Annotated Case

Maintenance Cost Management

Annual activity-based budget,
Monthly variance, forecast and decisions report
&
Data, database access and database-direct reports

Case note: To aid navigation through the herein individual components of cost management, the bottom-most footer matches the page number of the PDF document and the “go-to” buttons of the Adobe Reader.

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Introduction and discussion

Purpose of the document

The cold reality is that manufacturing maintenance cost is unmanaged. It has a life of its own, not to the plant's advantage.

This is because the purpose of plant traditional accounting is to report business financial performance, position and worth. Meanwhile, the purpose of all reliability and maintenance best practices and a CMMS is to design and manage the work to sustain and manage plant reliability and condition. This is why a maintenance manager said, "My cost fell last week. I wish I knew why."

We cannot envision what we have never seen. We also mistake what we have seen for what it is not. This is a big obstacle to managing maintenance cost in industry. Rather than maintenance cost management, the only perspective in industry is database-direct reports (tip-of-the-iceberg) cost reports, traditional plant accounting, best practices and the CMMS.

The purpose of this document is simple. Eliminate this obstacle, clearing the way to finally manage maintenance cost.

Plant safety, reliability and condition

Cost management is not cost cutting. That is because it is activity-based. Defining plant activities for all needs is the starting point for building the plant's ability to manage cost. Otherwise, the plant is merely organized for either run away spending or cost cutting. The latter may undermine plant safety, reliability and condition.

Many reliability and maintenance practitioners speak against cost management. This is because they have never seen cost management in action, only cost cutting. Naturally, they fear that safety, reliability and condition will be reduced if cost where managed. The advocated alternative is often for management to accept that maintenance will "cost what it will cost."

A foundation goal of cost management is to set all maintenance activities for the plant. The next goal is to determine what resources will be consumed and what drives activity and resource behavior. Thence the goal is to determine and then guide the plant to best or optimal cost to deliver those activities in good form.

When we speak of maintenance cost as a runaway cost, we are speaking of the cost to accomplish all defined activities. Cost management is to protect and assure that activity does occur and protect against the opposite.

Confidentiality and warning

The herein case is based on an actual plant. However, confidentiality is rigorously protected. Document terminology and organization remain in tack, but no activity and resource level resemblance remains. Furthermore, the case is packaged as a PDF file to prevent access to background drivers and algorithms.

Readers are also warned to not draw from the document any operational insights, performance targets and key indicators for their plant.

The case plant

There are two cost centers within maintenance: process and support maintenance. Process maintenance is concerned with production equipment, whereas, support maintenance is concerned with buildings and site condition.

Process maintenance has three production areas and an area spanning all three. "Reliability" is also treated as if an area rather than woven into the individual areas.

The process maintenance crafts are mechanical, electrical, instrument and laborers. The mechanical craft has multiple sub-crafts. There is a mechanical crew for each of the distinctive three areas. They collectively serve the fourth area. There is an electrical crew and instrument crew. Their activities span all areas.

One or more of the four craft categories is involved in any given work order. Consequently, the cost management system is built around mechanical, electrical and instrument activities (work class) rather than crafts.

Support maintenance cuts across the plant. It employs carpenters, fleet mechanics, equipment operators, labors, drivers and janitors.

The plant-wide work type categories are preventive, running mandatory, major jobs, programs, standard jobs, discretionary and contract maintenance. Across them, there are approximately 20 subcategories. However, this degree of categorization was not relevant to being able to manage maintenance cost.

Discretionary spending is utilized as an adjustment for delivering the year within budget. As year's total budget variance is forecasted each month, management makes a decision for discretionary spending.

Components of cost management

Managing maintenance cost requires a system of integrated procedures, practices and tools. The system will exist in parallel to the traditional accounting system because it is designed specifically to serve the maintenance department in ways completely out of reach to the traditional plant accounting system.

This section will introduce and summarize the seven components of a cost management system. However, not all will be shown as a case in this document for reasons of confidentiality.

System blueprint. It is tempting to regard the herein activity-based budget as the foundation to cost management. However, it is not. An activity and its deliverable is the foundation component. We call the activity blueprinting.

Any maintenance operation takes a unique operational form in the plant it serves reflecting a unique operating and business environment. Consequently, the first

step is to blueprint a system of component procedures, practices and tools to manage the plant's maintenance cost through its activity and resource drivers.

We interview personnel throughout the refinery and business to understand it as a reliable production operation, profitable business enterprise. In other words, we determine what cost management for maintenance must accomplish for the department, plant and business as a whole.

We concurrently survey the plant's information system of existing and planned databases. The task will identify and assess the data that is and will be available to build the refinery's ability to manage its maintenance cost.

In collaboration with the plant's managers and cost analysts, we establish the goals and define the overall system for managing maintenance cost. With them we also prepare a project plan to build and make operational the plant's ability to manage its maintenance cost.

For reasons of confidentiality, an example case of the blueprint is not shown in this document.

Annual activity-based budget. Defined by the blueprint stage, the budget is the drive shaft between understanding the plant's maintenance cost case and the ability to aggressively manage and guide it.

The blueprint identifies all operational needs for maintenance and how it is delivered organizationally. The budget translates that perspective to a plant-specific structure of activities, the resources they consume and their drivers. In that structure all activities are defined as distinctive line items rather defined as a black box of cost. The plant's databases are utilized heavily in the cost engineering work to set the plants activity levels, resources and drivers to both.

A side point. Reliability and maintenance professionals want KPIs to measure their maintenance process. The list of indicators has been established. However, the credibility of applying industry benchmarks to a specific plant has always been questionable. Now a plant's KPIs can be extracted from the activity-based budget. KPI "actuals" can be extracted from the monthly variance, forecast and decisions report.

Decision-support model for strategy decisions. Since the budget is essentially a large Excel-based algorithm it also serves as a business model to the annual budget process and interim issues. With it, maintenance activity, resource, organizational and spending strategies are evaluated for their ramifications to total maintenance cost and, in turn, enterprise profit, profit margin and return on investment (ROI).

We find that most plant have two to five significant decision points. These are aspects of the overall cost structure for which management can turn the knob. Examples include decisions for the annual pay increase, the terms of union agreements, craft profiles and levels, engaging cross-plant personnel differently in maintenance and production and materials management strategies. The blueprint stage reveals them.

These decisions are always interrelated. A decision for one changes the ramifications of the others. Consequently, to be meaningful all decisions have to be evaluated simultaneously within a single model.

To deal with this need, a component of the cost management system is a dashboard-type interactive graphic model. Its purpose is to support management as it evaluates and sets strategies that decide maintenance spending and enterprise profitability. It utilizes the budget as the underlying business model.

Candidate variations flow into the business model through interactive input elements (i.e., knobs, selectors, spinners and sliders). The integrated result is displayed through output elements (i.e., meters, progress bars, graphs and values). A sub-model translates the outcome to business profit, profit margin and ROI.

With a projector, this tool and other interactive components of the cost system can be operated real-time in management's annual budget and monthly review meetings. Once settled, the final decisions are returned to the activity-based budget and the operational policies associated with them are instituted as part of cost management procedure.

Monthly variance, forecast and decision report. The variance analysis, forecast and decision report is generated monthly. It is the line for line extension of the budget and much more.

A primary extension is the two dimensions of variance: cost category and variance cause. Together they result in 45 or more comparative elements of variance tied together in a single view such that cost performance has context.

Another is sections to evaluate the details as a collective whole but along different meaningful perspectives. An example is to view a forecast of the year distinguished from cost position for the year.

Through the report, the plant extracts and converts massive data from its databases to the information management needs to deliver the year's maintenance cost within budget. The report reveals what actually happened and where it happened. From that, it provides the paths along which to drill down to find its root causes. Otherwise it is easy to, for example, pronounce the month as good or bad when it was actually the reverse.

By identifying the exact points of attractive and unattractive performance and their root causes, the report provides management with the type of information on which they can make and act on remedial or opportunistic decisions. Furthermore, these are made in the context of forecasting the spending year and its ramifications for business profit, profit margin and ROI.

The report has another important power. Over several fiscal years, it has proven to produce the "lessons learned" that guided the plant to increasingly better understand its costs, how to budget them, and how to control them.

Driven by these lessons learned, each budget cycle has produced markedly improved budgets. In turn, the monthly report has advanced as it was upgraded to match each step-up in the ability to budget. The upgraded report then revealed

new layers of insight that were subsequently incorporated in the next annual or interim budget.

The "actuals" data for the monthly report is extracted from the plant's databases. When the variance, forecast and decisions report is defined, automated reports and interfaces are concurrently defined to extract and transfer data as input to the Excel-based variance, forecast and decision report.

Interactive variance, forecast and decision tools. The variance, forecast and decision report packages and delivers thousands of pieces of information.

There could probably be a 1 percent rule of information. Within the mass of information there is a short, but ever changing, list of performance information that management needs to currently notice and respond to. We must also be able to forecast the remaining year driven by a short and also ever changing list of perspectives existing at the pointed end of massive information.

Thus, another category of components evolved with the plant's annual and monthly, monitoring, analysis and decision cycles. So far three types of interactive tools have emerged through the actual experience of managing maintenance cost.

One type is to be able to make choices about viewing information. They enable the individual to seek and quickly find several needles in many haystacks. Through them massive information can be consolidated, drilled-down and sliced-and-diced.

This is accomplished with graphs that have pull-down menus for organization, axis and values. This allows massive variations for viewing: seeking the poke in the eye.

In the herein case, the interactive chart section of the monthly variance, forecast and decision report is an example. It is noteworthy that these charts can be created in a matter of moments as new information needs arise.

A second such tool is designed to deal with unusual events. For example, a cataclysmic event may occur that distorts the view of variance and forecast for the remaining year. It would be bad business to budget for such an event at the maintenance department level. When they occur, the problem is that the ability to manage cost can be made more difficult for lack of a clear picture.

In this case the variance report is provided with interactive "switches." With these, reviewing managers can turn the event "on-off" in the overall variance. These are set up in the report as they occur during the year. Accordingly, the plant can continue to view the "true" year such that it can still easily spot key information and take appropriate action. At the same time it does not loose its ability to see the "relevant" whole picture. One important ramification is to protect the integrity of holding personnel accountable for activities and resources.

A third type of tool is menu-based automated forecast and decision variations. They too are embedded in the variance report. With them management has many combinations: the herein case makes 32 available. They are originally defined

during the blueprint phase. The menu may be lengthened as the year unfolds and reveals new relevant variations particular to the plant or year.

Any forecast will be affected by the plant's opinion for how spending for the remaining year will shake out. This will usually be the case for only certain activities. In the case, the scenarios are based on activity variance (number of jobs done) for certain work types.

In turn, decisions are made to be compatible with the ramifications of the opinion. The case shows this concept with respect to setting discretionary spending for the subsequent month. A decision is made as a reflection of the opinion and the current spending position of discretionary maintenance.

In the case, examples of menu-driven forecast can be seen in the YTD variance and forecast sections for process and support maintenance.

Trend reports. A component of a cost management system is a report of trends. A trends report is an extension of the monthly variance, forecast and decision report.

A side note. A director of engineering and maintenance said, "It is amazing the number of trends that could be extracted from this document to help improve our maintenance process." His comment demonstrates that cost management is not just about cost, but a powerful necessity for improving overall maintenance and reliability operations.

The variance analysis and forecast report contains such massive amounts of information, that the possibilities for trends are also massive. It follows that the questions that can be asked and answered are almost limitless. Can we see the consequences of a crafts organization strategy in the work efficiency of the crews it was expected to affect? Are we seeing signs of weakening control of overtime by trends in focused work- and discipline-type groups?

With respect to interactive decision-support tools, the previous section spoke of the expectations that some would be formed as ideas and necessity revealed themselves. That is the same for trends since the plant's ability to manage maintenance cost is a process of continual discovery.

Consequently, it is important to note that building individual trends is enabled by a proactive element in the monthly variance, forecast and decision report. Automatically generated databases are placed out of sight within the monthly report's worksheets. They capture all information of the report in the format of a database table.

Each month, as part of the report generation procedure, their content transfers to the database in the trend report. There the data spans multiple months rather than a single month.

Interactive charts are built to utilize the database tables. With them a viewer can select points and time frame of interest.

Because of the open-endedness of the database tables and their availability, the plant can at any time form new interactive charts for newly recognized questions

of interest. Initially, the trends established will most likely match the interactive charts established in the monthly report. The selection of charts will grow as discovery results in new questions to monitor against.

For reasons of confidentially, a trend report is not include in this case. However, visualize the individual charts in the Interactive Charts section of the monthly report if they were given the dimension of time.

Cost management procedures and skills. At the top end of the cost management system are procedures and skills. As components of the system, all procedures are identified during the blueprint phase. Consequently, the previously described components are designed to serve them.

There are several types of procedures according to purpose. Of course, the obvious procedures are those to produce, deliver and review the annual budget and monthly variance, forecast and decision report.

The second type is procedures to manage aspects of the maintenance, production and other operations. If managed well in a particular way, the plant will achieve and sustain optimal overall maintenance cost while improving and protecting plant reliability and condition. Of course this is the ultimate goal of maintenance cost management.

A third type of procedure is to assure that each cost-related management policy is being observed. For example there may be rules for who, what, when and why of a specific work type such as standard work orders. Auditing and enforcing policy is a factor in the plant's ability to reach and exist at optimal total cost. Otherwise, gains made elsewhere never actually make it to the bank.

A fourth type of procedure protects the plant's ability to manage maintenance cost. An example is to frequently audit that specific rules for data reporting are being fulfilled.

Another example is to know that information means what it is intended to mean. For example, does an under run in an activity always mean that less work was needed not that work has been left undone? Furthermore, management wants to know when the latter is the case before the damage is done to the plant or in its ability to manage cost.

A side note. The last two types of procedures have proven to have immediate effect. This is because, as procedures, they are designed with integral activities for assurance through audit and control. The maintenance manager said about one such a case, "I don't want any stinking trend. I just want it fixed." A long standing behavior was fully reversed within two controls weeks and has now been the case for several years.

Integral to procedures as a component of cost management are cost management skills. Initially plants do not actually know how to manage maintenance cost. This is for the simple reason they have never had the opportunity to do so, because they have never had the cost management system through which to gain the experience.

Skills are developed in the context of procedures. They are methodically defined when the procedures are defined. When the plant ultimately executes the procedure it also immediately absorbs, by doing, the skills of the procedure.

For reasons of confidentially, the details of procedures that were designed for the case plant are not included in this case document. The elements of these procedures include an abilities map, procedure flowchart and detail table, policy and control plan to assure performance, measure and audit based reports on the procedure, job descriptions, organizational structure and rewards.

Database access and utilization. Plants capture tremendous amounts of data through all of the management software it utilizes to run its business. Cost management depends on the ability to access, extract and creatively tease insight from all of their databases. With the awareness of available data, the designer thinks like an accountant and behaves like an engineer to design a system of point-by-point solutions to depicting, measuring and managing each cost and its performance.

Therefore, a component of the management system is the tools to access and extract the data. These reach in to any database table and link them together.

These tools are off-the-shelf. One or several typically already exist in plants. One is commonly already installed on every computer. Another is increasingly packaged in the latest versions of leading CMMS.

Essentially, the technology for tapping in to plant data is well developed and relatively user friendly. In fact this evolution has been the gate opened to manage maintenance cost.

These tools have several dimensions. First of course is the ability to link to database tables. Second is the ability to extract and organize possibly hundreds of thousands of data bits into complex assortments. Third is to generate reports and tables that convert the data to information transferable to the algorithms of the budget, variance, forecast and decision report, and procedures.

What plants do now

Normal maintenance cost management has been shaped by the conventional accounting system and the nature of its budgeting and variance reporting. Maintenance and reliability best practices and modern day CMMS have also shaped the perspective.

Since the structure of the accounting system is limited to responsibility centers (cost, profit and investment) and standard plant-wide general ledger accounts (see Figure 1), a majority of the budget is usually a baseline cost estimate per cost center and accounts. This is why plants often describe their budgets as largely the past year adjusted to the next.

These baselines are estimated based on general linkages. Examples are maintenance headcount to production forecast, materials to asset base, or current case and past experience for both. There is little direct cross linkage between the accounts. In contrast to the activity-based approach to cost management, this

body of cost is not estimated around the resources consumed by activities performed to assure plant performance.

Visible individual big-ticket costs or unusual situations are added to the baseline budget. Sometimes these may include focal improvements.

Firms rarely budget uncertainty as a distinctive line item. It is rolled into the baseline budget or included either explicitly or implicitly in the estimate for each big ticket item.

As would be expected, the outcome of this scenario is that the final budget is typically negotiated. Accounting and senior management essentially sit across the table from maintenance. One side probes and cajoles while the other tries to hold the line. Some plants bypass the whole problem by just giving maintenance "their number."

Conventional accounting systems produce variance reports with the normal actual, budget and variance columns for the period and year to date. Figure 1 shows the conventional format.

In contrast to the herein case, the accounting variance report does not provide an adequate picture of what has happened or much guidance for finding the drivers of its summary variances. Nor can they provide a true picture of the expected remaining and full year.

Consequently, with respect to the baseline budget plants either do not forecast or they trend the past months into the remaining year, which does not work. True forecasting is limited to the individual big-ticket items.

Some plants (i.e., Toyota manufacturing) build their budget with improvement targets. In turn, they may present the normal variance columns of the traditional accounting system based on the degree of planned improvement at the month of the report.

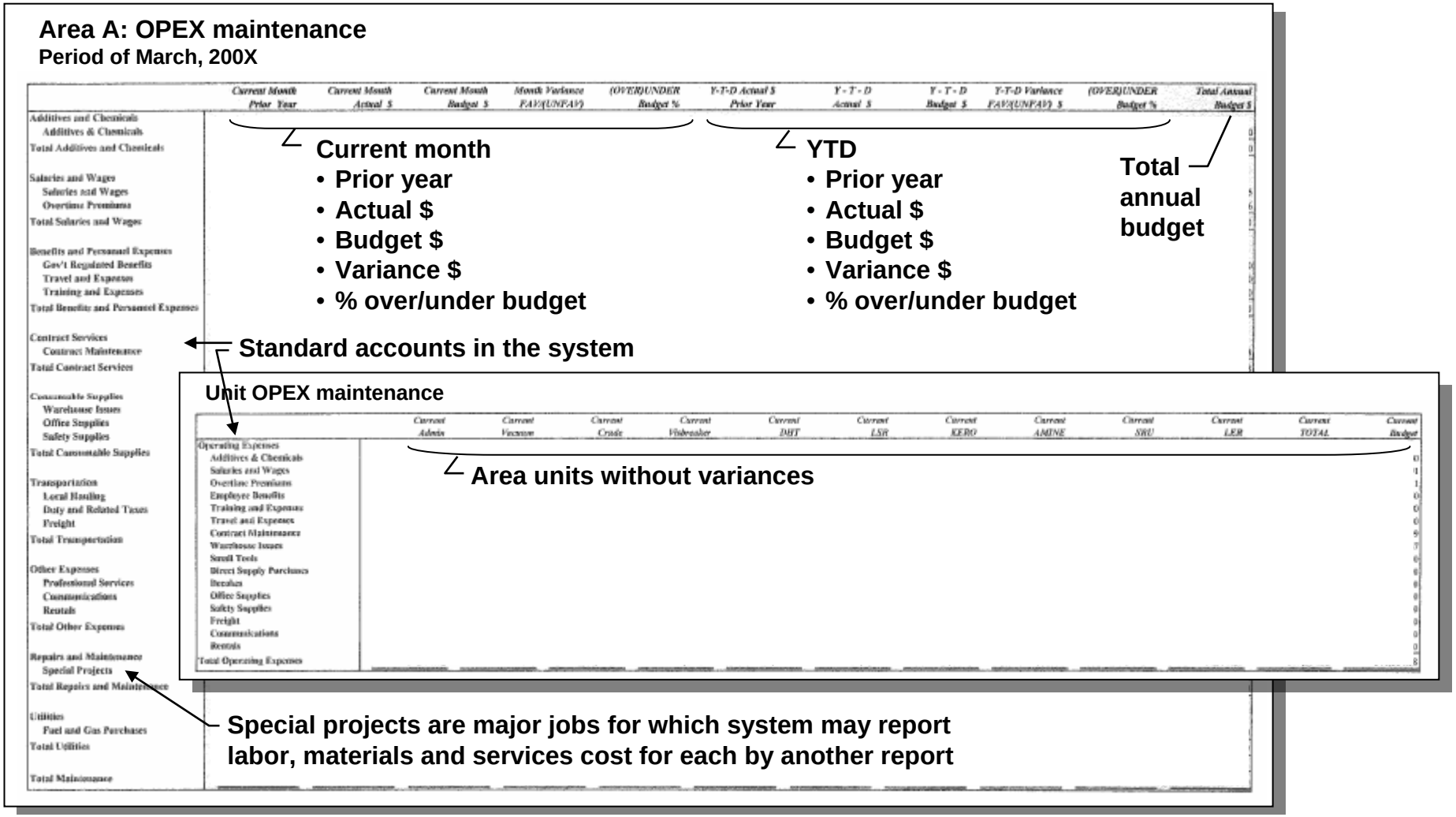
Plants attempt to overcome these limitations by looking to conventional reliability and maintenance best practices and systems. Three perspectives of cost management are typical.

One is that monitoring equipment-specific spending through the CMMS and forming solutions for bad actor equipment is cost management. Another is that the integration of work approval, backlog tracking, job plans, and weekly and daily scheduling is cost management. The third is that special database-direct cost reports are frequently regarded as "we're already managing cost."

Although the outcome is cost improvement, the first practice reports spending in a way that is disconnected from managing maintenance cost based on capacity. Although the second practice matches the resources of existing maintenance capacity to short-term workload, activity-based cost management reaches far beyond with its focus on all costs and the entire fiscal year.

As the ability for cost management is built, the ramifications of the plants existing database-direct reports will become apparent. They will be found to view several tips of a very large iceberg.

Figure 1: Monthly OPEX cost center report from accounting system



Note: The monthly report is an extension the budget accounts and cost centers

Annotated Case

Annual activity-based maintenance budget 200X

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Purpose, confidentiality and warning:

The purpose of this case activtiy-based budget is to give its viewer a vision of annual activity-based budgeting. An activity-based budget of the nature needed to manage maintenance cost is converted to the depth of detail needed to subsequently manage budgeted cost.

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Annotated Case
Maintenance Budget for 200X
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Case note: The worksheets with the factors and calculations for activity and resources drivers that generate the tables of the budget and make it a business model.

Budget Summaries

Introduction: Budget summaries

Summary tables. Budgets look the same. Regardless of appearance, the summary tables of this section is anything but the old way. Two cars can look the same but be very different when we look under their sheet metal. This is the same for the tables that roll up to feed the summary tables; cost center budgets and activity-specfic budgets.

The advancement is substantial for these layered tables of the budget.

First, the tables are the result of identifying all direct and indirect work (activity) tied to sustaining plant safety, reliability and condition.

Second, the tables are the result of analyzing *all* maintenance work types and classes. This is compared to the normal practice of detailing only those that are easily defined and all others are lumped together as a baseline cost.

Third, all activities are costed through the resource they consume and their cost drivers. This is compared to analyzing costs in the context of the labor, materials and services accounts.

Fourth, activity-based analysis through drivers fulfills the ideals of analysis and measurement. The budget process reaches into the plant databases. It uses many methods and tools to analyze and translate the data to engineered conclusions for activity, resource and drivers. The herein case budget drew on approximately 500,000 pieces of data.

Fifth, after the inaugural year of cost management, the budget has the previous years' monthly variance analysis to draw upon. This is important because the data sources do not offer the information and insight that the monthly report does. It structures information in the contexts needed to understand what happened.

These differences, as the background to the tables, allow the budget of the traditional accounting system to reflect an activity-based budget analysis. For example, rather than basing its labor account on employed headcount, the plant can now insert labor based on budgeted activity.

These differences also greatly reduce the traditional confrontation between maintenance on one side and accounting and senior management on the other. This is because the summary tables are the sharp end of “putting a pencil to paper.” The discussion becomes much less negotiation and much more joint decision-making.

Craft headcount profile. The headcount profile report of the budget section is a big advancement from what has been the past. It is far beyond what plants have had to work with. Consequently, management has never been able to validate the employed craft headcount.

The profile is possible because it is possible to link craft resources to activity. We have seen a particular outcome of such a profile. When craft employees resign, retire or change jobs there is always pressure to replace them based on principle. Now management has a sense of legitimate need and is in a position to break with the past in this case and others.

In the graphics and their support table, "Crew based" refers to the crafts employed full time at the time of the budget. "Core" is the activity-based craft profile needed to cover the generally level workload such as PM, corrective, etc. By contrast "major" is the large individual jobs that create spikes in the use of the employed crafts. These spikes affect crew productivity as excess headcount (excess maintenance capacity) is absorbed by core work between spike demands.

The craft profile allows management to view current headcount vis-a-vis core workload and decide the extent it will incur the expense of permanent headcount above that level. This decision will be driven by and made in conjunction with other operational and cost management strategies. The calculator for interrelated operational decisions supports this decision issue (see next section).

Discretionary spending table. The section rolls up all discretionary spending throughout the budget to a single table. This is important for the case plant because it is a significant, adjustable cost. The plant will use it as a knob to turn up and down as each monthly variance, forecast indicates.

It is noteworthy that the budgeted discretionary work has been decreased substantially since the cost management system was first built. The monthly variance report revealed that occurring major jobs were the greatest uncertainty. The discretionary budget reflected an amount to absorb it, because at the time it was unrecognized.

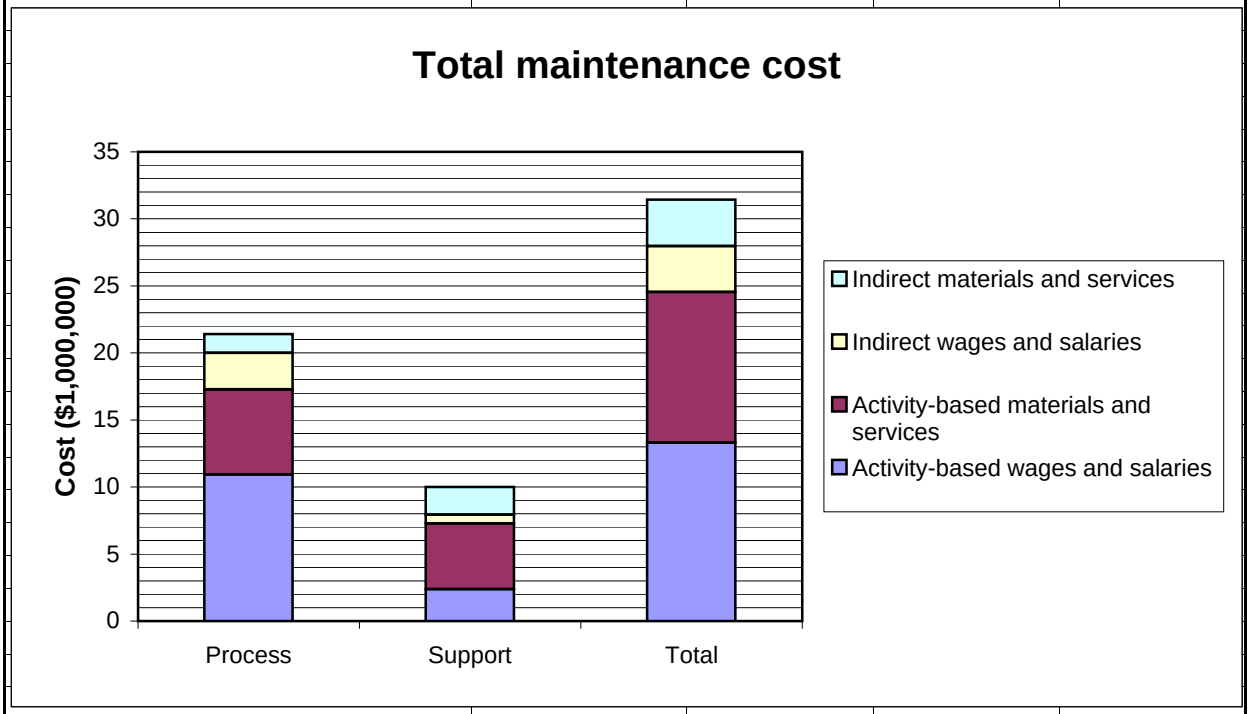
Consequently, this uncertainty was evaluated statistically and made area and class level line items in the budget for major jobs. In turn, the discretionary budget has been moved much closer to the statistical rate that accepted discretionary work orders arise each year.

The budget included discretionary as a work type in the engineered work up for core maintenance referred to above. It is also a subset of most other work types and classes. Thus, the plant can decide to adjust the activity level for some work types and replan specific jobs for other work types.

Total maintenance budget

Maintenance Budget: Summary

Cost category	Maintenance organization: Process	Maintenance organization: Support	Total
Activity-based direct cost			
Wages and salaries	$ 10,924,933	$ 2,374,558	$ 13,299,491
Materials and services	$ 6,345,698	$ 4,898,265	$ 11,243,963
Subtotals	$ 17,270,630	$ 7,272,824	$ 24,543,454
Indirect costs			
Wages and salaries	$ 2,744,720	$ 668,308	$ 3,413,028
Materials and services	$ 1,402,000	$ 2,069,585	$ 3,471,585
Subtotals	$ 4,146,720	$ 2,737,893	$ 6,884,612
Total maintenance 200X	$ 21,417,350	$ 10,010,716	$ 31,428,066



Case note:

Maintenance is organized as two divisions. "Process maintenance" is associated with production, inventory and distribution assets. "Support maintenance" is accountable for buildings, site and hygiene maintenance.

Cost is also organized to distinguish activity-driven cost and all other costs considered as indirect. Activity-driven includes crafts, whereas, indirect includes support and managerial staff.

