

FINANCIAL MODELING...SIMULATING YOUR WAY TO PLANNED OBJECTIVES

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ABSTRACT

The objective of this report is to relate our experience in developing, implementing and maintaining a financial model in a capital goods manufacturing enterprise. Particular attention will be given to the practical aspects of financial modeling, and to the impact upon all levels of management within the organization. Actual examples will be presented throughout to emphasize the practicality and simplicity of the model.

The model was developed to meet the specific needs of a division. Since its inception almost two years ago, the model's proven reliability has led to its acceptance throughout The Warner & Swasey Company as the corporate and divisional financial planning standard. Thus the model has been used successfully for several industries, ranging from machine tools to construction equipment, textile equipment and electronic accessories. We hope to share the perspective gained through this development and acceptance process.

NEED

Traditionally the accountant has provided management with various types of information that could be used for many purposes in running a business. As any business begins to grow, the need for management information grows accordingly and with this growth comes the demand to "tell us where we are going, not where we've been" from operating management.

To accomplish this, a profit planning procedure is implemented to project business activities for assorted future time periods. Most profit planning techniques are designed to take a "snapshot" of the business cycle at some point in time and make assumptions as well as generate projections from that point. The fact often overlooked is that it can take, and often does, two or three months to develop this "snapshot".

In addition, it is very likely during the interval between annual profit plan preparations and ultimate execution, conditions upon which the formal plan was based will have changed.

What management needs, then, is something that will expedite the turnaround time necessary to develop this "snapshot".....A FINANCIAL MODEL.

BASIC CONCEPTS

A financial model is a simplification of reality designed to accept certain input data, and with a set of internal decision-making rules, project what will happen in some specifically planned future time buckets. A model does nothing more than imitate what a group of skilled people could do manually. The quickness and ease of change are the model's main assets.

A model should be structured for responsibility accounting. The input data need not be as segmented as departmental budgets but can be grouped by operational manager. It is important that the operational manager plays a major role as to what information is used in the model from his areas of responsibility.

A model will have a certain degree of "tailoring" to reflect some specific conditions such as:

1. Style of Incumbent Managers
2. Nature of Market Demands
3. Length of Manufacturing Cycle
4. Quoting Advance Selling Prices
5. Advance Ordering of Raw Materials

As the model's importance will be judged by its use, its use will depend on the quality of its projections, and the quality of its projections will depend on it being readily understood. Therefore, it is important to note that to be a successful decision-making tool, the model must be readily understood by top management. The more simplistic and understandable the model, the greater and more rapid will be its acceptance by

top management.

OBJECTIVES

If the needs of the business and management style are properly considered in developing the model, a management tool will evolve which will have the capabilities to readily:

1. Provide a discipline for cataloging assumptions throughout the forecasting period.
2. Become a forecasting library.
3. Encourage realism in the numbers forecasted.
4. Alter assumptions and generate projections on a timely basis.
5. Provide impetus to making timely P & L decisions.
6. Provide a method of relating planned to actual performance, by manager, on a moving basis throughout the forecasting cycle.
7. Provide an excellent base for "what if" circumstances and sensitivity analysis.

A management tool with this potential begins to meet the needs of today's business environment.

The prerequisite for the development of a financial model is to formulate and define the objectives. A model should satisfy the general objectives described above as well as meet any specific criteria established by the organization. Our reporting objectives were a profit and loss statement, balance sheet, cash flow, inventory movement schedule and detailed expense analyses. We designed the outputs of the model to fulfill these requirements.

OUTPUT

The total time frame of the model is 5 years. Monthly forecasts are provided for the first two years, the third year is forecasted by quarters and the fourth and fifth years as full-year estimates. Most businesses lack appropriate data for periods more than two years out to make monthly forecasts for further time phases worthwhile. Our master schedule, for example, provides monthly shipping details for 18 months.

Reports are generated on both a rolling-future and a fiscal basis. The fiscal reports combine actual past data with future month forecasts to produce reports for any desired time frame. Normally we run both the rolling-12 month and a current calendar year projection. It proved interesting to note that the original design of the model was strictly a rolling-future tool.

The fiscal capabilities were added during the later stages of design, because management is appraised upon and public data is released on fiscal performance, and is thus quite heavily reviewed. In fact, the calendar forecasts have so far received more attention than the rolling forecasts.

All forecast reports are also formatted in the same style as the profit plan requirements. The level of detail regarding shipments is identical, and all expense data is provided in a condensed version of profit plan format. This conditions managers into regarding monthly forecasts in a serious manner, and provides managers with data in a form in which they become comfortable.

Seven formal reports are generated each month by the model:

1. Product Shipments Summary (by basic product line)
2. Product Shipment Detail (by specific model)
3. Income Statement
4. Factory Cost and Variance Analysis
5. Inventory Movement Analysis
6. Balance Sheet
7. Cash Flow Analysis

Several key financial ratios are calculated and also appear on the reports to provide more data. Profit before tax and gross margin percentages and interest expense coverage print on the income statement. The inventory movement report contains the net change in inventory, turns and future months' sales contained in inventory. Familiar ratios such as current ratio, quick ratio, debt ratio, ROI and ROA appear on the balance sheet. Because of their simplicity and widespread recognition, these ratios receive considerable management attention.

Besides the formal reports, several information displays can be provided upon request. The most useful of these is an Assumptions Display, which catalogs all the major pricing, inflation and timing assumptions incorporated in the forecast. This allows a display of the dates and percentage amounts of price and cost increases by product line and major cost category. When presented with the Product Shipment forecast, there is a concise summary of all major forecast assumptions which answers most of top management's questions before they are asked. Displays can also be printed showing detailed monthly expense forecasts for each functional manager or broader summaries. Report 1 presents the Product Shipments Summary.

