**Sample Only**

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1. **How the calculation works**

TheSurf model was designed to be easily managed and maintained by its intended user, making it an invaluable resource. This was accomplished utilizing meaningful names for all of the parameters, input/output streams, named ranges, and worksheet names. All names in the *ParametersInputs* sheet are workbook specific names. TheSurf model is constructed on the ripple principle, which means that changes on the *ParametersInputs* sheet ripple throughout the entire model. There is a summary sheet *RevenuesEarnings* which contains the outputs from the intermediate results achieved on the other worksheets.

Listed below you will have an introduction of terms that will be referred to going forth in explanation of our model and how each specifically pertains to TheSurf’s inner workings:

The *Parameters:* Are single cells, some parameters take in the data entered directly by a user and can be changed independently. Some parameters are calculated, i.e. contain formulas. These parameters are used as interim results for the output streams and other calculations. They cannot be changed by a direct input.

*Parameter Blocks:* The parameters are grouped into blocks primarily by category. Parameter blocks used in calculations also have defined names. Although an individual parameter in the parameter block can be changed, if parameters need to be added or removed from the parameter block, excel won’t allow it by producing the message: “You cannot change a part of the array”. If the parameter block size need to be changed, do the following: Go to Formulas > Find the Name of the Parameter block> on the line under Refers to, change the existing range to a new range.

*Input streams*. For the purposes of this project the input streams of data span the 12 time periods indicating months in the first operating year. Each individual cell in the input stream can be modified. If there is a change in the input stream size, the same steps as described in the parameter blocks above must be followed. Input streams have defined names which are used in calculations. Calculated input streams (intermediate results) contain formulas, and cannot be changed directly. The change to parameters either individual or in input streams change the data in the output streams.

*Output streams* are the results of calculations of parameters and input streams, and output streams contain formulas. For the purposes of this project, the output streams of data that span the 12 time periods for months in the first operating year. All output streams cannot be changed by a direct input from a user.

TheSurf spreadsheet model contains eight worksheets with self-explanatory names.

Formulas used in calculations throughout this model are either standard excel formulas, financial formulas, or TheSurf business specific calculation. The model mainly uses array arithmetic and multiplication. Below you will find the parameters, input streams, and output calculations listed by worksheet:

*ParametersInputs:* This sheet includes all of the parameters, and input streams used throughout the model to perform calculations. This is the user-modifiable page used to test different scenarios. Making changes to the numbers on this worksheet will ripple throughout the model and ultimately produce a different result for your output streams. The parameters, and input streams are listed on this worksheet, under headings that correspond to the worksheet where they are used, within the workbook (ie. changes made to the parameters listed under the “Rooms and Rates”heading will result in changes to the intermediate data on the worksheet entitled *RoomSales*, and ultimately the ouputs on the final worksheet *RevenuesEarnings*). The calculations for this worksheet are as follows:

AnnMrktBudget (=ProjectedRevenue\*PrctgMrktExp) Calculates the annual marketing budget by multiplying Projected Revenue from room sales by Projected Marketing Expense.

MonMrktBudget (= AnnualMarketingBudget/Periods) Calculates the monthly marketing budget by dividing annual budget by month

The two calculated input streams are as follows:

Utilities (=AvgMonUtilities\*OffSeasonUtil) Calculates an average monthly cost of utilities, accounting for off-season period.

Seasonal (=INT(OccupancyRate\*SeasonalStaffNo) The number of necessary season staff being hired every year depends on occupancy

*MortgageLeases*: Contains the calculations of the mortgage payments and the effects of a stream of lease events that occur under the terms of a single lease agreement. Each event triggers its own set of interest payments, principal payments, and depreciation. The calculations used are:

MonMortgagePmt (=PMT(InterestRate/Periods,MortgageTerm\*Periods,-AmtBorrowed) A standard financial formula to calculate payment. Instead of numbers, named parameters are used.

InterestPmt(=IPMT(InterestRate/Periods,PeriodNumber,(Periods\*MortgageTerm),-AmtBorrowed)) A standard financial formula to calculate interest. Instead of numbers, named parameters are used.

PrincipalPmt (=PPMT(InterestRate/Periods,PeriodNumber,(MortgageTerm \*Periods),-AmtBorrowed)) A standard financial formula to calculate payment. Instead of numbers, named parameters are used.

SolarPaymentPM and LaptopPaymentPM (=PMT(LeaseIntRate/Periods,Periods,-SolarCost) This formula is used to calculate the payment for expensive equipment that is under a capital lease agreement for a 12-month term. Payments are made at the end of each month.