Process total maintenance

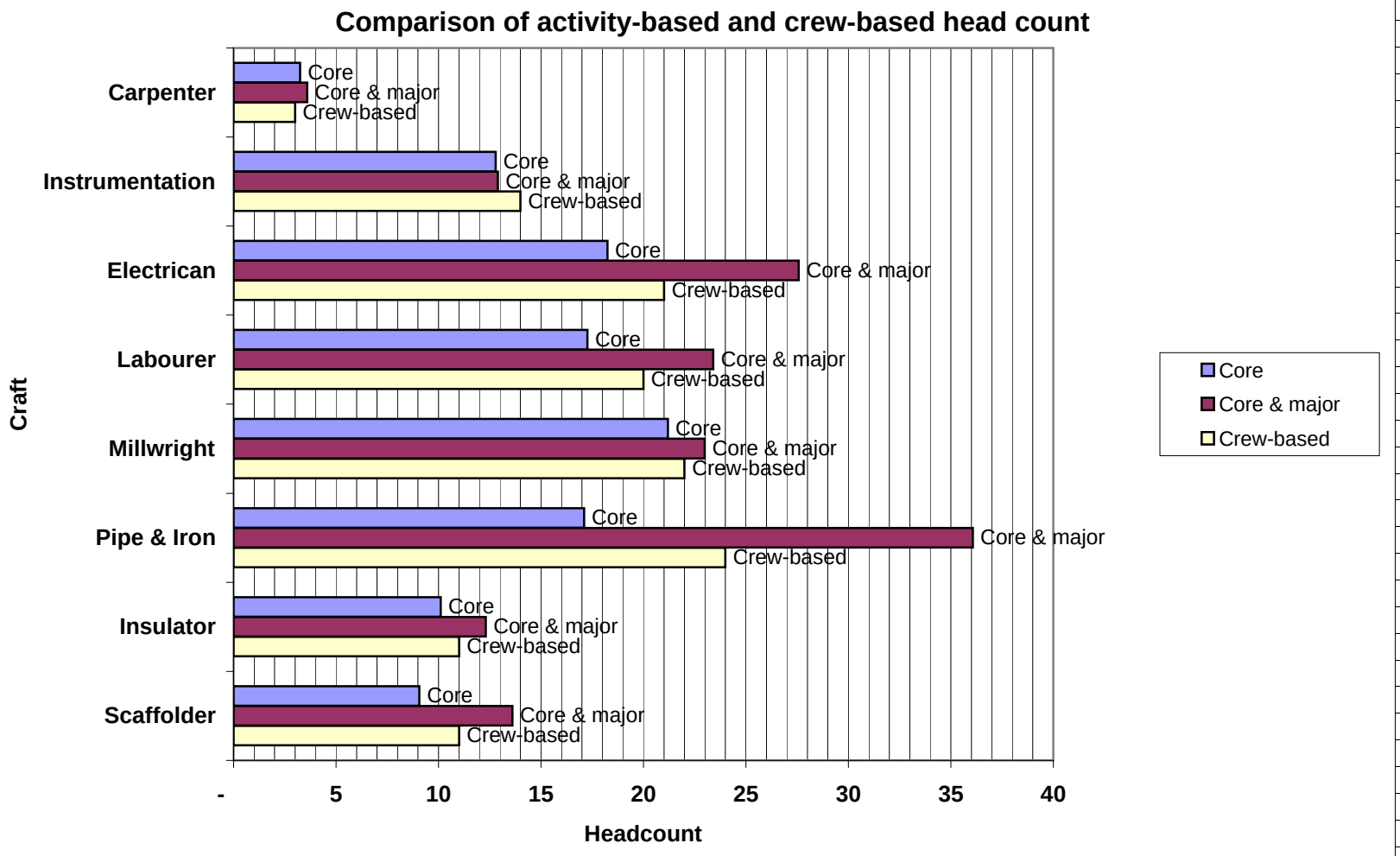
Process Maintenance Budget: Summary						
	Blocks					Total
	A	B	C	O	Rel	
Activity-based salaries and wages						
Salaries & wages	$ 3,026,109	$ 2,992,854	$ 1,632,913	$ 679,392	$ 22,181	$ 8,353,450
Overtime	$ 302,611	$ 299,285	$ 163,291	$ 67,939	$ 2,218	$ 835,345
Benefits	$ 499,308	$ 493,821	$ 269,431	$ 112,100	$ 4,503	$ 1,379,162
Subtotal	$ 3,828,028	$ 3,785,961	$ 2,065,635	$ 859,431	$ 28,902	$ 10,567,958
Wage for craft shifts to directly support to operations						
Salaries & wages	$141,097	$141,097				$282,194
Overtime	$14,110	$14,110				$28,219
Benefits	$23,281	$23,281				$46,562
Subtotal	$178,487	$178,487				$356,975
	68%	= Assumed percent of engagement				
Staff salaries and wages						
Salaries & wages	$ 275,799	$ 311,806	$ 268,387	$ -	$ 1,357,797	$ 2,213,789
Overtime	$ 13,790	$ 16,376	$ 13,419	$ -	$ 67,890	$ 111,475
Benefits	$ 48,099	$ 51,448	$ 44,284	$ -	$ 275,625	$ 419,456
Subtotal	$ 337,688	$ 379,630	$ 326,090	$ -	$ 1,701,311	$ 2,744,720
Total salaries and wages	$ 4,344,203	$ 4,344,079	$ 2,391,726	$ 859,431	$ 1,730,214	$ 13,669,652
Direct materials and services						
Materials	$ 2,025,536	$ 1,958,139	$ 828,644	$ 160,728	$ 40,000	$ 5,013,047
Services	$ 756,940	$ 390,124	$ 141,746	$ 35,839	$ 8,000	$ 1,332,650
Subtotal	$ 2,782,476	$ 2,348,264	$ 970,390	$ 196,567	$ 48,000	$ 6,345,698
Indirect expenses						
Consumables	$ 34,000	$ 37,000	$ 24,000		$ 117,000	$ 212,000
Services	$ 211,000	$ 254,000	$ 173,000		$ 552,000	$ 1,190,000
Total indirect expenses	$ 245,000	$ 291,000	$ 197,000	$ -	$ 669,000	$ 1,402,000
Total process maintenance	$ 7,126,680	$ 6,692,342	$ 3,362,116	$ 1,055,998	$ 1,778,214	$ 20,015,350

Support total maintenance

Support maintenance: Summary									
Wages and direct materials and services									
	Maintenance category							**Staff**	**Total**
	C/E & GS	**Fleet Mnt**	**Equip Ops**	**Clean up**	**Janitors**	**Driver**	**Tool crib**		
Activity-based salaries and wages									
Salaries & wages	$ 707,036	$ 178,030	$ 332,443	$ -	$ 531,814	$ 40,909	$ 61,564		$ 1,851,796
Overtime	$ 70,704	$ 17,803	$ 33,244	$ -	$ 53,181	$ 4,091	$ 6,156		$ 185,180
Benefits	$ 128,893	$ 32,455	$ 60,604	$ -	$ 96,950	$ 7,458	$ 11,223		$ 337,582
Subtotal	$ 906,632	$ 228,288	$ 426,292	$ -	$ 681,946	$ 52,457	$ 78,943		$ 2,374,558
Staff salaries and wages									
Salaries & wages								$ 542,326	$ 542,326
Overtime								$ 27,116	$ 27,116
Benefits								$ 98,866	$ 98,866
Subtotal								$ 668,308	$ 668,308
Materials and services									
Materials	$ 602,841	$ 159,036	$ -	$ -	$ -	$ -	$ -		$ 761,877
Services	$ 4,095,432	$ 40,956	$ -	$ -	$ -	$ -	$ -		$ 4,136,388
Subtotal	$ 4,698,273	$ 199,992	$ -	$ -	$ -	$ -	$ -	$ -	$ 4,898,265
Total directs	$ 5,604,905	$ 428,280	$ 426,292	$ -	$ 681,946	$ 52,457	$ 78,943	$ 668,308	$ 7,941,131
Indirect expenses									
Consumable supplies, and chemicals and additives									$ 866,000
Services, expenses not recorded to direct work orders									$ 1,203,585
Total indirect expenses									$ 2,069,585
Total support maintenance									$ 10,010,716

Activity and crew based headcount

Activity-based and crew-based headcount for primary crafts



Activity and crew based headcount

Primary crafts (See note below)				
	Activity-based headcount			Crew-based
Trade	Core	Major	Core & major	
Scaffolder	9.1	4.5	13.6	11
Insulator	10.1	2.2	12.3	11
Pipe & Iron	17.1	19.0	36.1	24
Millwright	21.2	1.8	23.0	22
Labourer	17.3	6.1	23.4	20
Electrican	18.2	9.3	27.6	21
Instrumentation	12.8	0.1	12.9	14
Carpenter	3.2	0.4	3.6	3
	109.0	43.4	152.5	126

Notes

1. Primary crafts do not include fleet mechanics, equipmenent operators, drivers, tool crib attendant or janitors.
2. "Core" activity is all work except major and program work, the statistically "level" workload.

Case note:

"Crew based" refers to the crafts employed full time at the time of the budget. "Core" is the generally level combined workload such as PM, corrective, etc. By contrast "major" is the large individual jobs that create spikes in the use of crafts including the employed crafts and, in turn, affects crew productivity reflected in hours per job of core workload.

Core and major jobs are both determined by activity-based computation and, thus, this table shows the gap of activity-based budgeting versus rough budgeting based on headcount.

The table and graph allows management to view current headcount vis-a-vis core workload and decide the extent it will incur the expense of permanent headcount above that level. This decision will be driven by and made in conjunction with other operational and cost management strategies. The calculator for interrelated operational decisions supports this decision issue--see section in the budget.

Total discretionary spending

Discretionary spending: Summary				
Discretionary spending by block and category				
Block	**Core**	**Major/Programs**	**Contract Mntc**	**Total**
Process maintenance				
Block A	$ 491,643	$ 43,500		$ 535,143
Block B	$ 379,234	$ 62,929		$ 442,163
Offisites	$ 248,631	$ -		$ 248,631
Block O	$ 105,938	$ -		$ 105,938
Reliabilty	$ -	$ 17,257	$ -	$ 17,257
	$ 1,225,446	$ 123,686	$ -	$ 1,349,132
Support maintenance				
Carp/environ	$ 389,480	$ 2,578,901	$ 16,000	$ 2,984,381
General services	$ 58,630	$ 220,000	$ -	$ 278,630
Fleet	$ 3,106	$ -		$ 3,106
	$ 451,215	$ 2,798,901	$ 16,000	$ 3,266,116
Total discretionary	$ 1,676,661	$ 2,922,587	$ 16,000	$ 4,615,248

Interactive Graphic calculator for strategy decision analysis

Introduction: Interactive graphic calculators for strategy analysis

This section utilizes the Excel-based algorithm as a business model to the annual budget process. With it, maintenance activity, resource, organizational and spending strategies are evaluated for their ramifications to total maintenance cost and, in turn, enterprise profit, profit margin and return on investment (ROI).

Once management makes its final strategy decisions the results are fed back into the budget.

The example interactive model of this section has been set up to jointly evaluate three strategy decisions. They are 1) craft profile, 2) pay increase and 3) overtime. Please note that these are issues selected to demonstrate the model in action rather than the strategic issues of the subject plant.

Variations are placed in the model at the left side of the display. Different craft levels are entered by slider. The productivity knob is adjusted to forecast the productivity of crews. Productivity is affected to the extent that there are personnel regularly employed compared to the activity-based core and peak work load (see discussion in previous section on headcount summary).

Variations are also entered for pay increases and changing overtime. In the first case, pay increase may be included for the subject plant in anticipation of contract negotiations and the need to evaluate proposals. Alternately, a non-union plant may wish to consider pay increases in the upcoming year.

On the right side of the graphic decision-making tool is a dynamic presentation of the results. These results are presented with a range of graphics that most effectively show them.

At the top are actually two graphs, but only one is visible. The viewer would click the button just above to switch between them. One shows headcount profile, the other is a column chart of impact on total maintenance cost, subdivided into the three strategy issues.

Just below is a table showing dollar and percent details. These are linked to the impact of each strategy decision and the decisions collectively.

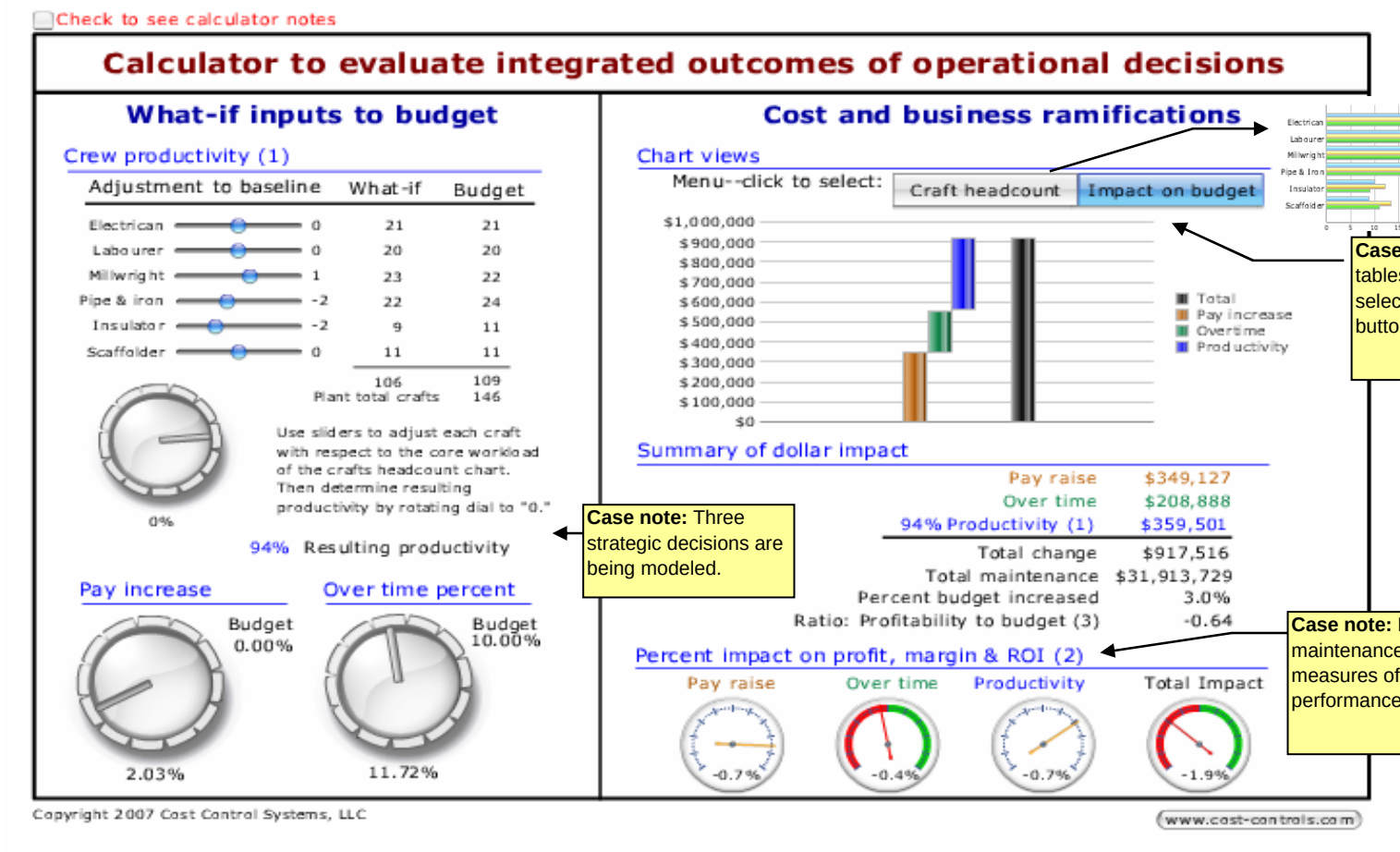
At the bottom of the graphic view are meters for business performance. They show the impact of the current inputs in terms of profit, profit margin and return on investment. Thus, management's final decisions will be linked to their ramifications for business perfformance

At the upper left corner of the model is a means to view the notes that referred to throughout the model. Click the "Check to see calculator notes" and the notes will appear. Click again to make them disappear.

The model is placed in two locations for the herein case. It is shown in this section. However, since the budget has been converted to a PDF file, it is rendered as view only. Therefore, a section following the herein budget provides an operational version.

Calculator to evaluate integrated operational decisions

Interactive graphic calculator for decision-support



Case note: The calculator is rendered non-funtional when this document is converted to an PDF file. In the actual budget it would be active for utilization at budget decision meetings. The final decisions for spending would be sent back into the budget and become the final budget.

Cost center budgets

Introduction: Cost center budgets

For each cost center, this section shows the maintenance budget for the activity-based portion of maintenance cost. Indirect expenses are not part of this section. They roll up to the budget summary from the activity-specific detailed worksheets of the next section.

The section is the detail directly below the summary budget tables. They are fed by the details engineered with respect to the drivers for activities, resources and costs.

The drivers are hidden for reasons of confidentiality. The work type and class specific details are captured in the next section.

Process maintenance direct expenses budget

Process maintenance: Activity-based detailed budget for all direct work categories

Hours: Direct hours time factor for unavailable personnel to reflect true total resources

Payroll: Hours time total hourly rate (wage + overtime + benefits)

Block A

	Jobs forecast		Labor budget		Material & service cost			Total
Work Type	**Mon Avg**	**Year**	**Hours**	**Payroll**	**Material**	**Service**	**M&S**	**PM&S**
Mechanical								
Preventive	67.0	804	6,049	$ 229,567	$ 9,648	$ 1,206	$ 10,854	$ 240,421
Running mandatory	100.0	1,200	33,663	$ 1,277,629	$ 960,000	$ 144,000	$ 1,104,000	$ 2,381,629
Planned major	NA	10	13,247	$ 502,769	$ 80,000	$ 434,500	$ 514,500	$ 1,017,269
Standard WO	1	12	2,210	$ 83,884	$ -	$ -	$ -	$ 83,884
Discretionary	6.2	74	5,750	$ 218,219	$ 221,760	$ 2,218	$ 223,978	$ 442,197
Subtotal	174.2	2,100	60,919	$ 2,312,067	$ 1,271,408	$ 581,924	$ 1,853,332	$ 4,165,399
Electrical								
Preventive	12.0	144	2,938	$ 111,502	$ 1,872	$ 288	$ 2,160	$ 113,662
Running mandatory	67.0	804	6,151	$ 233,458	$ 40,200	$ 8,040	$ 48,240	$ 281,698
Planned major	NA	1	1,889	$ 71,696	$ 29,000	$ -	$ 29,000	$ 100,696
Discretionary	0.9	11	310	$ 11,754	$ 6,336	$ 1,056	$ 7,392	$ 19,146
Subtotal	79.9	960	11,288	$ 428,410	$ 77,408	$ 9,384	$ 86,792	$ 515,202
Instrument								
Preventive	75.0	900	4,250	$ 161,316	$ 35,100	$ 2,700	$ 37,800	$ 199,116
Running mandatory	13.0	156	2,947	$ 111,846	$ 117,000	$ 1,560	$ 118,560	$ 230,406
Planned major	NA	-	-	$ -	$ -	$ -	$ -	$ -
Standard WO	1	12	-	$ -	$ -	$ -	$ -	$ -
Discretionary	0.9	11	206	$ 7,808	$ 21,120	$ 1,373	$ 22,493	$ 30,301
Subtotal	89.9	1,079	7,403	$ 280,970	$ 173,220	$ 5,633	$ 178,853	$ 459,823
Carpentry/Environmental								
Major jobs	NA	1	-	$ -	$ 3,500	$ 40,000	$ 43,500	$ 43,500
Subtotal		1	-	$ -	$ 3,500	$ 40,000	$ 43,500	$ 43,500
Occurring major jobs			21,252	$ 806,581	$ 500,000	$ 120,000	$ 620,000	$ 1,426,581
Block total	344	4,139	100,861	$ 3,828,028	$ 2,025,536	$ 756,940	$ 2,782,476	$ 6,610,504

Process maintenance direct expenses budget

Block B

	Jobs forecast		Labor budget		Material & service cost			Total
Work Type	**Mon Avg**	**Year**	**Hours**	**Payroll**	**Material**	**Service**	**M&S**	**PM&S**
Mechanical								
Preventive	80.0	960	9,793	$ 371,674	$ 76,800	$ 1,920	$ 78,720	$ 450,394
Running mandatory	95.0	1,140	34,887	$ 1,324,088	$ 912,000	$ 136,800	$ 1,048,800	$ 2,372,888
Planned major	NA	4	11,039	$ 418,974	$ 113,500	$ 62,000	$ 175,500	$ 594,474
Standard WO	1	12	2,210	$ 83,884	$ -	$ -	$ -	$ 83,884
Discretionary	6.2	74	2,733	$ 103,743	$ 184,800	$ 48,048	$ 232,848	$ 336,591
Subtotal	182.2	2,190	60,663	$ 2,302,363	$ 1,287,100	$ 248,768	$ 1,535,868	$ 3,838,231
Electrical								
Preventive	9.0	108	1,928	$ 73,173	$ 864	$ 216	$ 1,080	$ 74,253
Running mandatory	60.0	720	5,968	$ 226,489	$ 36,000	$ 5,040	$ 41,040	$ 267,529
Planned major	NA	1	1,889	$ 71,696	$ 29,000	$ 3,500	$ 32,500	$ 104,196
Discretionary	1.8	21	636	$ 24,122	$ 1,267	$ 422	$ 1,690	$ 25,811
Subtotal	70.8	850	10,420	$ 395,480	$ 67,131	$ 9,178	$ 76,310	$ 471,789
Instrument								
Preventive	63.0	756	3,213	$ 121,955	$ 52,920	$ 1,134	$ 54,054	$ 176,009
Running mandatory	21.0	252	3,868	$ 146,798	$ 194,040	$ 2,016	$ 196,056	$ 342,854
Planned major	NA	-	-	$ -	$ -	$ -	$ -	$ -
Standard WO	1	12	-	$ -	$ -	$ -	$ -	$ -
Discretionary	0.9	11	207	$ 7,855	$ 8,448	$ 528	$ 8,976	$ 16,831
Subtotal	85.9	1,031	7,288	$ 276,608	$ 255,408	$ 3,678	$ 259,086	$ 535,694
Carpentry/Environmental								
Major jobs	NA	2	130	$ 4,929	$ 10,500	$ 47,500	$ 58,000	$ 62,929
Subtotal		2	130	$ 4,929	$ 10,500	$ 47,500	$ 58,000	$ 62,929
Occurring major jobs			21,252	$ 806,581	$ 338,000	$ 81,000	$ 419,000	$ 1,225,581
Block total	339	4,073	99,753	$ 3,785,961	$ 1,958,139	$ 390,124	$ 2,348,264	$ 6,134,225

Process maintenance direct expenses budget

Block Offisites									
	Jobs forecast		Labor budget		Material & service cost			Total	
Work Type	Mon Avg	Year	Hours	Payroll	Material	Service	M&S	PM&S	
Mechanical									
Preventive	72.0	864	5,354	$ 203,213	$ 4,320	$ 1,296	$ 5,616	$ 208,829	
Running mandatory	58.0	696	21,211	$ 805,022	$ 372,360	$ 41,760	$ 414,120	$ 1,219,142	
Planned major	NA	2	1,913	$ 72,592	$ 44,000	$ 21,000	$ 65,000	$ 137,592	
Standard WO	1	12	1,148	$ 43,555	$ -	$ -	$ -	$ 43,555	
Discretionary	7.0	84	3,566	$ 135,326	$ 59,136	$ 5,914	$ 65,050	$ 200,376	
Subtotal	138.0	1,658	33,191	$ 1,259,709	$ 479,816	$ 69,970	$ 549,786	$ 1,809,494	
Electrical									
Preventive	9.0	108	1,818	$ 68,992	$ 1,080	$ 108	$ 1,188	$ 70,180	
Running mandatory	31.0	372	3,273	$ 124,220	$ 18,972	$ 3,720	$ 22,692	$ 146,912	
Planned major	NA	1	2,243	$ 85,139	$ 31,000	$ -	$ 31,000	$ 116,139	
Discretionary	0.9	11	283	$ 10,732	$ 6,336	$ 845	$ 7,181	$ 17,913	
Subtotal	40.9	492	7,617	$ 289,083	$ 57,388	$ 4,673	$ 62,061	$ 351,144	
Instrument									
Preventive	25.0	300	1,665	$ 63,182	$ 7,200	$ 900	$ 8,100	$ 71,282	
Running mandatory	7.0	84	987	$ 37,452	$ 8,400	$ 4,620	$ 13,020	$ 50,472	
Planned major	NA	-	-	$ -	$ -	$ -	$ -	$ -	
Standard WO	1	12	-	$ -			$ -	$ -	
Discretionary	0.9	11	340	$ 12,918	$ 15,840	$ 1,584	$ 17,424	$ 30,342	
Subtotal	33.9	407	2,992	$ 113,553	$ 31,440	$ 7,104	$ 38,544	$ 152,097	
Occurring major jobs			10,626	$ 403,290	$ 260,000	$ 60,000	$ 320,000	$ 723,290	
Block total	213	2,557	54,426	$ 2,065,635	$ 828,644	$ 141,746	$ 970,390	$ 3,036,026	

Process maintenance direct expenses budget

Block O--Process									
	Jobs forecast		Labor budget		Material & service cost			Total	
Work Type	Mon Avg	Year	Hours	Payroll	Material	Service	M&S	PM&S	
Mechanical									
Preventive	4.0	48	257	$ 9,756	$ 144	$ 48	$ 192	$ 9,948	
Running mandatory	4.0	48	832	$ 31,592	$ 11,040	$ 1,680	$ 12,720	$ 44,312	
Planned major	NA	-	-	$ -	$ -	$ -	$ -	$ -	
Standard WO	1	12	-	$ -	$ -	$ -	$ -	$ -	
Discretionary	3.5	42	657	$ 24,939	$ 25,344	$ 16,896	$ 42,240	$ 67,179	
Subtotal	12.5	150	1,747	$ 66,288	$ 36,528	$ 18,624	$ 55,152	$ 121,440	
Electrical									
Preventive	22.0	264	5,756	$ 218,474	$ 3,168	$ 528	$ 3,696	$ 222,170	
Running mandatory	28.0	336	2,956	$ 112,199	$ 40,320	$ 13,440	$ 53,760	$ 165,959	
Planned major	NA	-	-	$ -	$ -	$ -	$ -	$ -	
Standard WO	1	12	3,542	$ 134,430	$ -	$ -	$ -	$ 134,430	
Discretionary	1.8	21	400	$ 15,178	$ 4,224	$ 845	$ 5,069	$ 20,247	
Subtotal	52.8	633	12,655	$ 480,282	$ 47,712	$ 14,813	$ 62,525	$ 542,807	
Instrument									
Preventive	81.0	972	6,771	$ 256,977	$ 29,160	$ 972	$ 30,132	$ 287,109	
Running mandatory	8.0	96	1,371	$ 52,051	$ 33,600	$ 480	$ 34,080	$ 86,131	
Planned major	NA	-	-	$ -	$ -	$ -	$ -	$ -	
Discretionary	0.9	11	101	$ 3,833	$ 13,728	$ 950	$ 14,678	$ 18,511	
Subtotal	89.9	1,079	8,243	$ 312,861	$ 76,488	$ 2,402	$ 78,890	$ 391,751	
Block total	155	1,862	22,644	$ 859,431	$ 160,728	$ 35,839	$ 196,567	$ 1,055,998	
Total A, B, C and O	1,051	12,630	277,684	$ 10,539,055	$ 4,973,047	$ 1,324,650	$ 6,297,698	$ 16,836,753	

Process maintenance direct expenses budget

Reliability

	Jobs forecast		Labor budget		Material & service cost			Total
Work Type	**Mon Avg**	**Year**	**Hours**	**Payroll**	**Material**	**Service**	**M&S**	**PM&S**
Mechanical								
Preventive	NA	-	-	$ -	$ -	$ -	$ -	$ -
Planned major			112	$ 4,257	$ 13,000	$ -	$ 13,000	$ 17,257
Subtotal	-	-	112	$ 4,257	$ 13,000	$ -	$ 13,000	$ 17,257
Electrical								
Planned major	NA	-	649	$ 24,646	$ 27,000	$ 8,000	$ 35,000	$ 59,646
Subtotal		-	649	$ 24,646	$ 27,000	$ 8,000	$ 35,000	$ 59,646
Carpentry/Environmental								
Major jobs	NA	-	-	$ -	$ -	$ -	$ -	$ -
Subtotal		-	-	$ -	$ -	$ -	$ -	$ -
Block total	-	-	762	$ 28,902	$ 40,000	$ 8,000	$ 48,000	$ 76,902

Summary for process maintenance

	Jobs forecast		Labor budget		Material & service cost			Total
Work Type	**Mon Avg**	**Year**	**Hours**	**Payroll**	**Material**	**Service**	**M&S**	**PM&S**
Total Process	1,051	12,630	278,446	$ 10,567,958	$ 5,013,047	$ 1,332,650	$ 6,345,698	$ 16,913,655
Total major jobs			86,241	$ 3,273,150	$ 1,478,500	$ 877,500	$ 2,356,000	$ 5,629,150
Total discretionary								
Per blocks	32	380	15,188	$ 576,428	$ 568,339	$ 80,678	$ 649,018	$ 1,225,446
Per major jobs			242	$ 9,186	$ 27,000	$ 87,500	$ 114,500	$ 123,686
	32	380	15,430	$ 585,614	$ 595,339	$ 168,178	$ 763,518	$ 1,349,132

Case note:

The plant has many more work types and classes than shown in the detailed budget table. The distinctions are needed to manage the maintenance process, but undermine the ability to manage cost management. According the detail of this budget extracts plant data and combines them to a level suiting cost management. This is the case for both process and support maintenance.

Support maintenance direct expenses budget

Support maintenance: Activity-based detailed budget for all direct work categories

Hours: Direct hours time factor for unavailable personnel to reflect true total resources

Payroll: Hours time total hourly rate (wage + overtime + benefits)

	Jobs forecast		Labor budget		Material & service cost			Total
Work Type	**Mon Avg**	**Year**	**Hours**	**Payroll**	**Material**	**Service**	**M&S**	**PM&S**
Carp/Env								
Preventive	2.0	24	116	$ 4,409	$ 72	$ 24	$ 96	$ 4,505
Running mandatory	20.0	240	4,930	$ 187,127	$ 38,400	$ 19,200	$ 57,600	$ 244,727
Programs		5	4,345	$ 164,901	$ 167,000	$ 2,247,000	$ 2,414,000	$ 2,578,901
Discretionary	19.4	232	6,528	$ 247,764	$ 83,635	$ 58,080	$ 141,715	$ 389,480
Subtotal	41.4	501	15,920	$ 604,202	$ 289,107	$ 2,324,304	$ 2,613,411	$ 3,217,613
GenServ								
Preventive	23.0	276	1,662	$ 63,075	$ 414	$ 552	$ 966	$ 64,041
Running mandatory	14.0	168	2,202	$ 83,562	$ 50,400	$ 218,400	$ 268,800	$ 352,362
Programs		8	3,353	$ 127,261	$ 255,000	$ 1,530,000	$ 1,785,000	$ 1,912,261
Discretionary	2.6	32	752	$ 28,534	$ 7,920	$ 22,176	$ 30,096	$ 58,630
Subtotal	39.6	484	7,968	$ 302,431	$ 313,734	$ 1,771,128	$ 2,084,862	$ 2,387,293
Fleet								
Preventive	75.0	900	2,922	$ 110,905	$ 1,980	$ 900	$ 2,880	$ 113,785
Running mandatory	65.0	780	3,067	$ 116,390	$ 156,000	$ 39,000	$ 195,000	$ 311,390
Programs		-	-	$ -	$ -	$ -	$ -	$ -
Discretionary	0.9	11	26	$ 994	$ 1,056	$ 1,056	$ 2,112	$ 3,106
Subtotal	140.9	1,691	6,015	$ 228,288	$ 159,036	$ 40,956	$ 199,992	$ 428,280
Standard work orders								
Equipment operator	NA	NA	11,232	$ 426,292	$ -	$ -	$ -	$ 426,292
Janitors	NA	NA	27,040	$ 681,946	$ -	$ -	$ -	$ 681,946
Tool crib attendant	NA	NA	2,080	$ 78,943	$ -	$ -	$ -	$ 78,943
Repairs to mobile equipme	NA	NA	-	$ -	$ -	$ -	$ -	$ -
Bus driver	NA	NA	2,080	$ 52,457	$ -	$ -	$ -	$ 52,457
General site clean up	NA	NA	-	$ -	$ -	$ -	$ -	$ -
Subtotal			42,432	$ 1,239,638	$ -	$ -	$ -	$ 1,239,638
Block total	222	2,676	72,335	$ 2,374,558	$ 761,877	$ 4,136,388	$ 4,898,265	$ 7,272,824

Support maintenance direct expenses budget

Summary for support

	Jobs forecast		Labor budget		Material & service cost			Total
Work Type	**Mon Avg**	**Year**	**Hours**	**Payroll**	**Material**	**Service**	**M&S**	**PM&S**
Total Support	222	2,676	72,335	$ 2,374,558	$ 761,877	$ 4,136,388	$ 4,898,265	$ 7,272,824
Total programs	-	13	7,698	$ 292,162	$ 422,000	$ 3,777,000	$ 4,199,000	$ 4,491,162
Total discretionary								
Per blocks	23	275	7,306	$ 277,292	$ 92,611	$ 81,312	$ 173,923	$ 451,215
Per programs			4,345	$ 164,901	$ 387,000	$ 2,247,000	$ 2,634,000	$ 2,798,901
	23	275	11,651	$ 442,193	$ 479,611	$ 2,328,312	$ 2,807,923	$ 3,250,116

Activity-specific budgets

Introduction: Activity-specific details

This section of the budget captures the activity-specific detail as a worksheet for each work type. The detail of direct activities flows upward to the previous section. Indirect expenses flow directly to the budget summary tables.

All work types are shown as individual jobs, except for preventive, running mandatory and discretionary maintenance. These are statistical, thus, the table shows the job activity, hours, materials and services as factors. The factors are based on logrithmic statistical analysis, analysis of previous variance analysis reports and expectations for the plant's planned production profile for the year.

The hours of this work type for mechanical and electrical are affected by the full time employed headcount. A push-button tool is built into the worksheet to compute a resulting efficiency less than 100 percent.

Input engineered for statistical jobs

Preventive, running mandatory and discretionary

108%	= Process efficiency factor--electrical and mechanical	
100%	= Process efficiency factor--instrumentation	
100%	= Support efficiency factor	
92.6%	Crew efficiency: In budget	
92.6%	Crew efficiency: From what-if Productivity	
0.0%	Delta = 0 for trial and error calculation	

Case note: Push button runs the calculation.

Compute crew efficiency

Case note: In this plant, crew efficiency is driven by the extent that the plant has full time headcount in excess of the activity-based headcount for its core activity level. Accordingly, headcount is at times excessive and absorbed by core work, affecting average hours per job. As the full time crew decision for the year is set by plant management, the "Compute crew efficiency" button will determine efficiency with a trail-and-error. The result will then increase average hours per job-efficiency in the table . This element is also included in the interactive cost strategy analysis model.

Block A

	Per month		Avg hours per job			
Work class and type	**Jobs**	**Hours**	**History**	**Efficiency**	**Matl/job**	**Serv/job**
Mechanical						
Preventive	67.0	426.93	**5.90**	6.37	**12.0**	**1.5**
Running mandatory	**100.0**	2376.01	**22.00**	23.76	**800.0**	**120.0**
Discretionary	6.16	405.82	**61.00**	65.88	**3,000.0**	**30.0**
Subtotal	173.2	3208.8	88.90	96.01	3,812	152
Electrical						
Preventive	12.0	207.36	**16.00**	17.28	**13**	**2**
Running mandatory	**67.0**	434.16	**6.00**	6.48	**50**	**10**
Discretionary	0.8800	21.86	**23.00**	24.84	**600**	**100**
Subtotal	79.9	663.4	45.00	49	663	112
Instrument						
Preventive	75.0	300.00	**4.00**	4.00	**39**	**3**
Running mandatory	**13.0**	208.00	**16.00**	16.00	**750**	**10**
Discretionary	0.9	14.52	**16.50**	16.50	**2,000**	**130**
Subtotal	88.9	522.5	36.5	36.50	2,789	143
Block total	341.9	4394.7	170.40	181.11	7,264	407

Case note: The same table exists for each block. All are not shown in this case.

Process major jobs

Process mainenance: Planned and occurring major jobs

Dir Hrs: Hours worked on the subject job

Hours: Direct hours time factor for unavailable personnel to reflect true total resources

Payroll: Hours time total hourly rate (wage + overtime + benefits)

Case note: The line items are specific programs . Their description has been removed for confidentiality.