The aspect of the model which most allows for

REPORT 1

HYPOTHETICAL DATA

WARNER & SWASEY - TURNING MACHINE DIVISION
PRODUCT SHIPMENTS

	<u>JAN</u>	<u>FEB</u>	<u>MAR</u>	<u>APR</u>	<u>MAY</u>	<u>JUN</u>	<u>JUL</u>	<u>AUG</u>	<u>SEP</u>	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>YTD</u>
TOTAL RAMS	3	2	3	5	3	4	4	3	3	2	4	4	40
TOTAL SADDLES	4	1	2	2	4	1	5	1	3	3	4	2	32
TOTAL SSA	8	7	5	6	7	5	9	6	5	5	7	6	76
TOTAL SCB	1	4	4	3	1	3	3	4	4	3	3	3	36
TOTAL SCC	7	7	8	7	6	10	6	8	8	8	5	8	89
TOTAL PUBLIC	<u>23</u>	<u>21</u>	<u>22</u>	<u>23</u>	<u>21</u>	<u>23</u>	<u>27</u>	<u>22</u>	<u>23</u>	<u>21</u>	<u>23</u>	<u>23</u>	<u>272</u>
TOTAL ID	-	1	-	2	-	-	1	-	-	-	1	-	5
PRODUCT PARTS	1000.0	1100.0	1000.0	1150.0	1200.0	1000.0	1100.0	1150.0	1200.0	1100.0	1000.0	1100.0	13100.0

profit-improvement decisions to be made is the additional analysis features. Sensitivity analysis can be performed on any variables to highlight critical assumptions. Inflation on any expense or price can be forecast and the resulting changes of income projected. This has a very real value in forecasting impacts of supplier strikes, material shortages, labor contract settlements, extended backlogs at old prices or new price increases. Another feature is backward iteration; this enables you to know to what extent a specific variable must change in order to produce a desired result.

The model will provide graphic displays upon request. Once the user names the variables and the base, the model automatically titles, scales and plots the data. Many statistical data are available; simple statistics such as means and standard deviations as well as more advanced techniques such as regression and correlation. Results for a given period can be annualized to provide trend data. The statements can also be discounted to present value. All of these features enable management to get a better look at potential future outcomes and to be more confident of chosen strategies.

DEVELOPMENTAL APPROACH

Once the desired objectives are finalized, the next step is to determine the reporting requirements. The designer must decide what specific information is required from the model; i.e., what does the management team want the model to tell them? An effective procedure we used was to prepare a layout of the reports management wanted to receive. The format should be as complete as

possible, as the entire processing of the model is dependent upon the specific data to be generated. Once the final reports are designed, the generation of the data becomes the concern. It is here that one must remember that a financial model performs no mystical tricks; it only does what the financial planner could do if he had the time. A successful model needs no more intricate calculations than addition, subtraction, multiplication and division.

At this point the planner must look at the inputs necessary for the model. Typically, if budgeting is used, most base information will be available in usable form. Occasionally, input requirements must somehow be generated to support the model. If this occurs, the additional cost of this input data must be weighed against the resulting higher performance of the model. The designer now merges the selected input information with the processing specifications to produce the required report data. It is the overall flow of this process and the continuity and inclusiveness of the design which provide a successful planning tool.

INPUTS

There are four major inputs to the model:

1. The Shipping Forecast
2. Labor Activity (direct and indirect manufacturing hours)
3. Departmental Budgets (with revisions)
4. Purchases Forecast

The combination of these inputs provides the assumption base of each simulation.

SHIPPING FORECAST

The shipping forecast is the single most critical assumption in the model. It is compiled from three sources. Machine units by month are drawn from the master schedule. As our backlogs can range anywhere from 6-24 months, we are able to forecast this major portion of our total sales (80%) with varying degrees of certainty. A repair parts sales projection is provided by Sales, comparing original plan data with actual and expected future order activity. The International Marketing department furnishes the forecast data for a foreign subsidiary, based on their shipping schedule. Thus all relevant operating areas have contributed to the division shipping forecast.

LABOR ACTIVITY FORECAST

The division utilizes an advanced MRP system for our manufacturing planning. Much of our plan data is generated through this system. In particular, direct labor hour activity forecasts are provided by the Materials Management group. The master schedule assumptions drive quarterly projections of required direct labor hours by specific machining and assembly departments. Any major actual activity deviations or significant schedule changes are reason for a revised labor forecast. Optimal direct-to-indirect activity relationships and planned manpower levels provide the indirect hours forecast. The use of the MRP planning assures us of labor levels consistent with our shipping schedule.

DEPARTMENTAL BUDGETS

Each department manager or supervisor has prepared a detailed annual budget during the profit planning process. These serve as the basis for our expense projections. Actual budget performance is reviewed monthly, and revised expenditure forecasts are made by each functional manager when major deviations are expected to continue. Any changes of strategy or unplanned programs are also updated in the model. It is important to recognize that the model data will be adjusted for significant changes only; random monthly fluctuations and changes of lesser magnitude will not normally impact total divisional performance. It should also be noted that the model was not designed to replace detailed department budgets.

Budgeting data is input by major function. To do so by individual department would prove grossly cumbersome and provide few benefits. In this manner we achieve the responsibility accounting concept; each functional manager is responsible for the projections of his area. Grouping expense data by function thus enables the recog-

nition of three key benefits:

1. Responsibility Accounting
2. Elimination of Guesswork by Finance
3. Trackability of Actual vs. Forecasted Results by Manager

PURCHASES FORECAST

The purchases forecast is provided by Materials Management and is also encompassed in the MRP system. New projections of both committed orders and planned future requirements are made monthly by specific commodity. This forecast is also driven by the master schedule, further assuring the internal consistency of the forecast.

