>	<b>Total Coatings</b>	<b>0.0000</b>	<b>1,453,7600</b>	<b>1,031,5000</b>	<b>-422,2600</b>	<b>-\$155,6582</b>	<b>\$0.0000</b>	<b>\$0.0000</b>	<b>\$0.0021</b>	<b>\$561,7742</b>	<b>\$406,7415</b>	<b>-\$155,0327</b>

Enabled	Name	Standard	Actual	Variance
<input checked="" type="checkbox"/>	Tons per Hour	0.0000	0.0000	0.0000
<input checked="" type="checkbox"/>	Tons per Hour-stdn	6.5802	4.8889	-1.6913
<input checked="" type="checkbox"/>	*Speed	1,500.0000	1,215.8621	-284.1379
<input checked="" type="checkbox"/>	*Trim	136.0000	132.8276	-3.1724
<input checked="" type="checkbox"/>	*BasisWeight	56.0000	53.6552	-2.3448
<input checked="" type="checkbox"/>	*Grade Hourst	26.7468	36.0000	-9.2532
<input checked="" type="checkbox"/>	*Grade Efficiency	80.0000	56.4655	-23.5345

Figure 2

In this example, each tab has a combination of standard and actual cost results and the accompanying variance. So with just a few clicks a complete view of how the run performed is available to easily identify any problem areas.

## Reports

Once the cost model is calculated, results are available to build shareable custom reports. ImpactECS has a number of reporting options including an internal reporting tool, linking with existing third-party reporting systems, or Microsoft Excel. The variance report shown in Figure 3 is an example of an Excel report that compares two different runs of the same grade.

Run Vs Run Variance Report														
Run 1:	20588	Run Start:	1/14/12 6:06 AM	Run 2:	20548	Run Start:	1/3/12 2:14 PM							
Object:	0003	Run Stop:	1/15/12 7:33 AM	Object:	0003	Run Stop:	1/3/12 11:11 PM							
Grade:	3	Reel Count:	41	Grade:	3	Reel Count:	23							
Caliper:	12.00	Moisture:	5.64%	Caliper:	12.00	Moisture:	6.62%							
Basis Weight:	143.00			Basis Weight:	143.00									
Run Hours:	25.45			Run Hours:	8.95									
<b>PRODUCTION</b>														
			Tons/Hour			Tons			Tons/MSF			Quality Percent of Gross		
	Run 1	Run 2	Var	Run 1	Run 2	Var	Act	Std	Var	Act	Std	Var		
Gross Reel:	31.90	31.62	0.28	811.80	804.73	7.07	0.0364	0.1138	(0.0774)					
Good Scaled:	29.95	21.07	8.88	762.18	536.25	225.92	0.0369	0.1172	(0.0803)	93.9%	66.6%	27.2%		
Downgrade Scaled	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0%	0.0%	0.0%		
Offgrade Scaled	0.24	8.24	-8.00	6.01	209.67	-203.67	0.0348	0.1165	(0.0817)	0.7%	26.1%	-25.3%		
<b>Total Scaled</b>	<b>62.08</b>	<b>60.93</b>	<b>1.15</b>	<b>1,580</b>	<b>1,551</b>	<b>29</b>	<b>0.0366</b>	<b>0.1153</b>	<b>(0.0787)</b>	<b>194.6%</b>	<b>192.7%</b>	<b>1.9%</b>		
<b>MSF/Hour</b>														
	Run 1	Run 2	Var	Run 1	Run 2	Var	Act	Std	Var	Act	Std	Var		
Gross Reel:	876.26	790.30	85.96	22,301	7,073	15,228	27.47	8.79	18.68					
Good Scaled:	811.41	511.44	299.96	20,650	4,577	16,073	27.09	8.54	18.56	92.6%	64.7%	27.9%		
Downgrade Scaled	0.00	0.00	0.00	0	0	0	0.00	0.00	0.00	0.0%	0.0%	0.0%		
Offgrade Scaled	6.79	201.02	-194.23	173	1,799	-1,626	28.77	8.58	20.19	0.8%	25.4%	-24.7%		
<b>Total Scaled</b>	<b>1,694.45</b>	<b>1,502.76</b>	<b>191.69</b>	<b>43,124</b>	<b>13,450</b>	<b>29,674</b>	<b>27.29</b>	<b>8.67</b>	<b>18.62</b>	<b>193.4%</b>	<b>190.2%</b>	<b>3.2%</b>		
<b>Usage</b>														
			Dollars per Gross Ton			Dollars per Good Ton			Good Vs Gross		Price Volume Usage			
	Run 1	Run 2	Var	Run 1	Run 2	Var	Run 1	Run 2	Var	Act	Price	Volume	Usage	
<b>FURNISH</b>														
Chip	22.00%	22.00%	0.00%	\$90	\$90	\$0	\$95	\$135	(\$39)	\$6	\$0	(\$66,986)	\$0	
Sawdust	16.00%	16.00%	0.00%	\$56	\$56	\$0	\$60	\$84	(\$24)	\$4	\$0	(\$41,813)	\$0	
Hardwood	48.00%	48.00%	0.00%	\$246	\$246	\$0	\$262	\$370	(\$107)	\$16	\$0	(\$184,122)	\$0	
Broke	14.00%	14.00%	0.00%	\$64	\$64	\$0	\$68	\$96	(\$28)	\$4	\$0	(\$47,685)	\$0	
Broke/Off/Dvg Credit							(\$30)	(\$228)	\$199					
Gross Furnish	100.00%	100.00%	0.00%				\$456	\$456	\$0	\$456	\$0	(\$340,606)	\$0	
Pulp to Board Ratio	11.33%	38.16%	-26.83%				\$52	\$174	(\$122)		11.33%	11.33%	11.33%	
<b>Furnish Cost</b>							<b>\$52</b>	<b>\$174</b>	<b>(\$122)</b>	<b>\$52</b>	<b>\$0</b>	<b>(\$38,600)</b>	<b>\$0</b>	
<b>CHEMICALS</b>														
Wet End	7.30	7.52	(0.23)	\$3	\$3	(\$0)	\$3	\$5	(\$2)	\$0	(\$153)	\$24	(\$82)	
Wet Stack	44.53	44.53	-	\$17	\$17	\$0	\$18	\$25	(\$7)	\$1	\$0	\$119	\$0	
Biocides	4.95	4.95	-	\$1	\$1	\$0	\$2	\$2	(\$1)	\$0	\$0	\$10	\$0	
Size Press	-	-	-	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Cleaners	0.63	0.63	-	\$1	\$1	\$0	\$1	\$1	(\$0)	\$0	\$0	\$5	\$0	
<b>Chemical Total</b>	<b>57.41</b>	<b>57.63</b>	<b>(0.23)</b>	<b>\$22</b>	<b>\$22</b>	<b>(\$0)</b>	<b>\$24</b>	<b>\$34</b>	<b>(\$10)</b>	<b>\$1</b>	<b>(\$153)</b>	<b>\$159</b>	<b>(\$82)</b>	
<b>COATINGS</b>														