Block A

	Dir Hrs	Labor budget		Material & Service cost			Total
Work description		**Hours**	**Payroll**	**Matl**	**Service**	**M&S**	**PM&S**
Mechanical							
Preventive							
Job 1 (description confidential)	900	1,063	$ 40,329	$ 20,000	$ 5,000	$ 25,000	$ 65,329
Subtotal work type	900	1,063	$ 40,329	$ 20,000	$ 5,000	$ 25,000	$ 65,329
Planned mandatory							
Job 2a (description confidential)	1,800	2,125	$ 80,658	$ 15,000	$ 95,000	$ 110,000	$ 190,658
Job 2b (description confidential)	1,900	2,243	$ 85,139	$ 15,000	$ 100,000	$ 115,000	$ 200,139
Job 3 (description confidential)	1,700	2,007	$ 76,177	$ 15,000	$ 95,000	$ 110,000	$ 186,177
Job 4 (description confidential)	2,100	2,479	$ 94,101	$ 15,000	$ 100,000	$ 115,000	$ 209,101
Job 5 (description confidential)	600	708	$ 26,886		$ 7,500	$ 7,500	$ 34,386
Job6 (description confidential)	700	826	$ 31,367		$ 20,000	$ 20,000	$ 51,367
Job 7 (description confidential)	480	567	$ 21,509	$ -	$ 5,000	$ 5,000	$ 26,509
Job 8 (description confidential)	490	579	$ 21,957	$ -	$ 5,000	$ 5,000	$ 26,957
Job 9 (description confidential)	550	649	$ 24,646	$ -	$ 2,000	$ 2,000	$ 26,646
Subtotal work type	10,320	12,184	462,440	60,000	429,500	489,500	951,940
Subtotal mechanical	11,220	13,247	502,769	80,000	434,500	514,500	1,017,269
Electrical							
Running mandatory							
Job 10 (description confidential)	1,600	1,889	$ 71,696	$ 29,000		$ 29,000	$ 100,696
Subtotal work type	1,600	1,889	$ 71,696	$ 29,000	$ -	$ 29,000	$ 100,696
Subtotal electrical	1,600	1,889	$ 71,696	$ 29,000	$ -	$ 29,000	$ 100,696

Process major jobs

Carpentry/Environmental								
Discretionary								
Job 11 (description confidential)		-	$ -	$ 3,500	$ 40,000	$ 43,500	$ 43,500	
Subtotal work type	-	-	$ -	$ 3,500	$ 40,000	$ 43,500	$ 43,500	
Subtotal carp/environ	-	-	$ -	$ 3,500	$ 40,000	$ 43,500	$ 43,500	
Occurring jobs	18,000	21,252	$ 806,581	$ 500,000	$ 120,000	$ 620,000	$ 1,426,581	
Total block A	30,820	36,388	$ 1,381,046	$ 612,500	$ 594,500	$ 1,207,000	$ 2,588,046	

Case note: The same table exists for each block. All are not shown in this case.

Support programs

Support maintenance: Programs							
Dir Hrs: Hours worked on the subject job							
Hours: Direct hours time factor for unavailable personnel to reflect true total resources							
Payroll: Hours time total hourly rate (wage + overtime + benefits)							

Case note: The line items are specific programs . Their description has been removed for confidentiality.

	Dir Hrs	**Labor budget**		**Material & Service cost**			**Total**
Work description		**Hours**	**Payroll**	**Matl**	**Service**	**M&S**	**PM&S**
Carpentry/environmental							
Preventive							
None	-	-	$ -	$ -	$ -	$ -	$ -
Subtotal work type	-	-	$ -	$ -	$ -	$ -	$ -
Discretionary							
Program 1 (confidential)	650	767	$ 29,127	$ 7,000	$ 2,200,000	$ 2,207,000	$ 2,236,127
Program 2 (confidential)	2,300	2,716	$ 103,063	$ 100,000	$ 47,000	$ 147,000	$ 250,063
Program 3 (confidential)	730	862	$ 32,711	$ 60,000	$ -	$ 60,000	$ 92,711
Subtotal work type	3,680	4,345	$ 164,901	$ 167,000	$ 2,247,000	$ 2,414,000	$ 2,578,901
Subtotal Carpentry/environmental	3,680	4,345	$ 164,901	$ 167,000	$ 2,247,000	$ 2,414,000	$ 2,578,901
General services							
Preventive							
Program 4 (confidential)	250	295	$ 11,203	$ -	$ 1,300,000	$ 1,300,000	$ 1,311,203
Program 5 (confidential)	1,750	2,066	$ 78,418	$ 35,000	$ -	$ 35,000	$ 113,418
Subtotal work type	2,000	2,361	$ 89,620	$ 35,000	$ 1,300,000	$ 1,335,000	$ 1,424,620
Running mandatory							
Program 6 (confidential)	840	992	$ 37,640		$ 65,000	$ 65,000	$ 102,640
Program 7 (confidential)		-	$ -		$ 165,000	$ 165,000	$ 165,000
Subtotal work type	840	992	$ 37,640	$ -	$ 230,000	$ 230,000	$ 267,640
Discretionary							
Program 8 (confidential)				$ 220,000		$ 220,000	$ 220,000
Subtotal work type	-	-	$ -	$ 220,000	$ -	$ 220,000	$ 220,000
Subtotal general services	2,840	3,353	$ 127,261	$ 255,000	$ 1,530,000	$ 1,785,000	$ 1,912,261
Total Support maintenance programs	6,520	7,698	$ 292,162	$ 422,000	$ 3,777,000	$ 4,199,000	$ 4,491,162
Total discretionary	3,680	4,345	$ 164,901	$ 387,000	$ 2,247,000	$ 2,634,000	$ 2,798,901

Process maintenance: Standard work orders						
Dir Hrs: Hours worked on the job						
Dir $: Total cost of the hours (wage + overtime + benefits)						
Payroll $: Multiplies Dir $ by factor for unavailable personnel factor to reflect true cost of work						
Work order details						
	Labor Budget			**Material & Service cost**		**Total**
Block and description	**Dir Hrs**	**Dir $**	**Payroll $**	**Matl**	**Service**	**cost**
Block A						
Mechanical						
Vibration analysis	1,872	$ 71,049	$ 83,884			$ 83,884
Instrument						
Support operations	-	$ -	$ -			$ -
Total Block A	1,872	$ 71,049	$ 83,884			$ 83,884
Block B						
Mechanical						
Vibration analysis	1,872	$ 71,049	$ 83,884			$ 83,884
Instrument						
Support operations	-	$ -	$ -			$ -
Total Block B	1,872	$ 71,049	$ 83,884			$ 83,884
Offsites						
Mechanical						
Vibration analysis	972	$ 36,891	$ 43,555			$ 43,555
Instrument						
Support operations	-	$ -	$ -			$ -
Total Offsites	972	36,891	43,555			$ 43,555
Block O						
Mechanical						
Machine shop	-	$ -	$ -			$ -
Electrical						
Check out substantions	3,000	$ 113,860	$ 134,430			$ 134,430
Total Block O	3,000	$ 113,860	$ 134,430			$ 134,430
Process Grand Total	7,716	$ 292,848	$ 345,754			$ 345,754

Process standard work orders

Summary						
	Labor Budget			Material & Service cost		Total
Description	Dir Hrs	Dir $	Payroll $	Matl	Service	cost
Summary by work class						
Mechanical	4,716	$ 178,988	$ 211,324	NA	NA	$ 211,324
Electrical	3,000	$ 113,860	$ 134,430	NA	NA	$ 134,430
Instrument	-	$ -	$ -	NA	NA	$ -
Total by work class	7,716	$ 292,848	$ 345,754			$ 345,754
Summary by work order						
Vibration	4,716	$ 178,988	$ 211,324	NA	NA	$ 211,324
Instrument support to ope	-	$ -	$ -	NA	NA	$ -
Electrical substantion che	3,000	$ 113,860	$ 134,430	NA	NA	$ 134,430
Machine shop	-	$ -	$ -	NA	NA	$ -
Total by work order	7,716	$ 292,848	$ 345,754			$ 345,754

Case note:
For confidentiality, the input and analysis tables below these table are hidden from access for this case.

Support standard work orders

Support maintenance: Standard work orders

Dir Hrs: Hours worked on the job

Hours: Direct hours time factor for unavailable personnel to reflect true total resources

Payroll: Hours time total hourly rate (wage + overtime + benefits)

	Dir Hrs	Labor budget		Material & Service cost			Total
Work description		**Hours**	**Payroll**	**Matl**	**Service**	**M&S**	**PM&S**
Equipment operator	9,513	11,232	$ 426,292			$ -	$ 426,292
Janitors	22,902	27,040	$ 681,946			$ -	$ 681,946
Tool crib attendant	1,762	2,080	$ 78,943			$ -	$ 78,943
Repairs to mobile equipment	-	-	$ -			$ -	$ -
Bus driver	1,762	2,080	$ 52,457			$ -	$ 52,457
General site clean up	-	-	$ -			$ -	$ -
Total annual hours	35,939	42,432	1,239,638			-	1,239,638

Case note:
For confidentiality, the input and analysis tables below these table are hidden from access for this case.

Contract maintenance: process and support

Contract maintenance: Process and Support							
Dir Hrs: Hours worked on the job							
Hours: Direct hours time factor for unavailable personnel to reflect true total resources							
Payroll: Hours time total hourly rate (wage + overtime + benefits)							
Reliability							
	Dir Hrs	**Labor budget**		**Material & Service cost**			**Total**
Work description		**Hours**	**Payroll**	**Matl**	**Service**	**M&S**	**PM&S**
Mechanical							
Preventive							
Lube Oil Analysis		-	$ -		$ 17,000	$ 17,000	$ 17,000
Support agreemnt		-	$ -	$ -	$ 11,000	11,000	$ 11,000
Subtotal work type	-	-	-	-	28,000	28,000	28,000
Subtotal mechanical	-	-	-	-	28,000	28,000	28,000
Electrical							
Preventive							
Transformer Service Contract		-	$ -		$ 9,000	9000	$ 9,000
IR inspection of switchgear		-	$ -		$ 7,000	7000	$ 7,000
UPS Service Contract		-	$ -		$ 14,000	14000	$ 14,000
Fire Alarm Service Contract		-	$ -		$ 8,000	8000	$ 8,000
Fence line security		-	$ -	$ -	$ 56,000	56,000	$ 56,000
Subtotal work type	-	-	-	-	94,000	94,000	94,000
Subtotal electrical	-	-	$ -	$ -	$ 94,000	$ 94,000	$ 94,000
Total Reliability	-	-	$ -	$ -	$ 122,000	$ 122,000	$ 122,000
Total process contract maintenance	-	-	$ -	$ -	$ 122,000	$ 122,000	$ 122,000
Total discretionary	-	-	-	-	-	-	-

Contract maintenance: process and support

Carpentry/environmental and general services							
	Dir Hrs	Labor budget		Material & Service cost			Total
Work description		Hours	Payroll	Matl	Service	M&S	PM&S
Carpentry/environmental							
Preventive							
None	-	-	$ -	$ -		$ -	$ -
Subtotal work type	-	-	$ -	$ -	$ -	$ -	$ -
Discretionary							
Specialty overhead door maintenance	-	-	$ -	$ -	$ 16,000	$ 16,000	$ 16,000
Subtotal work type	-	-	$ -	$ -	$ 16,000	$ 16,000	$ 16,000
Subtotal Carpentry/environmental	-	-	$ -	$ -	$ 16,000	$ 16,000	$ 16,000
General services							
Preventive							
Contract (confidential)	80	94	$ 3,585	$ 42,000	$ 93,000	$ 135,000	$ 138,585
Pest control contract	-	-	$ -	$ -	$ 12,000	$ 12,000	$ 12,000
Subtotal work type	80	94	$ 3,585	$ 42,000	$ 105,000	$ 147,000	$ 150,585
Running mandatory							
Snowclearing/ice control	-	-	$ -	$ -	$ 103,000	$ 103,000	$ 103,000
Dump fees	-	-	$ -	$ -	$ 105,000	$ 105,000	$ 105,000
Subtotal work type	-	-	$ -	$ -	$ 208,000	$ 208,000	$ 208,000
Discretionary							
None	-	-	$ -	$ -	$ -	$ -	$ -
Subtotal work type	-	-	$ -	$ -	$ -	$ -	$ -
Subtotal general services	80	94	$ 3,585	$ 42,000	$ 313,000	$ 355,000	$ 358,585
Total Support contract maintenance	80	94	$ 3,585	$ 42,000	$ 329,000	$ 371,000	$ 374,585
Total discretionary	-	-	$ -	$ -	$ 16,000	$ 16,000	$ 16,000

Case note:
The line items are specific contracts. For some the description has been removed for confidentiality.

Indirect expenses: process and support

Total indirect materials and services

Consumable supplies, and chemicals and additives

Item	A	B	C	O	Reliability	Total
Small tools	$ 8,000	$ 8,000	$ 5,000	$ 150,000		$ 171,000
Office supplies	$ -	$ -	$ -	$ 2,000	$ 7,000	$ 9,000
Safety supplies	$ 12,000	$ 15,000	$ 9,000	$ 14,000	$ 110,000	$ 160,000
Chems and additives	$ 14,000	$ 14,000	$ 10,000	$ -		$ 38,000
Fuel and gas	$ -	$ -	$ -	$ 700,000		$ 700,000
Total supplies	$ 34,000	$ 37,000	$ 24,000	$ 866,000	$ 117,000	$ 1,078,000

Services, expenses not recorded to direct work orders

Item	A	B	C	O	Reliability	Total
Freight/duty and related taxes	$ 19,000	$ 75,000	$ 19,000	$ 12,000	$ 10,000	$ 135,000
Cleaning	$ -	$ -	$ -	$ 140,000		$ 140,000
Rentals	$ 175,000	$ 160,000	$ 110,000	$ 300,000	$ 80,000	$ 825,000
Travel and expenses	$ 5,000	$ 7,000	$ 3,000	$ 8,000	$ 8,000	$ 31,000
Fees and license	$ -	$ -	$ -	$ 20,000	$ 80,000	$ 100,000
Training and expenses	$ 10,000	$ 10,000	$ 40,000	$ 35,000	$ 15,000	$ 110,000
Contract maintenance				$ 374,585	$ 122,000	$ 496,585
Communications	$ 2,000	$ 2,000	$ 1,000	$ 4,000	$ 7,000	$ 16,000
Mobile equipment maintenance				$ 310,000		$ 310,000
Professional services					$ 230,000	$ 230,000
Total serv ices	$ 211,000	$ 254,000	$ 173,000	$ 1,203,585	$ 552,000	$ 2,393,585

Total indirect materials and services $ 3,471,585

Case note:
The table demonstrates a feature of a plant's ultimate budget. Throughout, the input cells are flagged as red bold font. Most are located in the "Hidden worksheets" that this case does not allow access. However, this demonstrates the format is such that annual budgeting is done rapidly once it is built initially.

Annotated Case

Monthly maintenance cost management report
Spending variance, forecast and decision

Month of March, 200X

Prepared by:
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Purpose, confidentiality and warning:

The purpose of this annotated case report is to give its viewer a vision of the monthly reporting needed to fully manage the cost of manufacturing maintenance. An activity-based budget of the nature needed to manage maintenance cost is converted to the depth of detail needed to subsequently manage budgeted cost.

The herein case is based on an actual plant. However, confidentiality is rigorously protected. Document terminology and organization remain in tack, but no activity and resource level resemblance remains. Furthermore, the case is packaged as a PDF file to prevent access to background drivers and algorithms. Readers are also warned to not draw from the document any operational insights, performance targets and key indicators for their plant.

Annotated Case

Monthly maintenance cost management report

Spending variance, forecast and decisions

Table of contents

Month of March 200X

Section	Worksheet tab title (hyperlink if underlined)
Total cost variance, forecast and decisions	
Introduction to section	Intro grand summaries'!A1
Total YTD, forecast and decisions	Grand YTD and Forecast
Total month summary	Grand Month Summary
Overtime: Summary chart with table	Overtime total
Cost center total variance, forecast and decisions	
Introduction to section	Intro cost center reports
Process maintenance YTD, forecast and decisions	Process YTD and forecast
Process maintenance month summary	Process Month Summary
Support maintenance YTD, forecast and decision	Support YTD and forecast
Support maintenance month summary	Support month Summary
Overtime reports	
Introduction to section	Intro to overtime section'!A1
Overtime summary by block	Overtime block summaries
Process maintenance overtime report	Process detailed overtime
Support maintenance overtime report	Support detailed overtime
Interactive performance analysis charts	Divider interactive charts
Introduction to section	Intro interactive chts'!A1
Crew-based variance: YTD and Month	Crew variance cht
Block-based variance: YTD and Month	Block variance cht
Stand work order variance: YTD and Month	Std WO variance cht
Overtime percent variance: YTD and Month	OT percent cht
Overtime cost of variance from 10%: YTD and Month	OT cost of var cht
Cost center in depth variance analysis	
Introduction to section	Intro cost center reports'!A1
Process maintenance YTD variance	Process YTD Variance
Process maintenance month variance	Process Month Variance
Support maintenance YTD variance	Support YTD Variance
Support maintenance month variance	Support Month Variance
Activity-specific variance analysis	
Introduction to section	Intro to details jobs section'!A1
Process inputs (prev, run mandatory, discretionary)	Process PM RM Disc YTD'!A1
Support inputs (prev, run mandatory, discretionary)	Support PM RM Disc YTD'!A1
Process major jobs: planned	Major Job Planned'!A1
Process major jobs: occuring	Major Job Occuring'!A1
Process standard jobs	Process YTD Std Jobs'!A1
Support standard jobs	Support YTD Std Jobs'!A1

Case note: At the highest level, the table include a calculation of the meaning of the forecast variance to the firm's profit, margin and ROI.

Case note: The YTD sections include menus within tables to select scenarios and decisions on which the forecast for the total year is computed each month. The section combine at the next level.

Case note: A core issue was the profile of overtime such that future budgets could better forecast expectation and reveal the points of best possible improvement via control.

Case note: The reports of this section are interactive graphs allowing the plant to search through a great deal of data captured in the sections below.

Case note: Highly detailed tables providing massive information shown in context, allowing deeper reviews triggered by the interactive chart section.

Case note: As the input to the above section, this section is the pathway to trace to the root cause of spending behavior.

Support programs					Support programs'!A1
Overhead cost					Overhead costs'!A1
Contract maintenance (Process and support)					Contract mntc'!A1
Hidden spreadsheets					
- Inputs to monthly report					
	Report input month				
	Winterization job input				
- Inputs from budget					
	Wage rate table-budget				
	Job lab matl input-budget (prev, run mand, discretionary				
- Other tables					
	Calculation spreadsheets behind the report				
	Databases behind interactive performance review charts				

Case note: The elements of these worksheets are of a nature they are made inaccessible to protect the plant's confidentiality.

Total cost variance, forecast and decisions

Introduction: Total cost variance, forecast and decisions

This section provides the summary reports of interest to managers: especially plant and enterprise senior management. The stress is total spending: what has happened and what is expected for the remaining year profitability. The results are also shown in the context of plant and enterprise profit, profit margin and return on investment (ROI).

A side note. When business profit, profit margin and ROI are a high profile meter, there is the risk that poorly advised operational choices will be made to maximize them. The cost management system is built to block such behavior. Consequently, striving to maximize these measures is done in the context of doing well what must be done.

The YTD and Forecast report of the section makes the distinction between cost position and forecasted cost for the year. Cost position is defined as spending to date plus the budgeted remaining spending. Variance is computed vis-a-vis the budget.

Cost forecast is defined as year to date spending plus a forecast for the year's remaining spending. Variance is computed as the difference between budgeted and forecasted year.

Built into the report is the automated ability to compute a forecast per a menu of assumptions applicable to the plant's situation. The action takes place: at the cost center worksheet level. The combined results roll up to this section.

One menu is a pick-by-click menu for remaining spending with respect to activity level for certain work types. A second is a pick-by-click menu is provided to select a strategy for discretionary spending for the next month. This decision will be made in the context of the year's results to date and the scenario selected for forecasted remaining spending. Therefore, the section provides an integrated analysis and decision.

Practitioners and general management have long wished to link maintenance spending to business financial results. A part of the YTD and forecast report, a computation that converts forecasted variance to ramifications for business profit, profit margin and ROI.

The Month Summary report makes a distinction between month spending as a variance with the budget as a whole and variance with the budgeted resources for work actually done. The former depicts spending compared to all planned activity and resources. The latter evaluate resources and overtime for work actually done compared to budgeted standards of efficiency.

Both the YTD and month reports present variance to budgeted overtime. This is reported as percent of overtime and dollar value of variance.

The total overtime report of this section provides a consolidated view. A section further back in the monthly report provides greater detail such that the profile can be investigated from many directions.

Overtime variance is based on a single percent applied to all work types. However, a year of monthly reports provides the profile with which different percentage could be budgeted for area, work type and discipline, etc. These would then be monitored and managed through the monthly report. As subsequent years progress, the understanding of overtime profile will sharpen.

Little of the information in this section and the remaining variance report is provided by the traditional accounting system. This is because the traditional system is not mechanically intended to report activities linked to operational objectives and resources consumed them. In other words, the tradition system cannot account for maintenance capacity, only business performance, position and worth.

Total YTD, forecast and decisions

Total maintenance: YTD variance, forecast and decisions

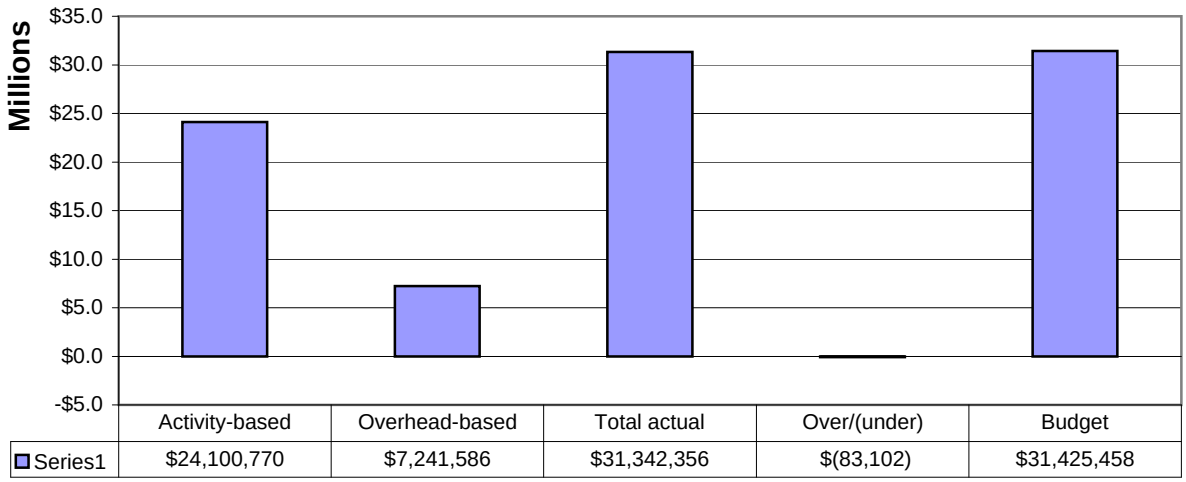
Month of March 200X

To go to:	Click:
Process maintenance	Process YTD and forecast
Support maintenance	Support YTD and forecast

Notes:
(1) **Position** shows outlook for total with respect to budget. It is YTD spending and budgeted remaining spending without attempting to forecast what the remaining will actually be.
(2) **Forecast** shows outlook for for actual total year spending. To YTD, it applies a scenario for remaining spending, rather than budget, and a decision for discretionary spending according to how the scenario affects total budget O/U.
(3) Overhead includes contracted maintenance services.

Total maintenance: Position against 200X budget (1)(3)

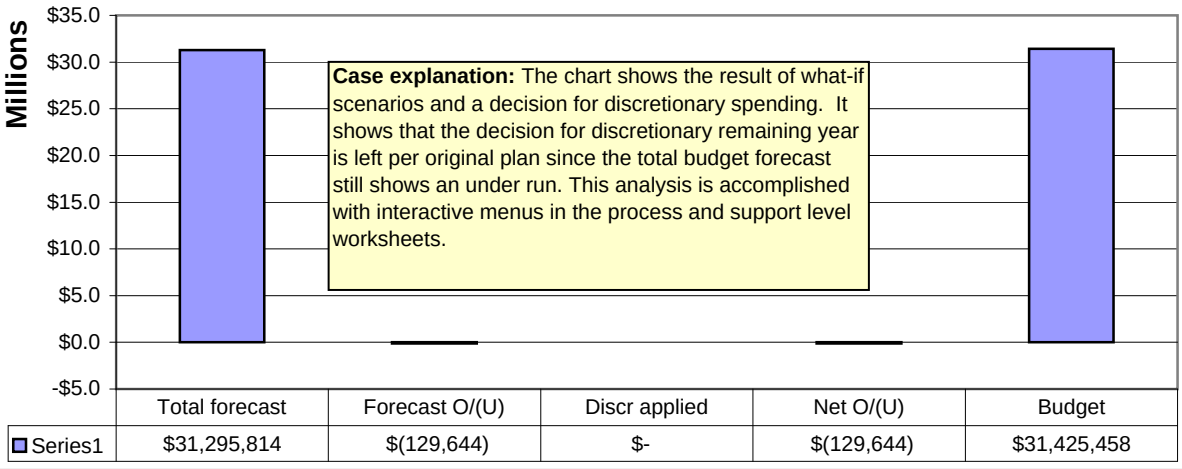
(YTD plus budget remaining year)



	Activity-based	Overhead-based	Total actual	Over/(under)	Budget
Series1	$24,100,770	$7,241,586	$31,342,356	$(83,102)	$31,425,458

Total maintenance: Forecast for 200X (2)(3)

(YTD plus forecast for remaining year spending)



Case explanation: The chart shows the result of what-if scenarios and a decision for discretionary spending. It shows that the decision for discretionary remaining year is left per original plan since the total budget forecast still shows an under run. This analysis is accomplished with interactive menus in the process and support level worksheets.

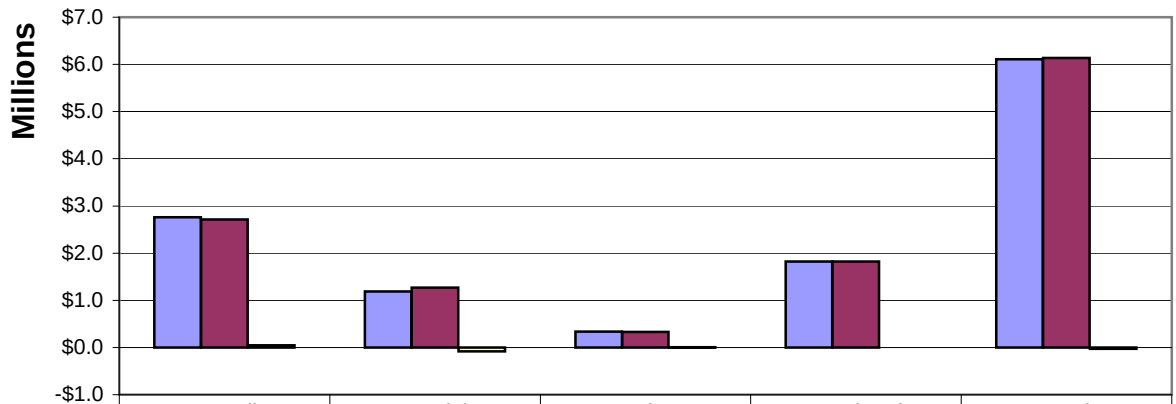
	Total forecast	Forecast O/(U)	Discr applied	Net O/(U)	Budget
Series1	$31,295,814	$(129,644)	$-	$(129,644)	$31,425,458

Demo note: "Discr applied" = how the discretionary budget is to be adjusted for the remaining year to absorb over/under in forecasted total cost.

Total YTD, forecast and decisions

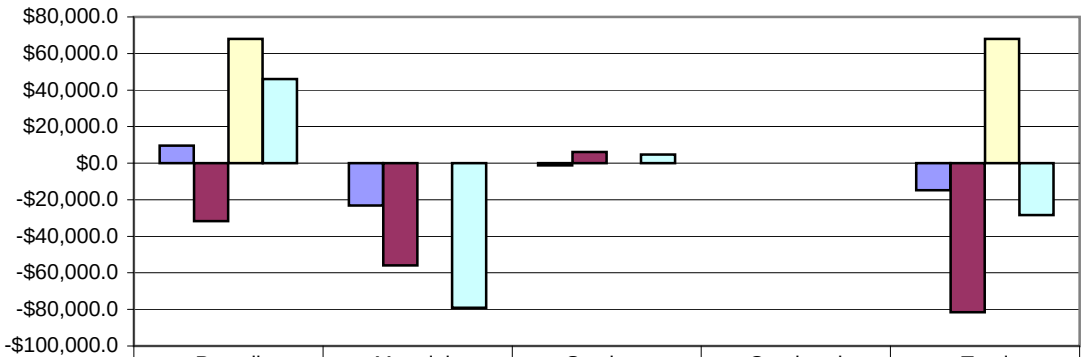
Notes:
(4) Columns titled payroll, materials and services are the cost categories for activity-based costs.

Total maintenance: Year to date spending (3)(4)



	Payroll	Materials	Services	Overhead	Total
Actual	$2,758,956	$1,187,987	$334,940	$1,824,862	$6,106,745
Budget	$2,712,978	$1,267,137	$330,138	$1,824,862	$6,135,115
Variance	$45,978	$(79,150)	$4,802	$-	$(28,370)

Total maintenance: Year to date variance (3)(4)

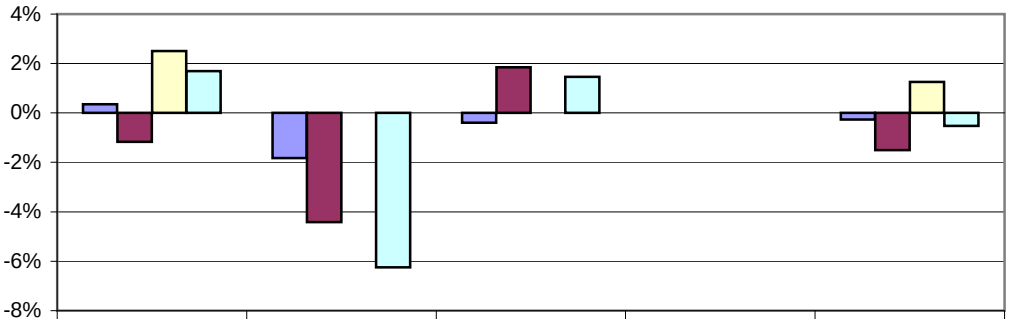


	Payroll	Materials	Services	Overhead	Total
Due to number jobs	$9,653	$(23,193)	$(1,285)	$-	$(14,824)
Due to resource	$(31,635)	$(55,957)	$6,088	$-	$(81,504)
Due to overtime	$67,959	$-	$-	$-	$67,959
Total variance	$45,978	$(79,150)	$4,802	$-	$(28,370)

Total YTD, forecast and decisions

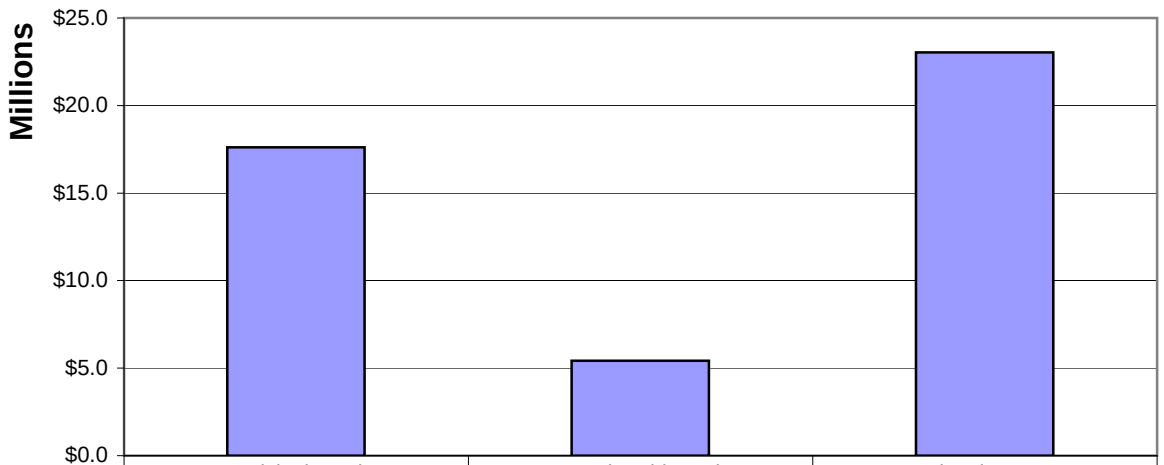
Total maintenance: YTD variance as percent budget (3)(4)

(Activity-based charted as payroll, materials and services)



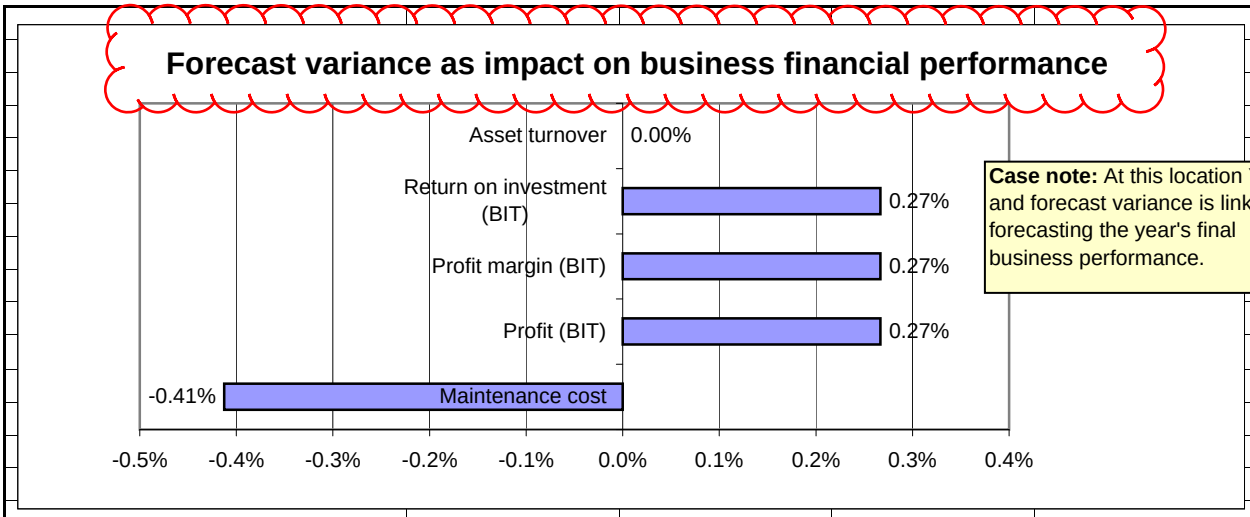
	Payroll	Materials	Services	Overhead	Total
Due to number jobs	0.4%	-1.8%	-0.4%	0.0%	-0.3%
Due to resource	-1.2%	-4.4%	1.8%	0.0%	-1.5%
Due to overtime	2.5%	0.0%	0.0%	0.0%	1.3%
Total variance	1.7%	-6.2%	1.5%	0.0%	-0.5%

Total maintenance: Current forecast remaining 2007 (3)



	Activity-based	Overhead-based	Total maintenance
Series1	$17,614,751	$5,416,724	$23,031,475

Total YTD, forecast and decisions



Case note: At this location YTD and forecast variance is linked to forecasting the year's final business performance.