The entire division management team has thus participated in the data input for the forecast. This encourages a joint commitment towards achievement of the resulting projection, as well as openly focusing on what events must subsequently occur to ensure this achievement. Should the projected results prove unacceptable, the management team may then make decisions which would provide a more desirable performance.

DECISION RULES

The total financial scope of the model necessitated the processing being divided into two phases. Phase one is the shipment model which generates our net sales, cost of sales and profit contribution data. The second phase processes all information from the profit contribution forward. This covers manufacturing expenses, factory variances, operating expenses (selling, engineering and administration), interest and tax data, inventory analysis, asset and liability determination and cash flow. Each portion of the program builds upon data calculated in prior portions. Thus, all functions of the model are integrated exactly as are all functions of the organization.

SALES REVENUE AND PROFIT CONTRIBUTION

The Turning Machine Division manufactures forty different machine models. Our data files contain information on selling prices, standard material cost of sales and standard labor and burden (conversion) costs for each product model. Selling prices are maintained at three different price levels, since firm delivered prices are quoted and shipments may be at several price levels due to differing backlogs for each product. Standard material and conversion costs change once a year due to our annual standard cost revision.

Our monthly data updates include the unit shipments by model, price level and month, the fore-

cast of repair parts sales and foreign subsidiary sales projections. Machine shipments are further divided into public and intercompany sales. The model calculates our total revenue, material and conversion cost of sales and profit contribution. Summary data is available for each month by model, product line and total. An example of the time-saving appeal of the model is that this process requires over 3,000 calculations for a one-year forecast. Report 2 shows the income statement.

MANUFACTURING EXPENSES

Particular attention is appropriately given to the manufacturing sector. We have classified detailed expenses as fixed, variable or semi-variable. These expenses are then projected for the following functional areas:

1. Machining
2. Assembly
3. Hourly Indirect
4. Salary/Fixed

The salary/fixed area provides forecasts for fixed expenses and the fixed portion of semi-variable expenses. Examples of these costs are depreciation, property taxes, salaries of manufacturing support personnel, normal preventative maintenance labor and supplies, and basic light and heat utilities. These items are forecasted as monthly dollar estimates by manufacturing management and adjusted as business assumptions change.

Variable expenses and the variable portion of semi-variable expenses are forecasted for the machining, assembly and hourly indirect areas.

WARNER & SWASEY - TURNING MACHINE DIVISION		REPORT 2												
INCOME STATEMENT		HYPOTHETICAL DATA												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD	
PUBLIC REVENUE	4363.0	4843.0	5290.0	4784.0	4252.0	5050.0	5285.0	5046.0	5192.0	5176.0	4562.0	5269.0	59112.0	
INT DIV REV	50.0	200.0	50.0	300.0	50.0	50.0	175.0	50.0	50.0	50.0	200.0	50.0	1275.0	
TOTAL REVENUE	4413.0	5043.0	5340.0	5084.0	4302.0	5100.0	5460.0	5096.0	5242.0	5226.0	4762.0	5319.0	60387.0	
MATERIAL COST	1362.2	1529.9	1738.7	1594.5	1388.5	1680.6	1740.5	1702.9	1727.4	1708.5	1470.1	1716.2	19359.9	
INV CONVERSION	707.3	689.1	794.4	770.8	720.3	760.5	921.3	762.3	801.5	782.5	778.5	808.8	9297.2	
MARGIN AFTER INV	2343.5	2824.0	2807.0	2718.7	2193.3	2659.0	2798.2	2630.8	2713.1	2735.0	2513.4	2794.0	31729.8	
OTH FACTORY COST	466.6	832.0	716.2	689.8	798.7	831.5	878.5	888.1	958.2	928.0	812.9	-604.9	8195.7	
GROSS MARGIN	1876.9	1992.0	2090.7	2028.9	1394.5	1827.5	1919.7	1742.6	1754.9	1807.0	1700.5	3398.9	23534.2	
ENGIN. COST	183.8	226.4	221.8	220.7	220.6	234.7	233.7	241.6	233.1	237.4	235.9	228.6	2718.2	
SALES COST	286.2	393.2	370.7	365.7	364.5	397.7	400.4	409.1	398.4	404.8	418.3	393.6	4602.6	
COMMISSION	17.5	19.4	21.2	19.1	17.0	20.2	21.1	20.2	20.8	20.7	18.2	21.1	236.4	
ADMIN COST	217.0	402.1	424.9	407.0	401.7	451.4	452.7	482.1	444.2	463.1	464.3	413.7	5024.3	
OPERATING EX	704.5	1041.1	1038.6	1012.5	1003.8	1103.9	1108.0	1153.0	1096.5	1125.9	1136.7	1057.0	12581.5	
OP PROFIT PRE CP	1172.4	950.9	1052.1	1016.4	390.7	723.6	811.7	589.6	658.4	681.1	563.9	2341.8	10952.7	
CORPORATE CHARGE	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	2100.0	
NET OPERATE PROF	997.4	775.9	877.1	841.4	215.7	548.6	636.7	414.6	483.4	506.1	388.9	2166.8	8852.7	
INTEREST	25.0	8.4	9.7	11.2	12.1	1.1	-6	4.3	4.1	2.2	4.5	.3	82.2	
OTHER INCOME	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	6.0	
NPBT	972.9	768.0	868.0	830.7	204.1	548.0	637.8	410.9	479.8	504.4	384.9	2167.0	8776.5	
STATE TAX	48.6	38.4	43.4	41.5	10.2	27.4	31.9	20.5	24.0	25.2	19.2	108.4	438.8	
FEDERAL TAX	415.9	328.3	371.1	355.1	87.2	234.3	272.7	175.6	205.1	215.6	164.5	926.4	3752.0	
NET PROFIT	508.3	401.3	453.5	434.1	106.6	286.3	333.3	214.7	250.7	263.5	201.1	1132.3	4585.7	
#INTEREST EARN	39.9	92.6	90.9	75.5	17.8	519.8	.0	97.5	118.1	228.1	86.6	7097.2	107.8	
NET PROFIT	22.0	15.2	16.3	16.3	4.7	10.7	11.7	8.1	9.2	9.7	8.1	40.7	14.8	
GROSS MARGIN	42.5	39.5	39.2	39.9	32.4	35.8	35.2	34.2	33.5	34.6	35.7	63.9	39.8	

These would include direct labor, indirect labor, perishable tools, operating supplies, and power used to run equipment in the machine shop. In each case we multiply a cost per hour times the forecasted attendance hours to provide variable expense estimates. An example of our machining forecast calculations appears in Table 1.