CumPrincipal (=C22+D24) and CumDepreciation (=C23+D28) Contain the cumulative principal and depreciation calculation accordingly. The two depreciation streams for the two equipment types are calculated with each stream giving the fractional depreciation for each month.

For each month, the following events are calculated (using an example of Solar Battery payments:

PrincipalPayment (=PPMT(LeaseIntRate/Periods,PeriodNo,Periods,-SolarCost) A standard financial formula to calculate payment is used. Instead of numbers, named parameters are used.

Payment (=SolarPmtPM) takes an input stream SolarPmtPM

Assets (=SolarCost-CumDepSolar) calculates assets

Liabilities =SolarCost-CumPrincipalSolar calculates liabilites

Depreciation (=INDEX(DepBase,1,0)\*1000) calculates depreciation

InterestPayment (=IPMT(LeaseIntRate/Periods,PeriodNo,Periods,-SolarCost)) ) A standard financial formula to calculate interest is used. Instead of numbers, named parameters are used.

*Personnel:* This sheet contains two tables one to calculate labor scheduling and the second to record labor costs. The calculations include the following:

The Personnel Schedule table has calculations of how many employees of each category that are needed every month of the year and a total number of employees per month.

Manager, Housekeeping, FullTime, Seasonal (=Manager,=Housekeeping, =FullTime,=Seasonal) Take input stream from Parameters&Inputs accordingly

Seasonal Replacements (=INT(Seasonal\*SeasonalTurnOverRate) Calculates how many employees need to be hired every season to repace those who left. SeasonalTurnOverRate is an industry average rate

TotalEmployeesMonth (=SUM(C5:C9) calculates how many employees are needed on monthly basis.

The Personnel Wages table contains calculations for how much employees of each category are paid every month of the year.

Manager, Housekeeping, FullTime, (=Manager\*ManagerW\*ManHrsMon, =Housekeeping\*HKWages\*HKHrsMon, =FullTime\*FullTimeW\*FTHrsMon)

Seasonal (=IF(SeasonalW\*Seasonal\*SeasHrsMon=0,0,SeasonalW\*Seasonal\*SeasHrsMon)

TotalPayrollPerMon (=SUM(C15:C18) calculates total payroll per month.

TotalAnnualPayroll (=SUM(TotalPayrollPerMonth) calculates annual payroll

*RoomSales: This* sheet has three tables which are directly effected by changes to the parameters on the *ParametersInputs,* any modification to the formula is automatically updates the calculated results.

The Total Average Room Sales contains calculations about the forecast revenue from the room sales for an average month:

LuxMonRevenue (=LuxRoomRate\*MonOccupancyLux\*Month)

Calculates monthly forecast revenue from luxury rooms based on the room rate and monthly occupancy, assuming that the number of rooms presented in the MonOccupancyLux is occupied daily.

StanMonRevenue (=StanRoomRate\*MonOccupancyStan\*Month)

Calculates monthly forecast revenue from standard rooms based on the room rate and monthly occupancy, assuming that the number of rooms presented in the MonOccupancyStan is occupied daily.

MonTotalAvgSales (=(LuxSales+StandSales) Calculates monthly forecast revenue from all rooms in the inn.

TotalYearProjectedRevenue (= SUM(RoomSales!E8:L8) Calculates the annual f orecast revenue

The Total Average Discounted Room Sales table contains calculations about the forecast revenue from the room sales for an average month if a management decides to attract more guests by promoting discounted room rates.

LuxAvgMonRevenueD(=(LuxRoomRate-LuxRoomRate\*LuxDiscountRate)\*MonOccupancyLux\*Month) Calculates monthly forecast revenue from luxury rooms based on the discounted room rate and monthly occupancy, assuming that the number of rooms presented in the MonOccupancyLux is occupied daily.

StanAvgMonRevenueD (=(StanRoomRate-StanRoomRate\*StanDiscountRate)\*MonOccupancyStan\*Month) Calculates monthly forecast revenue from standard rooms based on the discounted room rate and monthly occupancy, assuming that the number of rooms presented in the MonOccupancyStan is occupied daily

MonTotalAvgSalesD (=LuxDiscRate+StandDiscRate) Calculates monthly forecast revenue from all rooms in the inn with applied discounts.

TotalYearProjectedRevenueD (=SUM(RoomSales!E18:L18) Calculates the annual forecast revenue with applied discount.

The Total Scaled Room Sales table consists of one row which contains calculations about the forecast revenue from the room sales for an average month, if management decides to apply a scale to measure if sales are higher/lower than average.