Process maintenance position and forecast

	Activity-based	OH-based	Total
Position against the budget (1)			
Actual year to date	$ 6,356,375	$ 1,824,862	$ 8,181,237
Budget remaining year	$ 17,744,395	$ 5,416,724	$ 23,161,119
Total actual and remaining	$ 24,100,770	$ 7,241,586	$ 31,342,356
Total budgeted	$ 24,183,872	$ 7,241,586	$ 31,425,458
Total variance	$ (83,102)	$ -	$ (83,102)
Forecast per scenario for jobs variance and decision for discretionary spending. (2)			
Revision per scenario (5)	See process/support sheets (7)		$ (46,542)
Discretionary applied to O/(U) (6)	See process/support sheets (7)		$ -
Forecast for 2007			$ 31,295,814
Forecast variance O/(U)			$ (129,644)
Forecasted variance as a percent of budget			-1.0%
Forecast variance as impact on business financial performance (BIT)			
Profit (BIT)			0.27%
Profit margin (BIT)			0.27%
Return on investment (BIT)			0.27%
Asset turnover			0.00%
Discretionary spending per decision in forecast (6)			
Monthly average remaining year			$ 259,397
Remaining in budget			$ 2,334,576

Case note: Scenario for forecast and decision for discretionary spending is set at the cost center level of the monthly report (next section).

Case note: Because the plant can forecast, it can adjust discretionary spending to keep itself within the budget.

Case note:
The above forecast section reflects a tool at the cost center levelfor the reviewer to forecast the year's total spending and, in turn, make a decision for how discretionary spending will continue with respect to the forecast. The viewer will pull down and make a choice for scenario and decision, the forecast changes accordingly. If time shows the need for an additional choice, the variance pull down menu is extended in the month of discovery.

Overtime summary			
Total as percent			11.5%
Total as dollars			$ 55,821

Total YTD, forecast and decisions

Notes:

(5) The forecast for total year is automatically computed based on a scenario selected from a menu of ways to depict the remaining spending case for preventive, running mandatory and occuring major jobs. The choices are set and defined at the process and support sheet levels. The choices are a) apply YTD as the remaining case, b) weighted average of the YTD and budget remaining cases, c) use budgeted remaining and d) actual will ultimately converge on the budget as an average.

(6) Discretionary spending is automatically computed based a selecting a decision from a menu for how spending will be applied for the remaining year. The decision is integrated with the previously chosen scenarios. The decisions are a) discretionary under run will absorb total YTD over run, b) remaining budgeted discretionary will absorb total YTD over run, c) discretionary will remain the same, and d) increase discretionary spending by total YTD under run. The decisions are set at the process and support maintenance sheets.

(7) The scenarios and decisions are set in the equivalent worksheets for process and support maintenance. See the worksheet divider tab titled, "Block summaries."

(8) BIT = Before interest and taxes.

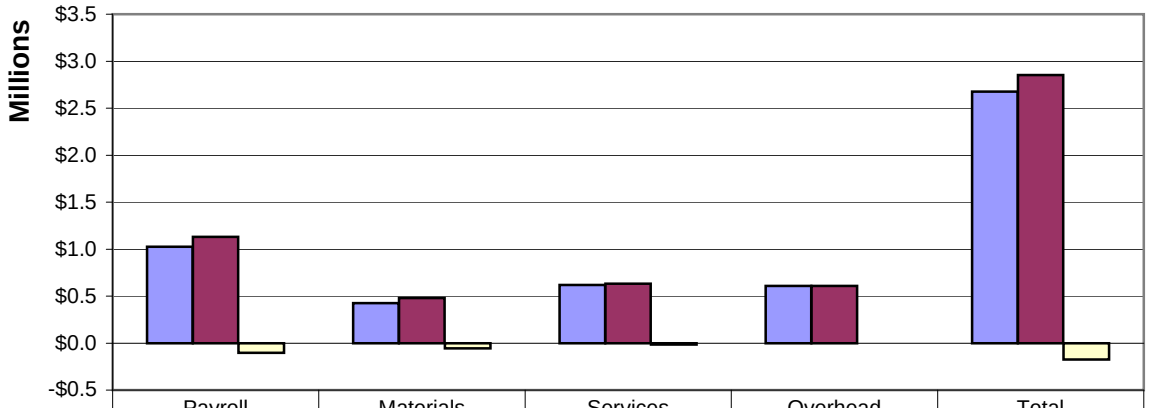
Total month summary

Total maintenance: Current month performance

Month of March 200X		To go to:	Click:
		Process maintenance	Process Month Summary
		Support maintenance	Support month Summary

Notes:
(1) Columns titled payroll, materials and services are the cost categories for activity-based costs.
(2) Overhead includes contracted maintenance services.

Process maintenance: Month total spending (1)(2)



	Payroll	Materials	Services	Overhead	Total
Actual	$1,025,864	$424,098	$618,200	608,287.4	$2,676,449
Budget	$1,130,735	$480,769	$632,628	608,287.4	$2,852,419
Variance	$(104,871)	$(56,671)	$(14,428)	-	$(175,970)

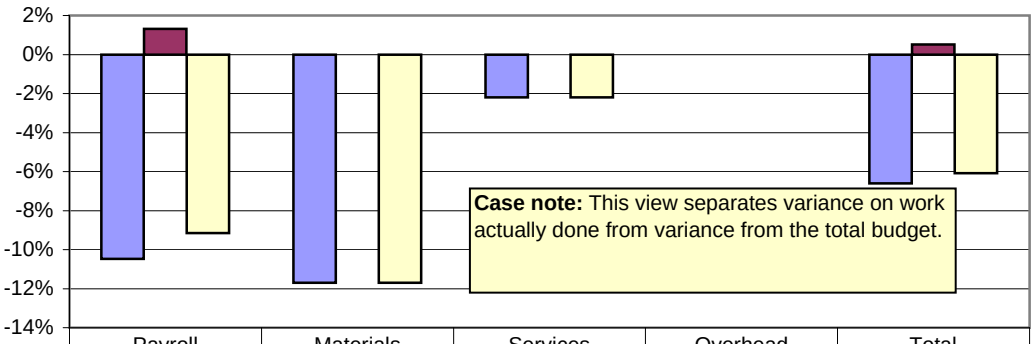
Process maintenance: Month variance on total budget (1)(2)

	Payroll	Materials	Services	Overhead	Total
Due to number jobs	$(1,556)	$(449)	$(591)		$(2,596)
Due to resource	$(118,186)	$(56,222)	$(13,837)	-	$(188,245)
Due to overtime	$14,871	$-	$-		$14,871
Total variance	$(104,871)	$(56,671)	$(14,428)	$-	$(175,970)

Total month summary

Process maintenance: Percent variance on work done (1)(2)

(Views variance against budget for work actually done)
(See previous table for value of variance percentages)



	Payroll	Materials	Services	Overhead	Total
Due to resource	-10.5%	-11.7%	-2.2%	0.0%	-6.6%
Due to overtime	1.3%	0.0%	0.0%		0.5%
Total variance	-9.1%	-11.7%	-2.2%	0.0%	-6.1%

Variance on total budget

	Activity-based	OH-based	Total
Month actual	$ 2,068,162	$ 608,287	$ 2,676,449
Month budget	$ 2,244,132	$ 608,287	$ 2,852,419
Variance	$ (175,970)	$ -	$ (175,970)

Variance on work actually done

Month actual spending		$ 2,676,449
Total budget for month	$ 2,852,419	
Variance due to number of jobs actually done.	$ (2,596)	
Budget for work actually done		$ 2,849,823
Variance due to resources and overtime on work done		$ (173,374)
Variance as a percent of budget for work actually done		-6.1%

Overtime summary

Total as percent	12.0%
Total as dollars	$ 14,871

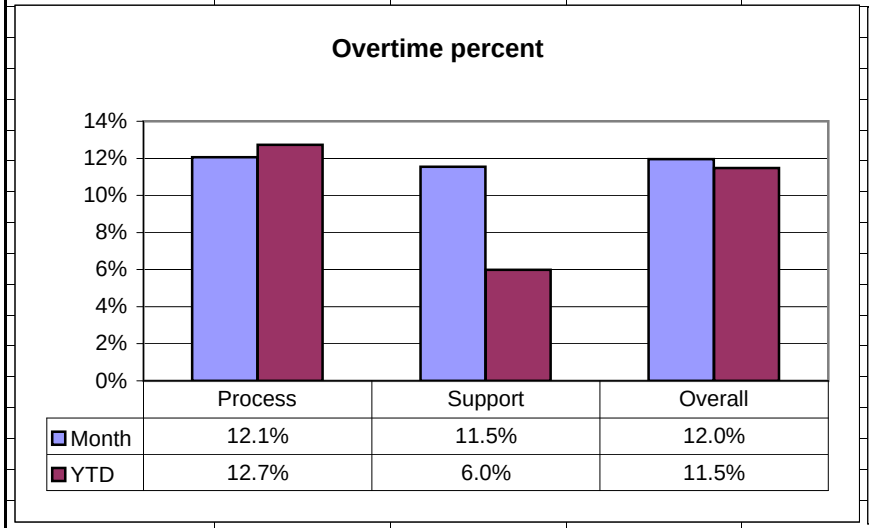
Variance Details for month: activity-based

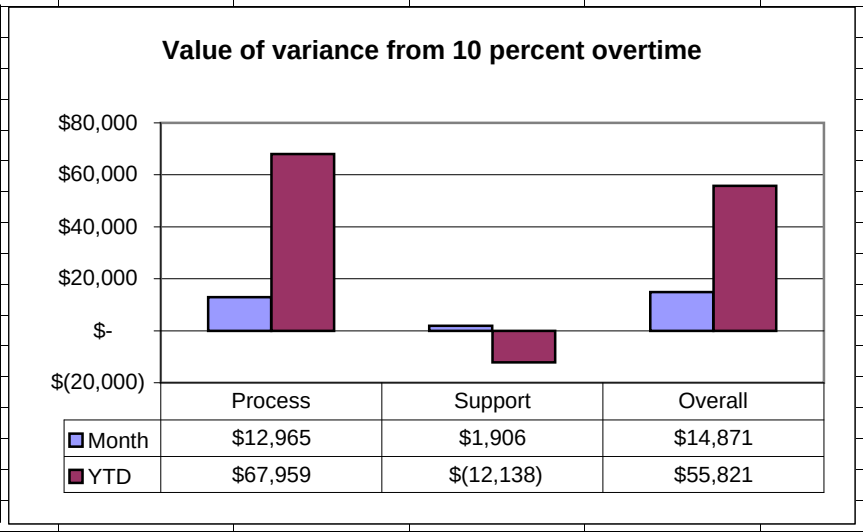
	Payroll	Materials	Services	Total
Actual	$ 1,025,864	$ 424,098	$ 618,200	$ 2,068,162
Budget	$ 1,130,735	$ 480,769	$ 632,628	$ 2,244,132
Total variance	$ (104,871)	$ (56,671)	$ (14,428)	$ (175,970)
Due to number of jobs	$ (1,556)	$ (449)	$ (591)	$ (2,596)
Due to resources per job	$ (118,186)	$ (56,222)	$ (13,837)	$ (188,245)
Due to overtime hours	$ 14,871	$ -	$ -	$ 14,871

Overtime: summary chart with table

Cost Center Total Overtime

Month of March 200X





Total overtime percent and value of variance

	Month				YTD			
	Hours		OT %	Variance	Hours		OT %	Variance
	Total	Regular		value	Total	Regular		value
Process	18,161	15,972	12.1%	$ 12,965	60,501	52,803	12.7%	$ 67,959
Support	4,073	3,603	11.5%	$ 1,906	13,615	12,800	6.0%	$ (12,138)
Unified	22,234	19,575	12.0%	$ 14,871	74,116	65,603	11.5%	$ 55,821

Case note: A later section with tab titled "Overtime reports" provides in-depth details. They were extracted from across the various detail sections of the variance report and roll up to this one.

Cost center total variance, forecast and decisions

Introduction: Cost center total variance, forecast and decisions

There are two cost centers within the maintenance department: process maintenance and support maintenance. Process maintenance is concerned with the production process. Alternately, support maintenance is concerned with site and building conditions.

In this section the YTD and month summaries of the previous section are presented at the process and support maintenance (cost center) levels.

This is the level at which the scenarios for the remaining year's activity and decisions for discretionary spending are set by management. The associated select-by-click pull down menu are visible as an integral part of each YTD report.

A total overtime report was provided in the previous section. Summary overtime is presented in the YTD and month reports, but details behind the report are placed in the next section of this report.

Another difference is that business measures (profit, profit margin and return on investment) are not presented with respect to the cost centers; although they could easily be. They are computed at the plant total maintenance cost level.

This section is the first level at which to isolate performance to the cost centers. Subsequent sections extend the ability by providing the pathway along which to follow performance and variance to their root causes; or in the reverse order.

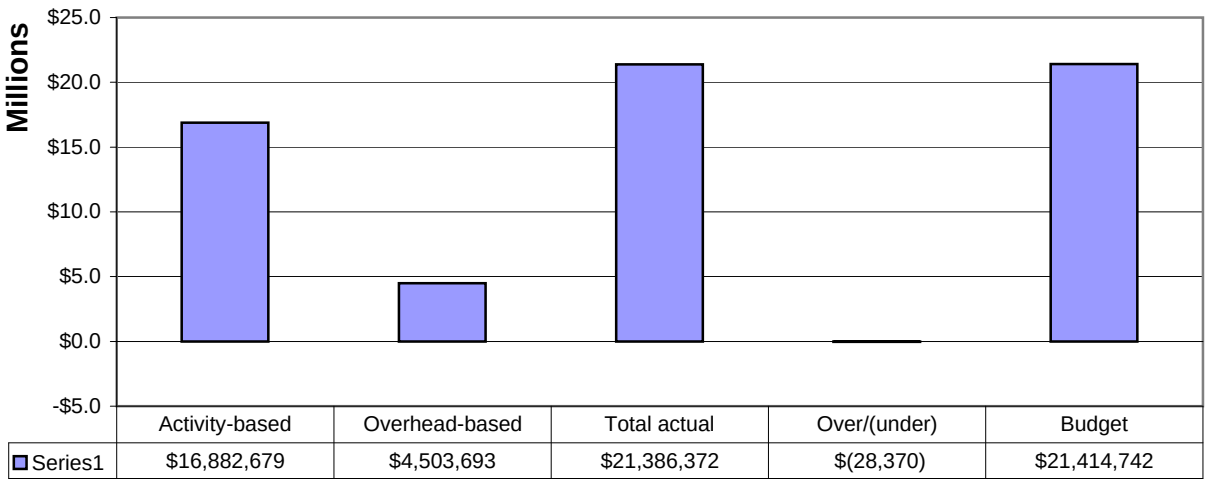
Process maintenance YTD, forecast and decisions

Process maintenance: YTD variance, forecast and decisions

Month of March 200X		To go to:	Click:
		Grand summary	Grand YTD and Forecast

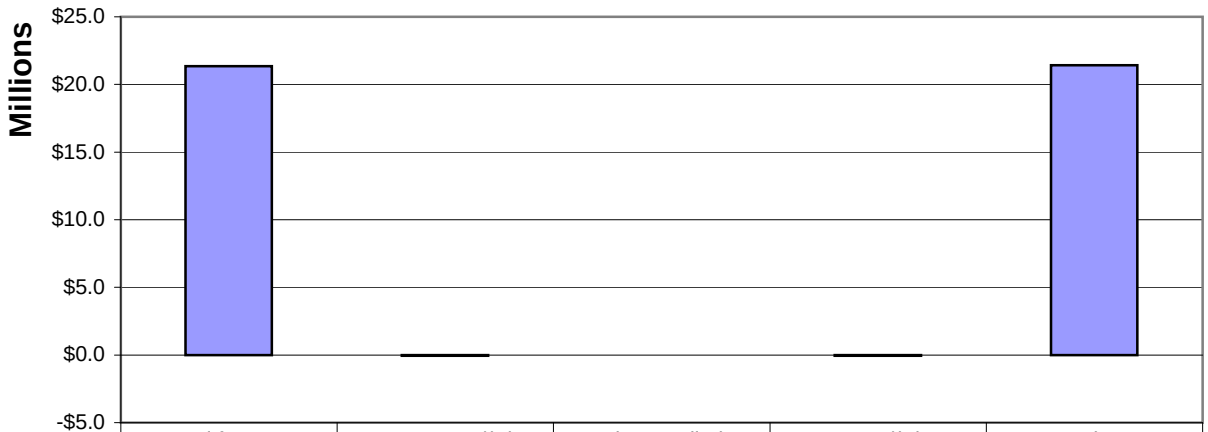
Notes:
(1) **Position** shows outlook for total with respect to budget. It is YTD spending and budgeted remaining spending without attempting to forecast what the remaining will actually be.
(2) **Forecast** shows outlook for for actual total year. To YTD, it applies a scenario for remaining spending, rather than budget, and a decision for discretionary spending according to how the scenario affects total budget O/U.
(3) Overhead includes contracted maintenance services.

Process maintenance: Position against 200X budget (1)(3)
(YTD plus budget remaining year)



	Activity-based	Overhead-based	Total actual	Over/(under)	Budget
Series1	$16,882,679	$4,503,693	$21,386,372	$(28,370)	$21,414,742

Process maintenance: Forecast for 200X (2)(3)
(YTD plus forecast for remaining year spending)



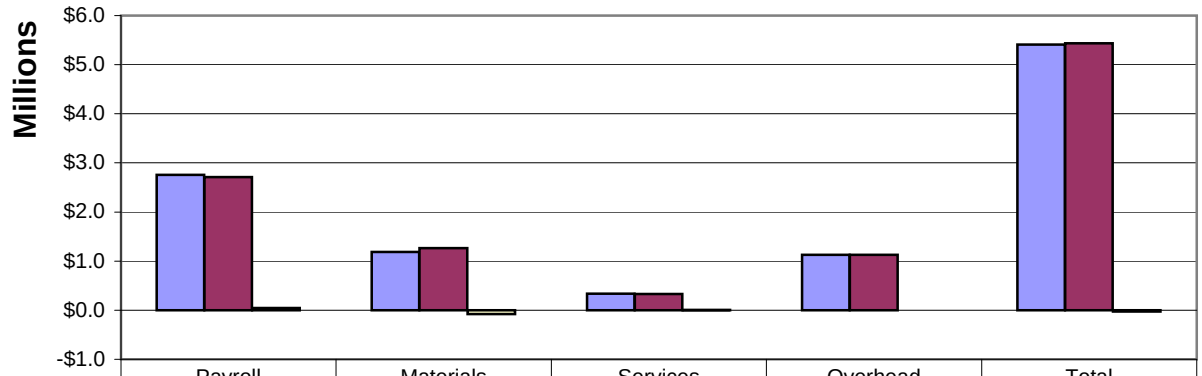
	Total forecast	Forecast O/(U)	Discr applied	Net O/(U)	Budget
Series1	$21,355,866	$(58,876)	$-	$(58,876)	$21,414,742

Case note: "Discr applied" = how the discretionary budget is to be adjusted for the remaining year to absorb over/under in forecasted total cost.

Process maintenance YTD, forecast and decisions

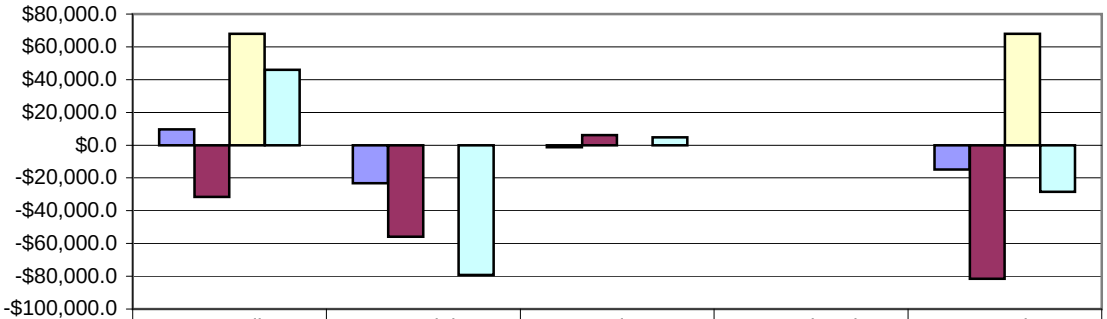
Notes:
(4) Columns titled payroll, materials and services are the cost categories for activity-based costs.

Process maintenance: Year to date spending (3)(4)
(Activity-based charted as payroll, materials and services)



	Payroll	Materials	Services	Overhead	Total
Actual	$2,758,956	$1,187,987	$334,940	$1,125,936	$5,407,819
Budget	$2,712,978	$1,267,137	$330,138	$1,125,936	$5,436,189
Variance	$45,978	$(79,150)	$4,802	$-	$(28,370)

Process maintenance: Year to date variance (3)(4)
(Activity-based charted as payroll, materials and services)

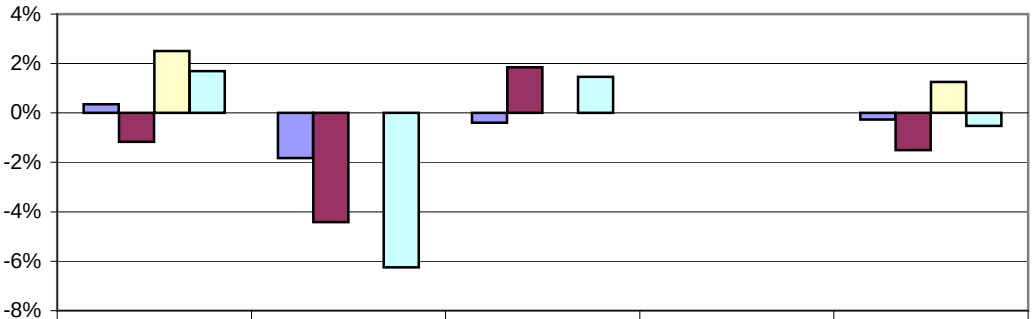


	Payroll	Materials	Services	Overhead	Total
Due to number jobs	$9,653	$(23,193)	$(1,285)	$-	$(14,824)
Due to resource	$(31,635)	$(55,957)	$6,088	$-	$(81,504)
Due to overtime	$67,959	$-	$-	$-	$67,959
Total variance	$45,978	$(79,150)	$4,802	$-	$(28,370)

Process maintenance YTD, forecast and decisions

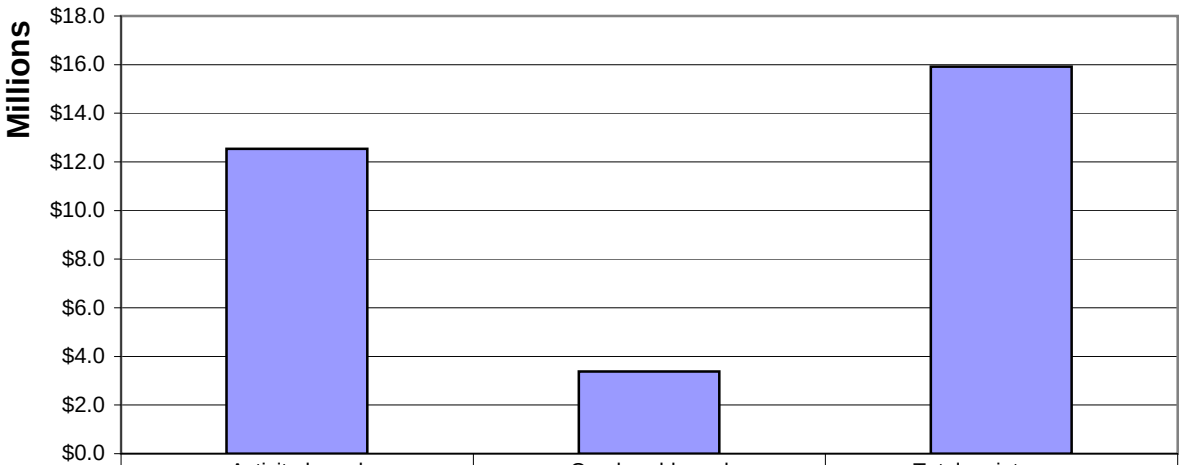
Process maintenance: Variance as percent budget (3)(4)

(Activity-based charted as payroll, materials and services)



	Payroll	Materials	Services	Overhead	Total
Due to number jobs	0.4%	-1.8%	-0.4%	0.0%	-0.3%
Due to resource	-1.2%	-4.4%	1.8%	0.0%	-1.5%
Due to overtime	2.5%	0.0%	0.0%	0.0%	1.3%
Total variance	1.7%	-6.2%	1.5%	0.0%	-0.5%

Process maintenance: Current forecast remaining 2006 (3)



	Activity-based	Overhead-based	Total maintenance
Series1	$12,541,920	$3,377,757	$15,919,677

Process maintenance YTD, forecast and decisions

Process maintenance position and forecast (1)			
	Activity-based	OH-based	Total
Position against the budget			
Actual year to date	$ 4,281,883	$ 1,125,936	$ 5,407,819
Budget remaining year	$ 12,600,796	$ 3,377,757	$ 15,978,553
Total actual and remaining	$ 16,882,679	$ 4,503,693	$ 21,386,372
Total budgeted	$ 16,911,049	$ 4,503,693	$ 21,414,742
Total variance	$ (28,370)	$ -	$ (28,370)
Forecast per scenario for jobs variance and decision for discretionary spending. (2)			
Revision per scenario (5)	Converge on budget		$ (30,507)
Revision per decision (6)	Absorb discretionary remaining		$ -
Forecast for 2007			$ 21,355,866
Forecast variance O/(U)			$ (58,876)
Forecasted variance as a percent of budget			-0.3%

Case note: Scenarios and decision choices are made available by pull-down menu. The menus may be foreseen or revealed as the year unfolds.

Case note:
The above forecast section provides a tool for the reviewer to forecast the year's total spending and, in turn, make a decision for how discretionary spending will continue with respect to the forecast. The viewer will pull down and make a choice for scenario and decision, the forecast changes accordingly. If time shows the need for an additional choice, the variance pull down menu is extended in the month of discovery.

Discretionary spending per decision in forecast (6)	
Monthly average remaining year	$ 62,481
Remaining in budget	$ 562,332
Overtime summary	
Total as percent	12.7%
Total as dollars	$ 67,959

Case note: Spending for discretionary maintenance is reevaluated each month as the automated outcome of the above scenario and decision menus.

Notes:
(5) The scenarios reflect how the variance for number of jobs with respect to preventive, running mandatory and occurring major jobs is forecasted to play out for the remaining year. Selected from the pull down menu, the choices are a) actual is remaining, b) average actual and budget, c) budget is remaining, and d) converge on budget.
(6) The decisions reflect how management chooses to apply discretionary spending to total budget O/U run for the remaining year--to be applied during the next month. Selected from the pull down menu, the choices are a) absorb discretionary under run, b) absorb discretionary remaining, c) increase by budget under run and d) leave discretionary unchanged.

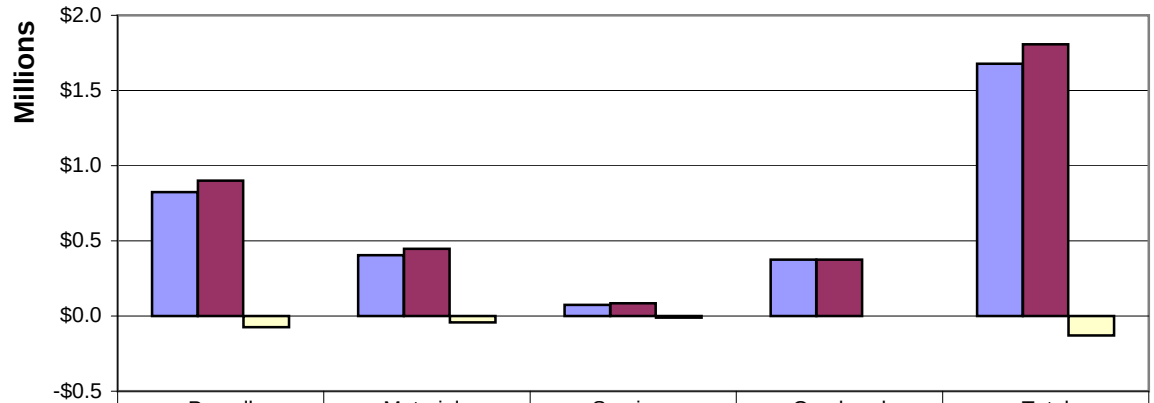
Process maintenance month summary

Process maintenance: Current month performance

Month of March 200X		To go to:	Click:	
		Grand month	Grand Month Summary	

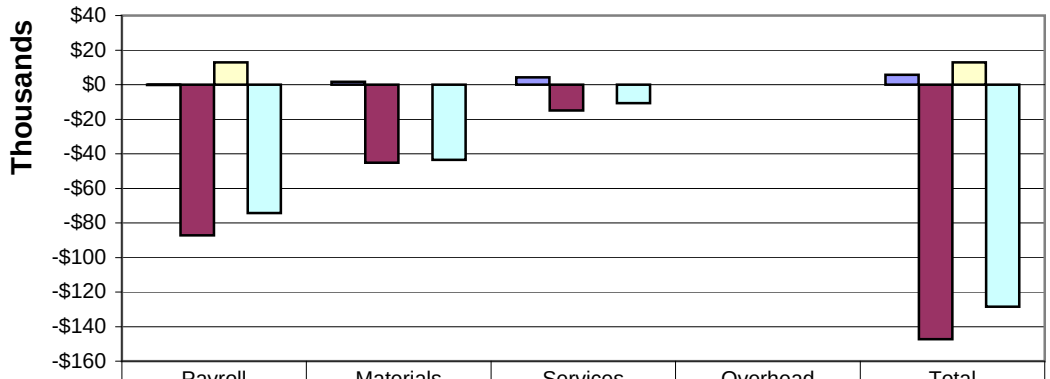
Notes:
(1) Columns titled payroll, materials and services are the cost categories for activity-based costs.
(2) Overhead includes contracted maintenance services.

Process maintenance: Month total spending (1)(2)



	Payroll	Materials	Services	Overhead	Total
Actual	$825,046	$403,628	$75,000	375,312.1	$1,678,986
Budget	$899,397	$447,046	$85,679	375,312.1	$1,807,434
Variance	$(74,351)	$(43,418)	$(10,679)	-	$(128,448)

Process maintenance: Month variance on total budget (1)(2)



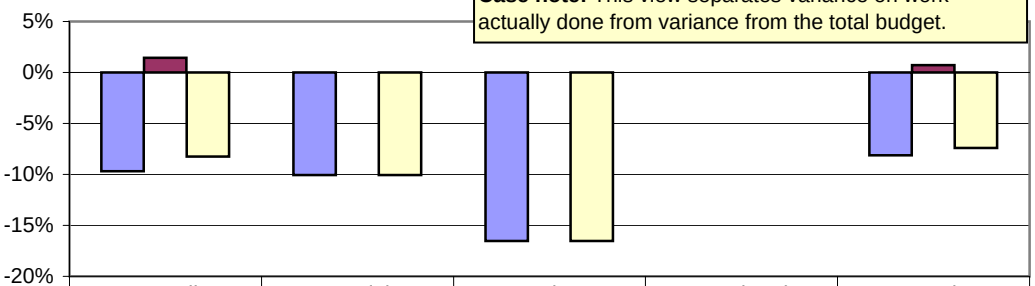
	Payroll	Materials	Services	Overhead	Total
Due to number jobs	$(101)	$1,699	$4,191		$5,789
Due to resource	$(87,216)	$(45,117)	$(14,870)	-	$(147,203)
Due to overtime	$12,965	$-	$-		$12,965
Total variance	$(74,351)	$(43,418)	$(10,679)	$-	$(128,448)

Process maintenance month summary

Process maintenance: Percent variance on work done (1)(2)

(Views variance against budget for work actually done)
(See previous table for value of variance percentages)

Case note: This view separates variance on work actually done from variance from the total budget.