The data files contain variable costs per hour for each expense in each of the three areas. These rates are developed at profit planning time and revised as actual or projected expense activity dictates. Monthly updates of the direct and indirect labor hour projections are processed with the variable expense rates to provide our total variable expense forecasts. These are added to our salary/fixed projections to provide an estimate of total factory expenses. Totals are displayed for each functional area, each expense within an area and each specific expense.

Labor productivity has a significant impact on our monthly profitability. While our levels of expenditures are based on forecasted attendance hours, our absorption to inventory is based on a forecast of standard hours that will be produced. Manufacturing's projection of productivity

combined with the estimated attendance hours provides our forecast of standard hours. This forecast of standard hours is multiplied by our standard inventory rate to generate the inventory absorption. The difference between forecasted expenditures and forecasted inventory absorption becomes a monthly P & L impact. Due to the linear productivity/profit relationship, we find that productivity forecasts generate much attention from top management.

FACTORY VARIANCES

In addition to monthly period expenses, several factory variances are incurred. These can be generated in several ways. Purchase price variance is a function of standard inventory purchases and inflation. Scrap and completed parts variances are a function of production levels and productivity. Inventory excess and obsolescence provisions are normally estimated during the profit planning cycle and expensed in fixed monthly amounts. The model projects each type of variance in the same manner in which they are actually generated, thus providing the most accurate forecast possible. Report 3 summarizes our period expenses and factory variances.

1. DATA FILE FOR MACHINING	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Costs per Attendance Hour:												
Labor	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.75	7.75	7.75	7.75
Labor Premiums	1.25	1.25	1.25	1.25	1.25	1.25	1.25	.75	1.40	1.40	1.40	1.40
Payroll Taxes	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65	.65
Employee Benefits	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.10	1.10
Perishable Tools	1.15	1.15	1.20	1.20	1.25	1.25	1.25	1.25	1.30	1.30	1.30	1.30
Operating Supplies	.35	.35	.35	.35	.37	.37	.39	.40	.40	.40	.40	.40
Repairs & Maintenance	1.00	1.00	1.00	1.05	1.05	1.05	1.25	2.50	1.05	1.07	1.07	1.07
Utilities	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.75	.85
Forecasted Attendance Hours (In Thousands)	37.5	33.4	39.8	37.2	38.5	39.0	36.5	21.0	38.8	40.3	37.1	35.5
2. CALCULATION OF FORECASTED EXPENSES - MARCH												
Labor	7.00 x 39,800 = 278,600											
Labor Premiums	1.25 x 39,800 = 49,750											
Payroll Taxes	.65 x 39,800 = 25,870											
Employee Benefits	1.00 x 39,800 = 39,800											
Perishable Tools	1.20 x 39,800 = 47,760											
Operating Supplies	.35 x 39,800 = 13,930											
Repairs & Maintenance	1.00 x 39,800 = 39,800											
Utilities	.75 x 39,800 = 29,850											
Total Machining Expenses (Variable)	525,360											

REPORT 3

WARNER & SWASEY - TURNING MACHINE DIVISION

OTHER FACTORY COSTS

HYPOTHETICAL DATA

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
MANUFACT. COST	996.1	1411.2	1317.5	1329.6	1446.4	1452.9	1539.3	1321.3	1425.0	1505.1	1429.4	1429.3	16602.1
ABSORPTION	771.9	816.1	804.8	852.1	873.1	878.5	920.4	683.7	757.4	831.1	867.7	783.8	9840.8
TRANSFER	28.6	51.9	53.0	52.9	53.0	53.0	53.0	55.0	55.0	55.0	55.0	55.0	620.4
UNABSORB CONVERS	195.6	543.2	459.7	424.5	520.3	521.5	565.9	582.6	612.6	618.9	505.6	590.5	6140.9
WARRANTY	39.9	42.5	39.1	41.4	42.5	42.5	44.8	33.3	36.8	40.2	42.5	37.9	483.8
PURC \$ VARIANCE	66.0	63.0	48.0	49.6	63.0	64.4	95.4	110.2	151.2	108.8	98.1	112.5	1052.2
SCRAP	41.3	46.3	39.8	42.7	44.7	45.0	44.7	31.4	37.0	41.2	37.3	38.9	490.2
OBsolescence	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	480.0
SHRINKAGE	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	300.0
COMP PARTS VARIA	74.2	70.0	68.4	59.8	65.2	69.6	66.2	68.6	49.3	56.0	60.5	61.4	767.4
OTHER VARIANCE	-45.5	-33.0	-33.8	-33.2	-32.0	-33.5	-33.5	-33.0	-33.7	-37.2	-36.3	-51.2	-435.8
LIMA	30.0	35.0	30.0	40.0	30.0	25.0	30.0	30.0	40.0	35.0	40.0	40.0	415.0
RECOST	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1500.0	1500.0
TOTAL VARIANCE	271.0	288.8	256.5	265.3	278.4	310.0	312.7	305.6	345.6	309.1	307.3	-1195.4	2054.8
OTH FACTORY COST	466.6	832.0	716.2	689.8	799.7	831.5	878.5	808.1	758.2	728.0	812.9	-604.9	8195.7