Figure 3



## User Interfaces

Not all ImpactECS users are equal, so the way they use the system shouldn't be either. One of the most utilized configuration features of ImpactECS is the ability to create user-defined interfaces that are tailored to a specific user or task. The interface shown in Figure 4 offers step-by-step actions required to run the model properly.

### Running the Model:

This form is designed to walk you through the steps necessary to run the model from setting the time period, to building the items and having Impact recalculate them.

### Setting the Date/Time:

Select the starting date/time and ending date/time. A time of 12 AM will be assumed unless a time is manually entered. "1/1/2012 6AM" without quotes is a valid entry.

OH Dollars:  Standard  Actual  This will display the table with the actual overhead data.

Starting Date/Time: 1/1/2012  Ending Date/Time: 1/31/2012  Month: Jan

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### Maintain Data:

This section will allow for the maintenance of the data that is used to run the model. This data is store inside of Impact, as well as in SQL server tables. This information will not necessarily change on a month to month basis.

#### Impact Data:

<input type="button" value="Open Furnish Price Table"/>	This opens the Impact table the contains the standard Chip, Hardwood and Sawdust costs.
<input type="button" value="Open Furnish Price Fcst Table"/>	This opens the Impact table the contains the actual Chip, Hardwood and Sawdust costs.
<input type="button" value="Open Energy Price Table"/>	This opens the Impact table the contains the standard costs for Natural Gas, Electricity and Steam
<input type="button" value="Open Energy Price Fcst Table"/>	This opens the Impact table the contains the actual costs for Natural Gas, Electricity and Steam
<input type="button" value="Open Chemical Data Source Table"/>	This Impact table maps if the actual Chemical usage data is coming from Pi or if the Standard is used.