	Payroll	Materials	Services	Overhead	Total
Due to resource	-9.7%	-10.1%	-16.5%	0.0%	-8.1%
Due to overtime	1.4%	0.0%	0.0%		0.7%
Total variance	-8.3%	-10.1%	-16.5%	0.0%	-7.4%

Variance on total budget

	Activity-based	OH-based	Total
Month actual	$ 1,303,674	375,312	$ 1,678,986
Month budget	$ 1,432,122	375,312	$ 1,807,434
Variance	$ (128,448)	-	$ (128,448)

Variance on work actually done

Month actual spending			$ 1,678,986
Total budget for month		$ 1,807,434	
Variance due to number of jobs actually done.		$ 5,789	
Budget for work actually done			$ 1,813,223
Variance due to resources and overtime on work done			$ (134,237)
Variance as a percent of budget for work actually done			-7.4%

Overtime summary

Total as percent	12.1%
Total as dollars	$ 12,965

Variance Details for month: activity-based

	Payroll	Materials	Services	Total
Actual	$ 825,046	$ 403,628	$ 75,000	$ 1,303,674
Budget	$ 899,397	$ 447,046	$ 85,679	$ 1,432,122
Total variance	$ (74,351)	$ (43,418)	$ (10,679)	$ (128,448)
Due to number of jobs	$ (101)	$ 1,699	$ 4,191	$ 5,789
Due to resources per job	$ (87,216)	$ (45,117)	$ (14,870)	$ (147,203)
Due to overtime hours	$ 12,965	$ -	$ -	$ 12,965

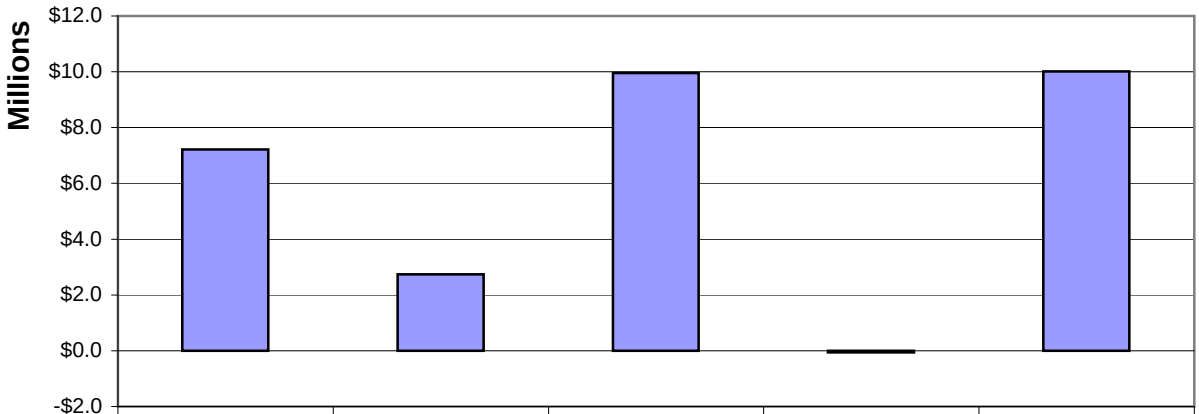
Support maintenance YTD, forecast and decisions

Support maintenance: YTD variance, forecast and decisions

Month of March 200X		To go to:	Click:	
		Grand summary	Grand YTD and Forecast	

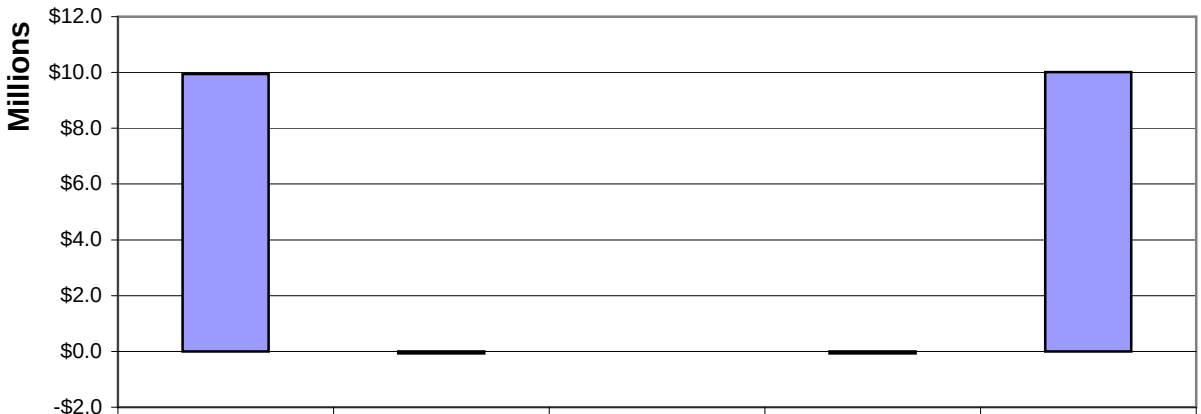
Notes:
(1) **Position** shows outlook for total with respect to budget. It is YTD spending and budgeted remaining spending without attempting to forecast what the remaining will actually be.
(2) **Forecast** shows outlook for for actual total year. To YTD, it applies a scenario for remaining spending, rather than budget, and a decision for discretionary spending according to how the scenario affects total budget O/U.
(3) Overhead includes contracted maintenance services.

Support maintenance: Position against 200X budget (1)(3)
(YTD plus budget remaining)



	Activity-based	Overhead-based	Total actual	Over/(under)	Budget
Series1	$7,218,091	$2,737,893	$9,955,983	$(54,732)	$10,010,716

Support maintenance: Forecast for 200X (2)(3)
(YTD plus forecast for remaining year spending)



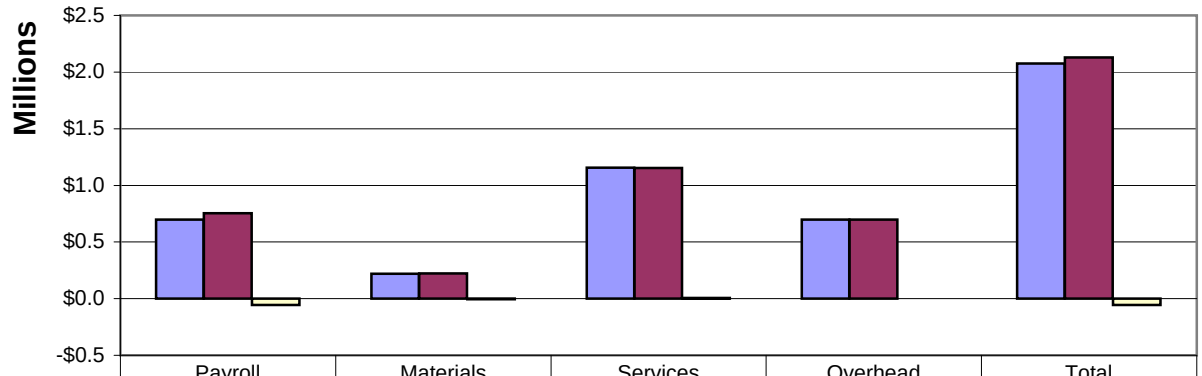
	Total forecast	Forecast O/(U)	Discr applied	Net O/(U)	Budget
Series1	$9,939,948	$(70,768)	$-	$(70,768)	$10,010,716

Case note: "Discr applied" = how the discretionary budget is to be adjusted for the remaining year to absorb over/under in forecasted total cost.

Support maintenance YTD, forecast and decisions

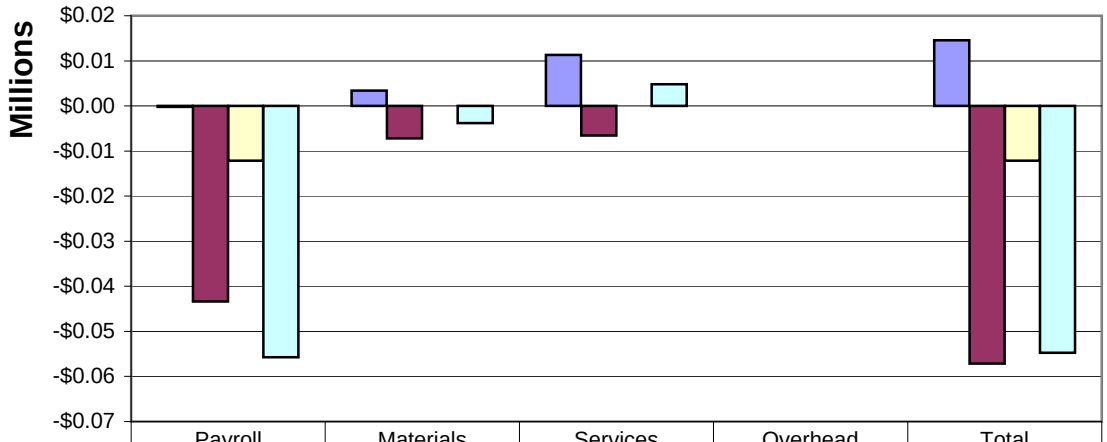
Notes:
(4) Columns titled payroll, materials and services are the cost categories for activity-based costs.

Support maintenance: Year to date spending (3)(4)
(Activity-based charted as payroll, materials and services)



	Payroll	Materials	Services	Overhead	Total
Actual	$698,812	$219,050	$1,156,630	$698,926	$2,074,492
Budget	$754,508	$222,869	$1,151,847	$698,926	$2,129,224
Variance	$(55,696)	$(3,819)	$4,783	$-	$(54,732)

Support maintenance: Year to date variance (3)(4)
(Activity-based charted as payroll, materials and services)

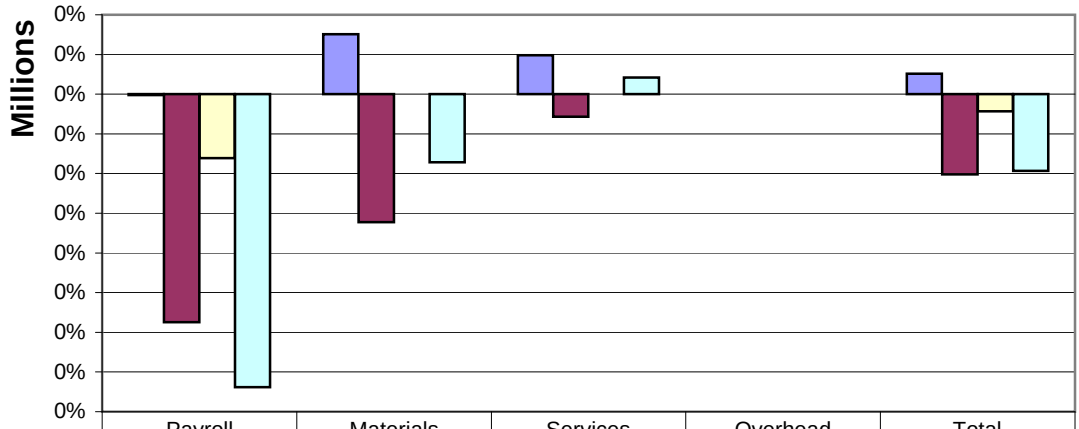


	Payroll	Materials	Services	Overhead	Total
Due to number jobs	$(183)	$3,375	$11,341	$-	$14,533
Due to resource	$(43,374)	$(7,195)	$(6,558)	$-	$(57,127)
Due to overtime	$(12,138)	$-	$-	$-	$(12,138)
Total variance	$(55,696)	$(3,819)	$4,783	$-	$(54,732)

Support maintenance YTD, forecast and decisions

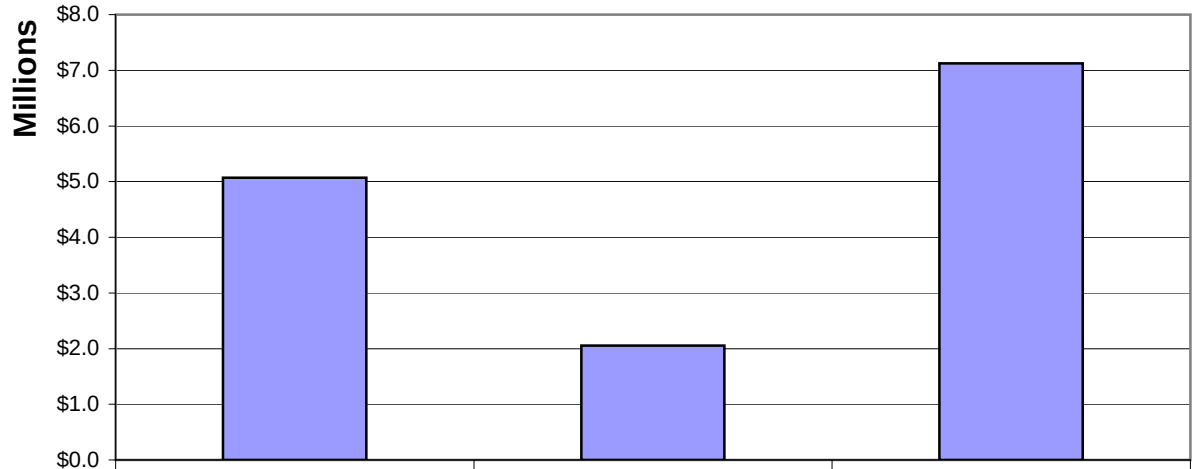
Support maintenance: Variance as percent of budget (3)(4)

(Activity-based charted as payroll, materials and services)



	Payroll	Materials	Services	Overhead	Total
Due to number jobs	0.0%	1.5%	1.0%	0.0%	0.5%
Due to resource	-5.7%	-3.2%	-0.6%	0.0%	-2.0%
Due to overtime	-1.6%	0.0%	0.0%	0.0%	-0.4%
Total variance	-7.4%	-1.7%	0.4%	0.0%	-1.9%

Support maintenance: Current forecast remaining 2007 (3)



	Work load-based	Overhead-based	Total maintenance
Series1	$5,072,831	$2,053,420	$7,126,251

Support maintenance YTD, forecast and decisions

Support maintenance position and forecast (1)			
	Activity-based	OH-based	Total
Position against the budget (1)			
Actual year to date	$ 2,074,492	$ 698,926	$ 2,773,418
Budget remaining year	$ 5,143,599	$ 2,038,967	$ 7,182,566
Total actual and remaining	$ 7,218,091	$ 2,737,893	$ 9,955,983
Total budgeted	$ 7,272,823	$ 2,737,893	$ 10,010,716
Total variance	$ (54,732)	$ -	$ (54,732)
Forecast per scenario for jobs variance and decision for discretionary spending. (2)			
Revision per scenario (5)	Converge on budget		$ (16,035)
Revision per decision (6)	Absorb discretionary remaining		$ -
Forecast for 2007			$ 9,939,948
Forecast variance O/(U)			$ (70,768)
Forecasted variance as a percent of budget			-0.7%

Case note:
The above forecast section provides a tool for the reviewer to forecast the year's total spending and, in turn, make a decision for how discretionary spending will continue with respect to the forecast. The viewer will pull down and make a choice for scenario and decision, the forecast changes accordingly. If time shows the need for an additional choice, the variance pull down menu is extended in the month of discovery.

Discretionary spending per decision in forecast (6)			
Monthly average remaining year			$ 196,916
Remaining in budget			$ 1,772,244
Overtime summary			
Total as percent			6.0%
Total as dollars			$ (12,138)

Notes:
(5) The scenarios reflect how the variance for number of jobs with respect to preventive, running mandatory and occurring major jobs is forecasted to play out for the remaining year. Selected from the pull down menu, the choices are a) actual is remaining, b) average actual and budget, c) budget is remaining, and d) converge on budget.
(6) The decisions reflect how management chooses to apply discretionary spending to total budget O/U run for the remaining year-to be applied during the next month. Selected from the pull down menu, the choices are a) absorb discretionary under run, b) absorb discretionary remaining, c) increase by budget under run and d) leave discretionary unchanged.

Support maintenance month summary

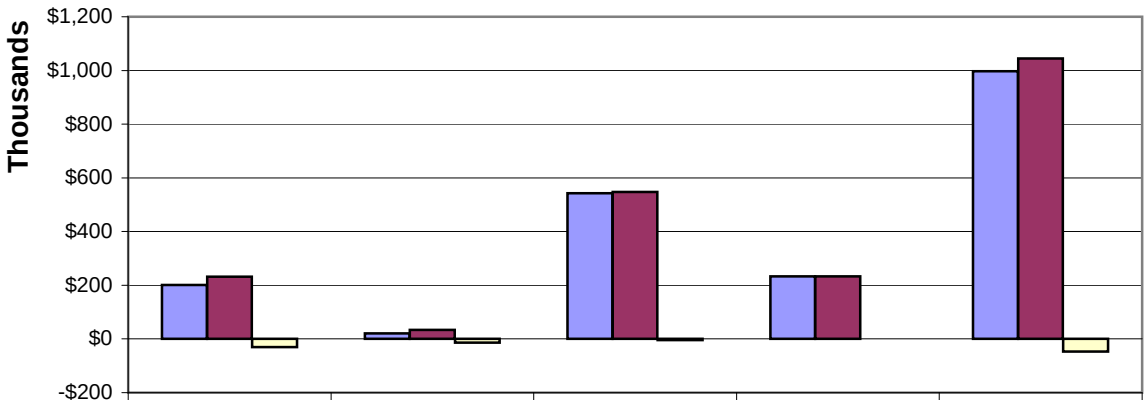
Support maintenance: Current month performance

Month of March 200X

To go to:	Click:
Grand month	Grand Month Summary

Notes:
(1) Columns titled payroll, materials and services are the cost categories for activity-based costs.
(2) Overhead includes contracted maintenance services.

Support maintenance: Month total spending (1)(2)



	Payroll	Materials	Services	Overhead	Total
Actual	$200,818	$20,470	$543,200	232,975.3	$997,463
Budget	$231,338	$33,723	$546,949	232,975.3	$1,044,985
Variance	$(30,520)	$(13,253)	$(3,749)	-	$(47,522)

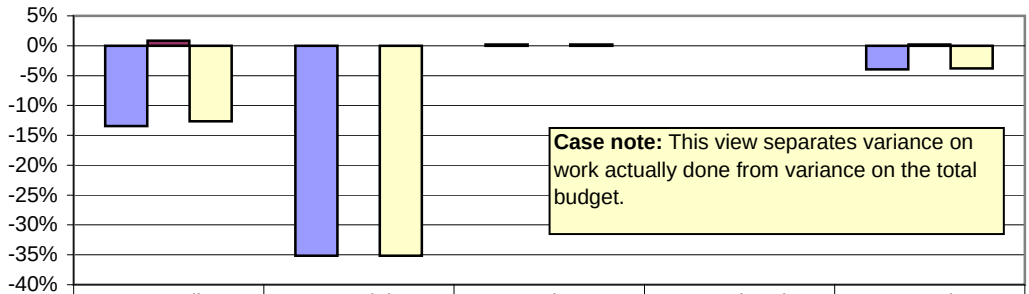
Support maintenance: Month variance on total budget (1)(2)

	Payroll	Materials	Services	Overhead	Total
Due to number jobs	$(1,455)	$(2,148)	$(4,782)		$(8,385)
Due to resource	$(30,971)	$(11,105)	$1,033	-	$(41,043)
Due to overtime	$1,906	$-	$-		$1,906
Total variance	$(30,520)	$(13,253)	$(3,749)	-	$(47,522)

Support maintenance month summary

Support maintenance: Variance on activity actually done (1)(2)

(Views variance against budget for work actually done)
(See previous chart for value of variance percentages)



	Payroll	Materials	Services	Overhead	Total
Due to resource	-13.5%	-35.2%	0.2%	0.0%	-4.0%
Due to overtime	0.8%	0.0%	0.0%		0.2%
Total variance	-12.6%	-35.2%	0.2%	0.0%	-3.8%

Variance on total budget

	Activity-based	OH-based	Total
Month actual	$ 764,488	232,975	$ 997,463
Month budget	$ 812,010	232,975	$ 1,044,985
Variance	$ (47,522)	-	$ (47,522)

Variance on work actually done

Month actual spending			$ 997,463
Total budget for month		$ 1,044,985	
Variance due to number of jobs actually done.		$ (8,385)	$ (47,522)
Budget for work actually done		$ -	$ 1,036,600
Variance due to resources and overtime on work done		$ 1,906	$ (39,137)
Variance as a percent of budget for work actually done			-3.8%

Overtime summary

Total as percent	11.5%	
Total as dollars	$ 1,906	

Variance Details for month

	Payroll	Materials	Services	Total
Actual	$ 200,818	$ 20,470	$ 543,200	$ 764,488
Budget	$ 231,338	$ 33,723	$ 546,949	$ 812,010
Total variance	$ (30,520)	$ (13,253)	$ (3,749)	$ (47,522)
Due to number of jobs	$ (1,455)	$ (2,148)	$ (4,782)	$ (8,385)
Due to resources per job	$ (30,971)	$ (11,105)	$ 1,033	$ (41,043)
Due to overtime hours	$ 1,906			$ 1,906

Overtime reports

Introduction: Overtime reports

This section was developed because overtime was a significant concern for the plant in two particular ways. Therefore, the section demonstrates a very important principle and practice. It is that the components of each cost systems are designed to deal with each plant's unique situation.

The plant's unique need was to determine what its budgeted overtime should be. However, there had never been a means to track and learn this with respect to distinctions across area, work types and class. The only available data was the cost-center gross information available through the traditional accounting system. Furthermore, the origin and basis of the percentage historically included in the annual plant budget was unknown and obviously unrealistic.

This section brings to one place the overtime detail (percent and dollar value of variance) dispersed across the variance report. The detail is a normal part of every variance breakdown matrix at every level of activity.

Like many points of interest the dispersed detail only needed to be harvested from other sections of the monthly report to answer the how much and where questions for overtime. Harvesting it only required the development of this work sheet in the monthly variance report.

Also note that there is an interactive chart in the next section to slice-and-dice and rubics-cube the details of overtime. The databases to the charts (hidden as a work sheet) are also the building blocks with which a trend analysis was built for overtime.

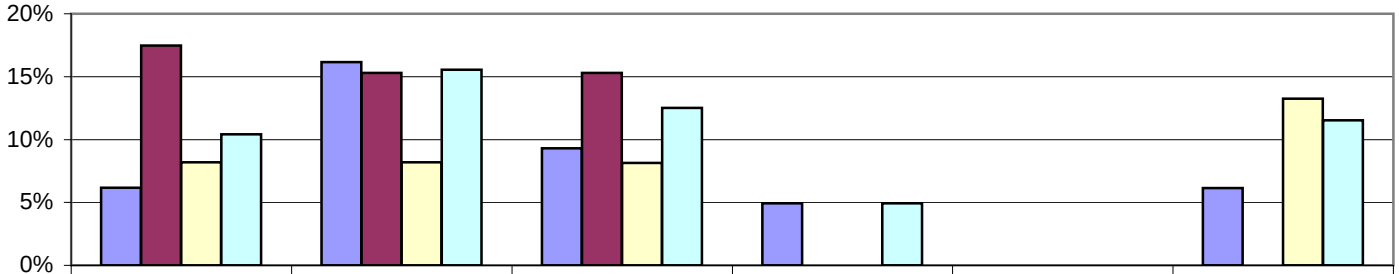
Overtime is a factor which is heavily affected by management’s ability to view trends. The variance report provides the foundation on which these are easily built and generated. We treat a trend report as a specialized monthly report extended from the herein monthly report. None have been presented due to confidentiality.

Overtime: Summary by block

Block summaries of overtime

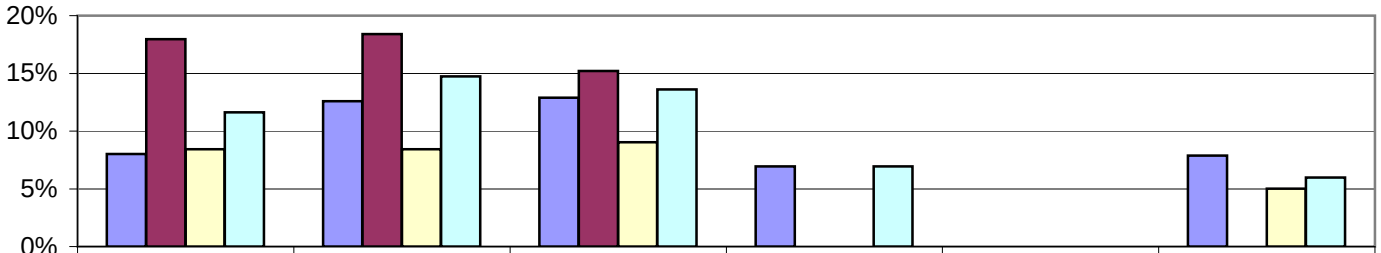
Month of March 200X

Month overtime by process maintenance block and support maintenance



	A	B	C	O	R	Support
Prev, Rman, Discretionary	6.2%	16.2%	9.3%	4.9%		6.1%
Major jobs/programs	17.5%	15.3%	15.3%	0.0%	0.0%	0.0%
Standard jobs	8.2%	8.2%	8.2%	0.0%		13.2%
Total	10.4%	15.5%	12.5%	4.9%		11.5%

YTD overtime by process maintenance block and support maintenance



	A	B	C	O	R	Support
Prev, Rman, Discretionary	8.0%	12.6%	12.9%	6.9%		7.9%
Major jobs/programs	18.0%	18.4%	15.2%	0.0%	0.0%	0.0%
Standard jobs	8.4%	8.4%	9.0%	0.0%		5.0%
Total	11.6%	14.7%	13.6%	6.9%		6.0%

Overtime: Summary by block

Process Maintenance								
	Month			**YTD**				
	Hours		**OT %**	**Hours**		**OT %**		
	Total	**Regular**		**Total**	**Regular**			
Block A								
Prev, Rman, Discretionary	4,200	3,941	6.2%	14,408	13,253	8.0%		
Major jobs	2,623	2,165	17.5%	8,528	6,997	18.0%		
Standard jobs	258	236	8.2%	584	535	8.4%		
	7,081	6,342	10.4%	23,520	20,785	11.6%		
Block B								
Prev, Rman, Discretionary	3,743	3,138	16.2%	12,740	11,135	12.6%		
Major jobs	1,635	1,385	15.3%	8,402	6,855	18.4%		
Standard jobs	258	236	8.2%	584	535	8.4%		
	5,636	4,759	15.5%	21,726	18,525	14.7%		
Block C								
Prev, Rman, Discretionary	1,720	1,560	9.3%	6,735	5,866	12.9%		
Major jobs	2,190	1,855	15.3%	3,585	3,040	15.2%		
Standard jobs	132	121	8.2%	237	216	9.0%		
	4,042	3,536	12.5%	10,557	9,122	13.6%		
Block O								
Prev, Rman, Discretionary	1,403	1,334	4.9%	4,697	4,371	6.9%		
Major jobs	-	-	0.0%	-	-	0.0%		
Standard jobs	-	-	0.0%	-	-	0.0%		
	1,403	1,334	4.9%	4,697	4,371	6.9%		
Reliability								
Major jobs	-	-	0.0%	-	-	0.0%		
	-	-	0.0%	-	-	0.0%		
Total overtime	18,161	15,972	12.1%	60,501	52,803	12.7%		

Overtime: Summary by block

Support Maintenance								
	Hours		OT %	Hours		OT %		
	Total	Regular		Total	Regular			
Prev, Rman, Discretionary	976	916	6.1%	4,605	4,242	7.9%		
Programs	-	-	0.0%	-	-	0.0%		
Standard jobs	3,097	2,687	13.2%	9,010	8,558	5.0%		
	4,073	3,603	11.5%	13,615	12,800	6.0%		

Process maintenance detailed overtime report

Process Maintenance Overtime Report				
Month of March 200X				
	Month		**YTD**	
	Percent	**Value**	**Percent**	**Value**
Total Process	12.1%	$ 12,965	12.7%	$ 67,959
Block A				
Preventive				
Mechanical	2.9%	$ (714)	3.2%	$ (4,462)
Electrical	6.1%	$ (387)	6.8%	$ (833)
Instrument	2.2%	$ (535)	2.9%	$ (1,428)
Work type	3.9%	$ (1,636)	4.0%	$ (6,722)
Running mandatory				
Mechanical	5.6%	$ (3,638)	9.0%	$ (2,201)
Electrical	16.1%	$ 565	11.8%	$ 521
Instrument	9.3%	$ (39)	12.7%	$ 526
Work type	6.8%	$ (3,111)	9.6%	$ (1,154)
Major jobs				
Mechanical	39.2%	$ 7,436	38.8%	$ 29,298
Electrical	9.6%	$ (68)	10.0%	$ (589)
Instrument	0.0%	$ -	0.0%	$ -
Work type	17.5%	$ 7,368	18.0%	$ 28,709
Standard jobs				
Mechanical	6.1%	$ (189)	9.0%	$ (130)
Instrument	0.0%	$ -	0.0%	$ -
Work type	8.2%	$ (138)	8.4%	$ (79)
Discretionary				
Mechanical	7.5%	$ (30)	8.3%	$ (595)
Electrical	0.0%	$ -	0.0%	$ (178)
Instrument	0.0%	$ (12)	10.0%	$ -
Work type	6.8%	$ (42)	8.4%	$ (773)
Total block A	10.4%	$ 2,441	11.6%	$ 19,981

Case note: This table is generated for each block of process maintenance. Only block "A" is shown since all others are identically formated.

Support maintenance detailed overtime report

Support Maintenance Overtime Report				
Month of March 200X				
	Month		**YTD**	
	Percent	**Value**	**Percent**	**Value**
Total Support	11.5%	$ 1,906	6.0%	$ (12,138)
Carpentry, env ironmental and general sevices				
Preventive				
Carp/env	10.0%	$ -	6.7%	$ (30)
General services	8.3%	$ (30)	11.8%	$ 149
Work type	8.6%	$ (30)	11.3%	$ 119
Running mandatory				
Carp/env	2.0%	$ (357)	17.0%	$ 1,440
General services	13.6%	$ 238	11.1%	$ 208
Work type	8.9%	$ (119)	14.1%	$ 1,648
Programs				
Carp/env	NA	NA	NA	NA
General services	NA	NA	NA	NA
Work type	NA	NA	NA	NA
Discretionary				
Carp/env	0.0%	$ (574)	6.0%	$ (1,621)
General services	5.0%	$ (59)	3.3%	$ (297)
Work type	0.9%	$ (634)	5.8%	$ (1,918)
Total CE and GS	0.0%	$ 110	0.0%	$ (985)
Fleet				
Preventive	6.5%	$ (128)	3.3%	$ (1,190)
Running mandatory	6.1%	$ (208)	3.7%	$ (1,547)
Discretionary	0.0%	$ -	0.0%	$ (12)
Total fleet	6.1%	$ (336)	6.1%	$ (2,748)
Standard work orders				
Equipment operator	12.5%	$ 595	13.0%	$ 2,142
Janitor	15.0%	$ 1,976	2.1%	$ (8,934)
Tool crib attendant	6.7%	$ (149)	4.4%	$ (744)
Repair mobile equip	0.0%	$ -	0.0%	$ -
Bus driver	0.0%	$ (291)	0.0%	$ (870)
Site clean up	0.0%	$ -	0.0%	$ -
Total standard	13.2%	$ 2,132	5.0%	$ (8,405)

Interactive performance analysis charts

Introduction: Interactive performance analysis charts

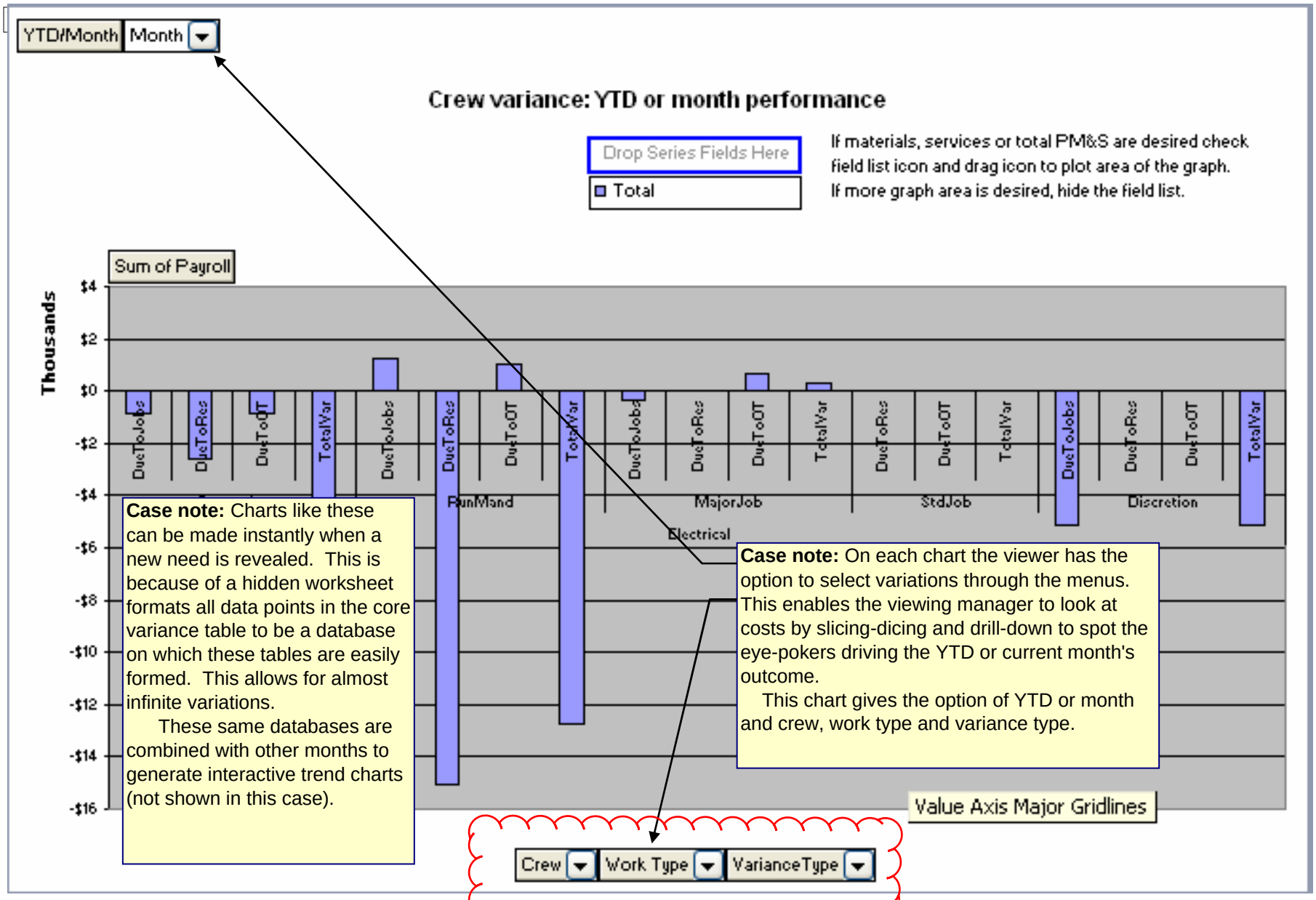
The next section of the monthly report provides a tremendous amount of information. It shows variance by area, work type, work class and resource type. It is powerful information, but we found that managers and analysts need the interactive tool of this section to quickly explore all of the information and determine where to focus further investigation and action.