REPORT 4

WARNER & SWASEY - TURNING MACHINE DIVISION

INVENTORY MOVEMENT

HYPOTHETICAL DATA

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
BEGIN INVENTORY	18300.0	18966.8	19425.1	19069.5	18732.4	19364.3	19364.7	19187.6	19092.7	19518.1	19240.8	18939.5	18300.0
PURCHASES	2200.0	2100.0	1800.0	1400.0	2100.0	1800.0	1800.0	1900.0	2400.0	1600.0	1300.0	1500.0	31700.0
CONVERSION	771.9	816.1	804.8	852.1	873.1	878.5	920.4	683.7	757.4	831.1	847.7	783.8	9840.8
TOTAL INPUT	2971.9	2916.1	2404.8	2252.1	2973.1	2678.5	2720.4	2583.7	3157.4	2431.1	2167.7	2383.8	31540.7
MATERIAL COST	1362.2	1529.9	1738.7	1594.5	1388.5	1680.6	1740.5	1702.9	1727.4	1708.5	1470.1	1716.2	19359.9
CONVERSION COST	707.3	689.1	794.4	770.8	720.3	760.5	921.3	762.3	801.5	782.5	778.5	808.8	9297.2
COST OF SALES	2069.5	2219.0	2533.0	2365.3	2108.7	2441.0	2661.8	2465.2	2528.9	2491.0	2248.6	2525.0	28457.1
WARRANTY	39.9	42.5	39.1	41.4	42.5	42.5	44.8	33.3	36.8	40.2	42.5	37.9	483.8
SCRAP	41.3	46.3	39.8	42.7	44.7	45.0	44.7	31.4	37.0	41.2	37.3	38.9	490.2
COMP PART VAR	74.2	70.0	68.4	59.8	65.2	69.6	66.2	68.6	49.3	56.0	60.5	61.4	767.4
CAPITAL ASSET	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	180.0
SHRINKAGE	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	300.0
OBsolescence	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	480.0
RECOST	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1500.0	1500.0
TOTAL VARIANCE	-235.5	-238.8	-227.3	-223.9	-232.4	-237.1	-235.8	-213.4	-203.1	-217.4	220.4	1281.7	-1203.4
END INVENTORY	18966.8	19425.1	19069.5	18732.4	19364.3	19364.7	19187.6	19092.7	19518.1	19240.8	18939.5	19780.0	19980.0
CHANGE INVENTORY	666.8	459.3	-355.6	-337.1	632.0	.3	-177.1	-94.9	425.4	-277.3	-301.3	1040.5	1680.0
INVENTORY TURN	1.3	1.4	1.6	1.5	1.5	1.7	1.7	1.5	1.6	1.5	1.4	1.6	1.5
SALES IN INVEN	9.2	8.8	7.5	7.8	9.2	7.9	7.2	7.7	7.7	7.7	8.4	7.9	8.4

At this point in the processing, all expenses down to the gross margin level have been forecasted. The profit contribution by product has been forecasted in the sales section of the model. From this we deduct the monthly unabsorbed manufacturing expenses and the factory variances to provide the gross margin.

OPERATING EXPENSES

The respective functional managers provide monthly forecasts by major expense for Sales, Engineering and Administrative expenses. The starting point is the annual budget. Monthly budget performance monitors spending levels and provides data for future projections. Each manager applied his judgment and future planning outlook to devise his rolling forecast. This forecast then becomes a commitment against which we can measure subsequent performance. When business conditions change annual expectations, these revised projections can also be incorporated into our formal budgeting process.

The following functional managers are responsible for providing expense forecasts:

1. Engineering
2. Field Sales
3. Foreign Sales
4. Sales Administration
5. M.I.S.
6. Finance
7. Industrial Relations
8. Purchasing
9. Division Administration

Table 2 shows the expense categories that are included in our forecasts. The model accumulates totals for each expense and each functional area. Summaries of operating expenses are deducted from gross margin to generate our net operating income. Hard-copy displays of forecasted expenses are available for each functional manager, providing a common basis for comparison and review.

REPORT GENERATION

The data already provided or generated is then used to produce the financial reports. Several steps are necessary to develop a final income statement from the net operating income. Interest expense is a function of balance sheet debt and prevailing money market conditions. International Marketing and Manufacturing Engineering personnel provide estimates of royalty income and asset disposals respectively. Decision rules are included in the model to generate tax effects and project final net earnings.

Once forecasts of income are complete, this data is then processed to provide further financial information. The purchases forecast is combined with the inventory absorption, material and conversion cost of sales and factory variances affecting inventory, all of which have been calculated, to provide information on inventory movement and balances. Considerable effort is placed on inventory management, since the capital goods industry is not known for rapid inventory turnover and inventory can often be the single largest net investment on the company's balance sheet. Forecasts of inventory activity are indeed used by division management for decision-making purposes, and they also provide a cross-check on the information generated through the MRP system. Report 4 displays the Inventory Movement schedule.