ProjectedRevenueScaled (=MMULT(TRANSPOSE(ScaleFactors),AveMonSales) Calculations use standard mmult and transpose functions.

OccupancyRate(=(MonOccupancyLux+MonOccupancyStan)/(LuxuryRoomNo+StandardRoomNo)Calculates rate how many rooms can be occupied out of total rooms available.

*FoodSales*: The Food Cost and Price by Category table contains calculations for the cost per serving for food bought in bulk and the price charged to guests. Total cost of breakfast and retail price of breakfast are calculated for comparison. Calculations on this worksheet consist of:

Food category (=CostPerUnit/Servings) Calculates the cost of serving;

( =PricePerServing) Calculates retail price of serving

TotalBreakfast=SUM(CostPerServing) Calculates actual cost of serving bought in bulk

=SUM(CostPerServing) Calculates retail price of breakfast

The Monthly Food Needs table contains calculations to determine the amount of food needed, the cost and the price, and the revenue that can be earned from food sales. Calculations are per serving.

MonExptGuest (=MonGuestLux+MonGuestStan) Calculates how many guests on average stays in the inn.

MonAvgServings (=MonExpGuest\*AveServingPerGuest) Calculates how many serving of each food category is needed.

MonAvgFoodPrice (=MonAveServings\*MealPrice) Calculates the retail price of a serving

MonAvgFoodCost (=MonAveServings\*MealCost) Calculates the bulk price of a serving

MonRevenueFood (=MonAveFoodPrice-MonAveFoodCost Calculates the difference between retail and bulk price of a serving)

The Scaled Monthly Food Needs table contains calculations of how much inventory must be kept in the inn. It also calculated the revenue that can be made from food sales if management were to apply a scale for fluctuation in occupancy to determine what if sales are going to be higher/lower than average.

ScaledMonExptGuest (=INT(MMULT(TRANSPOSE(GuestScaleFactors),MonGuest))

ScaledMonAvgServings (=ScaledMonExptGuest\*AvgServPGuest)

ScaledMonAvgFoodPrice (=ScaledMonAvgServ\*MealPrice)

ScaledMonAvgFoodCos (=ScaledMonAvgServ\*MealCost)

ScaledMonRevenueFood (=ScaledMonAvgFoodPrice-ScaledMonAvgFoodCost)

There are six inventory tables for the Food Inventory by Category section of the worksheet. There are calculations for the amount of food required by month, the food consumption, the amount to be ordered, and the costs. Calculations are made on bulk food purchases.

BeginningUnits (=IF(MonExptGuest=0,0,MonAveServings/BagelServPUnit+ FoodServingReserve/BagelServPUnit) Calculates the food needed at the beginning of the month in units.

MonConsumption (=MonAvgServ/BagelServPUnit) Calculated how much food is consumed in units.

EndingUnits (=BagelBegUnits-BagelMonConsumption) Calculated how much food is left at the end of the month.

OrderUnits (=IF((D41-C43)>0,(D41-C43), 0) Calculated how much needs to ordered for next month by distracting what is left from from what is required for next month

ReorderCost (=BagelOrderUnits\*BagelCost) Calculates the cost of order.

*Depreciation:* This sheet contains the leased equipment depreciation and furniture depreciation. The calculations for this worksheet are:

Leased Equipment Depreciation:=1/EqptDepreciaiton. Shows depreciation base for the Solar Battery and Laptops using a standard financial formula

The Furniture Depreciation section showscalculations for how much furniture costs are per room based on the quantity of the item needed. Depreciation rate of each item is also calculated.

Equipment Item (=CostPerItem\*Quantity) Calculates how many furniture items are required for each room and total cost of the items

(=1/UsefulLife\*Periods/100) Calculates the depreciation rate using a standard financial formula.

The DepBase table contains calculations for each furniture item for each room. Since all entries in the table use the same formulas, just the first entry is shown for demonstration purpose:

Equipment Item (= CostPRoom\*DepRate)Calculates depreciation base for each furniture item per room foe each month of the year.

The total monthly room depreciation expense and cumulatitve depreciation expense are calculated. As well as total depreciation expense (for all rooms):

DepExpPerRoom=SUM(C23:C36), CumDepExp(=C39+D38)left and upper cells are added,

TotalDepExp(=DepExpPRoom\*(LuxRoomNo+StanRoomNo)Calculates depreciation for all items in the room multiplies by a number of total rooms.)

*RevenuesEarnings:*  Contains the output parameters based upon the results of the above worksheets, in the form of an income statement. It calculated the total revenues, and expenses for the first operating year which determine the profitability of the business.

The Income Statement table brings expenses and revenues together and allows to calculate an annual income.