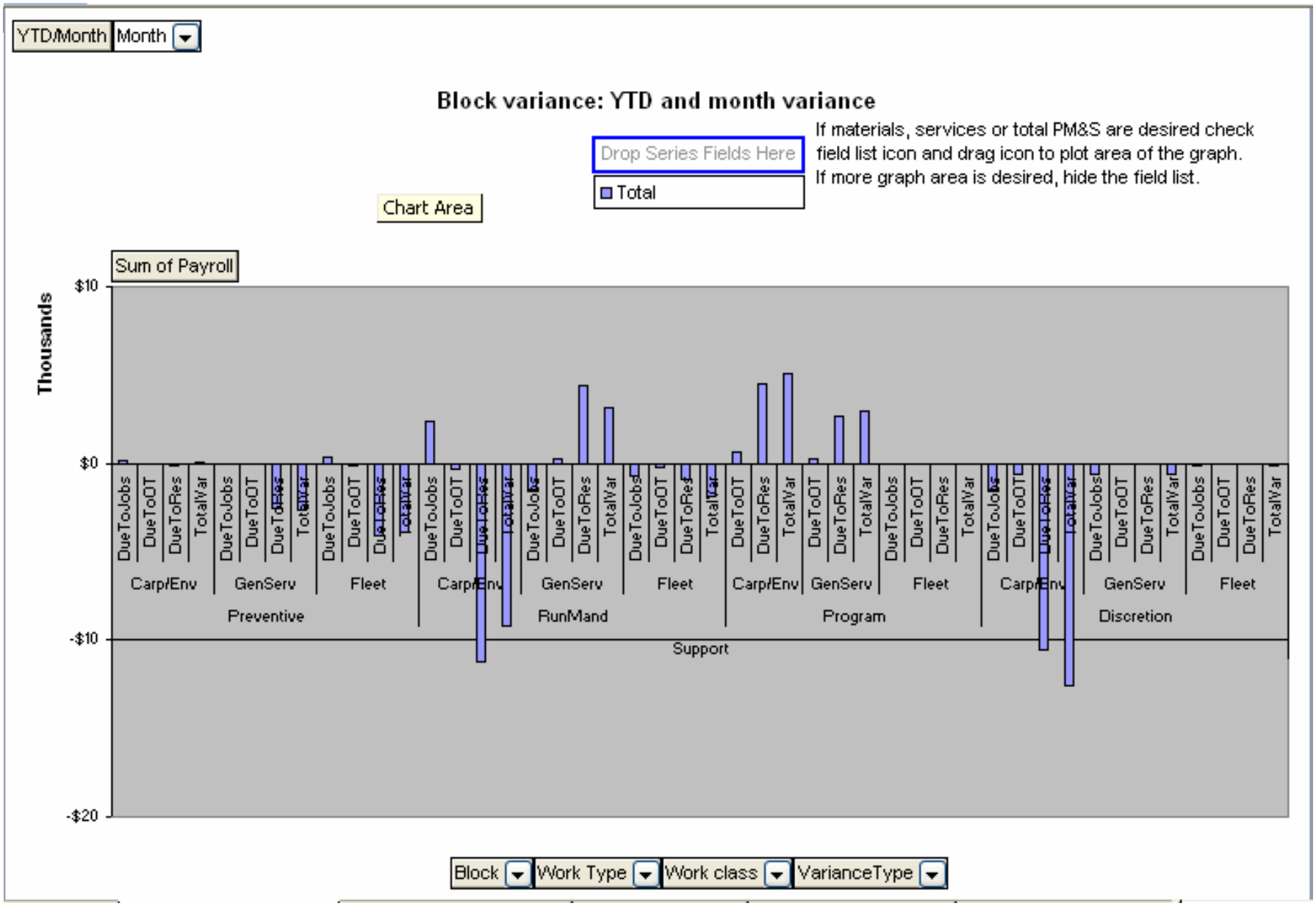
Hidden databases are built into the report that automatically collect every piece of the thousands of information points from the next section. The interactive charts of this section are then built on the databases. Furthermore, interactive charts can be developed literally in moments as needs emerge over time. The possibilities are almost limitless for what is to be viewed interactively and how the plant organization utilizes that capability.

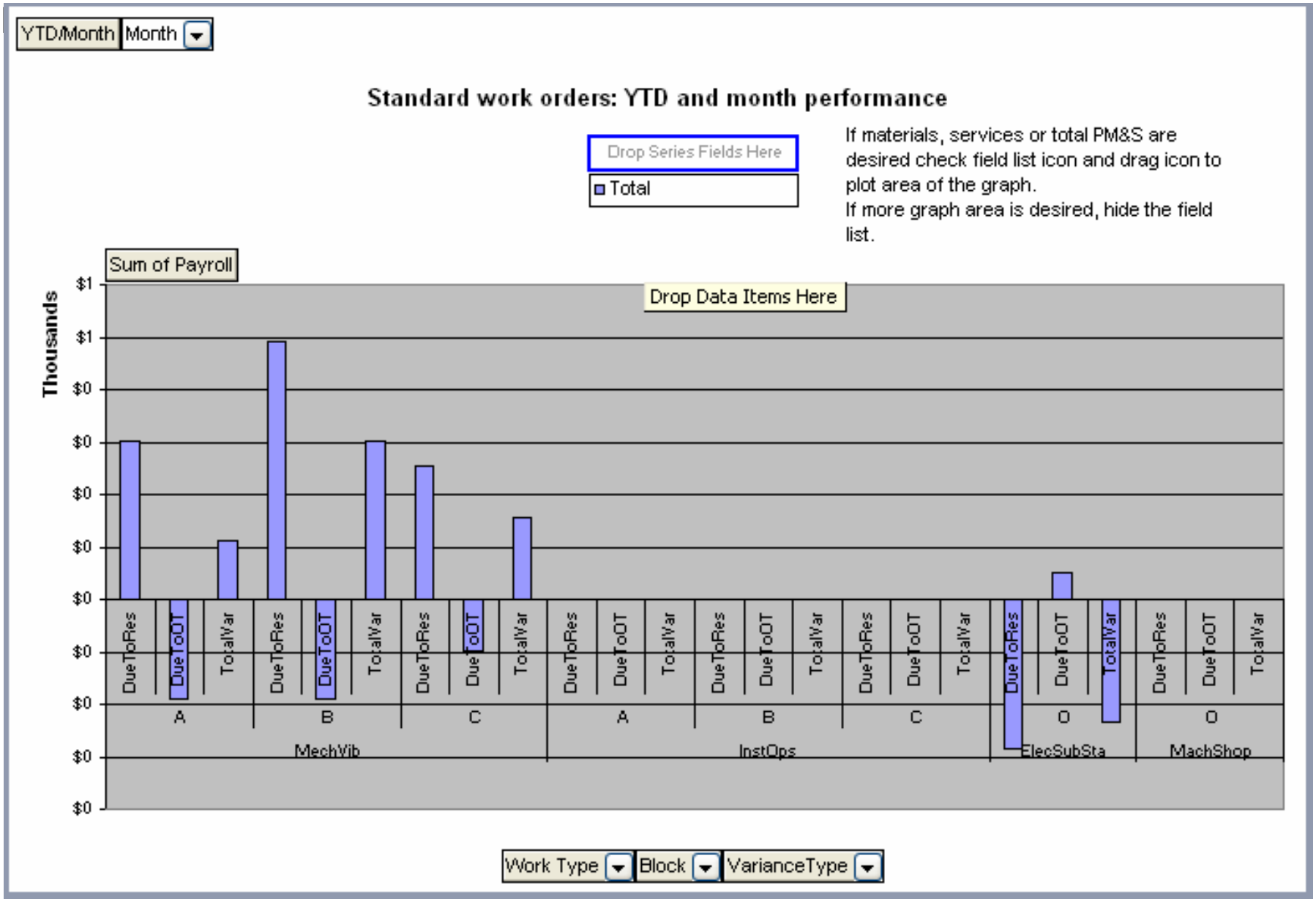
A manager interacts with the charts through their menus (see pull-down buttons the charts) to consolidate, screen, drill-down, and slice-and-dice the information. It is apparent that a graphic view allows the manager to quickly spot points of interest; the poke in the eye.

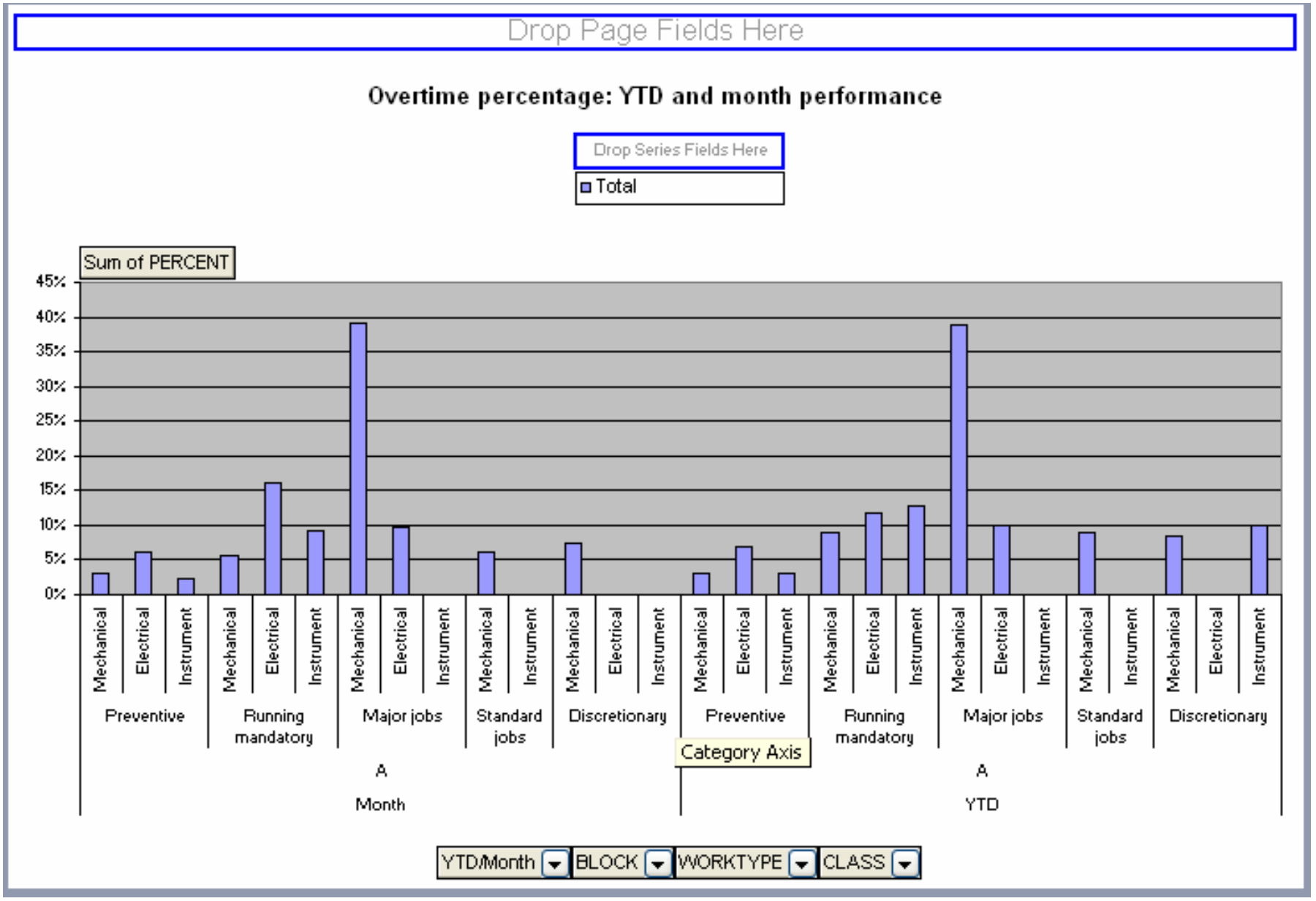
With these charts of this section, monthly cost meetings can be dynamic. When the variance document is projected at a meeting from a computer, the participants are able to move around through variations in the information they view. With it they can jointly review costs for the purpose of making decisions for spending targets and points to be monitored.

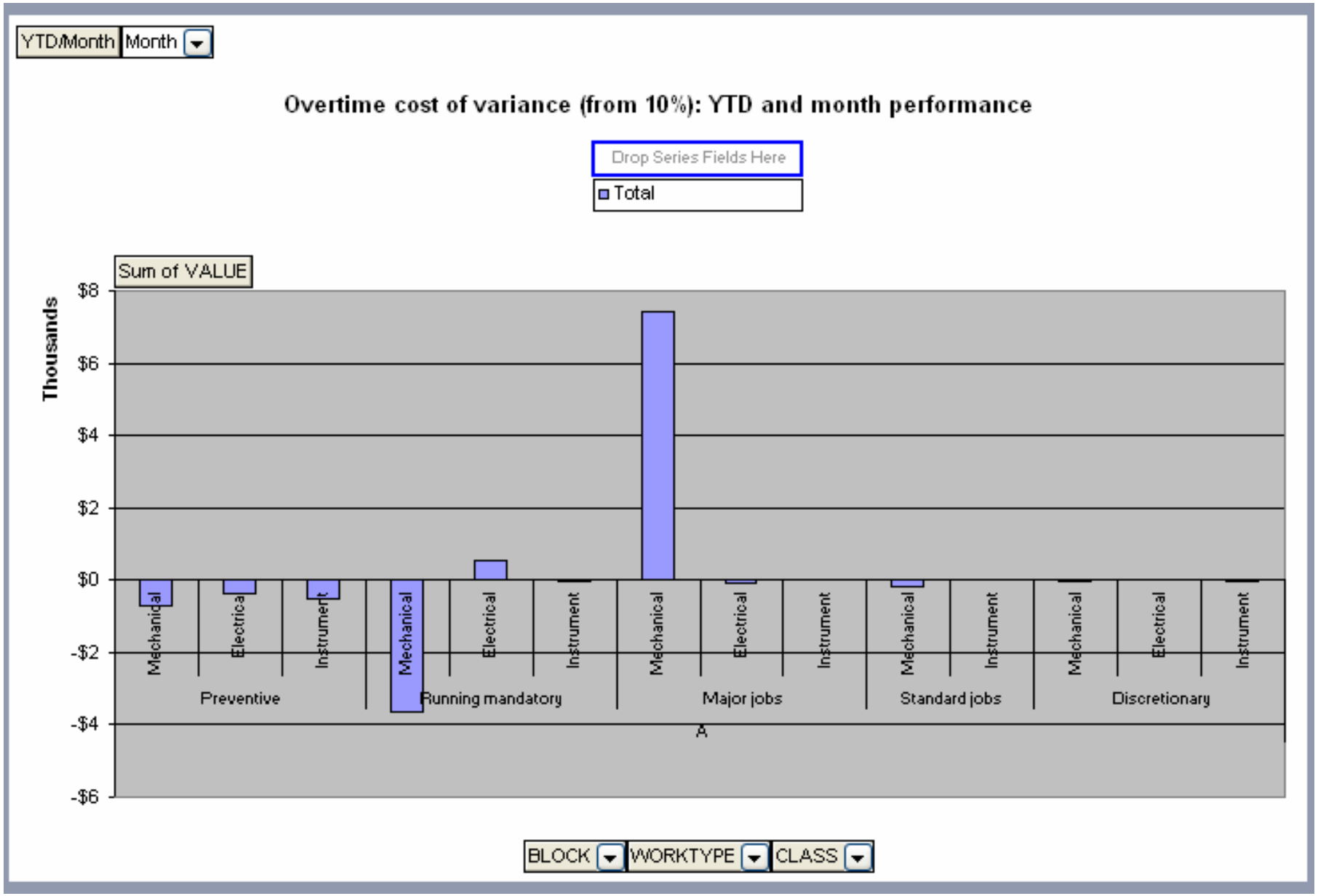
Interactive trend charts can also be built on the databases behind this section. They would be built by transferring each month's database to a common Excel file and using interactive charts to show them as trends rather than single YTD and month periods.


YTD/Month
Month
Crew variance: YTD or month performance
Drop Series Fields Here
Total
If materials, services or total PM&S are desired check field list icon and drag icon to plot area of the graph.
If more graph area is desired, hide the field list.
Sum of Payroll
Thousands
$4
$2
$0
-$2
-$4
-$6
-$8
-$10
-$12
-$14
-$16
DueToJobs
DueToRes
DueToOT
TotalVar
RunMaint
Electrical
MajorJob
StdJob
Discretion
Case note: Charts like these can be made instantly when a new need is revealed. This is because of a hidden worksheet formats all data points in the core variance table to be a database on which these tables are easily formed. This allows for almost infinite variations.
These same databases are combined with other months to generate interactive trend charts (not shown in this case).
Case note: On each chart the viewer has the option to select variations through the menus. This enables the viewing manager to look at costs by slicing-dicing and drill-down to spot the eye-pokers driving the YTD or current month's outcome.
This chart gives the option of YTD or month and crew, work type and variance type.
Value Axis Major Gridlines
Crew
Work Type
VarianceType


YTD/Month
Month
Block variance: YTD and month variance
If materials, services or total PM&S are desired check field list icon and drag icon to plot area of the graph. If more graph area is desired, hide the field list.
Drop Series Fields Here
Total
Chart Area
Sum of Payroll
Thousands
$10
$0
-$10
-$20
DueToJobs
DueToOT
DueToRes
TotalVar
Carp/Env
GenServ
Fleet
Preventive
RunMand
Program
Discretion
Support
Block
Work Type
Work class
VarianceType


YTD/Month
Month
Standard work orders: YTD and month performance
Drop Series Fields Here
Total
If materials, services or total PM&S are desired check field list icon and drag icon to plot area of the graph.
If more graph area is desired, hide the field list.
Sum of Payroll
Drop Data Items Here
Thousands
$1
$1
$0
$0
$0
$0
$0
$0
$0
$0
DueToRes
DueToOT
TotalVar
A
B
C
MechVib
InstOps
ElecSubSta
O
MachShop
Work Type
Block
VarianceType


Drop Page Fields Here
Overtime percentage: YTD and month performance
Drop Series Fields Here
Total
Sum of PERCENT
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Mechanical
Electrical
Instrument
Preventive
Running mandatory
Major jobs
Standard jobs
Discretionary
Category Axis
A
Month
YTD
YTD/Month
BLOCK
WORKTYPE
CLASS


YTD/Month
Month
Overtime cost of variance (from 10%): YTD and month performance
Drop Series Fields Here
Total
Sum of VALUE
Thousands
$8
$6
$4
$2
$0
-$2
-$4
-$6
Mechanical
Electrical
Instrument
Preventive
Running mandatory
Major jobs
Standard jobs
Discretionary
A
BLOCK
WORKTYPE
CLASS

Cost center in depth variance analysis

Introduction: Cost center in depth variance analysis

This section presents detailed variance reports for the process and support maintenance cost centers. For each, there are mirror YTD and month reports. For the case document, this set of lengthy reports has been limited to show only block "A" for process maintenance and all of support maintenance.

In these reports, actual, budget and variance details come together from back ground detailed per work type and work class. Thus, this is the point at which the journey begins to drill down to the root cause of currently important variances. Interactive charts in the previous section are designed to support the search process.

Without these tables, cost behavior is just a black-box. This, of course, is the historical reality of maintenance cost management.

In this section a powerful contrast with traditional accounting is apparent. It cannot provide the maintenance-capacity-based account variance information a plant must have to manage its maintenance cost. This is highlighted by the variance matrix common to all levels of the report.

One reason is that the accounts are the take-or-leave-it from the accounting system general ledger. Furthermore, when reported back to maintenance accounts “actuals” are disconnected from activity.

Another powerful distinction with traditional accounting is the second dimension of variance that we call the “due-to” dimension. It is perpendicular to account variance. Both dimensions work together.

The budget section (along the top row) of each variance matrix is the budget for the subject level. The remainder of the table presents variance from the budget along the two dimensions: accounts (columns) linked to activity and “due-to” (rows). Rather than universal, the dimensions and their constructs are decided by the plant’s cost management opportunities and issues.

The “due-to” dimension breaks each account’s variance into its causes, something entirely out of reach to the traditional accounting system variance report. The table shows three such rows. “Due to jobs” measures total variance as it is affected by the actual number of jobs undertaken. “Due to resources” measures total variance as it is affected by the labor, materials and services actually consumed. “Due to overtime” measures total variance as actual overtime hours vary from a budgeted average.

The importance of the due-to dimension and, therefore, the contrast with traditional-accounting-based cost management is dramatic. Reviewing matrixes reveals that total variance at a subject level will show a good or bad month. When we look at the “due-to” dimension we discover that behind the curtain it was actually the reverse. Without the “due to” dimension this would have been masked. In cost management, what is not recognized is a lost opportunity or worse.

The cells at the intersection of the variance matrix dimensions tell the plant where to drill down and what to look for. When the source is reached, the plant can ask itself all sorts of questions for which the answers have all sorts of ramifications.

“Due-to” variances can be almost anything by designing their algorithms behind the variance table. Thus, a step in the building the variance and forecast report is to engineer the algorithms for the due-to variances.

The tables of this section are the gut of the monthly variance, forecast and decision report. Behind these reports are lower level tables (see next section). They deal with the nature of various work types and classes.

A side note. Maintenance practitioners have long wished for key performance indicators for maintenance. The KPIs of interest have long ago been established. The problem has been that KPIs have been industry averages rather than reflect the plant. A common and unanswered question to practitioners is, “What should my plant’s KPIs be?”

Maintenance cost management enables plants to finally close the gap between principle and practicality. The plant’s KPIs can be extracted from the budget as an activity and resource model. The variance tables, of this section, provide actual KPI performance. Without cost management KPI is a good concept difficult to accept as highly meaningful. Now the KPI can say something about cost performance as always intended.

Process maintenance YTD variance

Month of March 200X

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Total of all blocks												
Total all blocks	3,181	60,482	2,758,956	1,187,987	334,940	4,281,883	3,128	60,544	2,712,978	1,267,137	330,138	4,310,253
							Total variance		45,978	(79,150)	4,802	(28,370)
							Due to jobs		9,653	(23,193)	(1,285)	(14,824)
							Due to resources		(31,635)	(55,957)	6,088	(81,504)
			12.7%	= Percent overtime			**Due to overtime**		67,959			67,959
						Preventive and running mandatory: Over/(under) due to jobs						51,844
						Discretionary spending to date						228,675
Block A												
Preventive												
Mechanical	210	2,200	94,121	300	-	94,421	201	1,280	57,367	2,412	302	60,080
Per job		10	448	1	-	450		6.4	285	12	2	299
							Total variance		36,754	(2,112)	(302)	34,340
							Due to jobs		2,569	108	14	2,690
							Due to resources		38,647	(2,220)	(315)	36,112
			3.2%	= Percent overtime			**Due to overtime**		(4,462)			(4,462)
Electrical	34	880	38,600	-	-	38,600	36	622	27,863	468	72	28,403
Per job		26	1,135	0	-	1,135		17	774	13	2	789
							Total variance		10,737	(468)	(72)	10,197
							Due to jobs		(1,548)	(26)	(4)	(1,578)
							Due to resources		13,117	(442)	(68)	12,607
			6.8%	= Percent overtime			**Due to overtime**		(833)			(833)

Case note: Information in the four mirror tables of this section is massive, but absolutely necessary to manage maintenance cost. Interactive charts (see section) slice and dice it for "eye-poke" type analysis.

Process maintenance YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Instrument	230	680	29,043	220	4,800	34,063	225	900	40,329	8,775	675	49,779
Per job		3	126	1	21	148		4	179	39	3	221
							Total variance		(11,286)	(8,555)	4,125	(15,716)
							Due to jobs		896	195	15	1,106
							Due to resources		(10,754)	(8,750)	4,110	(15,394)
			2.9%	= Percent overtime			**Due to overtime**		(1,428)			(1,428)
Total preventive	474	3,760	161,764	520	4,800	167,084	462	2,802	125,559	11,655	1,049	138,263
							Total variance		36,205	(11,135)	3,752	28,821
							Due to jobs		1,917	277	25	2,218
							Due to resources		41,010	(11,412)	3,727	33,325
			4.0%	= Percent overtime			**Due to overtime**		(6,722)			(6,722)
Running mandatory												
Mechanical	310	7,740	344,629	290,000	34,000	668,629	300	7,125	319,268	240,000	36,000	595,268
Per job		25	1,112	935	110	2,157		24	1,064	800	120	1,984
							Total variance		25,361	50,000	(2,000)	73,361
							Due to jobs		10,642	8,000	1,200	19,842
							Due to resources		16,920	42,000	(3,200)	55,720
			9.0%	= Percent overtime			**Due to overtime**		(2,201)			(2,201)
Electrical	195	975	44,210	10,000	2,100	56,310	201	1,302	58,339	10,050	2,010	70,399
Per job		5	227	51	11	289		6	290	50	10	350
							Total variance		(14,129)	(50)	90	(14,089)
							Due to jobs		(1,741)	(300)	(60)	(2,101)
							Due to resources		(12,908)	250	150	(12,508)
			11.8%	= Percent overtime			**Due to overtime**		521			521
Instrument	43	653	29,787	2,800	500	33,087	39	624	27,961	29,250	390	57,601
Per job		15	693	65	12	769		16	717	750	10	1,477
							Total variance		1,826	(26,450)	110	(24,514)
							Due to jobs		2,868	3,000	40	5,908
					-		**Due to resources**		(1,568)	(29,450)	70	(30,948)
			12.7%	= Percent overtime			**Due to overtime**		526			526

Case note: Basic pattern of information through out the report making possible all sorts of contextural cost perspectives possible.

Process maintenance YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Total running mandator	548	9,368	418,627	302,800	36,600	758,027	540	9,051	405,568	279,300	38,400	723,268
							Total variance		13,058	23,500	(1,800)	34,758
							Due to jobs		11,769	10,700	1,180	23,649
							Due to resources		2,444	12,800	(2,980)	12,264
			9.6%	= Percent overtime			**Due to overtime**		(1,154)			(1,154)
Major jobs		Note: Row "Due to jobs" shows an unexpected major job.										
Mechanical		7,220	343,695	125,500	141,000	610,195		6,940	310,982	127,500	134,500	572,982
							Total variance		32,713	(2,000)	6,500	37,213
							Due to jobs		4,481	(4,000)	5,500	5,981
							Due to resources		(1,066)	2,000	1,000	1,934
			38.8%	= Percent overtime			**Due to overtime**		29,298			29,298
Electrical		1,308	58,023	24,200	3,000	85,223		1,300	58,253	24,500	3,000	85,753
							Total variance		(230)	(300)	-	(530)
							Due to jobs		358	(300)	-	58
							Due to resources		(0)	-	-	(0)
			10.0%	= Percent overtime			**Due to overtime**		(589)			(589)
Instrument		-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to jobs		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Carpentry/Environ		-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to jobs		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-

Process maintenance YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Total major		8,528	401,718	149,700	144,000	695,418	-	8,240	369,235	152,000	137,500	658,735
							Total variance		32,483	(2,300)	6,500	36,683
							Due to jobs		4,839	(4,300)	5,500	6,039
							Due to resources		(1,066)	2,000	1,000	1,934
			18.0%	= Percent overtime			**Due to overtime**		28,709	-	-	28,709
Standard work orders												
Mechanical	1	456.48855	20,325	-	-	20,325		468	20,971	-	-	20,971
							Total variance		(646)	-	-	(646)
							Due to resources		(516)	-	-	(516)
			9.0%	= Percent overtime			**Due to overtime**		(130)			(130)
Electrical	1	94.8	$ 4,248	$ -	$ -	4,248		100	4,481	-	-	4,481
							Total variance		(233)	-	-	(233)
							Due to resources		(284)	-	-	(284)
			-28417.2%	= Percent overtime			**Due to overtime**		51			51
Instrument	0	0	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
			0.0%	= Percent overtime			**Due to resources**		-	-	-	-
							Due to overtime		-			-
Total standard	2	551	24,573	-	-	24,573	-	568	25,452	-	-	25,452
							Total variance		(879)	-	-	(879)
							Due to resources		(800)	-	-	(800)
			8.4%				**Due to overtime**		(79)	-	-	(79)
Discretionary												
Mechanical	17	1,200	53,177	5,400	700	59,277	18	1,217	54,531	55,440	554	110,525
Per job		71	3,128	318	41	3,487		66	2,951	3,000	30	5,981
							Total variance		(1,354)	(50,040)	146	(51,248)
							Due to jobs		(4,367)	(4,440)	(44)	(8,852)
							Due to resources		3,608	(45,600)	190	(41,802)
			8.3%	= Percent overtime			**Due to overtime**		(595)			(595)

Case note: The plant's cost system provides managers with a push button report to monitor all standard jobs for hiding excess resources.

Process maintenance YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Electrical	2	60	2,510	1,000	150	3,660	3	66	2,937	1,584	264	4,785
Per job		30	1,255	500	75	1,830		25	1,113	600	100	1,813
							Total variance		(427)	(584)	(114)	(1,125)
							Due to jobs		(712)	(384)	(64)	(1,160)
							Due to resources		463	(200)	(50)	213
			0.0%	= Percent overtime			**Due to overtime**		(178)			(178)
Instrument	5	20	896	9,000	-	9,896	3	44	1,952	5,280	343	7,575
Per job		4	179	1,800	-	1,979		17	739	2,000	130	2,869
							Total variance		(1,056)	3,720	(343)	2,321
							Due to jobs		1,745	4,720	307	6,772
							Due to resources		(2,801)	(1,000)	(650)	(4,451)
			10.0%	= Percent overtime			**Due to overtime**		-			-
Total discretionary	24	1,280	56,584	15,400	850	72,834	24	1,326	59,420	62,304	1,162	122,886
							Total variance		(2,837)	(46,904)	(312)	(50,052)
							Due to jobs		(3,334)	(104)	198	(3,240)
							Due to resources		1,271	(46,800)	(510)	(46,039)
			8.4%	= Percent overtime			**Due to overtime**		(773)			(773)
Total block A	1,048	23,487	1,063,265	468,420	186,250	1,717,935	1,026	21,987	985,234	505,259	178,110	1,668,603
							Total variance		78,031	(36,839)	8,140	49,332
							Due to jobs		15,191	6,573	6,903	28,667
							Due to resources		42,859	(43,412)	1,237	684
			11.6%	= Percent overtime			**Due to overtime**		19,981			19,981
						Preventive and running mandatory: Over/under due to jobs						25,867

Case note: The section continues for all blocks. However, this demo will only show the Block A.

Process maintenance month variance												
Month of March 200X												
	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Total of all blocks												
Total all blocks	1,042	18,161	825,046	403,628	75,000	1,303,674	1,043	20,071	899,397	447,046	85,679	1,432,122
							Total variance		(74,351)	(43,418)	(10,679)	(128,448)
							Due to jobs		(101)	1,699	4,191	5,789
							Due to resources		(87,216)	(45,117)	(14,870)	(147,203)
			12.1%	= Percent overtime			**Due to overtime**		12,965			12,965
						Preventive and running mandatory: Over/under due to jobs						37,657
						Discretionary spending to date						18,849
Block A												
Preventive												
Mechanical	60	340	14,522	25	-	14,547	67	427	19,122	804	101	20,027
Per job		6	242	0	-	242		6.4	285	12	2	299
							Total variance		(4,601)	(779)	(101)	(5,480)
							Due to jobs		(1,998)	(84)	(11)	(2,092)
							Due to resources		(1,889)	(695)	(90)	(2,674)
			2.9%	= Percent overtime			**Due to overtime**		(714)			(714)
Electrical	13	330	14,401	-	-	14,401	12	207	9,288	156	24	9,468
Per job		25	1,108	0	-	1,108		17	774	13	2	789
							Total variance		5,113	(156)	(24)	4,933
							Due to jobs		774	13	2	789
							Due to resources		4,726	(169)	(26)	4,531
			6.1%	= Percent overtime			**Due to overtime**		(387)			(387)

Process maintenance month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Instrument	77	230	9,771	70	1,610	11,451	75	300	13,443	2,925	225	16,593
Per job		3	127	1	21	149		4	179	39	3	221
							Total variance		(3,672)	(2,855)	1,385	(5,142)
							Due to jobs		358	78	6	442
							Due to resources		(3,495)	(2,933)	1,379	(5,049)
			2.2%	= Percent overtime			**Due to overtime**		(535)			(535)
Total preventive	150	900	38,693	95	1,610	40,398	154	934	41,853	3,885	350	46,088
							Total variance		(3,160)	(3,790)	1,261	(5,689)
							Due to jobs		(865)	7	(3)	(861)
							Due to resources		(659)	(3,797)	1,263	(3,193)
			3.9%	= Percent overtime			**Due to overtime**		(1,636)			(1,636)
Running mandatory												
Mechanical	110	2,753	119,724	125,000	600	245,324	100	2,375	106,423	80,000	12,000	198,423
Per job		25	1,088	1,136	5	2,230		24	1,064	800	120	1,984
							Total variance		13,302	45,000	(11,400)	46,902
							Due to jobs		10,642	8,000	1,200	19,842
							Due to resources		6,297	37,000	(12,600)	30,697
			5.6%	= Percent overtime			**Due to overtime**		(3,638)			(3,638)
Electrical	70	310	14,456	1,040	-	15,496	67	434	19,446	3,350	670	23,466
Per job		4	207	15	-	221		6	290	50	10	350
							Total variance		(4,990)	(2,310)	(670)	(7,970)
							Due to jobs		871	150	30	1,051
							Due to resources		(6,426)	(2,460)	(700)	(9,586)
			16.1%	= Percent overtime			**Due to overtime**		565			565
Instrument	15	193	8,610	20	-	8,630	13	208	9,320	9,750	130	19,200
Per job		13	574	1	-	575		16	717	750	10	1,477
							Total variance		(711)	(9,730)	(130)	(10,571)
							Due to jobs		1,434	1,500	20	2,954
					-		**Due to resources**		(2,106)	(11,230)	(150)	(13,486)
			9.3%	= Percent overtime			**Due to overtime**		(39)			(39)

Process maintenance month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Total running mandator	195	3,256	142,790	126,060	600	269,450	180	3,017	135,189	93,100	12,800	241,089
							Total variance		7,601	32,960	(12,200)	28,361
							Due to jobs		12,947	9,650	1,250	23,847
							Due to resources		(2,235)	23,310	(13,450)	7,625
			6.8%	= Percent overtime			**Due to overtime**		(3,111)			(3,111)
Major jobs												
Mechanical		2,020	96,406	40,000	17,500	153,906		1,840	82,451	37,500	14,000	133,951
							Total variance		13,955	2,500	3,500	19,955
							Due to jobs		6,722	2,500	4,000	13,222
							Due to resources		(202)	-	(500)	(702)
			39.2%	= Percent overtime			**Due to overtime**		7,436			7,436
Electrical		603	26,952	10,900	1,300	39,152		600	26,886	11,167	1,000	39,053
							Total variance		66	(267)	300	99
							Due to jobs		134	(267)	300	168
							Due to resources		(0)	-	-	(0)
			9.6%	= Percent overtime			**Due to overtime**		(68)			(68)
Instrument		-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to jobs		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Carpentry/Environ		-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to jobs		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-

Process maintenance month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Total major		2,623	123,358	50,900	18,800	193,058	-	2,440	109,337	48,667	15,000	173,003
							Total variance		14,021	2,233	3,800	20,054
							Due to jobs		6,856	2,233	4,300	13,389
							Due to resources		(202)	-	(500)	(702)
			17.5%	= Percent overtime			**Due to overtime**		7,368	-	-	7,368
Standard work orders												
Mechanical	1	162.74809	7,104	-	-	7,104		156	6,990			6,990
							Total variance		113	-	-	113
							Due to resources		302	-	-	302
			6.1%	= Percent overtime			**Due to overtime**		(189)			(189)
Electrical	1	94.8	$ 4,248	$ -	$ -	4,248		100	4,481	-	-	4,481
							Total variance		(233)	-	-	(233)
							Due to resources		(284)	-	-	(284)
			11.8%	= Percent overtime			**Due to overtime**		51			51
Instrument	0	0	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
			0.0%	= Percent overtime			**Due to resources**		-	-	-	-
							Due to overtime		-			-
Total standard	2	258	11,352	-	-	11,352	-	256	11,471	-	-	11,471
							Total variance		(120)	-	-	(120)
							Due to resources		18	-	-	18
			8.2%				**Due to overtime**		(138)			(138)
Discretionary												
Mechanical	5	40	1,763	-	-	1,763	6	406	18,177	18,480	185	36,842
Per job		8	353	-	-	-		66	2,951	3,000	30	5,981
							Total variance		(16,414)	(18,480)	(185)	(35,079)
							Due to jobs		(3,423)	(3,480)	(35)	(6,938)
							Due to resources		(12,962)	(15,000)	(150)	(28,112)
			7.5%	= Percent overtime			**Due to overtime**		(30)			(30)

Case note: The plant's cost system provides managers with a push button report to monitor all standard jobs for hiding excess resources.