Perhaps the most interesting information comes from the balance sheet projections. Certain assets and liabilities are determined by financial management, such as on-hand cash balances, depreciation schedules, expense accruals and dividend allocations. Fixed assets are determined by divisional management through the

TABLE 2	
FORECASTED EXPENSES	
COMPENSATION:	
	LABOR
	SALARIES
	LABOR PREMIUMS
	SALARY PREMIUMS
EMPLOYEE-RELATED EXPENSES:	
	PAYROLL TAXES
	EMPLOYEE BENEFITS
PURCHASED EXPENSES:	
	PERISHABLE TOOLS
	OPERATING SUPPLIES
	REPAIRS AND MAINTENANCE
	UTILITIES
	OUTSIDE SERVICES
	TRAVEL
	ADVERTISING
	WARRANTY
	OFFICE SUPPLIES
	COMMUNICATIONS
	AUTOMOTIVE
FIXED EXPENSES:	
	DEPRECIATION
	PROPERTY AND REAL ESTATE TAXES
	REIT

BALANCE SHEET

HYPOTHETICAL DATA

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD
CASH	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
A/R	9113.0	9918.5	11441.9	11526.9	10623.0	10737.2	11610.6	11046.0	11823.5	11881.8	11295.6	11303.8	11383.8
INVENTORY	18966.8	19425.1	19069.5	18732.4	19364.3	19364.7	19187.6	19092.7	19518.1	19240.8	18939.5	19980.0	19980.0
CURRENT ASSET	29179.8	29443.6	30611.4	30359.3	30087.3	30201.8	30898.2	31038.7	31441.6	31222.6	30335.1	31463.8	31463.8
OTHER ASSETS	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
GROSS FIXED AST	18600.0	18750.0	18850.0	18925.0	18975.0	19175.0	19250.0	19350.0	19400.0	19450.0	19600.0	19675.0	19675.0
DEPRECIATION	11025.0	11158.8	11292.5	11426.3	11560.1	11694.9	11829.5	11964.1	12098.7	12233.3	12367.1	12500.9	12500.9
NET FIXED ASSET	7575.0	7591.2	7557.5	7498.7	7414.9	7480.1	7420.5	7385.8	7301.3	7216.7	7232.9	7174.1	7174.1
TOTAL ASSETS	35829.8	37109.8	38243.0	37932.9	37577.2	37756.9	38393.7	38499.5	38817.9	38514.3	37643.0	38712.9	38712.9
A/P	2255.7	2189.8	1665.8	1451.7	2096.9	1947.5	1838.4	1950.0	2382.0	1626.3	1431.1	1545.5	1545.5
OTHER PAYABLES	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
ACCRUED WAGES	192.8	317.9	526.7	406.9	475.7	530.4	720.7	248.4	360.5	445.5	332.5	346.6	346.6
ACCRUED TAX	800.0	900.0	1000.0	1000.0	1100.0	1200.0	1000.0	1100.0	1200.0	1300.0	1300.0	600.0	600.0
OTHER ACCRUEN	700.0	900.0	1200.0	1400.0	1700.0	1600.0	1700.0	1700.0	1200.0	1300.0	1000.0	400.0	400.0
INCOME TAX	415.9	744.3	1115.3	355.1	442.4	676.6	272.7	448.3	653.4	215.6	380.1	1306.6	1306.6
CUR. LIABILITY	4464.3	5151.9	5607.7	4713.7	5914.9	6054.6	5631.8	5546.7	5895.9	4987.5	4543.7	4290.7	4298.7
A/R	9113.0	9918.5	11441.9	11526.9	10623.0	10737.2	11610.6	11046.0	11823.5	11881.8	11295.6	11303.8	11383.8
CORPORATE ADV	-7855.9	-8470.3	-9768.9	-9704.9	-10464.5	-10825.0	-10972.1	-11231.3	-11490.4	-11207.4	-11249.8	-9755.3	-9755.3
EQUITY/DIVISION	21000.0	21000.0	21000.0	21000.0	21000.0	21000.0	21000.0	21000.0	21000.0	21000.0	21000.0	21000.0	21000.0
CURRENT PROFIT	508.3	909.6	1363.2	1797.2	1903.8	2190.2	2523.4	2738.1	2988.8	3252.4	3453.5	4585.7	4585.7
PRIOR PROFIT	22000.0	22000.0	22000.0	22000.0	22000.0	22000.0	22000.0	22000.0	22000.0	22000.0	22000.0	22000.0	22000.0
DIVIDENDS	-13400.0	-13400.0	-13400.0	-13400.0	-13400.0	-13400.0	-13400.0	-13109.0	-13400.0	-13400.0	-13400.0	-14800.0	-14800.0
TOTAL EQUITY	30108.3	30509.6	30963.2	31397.2	31803.8	31790.2	32123.4	32338.1	32508.8	32852.4	33053.4	32785.7	32785.7
LIAB. + EQUITY	35829.8	37109.8	38243.8	37932.9	37577.2	37756.9	38393.7	38499.5	38817.9	38514.3	37643.0	38712.9	38712.9
CURRENT RATIO	6.3	5.7	5.5	6.4	5.1	5.0	5.5	5.6	5.3	6.3	6.7	7.3	7.3
ACID TEST	2.1	1.9	2.1	2.5	1.8	1.8	2.1	2.2	2.0	2.4	2.5	2.7	2.7
DEBT/ASSETS	.2	.3	.2	.2	.2	.2	.2	.2	.2	.1	.1	.2	.2
ROI	38.8	30.2	33.6	31.8	7.8	20.7	23.8	15.2	17.7	18.4	14.0	79.3	27.9
ROA	32.6	24.8	27.2	26.3	6.5	17.4	19.9	12.8	14.8	15.7	12.3	67.0	23.5

capital equipment budget. Many current assets and liabilities are dependent upon the level of business. Inventories have previously been forecasted in detail. State and federal tax regulations and the net income projection determine tax liabilities.

Still other accounts require unique decision rules. Accounts receivable are a function of sales, credit and collection policy and product reliability. Such an asset requires a combined effort by Sales, Manufacturing and Credit to forecast a proper "days outstanding" rule. In order to predict accounts payable, its individual components must be examined. We found that a forecast based on capital asset additions, inventory purchases and factory supplies and tools provided most accurate results.