#### SQL Data:

<input type="button" value="Edit PM Production Standards"/>	This opens an Impact query where the PM Production Standards can be changed.
<input type="button" value="Edit Extruder Production Standards"/>	This opens an Impact query where the Extruder Production Standards can be changed.
<input type="button" value="Edit PM Overhead Standards"/>	This opens an Impact query where the PM Overhead Standards can be changed.
<input type="button" value="Edit Extruder Overhead Standards"/>	This opens an Impact query where the Extruder Overhead Standards can be changed.
<input type="button" value="Open Chemical Change Form"/>	This opens the Impact Form that allows for a Chemical change. (Use this when one chemical relpaces another chemical.)

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### Build and Recalculate Cost Objects:

This section will build the standard and run cost objects. The delete should be used when the data in the tables that create the runs changes. This data can only be refreshed by recreating the objects.

<input type="button" value="Build PM Standards"/>	If a new paper machine standard is created, this will create and recalculate it
<input type="button" value="Build PM Runs"/>	This will build all the paper machine runs for the current period. <b>NOTE:</b> Cost Objects that already exist
<input type="button" value="Build Extruder Runs"/>	This will build all the extruder runs for the current period. but have had data change, need to be deleted
<input type="button" value="Recalc Extruder Runs for Current Period"/>	This will recalculate the extruder runs for the current period. and rebuilt in order for changes to be seen.
<input type="button" value="Recalc PM Runs for Current Period"/>	Will recalculate the PM runs for the current period.
<input type="button" value="Open Reports Form"/>	Opens the form that runs reports.

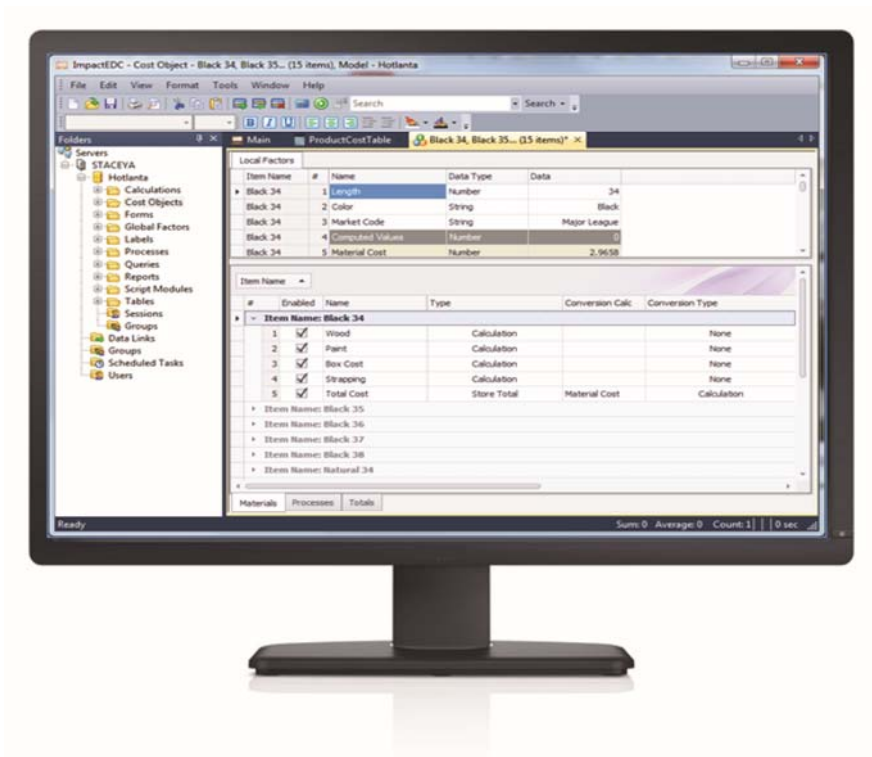
Figure 4

# Get Better Costing Now

While we're only able to include a few of the capabilities of ImpactECS in this guide, we hope you see the benefit to mill managers and mill operations leaders who want to better understand their grade costs.

## Our offer to you!

Just for downloading this paper, you're eligible for a **FREE GRADE COSTING AUDIT** from 3C Software. You'll get a consultation session with our costing experts and you can even have a sample model built in ImpactECS with your data.



## Ready to get started?

Connect with our pulp and paper industry manager to schedule your audit, or just to learn more about ImpactECS.

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# About 3C Software



Founded in 1988, 3C Software has become the leading provider of enterprise cost and profitability systems. With over 600 installations in North and South America, Europe, Asia, and Australia, the ImpactECS platform gives business leaders the tools needed to build dynamic models to support the unique and complex analysis required to effectively manage their business.

## Paper Industry Organizations



## Technology Partners and Associations