Process maintenance month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Electrical	-	-	-	-	-	-	1	22	979	528	88	1,595
Per job		-	-	0	-	-		25	1,113	600	100	1,813
							Total variance		(979)	(528)	(88)	(1,595)
							Due to jobs		(979)	(528)	(88)	(1,595)
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Instrument	1	4	167	-	-	167	1	15	651	1,760	114	2,525
Per job		4	167	0	-	167		17	739	2,000	130	2,869
							Total variance		(483)	(1,760)	(114)	(2,358)
							Due to jobs		89	240	16	344
							Due to resources		(560)	(2,000)	(130)	(2,690)
			0.0%	= Percent overtime			**Due to overtime**		(12)			(12)
Total discretionary	6	44	1,930	0	-	1,930	8	442	19,807	20,768	387	40,962
							Total variance		(17,877)	(20,768)	(387)	(39,032)
							Due to jobs		(4,313)	(3,768)	(107)	(8,188)
							Due to resources		(13,522)	(17,000)	(280)	(30,802)
			6.8%	= Percent overtime			**Due to overtime**		(42)			(42)
Total block A	353	7,081	318,123	177,055	21,010	516,188	342	7,089	317,657	166,420	28,537	512,613
							Total variance		466	10,635	(7,527)	3,575
							Due to jobs		14,624	8,122	5,440	28,187
							Due to resources		(16,599)	2,513	(12,967)	(27,053)
			10.4%	= Percent overtime			**Due to overtime**		2,441			2,441
						Preventive and running mandatory: Over/under due to jobs						22,986

Case note: The section continues for all blocks. However, this demo will only show the Block A.

Support Maintenance: YTD variance

Support maintenance YTD variance												
Month of March 200X												
	Actual activity		**Actual cost**				**Budget activity**		**Budget cost**			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Total of all categories												
Total all blocks	657	18,995	698,812	219,050	1,156,630	2,074,492	666	18,907	754,508	222,869	1,151,847	2,129,224
							Total variance		(55,696)	(3,819)	4,783	(54,732)
							Due to jobs		(183)	3,375	11,341	14,533
							Due to resources		(43,374)	(7,195)	(6,558)	(57,127)
			6.0%	= Percent overtime			**Due to overtime**		(12,138)			(12,138)
						Preventive and running mandatory: Over/under due to jobs						16,035
						Budgeted discretionary spending						2,814,901
						Discretionary spending (Month or YTD)						106,934
Carpentry, environment and general												
Preventive												
Carp/Env	6	30	1,315	50	-	1,365	6.0	25	1,102	18	6	1,126
Per job		5	219	8	-	227		4.1	184	3	1	188
							Total variance		212	32	(6)	238
							Due to jobs		-	-	-	-
							Due to resources		242	32	(6)	268
			6.7%	= Percent overtime			**Due to overtime**		(30)			(30)
General services	71	280	12,696	300	180	13,176	69.0	352	15,769	104	138	16,010
Per job		4	179	4	3	186		5.1	229	2	2	232
							Total variance		(3,073)	197	42	(2,835)
							Due to jobs		457	3	4	464
							Due to resources		(3,679)	194	38	(3,447)
			11.8%	= Percent overtime			**Due to overtime**		149			149

Support Maintenance: YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Total preventive	77	310	14,010	350	180	14,540	75	377	16,871	122	144	17,136
							Total variance		(2,861)	229	36	(2,596)
							Due to jobs		457	3	4	464
							Due to resources		(3,437)	226	32	(3,179)
			11.3%	= Percent overtime			**Due to overtime**		119			119
Running mandatory												
Carp/Env	58	696	32,627	8,600	5,200	46,427	60.0	1,044	46,782	9,600	4,800	61,182
Per job		12	563	148	90	800		17.4	780	160	80	1,020
							Total variance		(14,154)	(1,000)	400	(14,754)
							Due to jobs		(1,559)	(320)	(160)	(2,039)
							Due to resources		(14,035)	(680)	560	(14,155)
			17.0%	= Percent overtime			**Due to overtime**		1,440			1,440
General services	50	650	29,335	13,400	59,000	101,735	42.0	466	20,890	12,600	54,600	88,090
Per job		13	587	268	1,180	2,035		11.1	497	300	1,300	2,097
							Total variance		8,444	800	4,400	13,644
							Due to jobs		3,979	2,400	10,400	16,779
							Due to resources		4,257	(1,600)	(6,000)	(3,343)
			11.1%	= Percent overtime			**Due to overtime**		208			208
Total running mandato	108	1,346	61,962	22,000	64,200	148,162	102	1,510	67,672	22,200	59,400	149,272
							Total variance		(5,710)	(200)	4,800	(1,110)
							Due to jobs		2,420	2,080	10,240	14,740
							Due to resources		(9,778)	(2,280)	(5,440)	(17,498)
			14.1%	= Percent overtime			**Due to overtime**		1,648			1,648
Programs												
Carp/Env		2,700	122,772	100,900	996,000	1,219,672		2,600	116,506	102,900	997,000	1,216,406
							Total variance		6,266	(2,000)	(1,000)	3,266
							Due to resources		4,481	(2,000)	(1,000)	1,481
			12.2%	= Percent overtime			**Due to overtime**		1,785			1,785

Support Maintenance: YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
General services		2,680	117,473	34,000	68,000	219,473		2,620	117,402	35,000	65,000	217,402
							Total variance		71	(1,000)	3,000	2,071
							Due to resources		2,689	(1,000)	3,000	4,689
			6.7%	= Percent overtime			**Due to overtime**		(2,617)			(2,617)
Total major	-	5,380	240,245	134,900	1,064,000	1,439,145	-	5,220	233,908	137,900	1,062,000	1,433,808
							Total variance		6,337	(3,000)	2,000	5,337
							Due to resources		7,170	(3,000)	2,000	6,170
			NA	= Percent overtime			**Due to overtime**		(833)			(833)
Descretionary												
Carp/Env	55	1,375	59,993	19,000	13,500	92,493	58.1	1,382	61,941	20,909	14,520	97,370
Per job		25	1,091	345	245	1,682		23.8	1,066	360	250	1,676
							Total variance		(1,948)	(1,909)	(1,020)	(4,877)
							Due to jobs		(3,285)	(1,109)	(770)	(5,164)
							Due to resources		2,957	(800)	(250)	1,907
			6.0%	= Percent overtime			**Due to overtime**		(1,621)			(1,621)
General services	10	150	6,424	2,000	5,600	14,024	7.9	159	7,133	1,980	5,544	14,657
Per job		15	642	200	560	1,402		20.1	901	250	700	1,851
							Total variance		(709)	20	56	(633)
							Due to jobs		1,873	520	1,456	3,849
							Due to resources		(2,285)	(500)	(1,400)	(4,185)
			3.3%	= Percent overtime			**Due to overtime**		(297)			(297)
Total Discretionary	65	1,525	66,417	21,000	19,100	106,517	66	1,541	69,075	22,889	20,064	112,027
							Total variance		(2,658)	(1,889)	(964)	(5,510)
							Due to jobs		(1,411)	(589)	686	(1,314)
							Due to resources		672	(1,300)	(1,650)	(2,278)
			5.8%	= Percent overtime			**Due to overtime**		(1,918)			(1,918)

Support Maintenance: YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Total CRP/ENV/GS	250	8,561	382,634	178,250	1,147,480	1,708,364	243	8,648	387,526	183,110	1,141,608	1,712,244
							Total variance		(4,892)	(4,860)	5,872	(3,880)
							Due to jobs		1,465	1,494	10,930	13,890
							Due to resources		(5,373)	(6,355)	(5,058)	(16,785)
			0.0%	= Percent overtime			**Due to overtime**		(985)			(985)
Fleet												
Preventive	200	600	25,696	700	0	26,396	225	619	27,726	495	225	28,446
Per job		3	128	4	-	132		2.8	123	2	1	126
							Total variance		(2,030)	205	(225)	(2,050)
							Due to jobs		(3,081)	(55)	(25)	(3,161)
							Due to resources		2,241	260	(200)	2,301
			3.3%	= Percent overtime			**Due to overtime**		(1,190)			(1,190)
Run mandatory	205	820	35,198	40,000	9,000	84,198	195	649	29,097	39,000	9,750	77,847
Per job		4	172	195	44	411		3.3	149	200	50	399
							Total variance		6,100	1,000	(750)	6,350
							Due to jobs		1,492	2,000	500	3,992
							Due to resources		6,155	(1,000)	(1,250)	3,905
			3.7%	= Percent overtime			**Due to overtime**		(1,547)			(1,547)
Programs	-	-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to jobs		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Discretionary	2	4	167	100	150	417	2.6	6	248	264	264	776
Per job		2	84	50.0	75	209		2.1	94	100	100	294
							Total variance		(81)	(164)	(114)	(359)
							Due to jobs		(60)	(64)	(64)	(188)
							Due to resources		(9)	(100)	(50)	(159)
			0.0%	= Percent overtime			**Due to overtime**		(12)			(12)

Support Maintenance: YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Total Fleet	407	1,424	61,061	40,800	9,150	111,011	423	1,274	57,072	39,759	10,239	107,070
							Total variance		3,989	1,041	(1,089)	3,941
							Due to jobs		(1,649)	1,881	411	643
							Due to resources		8,386	(840)	(1,500)	6,046
			6.1%	= Percent overtime			**Due to overtime**		(2,748)			(2,748)
Standard work orders												
Equipment operator		2,400	93,230	-	-	93,230		2,378	106,573	-	-	106,573
							Total variance		(13,343)	-	-	(13,343)
							Due to resources		(15,485)	-	-	(15,485)
			13.0%	= Percent overtime			**Due to overtime**		2,142			2,142
Janitors		5,720	135,324	-	-	135,324		5,726	170,486	-	-	170,486
							Total variance		(35,162)	-	-	(35,162)
							Due to resources		(26,229)	-	-	(26,229)
			2.1%	= Percent overtime			**Due to overtime**		(8,934)			(8,934)
Tool crib attendant		450	16,335	-	-	16,335		440	19,736	-	-	19,736
							Total variance		(3,400)	-	-	(3,400)
							Due to resources		(2,657)	-	-	(2,657)
			4.4%	= Percent overtime			**Due to overtime**		(744)			(744)
Repairs mobile equip		-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Bus driver		440	10,227	-	-	10,227		440	13,114	-	-	13,114
							Total variance		(2,887)	-	-	(2,887)
							Due to resources		(2,018)	-	-	(2,018)
			0.0%	= Percent overtime			**Due to overtime**		(870)			(870)

Case note: The plant's cost system provides managers with a push button report to monitor all standard jobs for hiding excess resources.

Support Maintenance: YTD variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Site clean up		-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Total standard WOs		9,010	255,116	-	-	255,116	-	8,985	309,909	-	-	309,909
							Total variance		(54,793)	-	-	(54,793)
							Due to resources		(46,388)	-	-	(46,388)
			5.0%	= Percent overtime			**Due to overtime**		(8,405)	-	-	(8,405)

Support maintenance: month variance

Support maintenance month variance												
Month of March 200X												
	Actual activity		**Actual cost**				**Budget activity**		**Budget cost**			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Total of all categories												
Total all blocks	224	5,523	200,818	20,470	543,200	764,488	222	5,852	231,338	33,723	546,949	812,010
							Total variance		(30,520)	(13,253)	(3,749)	(47,522)
							Due to jobs		(1,455)	(2,148)	(4,782)	(8,385)
							Due to resources		(30,971)	(11,105)	1,033	(41,043)
			11.5%	= Percent overtime			**Due to overtime**		1,906			1,906
						Preventive and running mandatory: Over/under due to jobs						(4,662)
						Budgeted discretionary spending						2,814,901
						Discretionary spending (Month or YTD)						12,207
Carpentry, environment and general												
Preventive												
Carp/Env	3	10	448	90	-	538	2.0	8	367	6	2	375
Per job		3	149	30	-	179		4.1	184	3	1	188
							Total variance		81	84	(2)	163
							Due to jobs		184	3	1	188
							Due to resources		(103)	81	(3)	(25)
			10.0%	= Percent overtime			**Due to overtime**		-			-
General services	23	60	2,659	100	-	2,759	23.0	117	5,256	35	46	5,337
Per job		3	116	4	-	120		5.1	229	2	2	232
							Total variance		(2,597)	66	(46)	(2,578)
							Due to jobs		-	-	-	-
							Due to resources		(2,568)	66	(46)	(2,548)
			8.3%	= Percent overtime			**Due to overtime**		(30)			(30)

Support maintenance: month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Total preventive	26	70	3,107	190	-	3,297	25	126	5,624	41	48	5,712
							Total variance		(2,517)	150	(48)	(2,415)
							Due to jobs		184	3	1	188
							Due to resources		(2,671)	147	(49)	(2,573)
			8.6%	= Percent overtime			**Due to overtime**		(30)			(30)
Running mandatory												
Carp/Env	23	150	6,365	-	-	6,365	20.0	348	15,594	3,200	1,600	20,394
Per job		7	277	0	-	277		17.4	780	160	80	1,020
							Total variance		(9,229)	(3,200)	(1,600)	(14,029)
							Due to jobs		2,339	480	240	3,059
							Due to resources		(11,211)	(3,680)	(1,840)	(16,731)
			2.0%	= Percent overtime			**Due to overtime**		(357)			(357)
General services	11	220	10,096	4,880	14,600	29,576	14.0	155	6,963	4,200	18,200	29,363
Per job		20	918	444	1,327	2,689		11.1	497	300	1,300	2,097
							Total variance		3,133	680	(3,600)	213
							Due to jobs		(1,492)	(900)	(3,900)	(6,292)
							Due to resources		4,387	1,580	300	6,267
			13.6%	= Percent overtime			**Due to overtime**		238			238
Total running manda	34	370	16,461	4,880	14,600	35,941	34	503	22,557	7,400	19,800	49,757
							Total variance		(6,097)	(2,520)	(5,200)	(13,817)
							Due to jobs		847	(420)	(3,660)	(3,233)
							Due to resources		(6,825)	(2,100)	(1,540)	(10,465)
			8.9%	= Percent overtime			**Due to overtime**		(119)			(119)
Programs												
Carp/Env		550	25,240	3,400	451,000	479,640		450	20,165	5,400	452,000	477,565
							Total variance		5,076	(2,000)	(1,000)	2,076
							Due to resources		4,481	(2,000)	(1,000)	1,481
			12.2%	= Percent overtime			**Due to overtime**		595			595

Support maintenance: month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
General services		900	40,626	-	68,000	108,626		840	37,640	-	65,000	102,640
							Total variance		2,986	-	3,000	5,986
							Due to resources		2,689	-	3,000	5,689
			11.1%	= Percent overtime			**Due to overtime**		297			297
Total major	-	1,450	65,867	3,400	519,000	588,267	-	1,290	57,805	5,400	517,000	580,205
							Total variance		8,062	(2,000)	2,000	8,062
							Due to resources		7,170	(2,000)	2,000	7,170
			NA	= Percent overtime			**Due to overtime**		892			892
Descretionary												
Carp/Env	18	193	8,074	-	-	8,074	19.4	461	20,647	6,970	4,840	32,457
Per job		11	449	0	-	449		23.8	1,066	360	250	1,676
							Total variance		(12,573)	(6,970)	(4,840)	(24,382)
							Due to jobs		(1,450)	(490)	(340)	(2,280)
							Due to resources		(10,548)	(6,480)	(4,500)	(21,528)
			0.0%	= Percent overtime			**Due to overtime**		(574)			(574)
General services	2	40	1,733	700	1,700	4,133	2.6	53	2,378	660	1,848	4,886
Per job		20	866	350	850	2,066		20.1	901	250	700	1,851
							Total variance		(645)	40	(148)	(753)
							Due to jobs		(576)	(160)	(448)	(1,184)
							Due to resources		(9)	200	300	491
			5.0%	= Percent overtime			**Due to overtime**		(59)			(59)
Total Discretionary	20	233	9,807	700	1,700	12,207	22	514	23,025	7,630	6,688	37,342
							Total variance		(13,218)	(6,930)	(4,988)	(25,135)
							Due to jobs		(2,027)	(650)	(788)	(3,464)
							Due to resources		(10,557)	(6,280)	(4,200)	(21,037)
			0.9%	= Percent overtime			**Due to overtime**		(634)			(634)

Support maintenance: month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Total CRP/ENV/GS	80	2,123	95,242	9,170	535,300	639,712	81	2,433	109,011	20,470	543,536	673,017
							Total variance		(13,769)	(11,300)	(8,236)	(33,305)
							Due to jobs		(996)	(1,067)	(4,447)	(6,510)
							Due to resources		(12,883)	(10,234)	(3,789)	(26,905)
			0.0%	= Percent overtime			**Due to overtime**		110			110
Fleet												
Preventive	78	123	5,384	300	0	5,684	75.0	206	9,242	165	75	9,482
Per job		2	69	4	-	73		2.8	123	2	1	126
							Total variance		(3,858)	135	(75)	(3,798)
							Due to jobs		370	7	3	379
							Due to resources		(4,100)	128	(78)	(4,050)
			6.5%	= Percent overtime			**Due to overtime**		(128)			(128)
Run mandatory	60	180	7,858	11,000	7,900	26,758	65.0	216	9,699	13,000	3,250	25,949
Per job		3	131	183	132	446		3.3	149	200	50	399
							Total variance		(1,842)	(2,000)	4,650	808
							Due to jobs		(746)	(1,000)	(250)	(1,996)
							Due to resources		(887)	(1,000)	4,900	3,013
			6.1%	= Percent overtime			**Due to overtime**		(208)			(208)
Programs	-	-	-	0	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to jobs		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Discretionary	-	-	-	-	-	-	0.9	2	83	88	88	259
Per job		-	-	-	-	-		2.1	94	100	100	294
							Total variance		(83)	(88)	(88)	(259)
							Due to jobs		(83)	(88)	(88)	(259)
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-

Support maintenance: month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	Dir hrs	Payroll	Material	Service	Total	Jobs	Dir hrs	Payroll	Material	Service	Total
Total Fleet	138	303	13,241	11,300	7,900	32,441	141	425	19,024	13,253	3,413	35,690
							Total variance		(5,783)	(1,953)	4,487	(3,249)
							Due to jobs		(459)	(1,081)	(335)	(1,876)
							Due to resources		(4,987)	(872)	4,822	(1,037)
			6.1%	= Percent overtime			**Due to overtime**		(336)			(336)
Standard work orders												
Equipment operato	1	800	30,958	-	-	30,958		793	35,524	-	-	35,524
							Total variance		(4,567)	-	-	(4,567)
							Due to resources		(5,162)	-	-	(5,162)
			12.5%	= Percent overtime			**Due to overtime**		595			595
Janitors	1	2,000	52,416	-	-	52,416		1,909	56,829	-	-	56,829
							Total variance		(4,413)	-	-	(4,413)
							Due to resources		(6,389)	-	-	(6,389)
			15.0%	= Percent overtime			**Due to overtime**		1,976			1,976
Tool crib attendant	1	150	5,544	-	-	5,544		147	6,579	-	-	6,579
							Total variance		(1,034)	-	-	(1,034)
							Due to resources		(886)	-	-	(886)
			6.7%	= Percent overtime			**Due to overtime**		(149)			(149)
Repairs mobile equ	1	-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Bus driver	1	147	3,417	-	-	3,417		147	4,371	-	-	4,371
							Total variance		(955)	-	-	(955)
							Due to resources		(664)	-	-	(664)
			0.0%	= Percent overtime			**Due to overtime**		(291)			(291)

Case note: The plant's cost system provides managers with a push button report to monitor all standard jobs for hiding excess resources.

Support maintenance: month variance

	Actual activity		Actual cost				Budget activity		Budget cost			
	Jobs	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**	**Jobs**	**Dir hrs**	**Payroll**	**Material**	**Service**	**Total**
Site clean up	1	-	-	-	-	-		-	-	-	-	-
							Total variance		-	-	-	-
							Due to resources		-	-	-	-
			0.0%	= Percent overtime			**Due to overtime**		-			-
Total standard WOs	6	3,097	92,335	-	-	92,335	-	2,995	103,303	-	-	103,303
							Total variance		(10,968)	-	-	(10,968)
							Due to resources		(13,100)	-	-	(13,100)
			13.2%	= Percent overtime			**Due to overtime**		2,132	-	-	2,132

Activity-specific variance analysis

Introduction: Activity-specific variance analysis

The previous section focused all activities and the resources they consumed in a format that allows the plant to view the true performance of its maintenance and reliability organization. Typically plant maintenance cost information is too fragmented and partial to do this.

This section focuses on the different work types with respect to budget, actual performance. Notice that the variance matrix, is evident in every case. The worksheets of this section are also the points at which the clerk inputs details each month that roll into and cost-center's YTD and month report (previous section). The points of entry are in bold red font.

What will be apparent is that every plant has its own set of job types. Also how those jobs should best be incorporated in overall cost management can be different. This will be a function of many factors such as the value of information, controllability, magnitude, etc., vis-à-vis the absolute necessity for inclusiveness.

The previous cost-center section is a means to discover variances of importance. With it, the analyst can drill down to the root causes via the worksheets in this section. Through them, the analyst can follow through to the data on which the report is generated.

The worksheets of this section can also be scanned for significant specific variances that will roll up to the next level and become less noticeable when viewed from that end.

Process input (prev, run mandatory, discretionry)

Process mainenance:YTD Inputs to preventive, running mandatory and discretionary

Case notes: The **bold red cells** are the point that the analyst inserts the data extracted from the plant's databases. It is possible to automate the input. Throughout the report, the points of data entry are shown as red bold as an aid to report preparation.

Block A

	Jobs	Dir Hrs	Materials	Services	Reg Hrs	OT %
Preventive						
Mechanical						
From report	**210**	**2,200**	**300**	**-**	**2,130**	3.2%
Transfer from S/D	**-**	**-**	**-**	**-**	**-**	0.0%
Total mechancal	**210**	**2,200**	**300**	**-**	**2,130**	**3.2%**
Electrical						
From report	**34**	**880**	**-**	**-**	**820**	6.8%
Adjustment				**-**	**-**	0.0%
Total electrical	**34**	**880**	**-**	**-**	**820**	**6.8%**
Instrument						
From report	**230**	**680**	**220**	**4,800**	**660**	2.9%
Transfer from S/D	**-**	**-**	**-**	**-**	**-**	0.0%
Total instrument	**230**	**680**	**220**	**4,800**	**660**	**2.9%**
Total preventive	474	3,760	520	4,800	3,610	4.0%
Running mandatory						
Mechanical						
From report	**310**	**7,740**	**290,000**	**34,000**	**7,040**	9.0%
Transfer from S/D	**-**	**-**	**-**	**-**	**-**	0.0%
Total mechancal	**310**	**7,740**	**290,000**	**34,000**	**7,040**	**9.0%**
Electrical						
From report	**195**	**975**	**10,000**	**2,100**	**860**	11.8%
Transfer from S/D	**-**	**-**	**-**	**-**	**-**	0.0%
Total electrical	**195**	**975**	**10,000**	**2,100**	**860**	**11.8%**
Instrument						
From report	**42**	**630**	**2,800**	**500**	**550**	12.7%
Transfer from S/D	**1**	**23**	**-**	**-**	**20**	13.0%
Total instrument	**43**	**653**	**2,800**	**500**	**570**	**12.7%**
Total running mandatory	548	9,368	302,800	36,600	8,470	9.6%
Discretionary						
Mechanical						
From report	**17**	**1,200**	**5,400**	**700**	**1,100**	8.3%
Transfer from S/D	**-**	**-**	**-**	**-**	**-**	0.0%
Total mechancal	**17**	**1,200**	**5,400**	**700**	**1,100**	**8.3%**

Process input (prev, run mandatory, discretionry)

	Jobs	Dir Hrs	Materials	Services	Reg Hrs	OT %
Electrical						
From report	2	60	1,000	150	55	8.3%
Adjustment	-	-	-	-	-	0.0%
Total electrical	**2**	**60**	**1,000**	**150**	**55**	**8.3%**
Instrument						
From report	5	20	9,000	400	18	10.0%
Adjustment	-	-	-	-	-	0.0%
Total instrument	**5**	**20**	**9,000**	**400**	**18**	**10.0%**
Total discretionary	24	1,280	15,400	1,250	1,173	8.4%
Total block A	1,046	14,408	318,720	42,650	13,253	8.0%

Case notes:

This work sheet shows the case of preventive, running mandatory and discretionary maintenance which is statistical in nature. There is also a mirror sheet for the month's input.

The categories are actually groups of categories for which the plant has subdivided, for example, corrective maintenance in many categories for the purpose of work order management. However, the same distinctions are actually an obstacle to cost management.

Support mainenance: YTD Inputs to preventive, running mandatory and discretionary

Carp/Env and Genserv

	Jobs	Dir Hrs	Materials	Services	Reg Hrs	OT %
Preventive						
Carp/Env						
From report	**6**	**30**	**50**	**-**	**28**	6.7%
Adjustment						0.0%
Total CarpEnv	**6**	**30**	**50**	**-**	**28**	**6.7%**
General services						
From report	**71**	**280**	**300**	**180**	**247**	11.8%
Adjustment						0.0%
Total GenServ	**71**	**280**	**300**	**180**	**247**	**11.8%**
Total preventive	77	310	350	180	275	11.3%
Running mandatory						
Carp/Env						
From report	**58**	**696**	**8,600**	**5,200**	**578**	17.0%
Adjustment						0.0%
Total CarpEnv	**58**	**696**	**8,600**	**5,200**	**578**	**17.0%**
General services						
From report	**50**	**650**	**13,400**	**59,000**	**578**	11.1%
Adjustment						0.0%
Total GenServ	**50**	**650**	**13,400**	**59,000**	**578**	**11.1%**
Total running mandatory	108	1,346	22,000	64,200	1,156	14.1%
Discretionary						
Carp/Env						
From report	**55**	**1,375**	**19,000**	**13,500**	**1,292**	6.0%
Adjustment						0.0%
Total CarpEnv	**55**	**1,375**	**19,000**	**13,500**	**1,292**	**6.0%**
General services						
From report	**10**	**150**	**2,000**	**5,600**	**145**	3.3%
Adjustment						0.0%
Total GenServ	**10**	**150**	**2,000**	**5,600**	**145**	**3.3%**
Total discretionary	65	1,525	21,000	19,100	1,437	5.8%
Total Carp/Env, Genserv	250	3,181	43,350	83,480	2,868	9.8%

Process maintenance: major jobs, planned

Process planned major jobs								
Dir Hrs: Hours worked on the job								
Hours: Direct hours plus times and unavailable personnel factor to reflect true total resources								
Payroll: Hours time total hourly rate (wage + overtime + benefits)								
Block A								
	Dir Hrs	**Labor budget**		**Material & Service cost**			**Total**	**Reg Hrs**
Work description		**Hours**	**Payroll**	**Matl**	**Service**	**M&S**	**PM&S**	
Spent to date by month								
Mechanical Month 1								
Planned mandatory								
Job 2a	WONUM XXXXXX							
Budget	1,800	2,125	$ 80,658	$ 15,000	$ 95,000	$ 110,000	$ 190,658	
Actual to-date	**1,900**	2,243	91,385	**$ 17,000**	**$ 97,000**	$ 114,000	$ 205,385	**1,500**
Total variance	100	118	10,727	2,000	2,000	4,000	14,727	
Due to jobs	-	-	-	-	-	-	-	-
Due to resouces	100	118	$ (1,170)	2,000	2,000	4,000	$ 2,830	-
Due to overtime			11,898				$ 11,898	
			21%	= Actual overtime				
Mechanical Month 2								
Job 5	WONUM XXXXXX							
Budget	600	708	$ 26,886	$ -	$ 7,500	$ 7,500	$ 34,386	
Actual to-date	**650**	767	30,168	**$ -**	**$ 7,000**	$ 7,000	$ 37,168	**550**
Total variance	50	59	3,282	-	(500)	(500)	2,782	
Due to jobs	-	-	-	-	-	-	-	-
Due to resouces	50	59	$ 307	-	(500)	(500)	$ (193)	-
Due to overtime			2,974				$ 2,974	
			15%	= Actual overtime				

Process maintenance: major jobs occuring

Process occuring major jobs

Dir Hrs: Hours worked on the job

Hours: Direct hours plus times and unavailable personnel factor to reflect true total resources

Payroll: Hours time total hourly rate (wage + overtime + benefits)

Case note: Variance analysis over time revealed that the greatest cost uncertainty was what became designated as occuring jobs, defined as "would be a planned major job if they could have been foreseen. These jobs also made it difficult to measure crew efficiency because they distort the short-term picture. Accordingly, the plants data was statistically analyzed to distinquish what part of corrective type maintenance statistically falls into this category across the blocks. The budget includes a line item for these jobs and they are tracked in this section and then combined with the planned major jobs for overall major job variance.

Block A

	Dir Hrs	Labor budget		Material & Service cost			Total	Reg Hrs
Work description		**Hours**	**Payroll**	**Matl**	**Service**	**M&S**	**PM&S**	
Spent to date by month								
Mechanical January								
WONUM XXXXXX	**1,450**	1,712	69,585	**$ 36,500**	**$ 11,000**	$ 47,500	$ 117,085	**1,150**
Enter WONUM Description		-	-			$ -	$ -	
Budget	1,350	1,594	60,494	37,500	9,000	46,500	106,994	-
Actual	1,450	1,712	69,585	36,500	11,000	47,500	117,085	1,150
Total variance	100	118	9,091	(1,000)	2,000	1,000	10,091	1,150
Due to jobs	100	118	4,481	(1,000)	2,000	1,000	10,091	1,150
Due to resouces	-	-	-	-	-	-	-	
Due to overtime			4,610				4,610	
			21%	= Actual overtime				
Mechanical February								
WONUM XXXXXX	**1,200**	1,417	56,152	**$ 32,000**	**$ 8,500**	$ 40,500	$ 96,652	**1,000**
Enter WONUM Description		-	-			$ -	$ -	
Budget	1,350	1,594	60,494	37,500	9,000	46,500	106,994	-
Actual	1,200	1,417	56,152	32,000	8,500	40,500	96,652	1,000
Total variance	(150)	(177)	(4,342)	(5,500)	(500)	(6,000)	(10,342)	1,000
Due to jobs	(150)	(177)	(6,722)	(5,500)	(500)	(6,000)	(10,342)	1,000
Due to resouces	-	-	-	-	-	-	-	
Due to overtime			2,380				2,380	
			17%	= Actual overtime				

Process maintenance: standard jobs

Process: YTD standard work orders

Case note: There is also a month worksheet that mirrors this one.

Dir Hrs: Hours worked on the job

Dir $: Total cost of the hours (wage + overtime + benefits)

Payroll $: Multiplies Dir $ by factor for unavailable personnel factor to reflect true cost of work

Actual-YTD hours

	Dir Hrs	Regular Hrs
Vibration analysis	**1150**	**1046**
Electrical substations	**320**	**300**

Case note: The approach to recording these two work orders suits the plant accounting system but not the needs for cost management. When entered in the cells (bold red = input points), the hours are distributed across the plant per the activity-based budget.