Accrued wages combine two different bases: a

vacation and holiday pay accrual determined by Payroll and vacation schedules, and normal monthly accruals based on pay dates and the total compensation earned that month. The key point is that assets and liabilities such as these will act differently in every company, necessitating detailed analysis to determine the optimal decision rules. Decision rules should also be reviewed periodically and updated if necessary to current conditions. The balance sheet is shown in Report 5.

Cash flow requirements become a simple function of the income and balance sheet information already generated. A comparison of asset and liability balances over a specified period of time provides data on sources and uses of funds through investment/financing decisions. Net income and period depreciation expenses from the income data provide the sources of funds due to operating

decisions. The cash flow forecast concludes the processing flow of the model. Report 6 presents the cash flow.

BENEFITS

In retrospect, the tremendous benefits of the model now become evident:

1. Instant Response - Report printouts can begin ten seconds after final data input. The total forecasting planning scope performed by the model would have required 12,000-15,000 manual calculations and taken several months to complete by hand.
2. Guaranteed Synchronization - Since the four basic updates (all input before processing) and calculations made thereupon have driven the entire model, all assumptions are guaranteed to have been documented consistently throughout the particular forecast. The flow chart in Figure 1 demonstrates the model's overall plan.

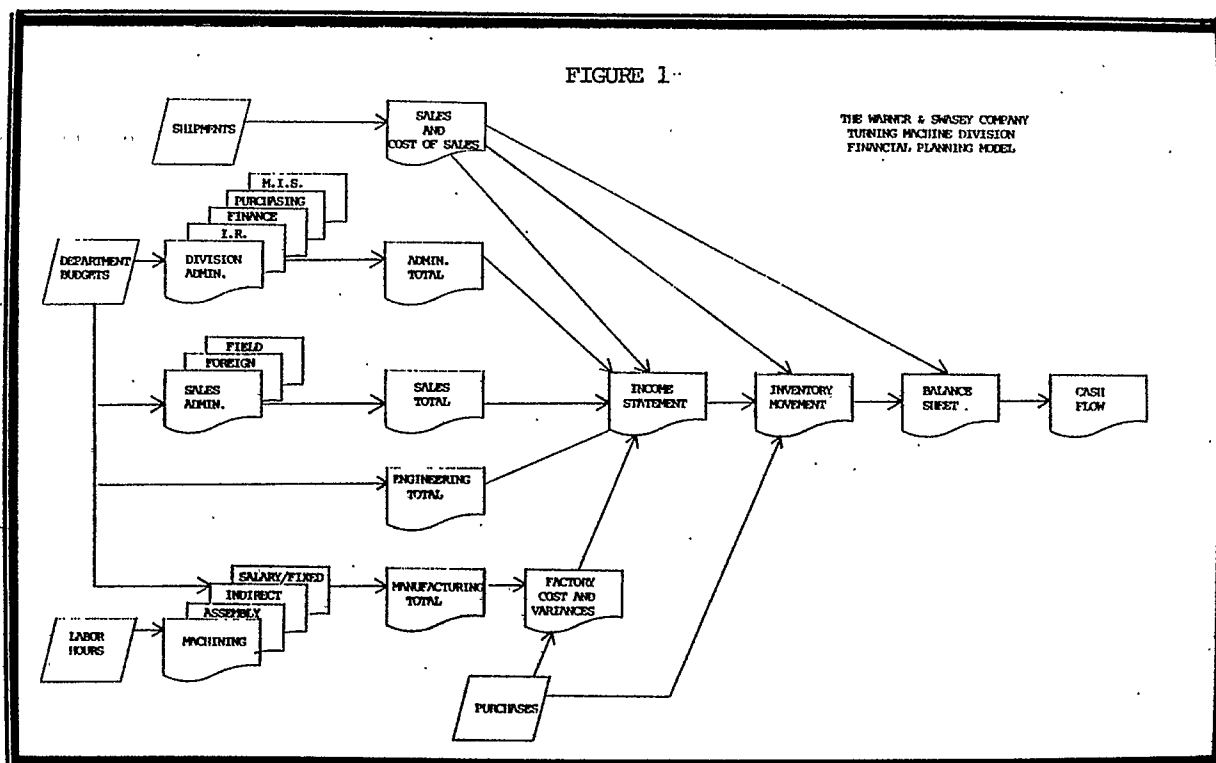
3. Total Flexibility - All assumptions and data, as well as the program logic itself, can be updated at any time. This allows complete information as to outcomes of many different possible occurrences.
4. Trackability - All expense data is summarized in enough detail to allow complete performance and commitment review by manager or expense.
5. Total Financial Information - All financial data required for most management decisions is provided - a total pro forma package of complete financial information.

DEVELOPMENT EFFORT

It is appropriate to discuss the developmental efforts required for such a model. The actual system design and specifications, which were developed entirely by Accounting, took approximately two weeks. However, thought was constantly being given to the model during the previous profit planning cycle. The programming, testing and

WARNER & SMASEY - TURNING MACHINE DIVISION		REPORT 6												
CASH FLOW ANALYSIS		HYPOTHETICAL DATA												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YTD	
NET INCOME/	508.3	401.3	453.5	434.1	106.6	286.3	333.3	214.7	250.7	263.5	201.1	1132.3	4585.7	
DEPRECIATION	125.0	133.8	133.7	133.8	133.8	134.8	134.6	134.7	134.6	134.6	133.8	133.8	1600.9	
OPERATE FUNDS	633.3	535.1	587.2	567.9	240.4	421.1	467.8	349.4	385.3	398.1	334.9	1266.1	6186.6	
- (+) IN ASSET														
FIX ASSET-GROSS	100.0	150.0	100.0	75.0	50.0	200.0	75.0	100.0	50.0	50.0	150.0	75.0	1175.0	
ACC. RECEIVE	1887.0	-805.5	-1523.4	-85.0	903.9	-114.2	-873.4	-235.4	22.5	-58.3	584.2	-88.2	-383.8	
INVENTORY	-664.8	-458.3	355.6	337.1	-632.0	-.3	177.1	94.9	-425.4	277.3	301.3	-1040.5	-1680.0	
OTHER ASSETS	425.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	425.0	
TOTAL	1545.2	-1413.8	-1267.8	177.1	221.9	-314.5	-771.3	-240.5	-452.9	169.0	737.5	-1203.7	-2813.8	
+ (-) LIABILITY														
ACCT. PAYABLE	655.7	-65.9	-524.0	-214.1	645.2	-149.3	-109.1	111.5	432.0	-755.6	-195.2	114.4	-54.5	
INC. TAX PAY	-1334.1	328.3	371.1	-760.2	87.2	234.3	-404.0	175.4	205.1	-437.8	164.5	926.4	-443.4	
OTH PAYABLE	-757.2	425.1	608.8	80.3	468.8	54.7	90.3	-372.3	-287.9	285.0	-413.0	-1285.9	-1103.4	
TOTAL	-1435.7	687.6	455.8	-894.0	1201.2	139.7	-422.8	-85.1	349.3	-908.5	-443.7	-245.1	-1601.3	
DIVIDEND INC	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	1400.0	1400.0	
TOT CASH FLOW	742.9	-191.1	-224.7	-149.1	1663.6	246.3	-726.3	23.8	281.6	-341.3	628.6	-1582.7	371.5	

FIGURE 1



THE WARNER & SHASEY COMPANY
TURNING MACHINE DIVISION
FINANCIAL PLANNING MODEL

debugging took about ten weeks. Accumulating the original input data to load the model can be cumbersome and should be done while the programming is underway.

An essential point is that the design and specifications should be prepared by the financial planner and not by M.I.S. or service bureau personnel. The user must be totally familiar with the flow and logic of the model. Otherwise, it can become difficult to analyze the causes when a forecast offers an unexpected result. All calculations should also be tested in their entirety by hand during the test stage to assure that the model is accomplishing all that it was designed to do.

The cost of developing a model is comprised of two parts; the time and efforts of the financial personnel (and M.I.S. personnel if done in-house) and out-of-pocket expenses for the time-sharing firm. The time and effort of financial personnel is not an expense but an investment which will provide returns in the form of time savings and the benefits of better, more timely forecasting indefinitely into the future. Our out-of-pocket investment of approximately \$5,000 has yielded data upon which decisions of a magnitude of 100 times this investment have been made.

IMPACT TO THE ORGANIZATION

FINANCIAL MANAGEMENT

Generally a financial model will be readily accepted by the financial part of the organization. The degree of enthusiasm will vary based on the acceptance given to the manually generated projections. A model will be most welcomed in an environment where the financial people are usually defending low profit number projections to operating management. A model will be least welcome in the forecasting environment where there is some element of "accounting wizardry" associated with the forecast. Chances of inconsistencies being challenged will increase via the display of information available utilizing a model.

NON-FINANCIAL MANAGEMENT

Care must be taken to present any financial model to the total organization as a management tool for use in analyzing and improving the operating results. As with any new function or procedure introduced to an organization, there is a learning curve associated with the implementation and use of a financial model. However, as the operating management team is an integral part of any profit planning/budgeting function, they must continue to play a key role in any financial modeling venture,

It is important that this group relate to the model and to the significance of the model output. Therefore, for optimal results, applicable

instructions and/or presentations to this group are required. Caution should be exercised against creating any management credibility problems pertaining to the model. All variable inputs and assumptions, as well as the internal decision-making rules, should be openly discussed and explained. Also, the analysis of actual results versus model projections will result in improved model performance. The entire management team's sense of awareness to future opportunities or pitfalls will increase.

The non-financial managers will at first be quietly skeptical of the modeling approach to forecasting. They may view it as a tool which openly displays more of their individual realms than would otherwise be highlighted. This is not surprising, as a model is a tool with the capability to formally log their business commitments and display applicable results on a timely basis. However, if the model projections have a high degree of accuracy and the results are communicated properly, the model will quickly gain acceptance among management as a forecasting tool.

MAINTENANCE EFFORT

The time requirements do not totally abate once the model is operational. In fact, upon completion of the model, the creative efforts which are most satisfying come to an end and the more routine task of data maintenance begins. Forecasts must be compared to actual results to ensure credibility. Data audits must be made to assure that all data is up-to-date. We employ a formal schedule which calls for each line of data being audited at least quarterly with the more critical items reviewed monthly. Processing rules must also be reviewed to assure their continued validity.

In addition to the data audits and decision rule reviews, certain data must be updated monthly. These would include:

1. Input of the actual data from the previous month;
2. All revised data due to revised assumptions and better knowledge;
3. Data for the new rolling 12th or 24th month.

Optimal monthly maintenance time should average about 8-12 hours. This is absolutely essential as the forecasts from the model can only be as good as the data used to generate it.

Monthly costs to maintain and run the model average around \$350-400. Charges are incurred for data storage, hookup time with the CPU, and

actual computational time. Were our files maintained off-line (requiring several hours notice to bring up) and were we to run all the forecasts via batch process at night, our costs could be reduced by possibly 40%. However, with a tool as powerful and beneficial as a financial model, management will often desire the ease and flexibility of instantaneous availability.

SUMMARY

The decision to utilize a financial model must be a total commitment by top management. This means allocating applicable talent to develop, implement and maintain the data, ample computer systems and programming time or funds for outside vendors, as well as devoting much of management's time in order to objectively evaluate the model's outputs. Combining these elements of the investment with some patience for results will give the organization an invaluable tool for profit planning and forecasting. At Warner & Swasey, it is an invaluable tool.