Work order details

	Labor Budget			Material & Service cost		Total	Regular
Block and description	**Dir Hrs**	**Dir $**	**Payroll $**	**Matl**	**Service**	**cost**	**Hours**
Block A							
Mechanical-vibration analysis							
Budget-year	1,872	$ 71,049	$ 83,884	-	-	$ 83,884	
Budget-YTD	468	$ 17,762	$ 20,971	-	-	$ 20,971	
Actual-YTD	456	$ 17,325	20,325	-	-	$ 20,325	415
Variance	(12)	(437)	(646)	-	-	$ (646)	
Due to resources	(12)	(437)	(516)	-	-	$ (516)	
Due to overtime			(130)			$ (130)	
			9.0%	= Percent overtime			
Electrical-check out substations							
Budget-year	1,200	$ 45,544	$ 53,772	-	-	$ 53,772	
Budget-YTD	300	$ 11,386	$ 13,443	-	-	$ 13,443	
Actual-YTD	128	$ 4,858	$ 5,736		-	$ 5,736	120.00
Variance	(172)	(6,528)	(7,707)	-	-	$ (7,707)	
Due to resources	(172)	(6,528)	(7,565)	-	-	$ (7,565)	
Due to overtime			(143)			$ (143)	
			6.3%	= Percent overtime			
Total Block A							
Budget-year	3,072	116,593	137,656	-	-	137,656	-
Budget-YTD	768	29,148	34,414	-	-	34,414	-
Actual-YTD	584	22,183	26,061	-	-	26,061	535
Variance	(184)	(6,965)	(8,353)	-	-	(8,353)	-
Due to resources	(184)	(6,965)	(8,080)	-	-	(8,080)	-
Due to overtime	-	-	(273)	-	-	(273)	-
			8.4%	= Percent overtime			

Case note: This report extends to all process maintenance blocks, but only block A is shown.

Support maintenance: standard

Support: YTD standard work orders

Case note: There is also a month worksheet that mirrors this one.

Dir Hrs: Hours worked on the job

Hours: Direct hours plus times and unavailable personnel factor to reflect true total resources

Payroll: Hours time total hourly rate (wage + overtime + benefits)

	Dir Hrs	Labor budget		Material & Service cost			Total	Regular
Work description		**Hours**	**Payroll**	**Matl**	**Service**	**M&S**	**PM&S**	**Hours**
Equipment operator		WONUM:						
Budget-year	9,513	11,232	$ 426,292	0	0	$ -	$ 426,292	
Budget-YTD	2,378	2,808	$ 106,573	0	0	$ -	$ 106,573	
Actual-YTD	**2400**	2,834	$ 93,230	**0**	**0**	$ -	$ 93,230	**2088**
Variance	22	26	(13,343)	-	-	-	(13,343)	
Due to resources	22	26	(15,485)	-	-	$ -	$ (15,485)	
Due to overtime			2,142				$ 2,142	
			13.0%	= Percent overtime				
Janitors		WONUM:						
Budget-year	22,902	27,040	$ 681,946	0	0	$ -	$ 681,946	
Budget-YTD	5,726	6,760	$ 170,486	0	0	$ -	$ 170,486	
Actual-YTD	**5720**	6,753	$ 135,324	**0**	**0**	$ -	$ 135,324	**5600**
Variance	(6)	(7)	(35,162)	-	-	-	(35,162)	
Due to resources	(6)	(7)	(26,229)	-	-	$ -	$ (26,229)	
Due to overtime			(8,934)				$ (8,934)	
			2.1%	= Percent overtime				
Tool crib attendant		WONUM:						
Budget-year	1,762	2,080	$ 78,943	0	0	$ -	$ 78,943	
Budget-YTD	440	520	$ 19,736	0	0	$ -	$ 19,736	
Actual-YTD	**450**	531	$ 16,335	**0**	**0**	$ -	$ 16,335	**430**
Variance	10	11	(3,400)	-	-	-	(3,400)	
Due to resources	10	11	(2,657)	-	-	$ -	$ (2,657)	
Due to overtime			(744)				$ (744)	
			4.4%	= Percent overtime				
Bus driver		WONUM:						
Budget-year	1,762	2,080	$ 52,457	0	0	$ -	$ 52,457	
Budget-YTD	440	520	$ 13,114	0	0	$ -	$ 13,114	
Actual-YTD	**440**	519	$ 10,227	**0**	**0**	$ -	$ 10,227	**440**
Variance	(0)	(1)	(2,887)	-	-	-	(2,887)	
Due to resources	(0)	(1)	(2,018)	-	-	$ -	$ (2,018)	
Due to overtime			(870)				$ (870)	
			0.0%	= Percent overtime				
Total Standard WO								
Budget-year	35,939	42,432	1,239,638	-	-	-	1,239,638	
Budget-month	8,985	10,608	309,909	-	-	-	309,909	
Actual-month	9,010	10,638	255,116	-	-	-	255,116	8,558
Variance	25	30	(54,793)	-	-	-	(54,793)	
Due to resources	25	30	(46,388)	-	-	-	(46,388)	
Due to overtime	-	-	(8,405)				(8,405)	
			5.0%	= Percent overtime				

Support maintenence: programs

Tables for support programs

Carpentry and environmental

Discretionary

Program 1

Month			Direct hours			Payroll		Materials			Services			Total		
	A-OT %	Act-Reg	Act-Tot	Bud	Var	Act	Bud	Act	Bud	Var	Act	Bud	Var	Act	Bud	Var
Jan	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Feb	17%	125	150	150	0	7,019	6,722	1500	1500	-	500000	500000	-	508,519	508,222	297
Mar	17%	125	150	150	0	7,019	6,722	1400	1400	-	450000	450000	-	458,419	458,122	297
Apr	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
May	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Jun	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Jul	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Aug	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Sep	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Oct	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Nov	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Dec	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
YTD	17%	250	300	300	-	14,038	13,443	2,900	2,900	-	950,000	950,000	-	953,200	953,200	-
Initial budget				650			29,127		7,000			2,200,000		-	2,236,127	-
Remaining				350			15,684		4,100			1,250,000		-	1,269,784	-
	0	Completion code: 0 = incomplete, 1 = completed														

Case note: It is necessary to include all work types, but not all justify the highest sophistication. This the case for support programs and contract maintenance. This table demonstrates an alternative method that tracks jobs and variance but allows variance to only appear when the job is complete.

Overhead cost (not direct to workload costs)

Month of March 200X

Process overhead wages and salaries

	Blocks					Total
	A	B	C	O	Rel	
Staff salaries & wages	$ 337,688	$ 379,630	$ 326,090	$ -	$ 1,701,311	$2,744,719
Nonengaged shift wages (note 1)	$178,487	$178,487				$356,974
Total	$ 516,175	$ 558,117	$ 326,090	$ -	$ 1,701,311	$ 3,101,693
Consumables and services						
Consumable, etc	34,000	37,000	24,000		117,000	212,000
Services	211,000	254,000	173,000		552,000	1,190,000
Total	245,000	291,000	197,000	-	669,000	1,402,000
Total process	761,175	849,117	523,090	-	2,370,311	4,503,693

Notes:

(1) Nonegaged shift is the allowance for time shift personnel are not engaged in maintenance workorder jobs. See budget shift engagement worksheet for details.

Support overhead wages, salaries, consumables and services

	Total
Staff wages and salaries	668,308
Consumable supplies, and chemicals and additives	866,000
Services, expenses not recorded to direct work orders	1,203,585
Total	2,737,893

Overhead cost

Consumable supplies, and chemicals and additives								
Item			**A**	**B**	**C**	**O**	**Reliability**	**Total**
Small tools			$ 8,000	$ 8,000	$ 5,000	$ 150,000		171,000
Office supplies			$ -	$ -	$ -	$ 2,000	$ 7,000	9,000
Safety supplies			$ 12,000	$ 15,000	$ 9,000	$ 14,000	$ 110,000	160,000
Chems and additives			$ 14,000	$ 14,000	$ 10,000	$ -		38,000
Fuel and gas			$ -	$ -	$ -	$ 700,000		700,000
			34,000	37,000	24,000	866,000	117,000	1,078,000
Services, expenses not recorded to direct work orders								
Item			**A**	**B**	**C**	**O**	**Reliability**	**Total**
Freight/duty and related taxes			$ 19,000	$ 75,000	$ 19,000	$ 12,000	$ 10,000	135,000
Cleaning			$ -	$ -	$ -	$ 140,000		140,000
Rentals			$ 175,000	$ 160,000	$ 110,000	$ 300,000	$ 80,000	825,000
Travel and expenses			$ 5,000	$ 7,000	$ 3,000	$ 8,000	$ 8,000	31,000
Fees and license			$ -	$ -	$ -	$ 20,000	$ 80,000	100,000
Traning and expenses			$ 10,000	$ 10,000	$ 40,000	$ 35,000	$ 15,000	110,000
Contract maintenance						374,585	122,000	496,585
Communications			$ 2,000	$ 2,000	$ 1,000	$ 4,000	$ 7,000	16,000
Mobile equipment maintenance						$ 310,000		310,000
Professional services							$ 230,000	230,000
			211,000	254,000	173,000	1,203,585	552,000	2,393,585

Case note: The plant chose to assume a month average for all indirect costs except for contract-specific maintenance. Accordingly, the variance calculation (existing on a hidden worksheet) will be a combination of the overheads as an average per month and contract maintenance as their costs accrue.

Tables for contract maintenance

Process maintenance

Mechanical

Preventive

Lube oil analysis

Month			Direct hours			Payroll		Materials			Services			Total		
	A-OT %	Act-Reg	Act-Tot	Bud	Var	Act	Bud	Act	Bud	Var	Act	Bud	Var	Act	Bud	Var
Jan	0%	0	0	0	0	-	-	0	0	-	1420	1420	-	1,420	1,420	-
Feb	0%	0	0	0	0	-	-	0	0	-	1420	1420	-	1,420	1,420	-
Mar	0%	0	0	0	0	-	-	0	0	-	1420	1420	-	1,420	1,420	-
Apr	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
May	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Jun	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Jul	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Aug	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Sep	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Oct	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Nov	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
Dec	0%	0	0	0	0	-	-	0	0	-	0	0	-	-	-	-
YTD	0%	-	-	-	-	-	-	-	-	-	4,260	4,260	-	4,260	4,260	-
Initial budget				0			-		0			17000		-	17,000	-
Remaining				-			-		-			12,740		-	12,740	-
	0	Completion code: 0 = incomplete, 1 = completed														

Demo note: It is necessary to include all work types, but not all justify the highest sophistication. This the case for support programs and contract maintenance. This table demonstrates an alternative method that tracks jobs and variance but allows variance to only appear when the job is complete.

Data

Database access

&

Database-direct reports

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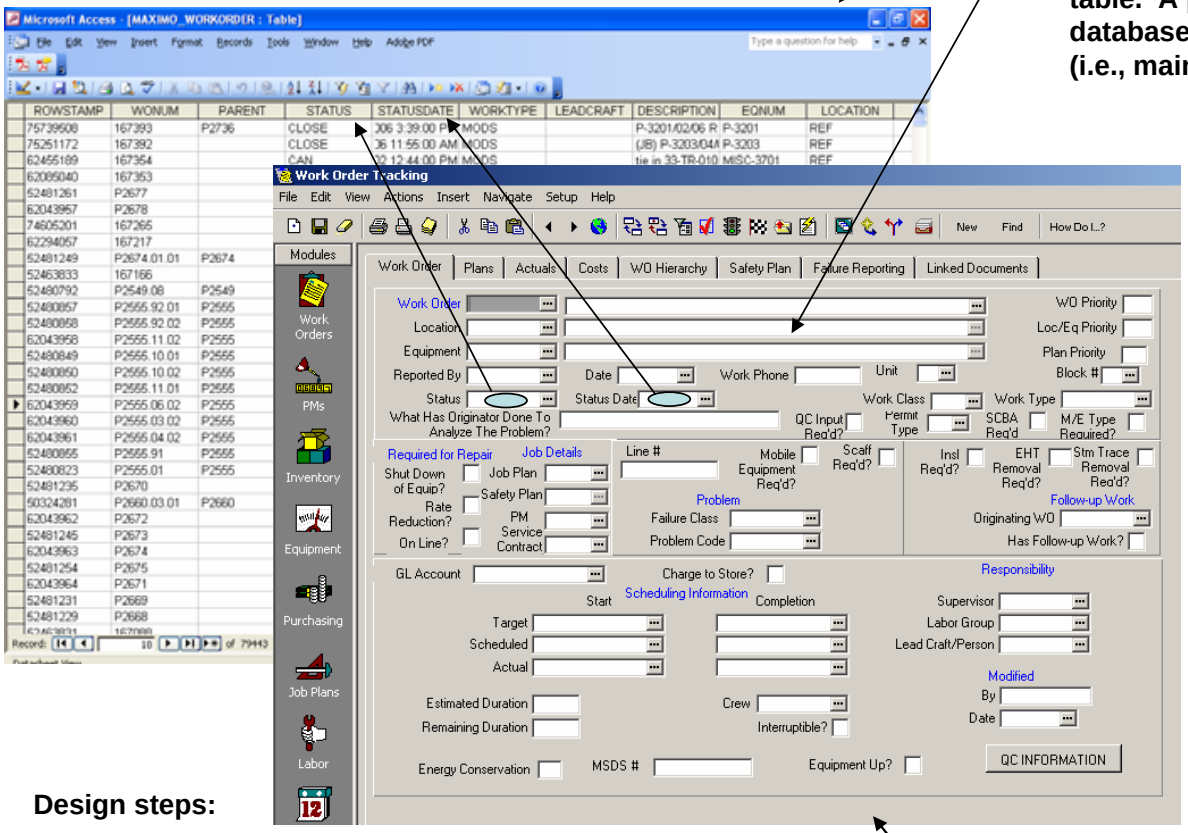
Where the data to manage maintenance cost comes from

A table in a subject system's database (i.e., Oracle, SAP).

All plants have multiple specific-purpose systems. Any entry goes to a database table. A plant can reach in to any database to use it data for any purpose (i.e., maintenance cost management).



NOTE: The shown system is a maintenance management system (CMMS). Like all other plant systems, no CMMS is capable of cost management. However, it spins off activity-based data that is requisite to managing maintenance cost. Using the data for cost management returns millions of dollars per year of value from the CMMS.

Design steps:

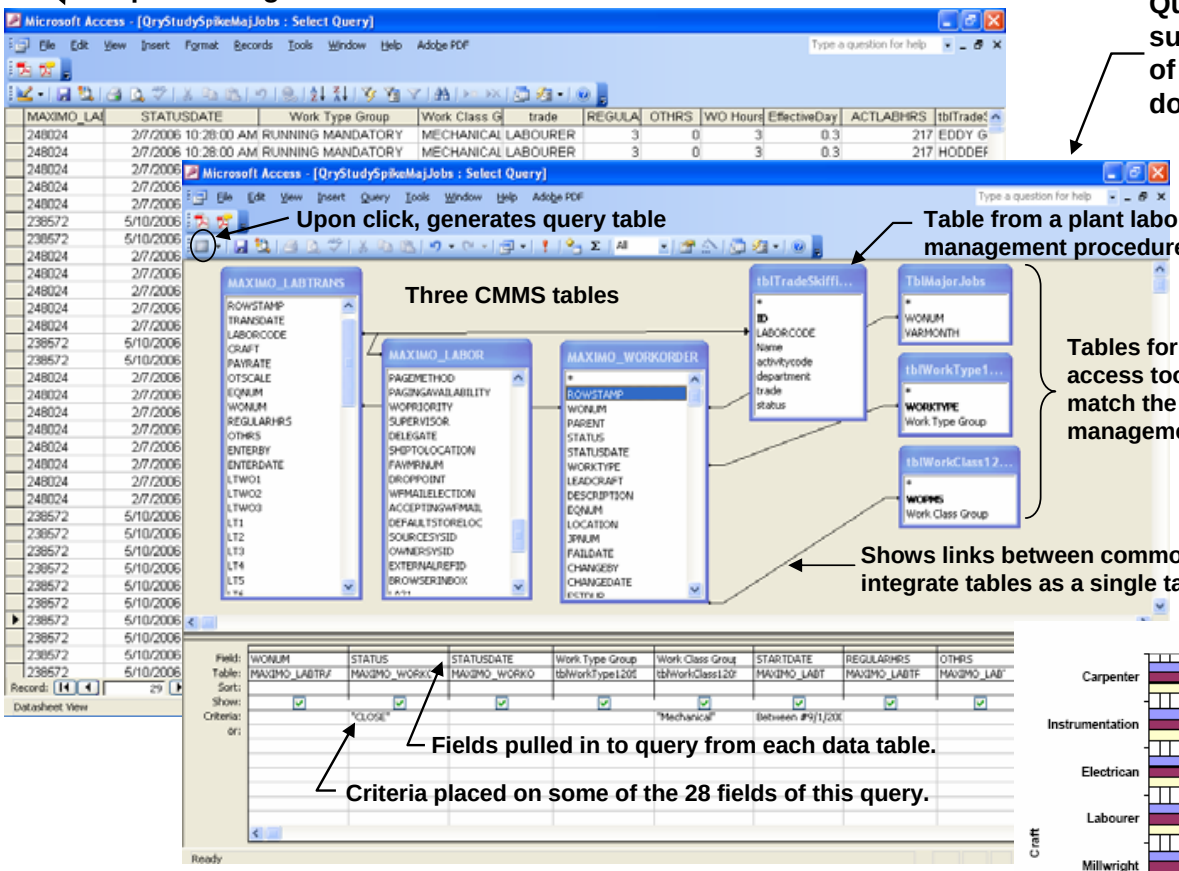
- **Define the cost management system's reports and procedures.**
- **Survey what's available from all plant systems.**
- **Identify the data that will be extracted, processed and input into the cost management system**

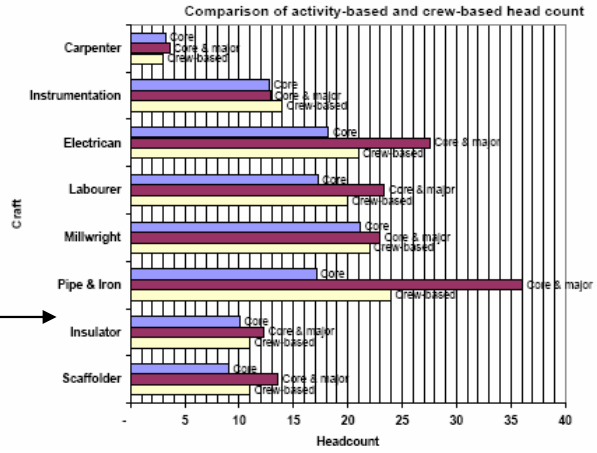
Relative to an entry, the design for cost management will reveal if any existing plant procedures must be adjusted or more closely controlled.

How data needed for cost management is extracted

Table generated by query is raw data, ready for processing to workable information

Queries are designed to support one or more aspects of the cost system's documents and procedures.

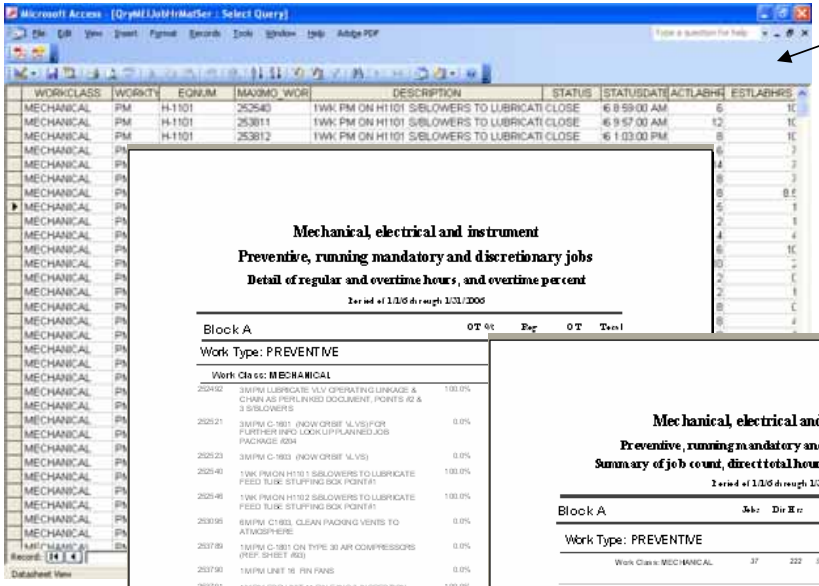




Query was used as input making the budget document able to generate an activity-based craft profile and compare to the currently employed crafts.

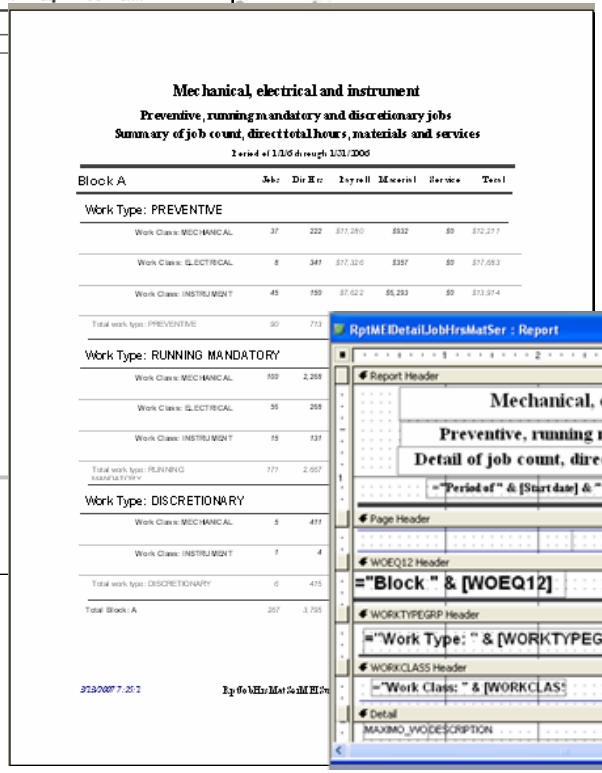
This is one of many available database access tools: all with a similar feel. Most plants already own at least one. Tool(s) are chosen based on plant's case.

How queried data is converted to information



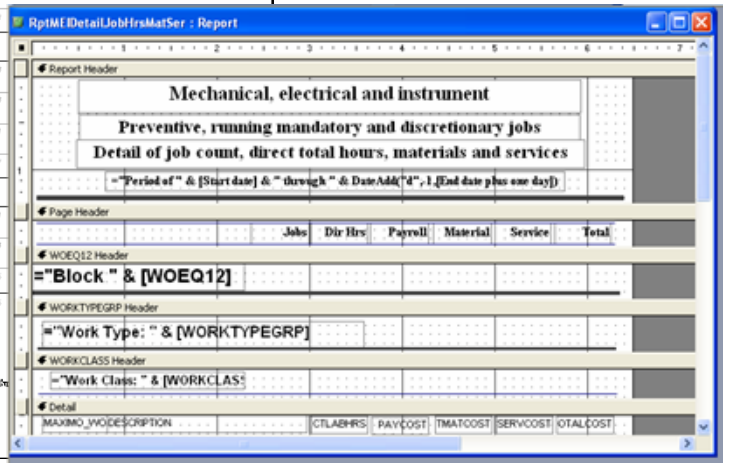
Raw data generated by each query needs to be transformed to working information; database-direct reports do this.

Example report: Summary version providing input to monthly variance, forecast and decision report.



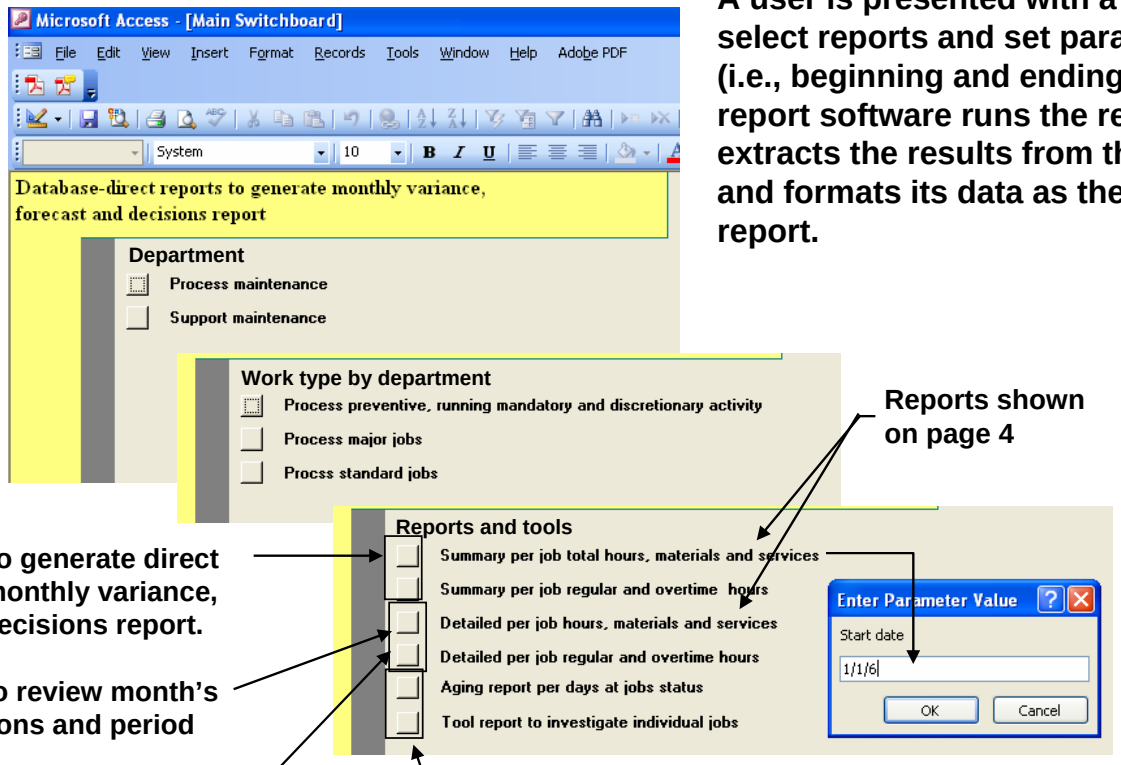
Note: Some queried data is sent directly to the system's primary Excel-based documents for automated processing into its computations.

A database-direct reporting tool (i.e. Crystal Reports, Access, SAP) is used to design all reports. They format extracted data to be input to cost system documents and procedures or are used to investigate activities and resource drivers.



Example report: Detailed version to review jobs in process of generating monthly report and to trace back from monthly report to root causes of revealed significant variances.

How the designed database-direct reports are produced



A user is presented with a dashboard to select reports and set parameters desired (i.e., beginning and ending dates). The report software runs the related query, extracts the results from the query table and formats its data as the requested report.

Reports shown on page 4

Analysts use to generate direct inputs to the monthly variance, forecast and decisions report.

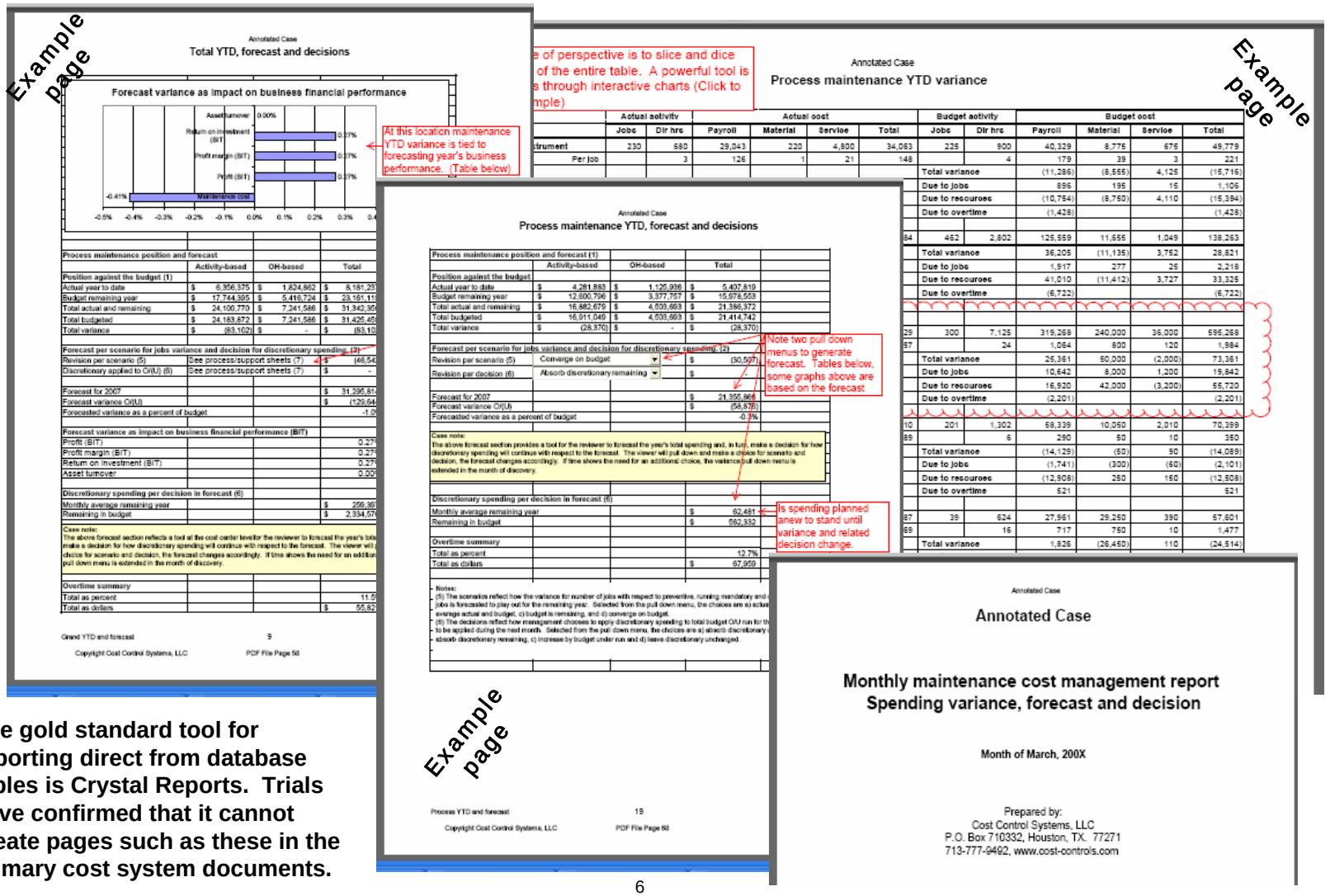
Analysts use to review month's jobs for questions and period adjustments.

Back from monthly variance report, plant uses to find the root cause of significant variances.

Tools used by analyst to search and investigate job-specific concerns.

Destination in the cost system for the database-direct reports

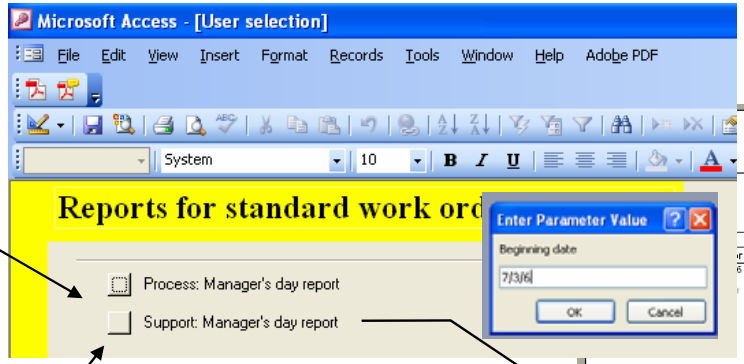
NOTE: For technical reasons, database-direct reports can only be narrow purpose, lacking context. The full context needed to manage cost occurs in the primary Excel-based documents to which the many DB-direct reports are input.

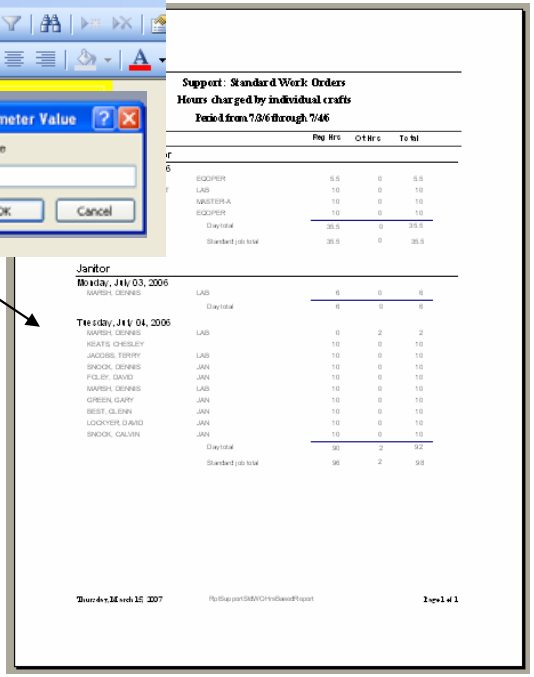


The gold standard tool for reporting direct from database tables is Crystal Reports. Trials have confirmed that it cannot create pages such as these in the primary cost system documents.

Database-direct reports also support procedures designed to deal with parts of managing total maintenance cost

This form resides at the manager's elbow for frequent monitoring.





Two department managers use the report to monitor compliance with policy for charging time to standard jobs such as vibration analysis, substation checks and janitorial. Variance analysis revealed these to be locations for supervisors to hoard excessive maintenance capacity.

When button is clicked the user will be asked for the one or more inclusive days of interest.

Plants typically have at least several such reports. They are often perceived as a cost management system. Besides their pinpoint view, they were not designed in the context of the challenge to manage the plant's total management cost. They may be acceptable as is or be upgraded to be part of the total system