Revenues (=MonTotalSales+MonRevFood) Calculates revenue from room sales and food sales

Expenses(=TotalExp-MktgExpIS) Calculates expenses when marketing expenses are distracted.

Depreciation (=DepExp) Takes in the DepExp stream

Gross Profit (=Revenues-Exp-DepIS) Calculates Gross Profit by distracting expenses and depreciation expense from the total revenue

SG&A Expenses (=MktgExpIS) Takes in the MktgExpIS stream

Operating Income / EBIT (=GrossProfit-SGAExp) Calculates operating income by distracting SGAExp from gross profit.

Interest Expense (=InterestExp) Takes in the InterestExp stream

Pretax Income (=EBIT-InterestExpIS) Calculates Pretax Income by distracting the InterestExpIS from the EBIT.

Taxes (%) (=PretaxIncomeIS\*TaxRate) Calculates taxes on the pretax income.

Net Income (=PretaxIncomeIS-TaxesIS) Calculates the net income by distracting taxes from the pretax income.

1. **How to locate inputs, outputs and intermediate results**

Colors are used to provide visual cues to locate inputs, outputs and intermediate results. Cells that have special significance are tinted. Please refer to the color convention guide in the next section.

Names are used to define and locate inputs, outputs and intermediate results at a glance. For streams and parameters, the name is located in the cell to the left of the parameter itself. For vertical rectangular ranges, its name is the same as the column heading.

Also examination of precedents and dependents, and tracing are very useful, especially tracing. Use the menu command Tools>Formula Auditing>Show Formula Auditing Toolbar (Excel 2003), or Tools>Auditing>Show Auditing Toolbar (Excel 2004) to expose the Auditing Toolbar. In Excel 2007, the tools are on Formulas>Formula Auditing. The keyboard can be used. See Table 1 in Appendix for a list of windows keystrokes and corresponding commands.

1. **Guide to visual cues and naming conventions**

The Workbook Color Convention:

Yellow means data, parameters, rather than formulas.

White cells are formulas or data that the user is not to disturb.

Green means definitions of names.

Blue is a table name, name of a part of a spreadsheet.

Gray is background.

The Workbook Name Convention:

Names must be meaningful and as short as possible so they are more useful in identifying information. The sheet names begin with an alphabetic character. It can contain numbers, letters and the period (.) character. No other characters are allowed. Each word component of the name follows a pattern of initial upper case letter, followed by lower case letters or numbers. Sheet names are 20 characters long or fewer.

Each word component of the parameter, input/output stream, range name follows a pattern of initial upper case letter, followed by lower case letters or numbers. Please note that the name definition (what you see in the worksheet) may slightly be different from the defined name. For example, in the table you can read StanDiscountRate as a name definition, but the named parameter 6% has a defined name StanDiscRate. It was done to preserve readability of the model for users, and at the same time to conform to the requirement that defined names must be meaningful. For range name abbreviations please refer to Table 2 in the appendix.

1. **How to make changes**

Whenever the model needs to be extended or reviewed, it is important to keep new additions consistent with how the model is currently constructed. User-supplied data –parameters, input streams and intermediate output streams which may be used in output must always be segregated, i.e. they must be put in the ParametersInputs sheet (which must always be kept the first worksheet). This structure makes it easier for users to find the cells and ranges that they have permission to change. Output streams or cells , i.e. results of manipulations with user-supplied data, also must be segregated in the worksheets with the suggestive name, such as “Personnel”, for example. This makes it easier for users to find the results. The model logically produces results on several different worksheets in the workbook. There is a separate summary worksheet called RevenuesIncome that simply links to the places where the results are originally produced, and presents them in a convenient, compact way. When adding new parameters, input/output streams to the follow these requirements: place related data in contiguous ranges, use arrays wherever possible, arrange time horizontally, define names following the naming convention described above, and use color to provide visual cues to users using the color described above.

**Appendix**

Table 1

|  |  |
| --- | --- |
| Windows Keystroke | Command |
| Ctrl+Backquote | Toggle between viewing formulas and viewing values |
| Ctrl+/ | Select current array |
| Ctrl+Tab | Activate previous window |
| Ctrl+Shift+Tab | Activate next window |
| Ctrl+Page Down | Activate next sheet |
| Ctrl+Page Up | Activate previous sheet |
| Ctrl+[ | Select dependents |
| Ctrl+Shift+{ | Select dependents all levels |
| Ctrl+] | Select precedents |
| Ctrl+Shift+} | Select precedents all levels |

Table 2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Amt | Amount |  | HK | Housekeeping |
| Ann | Annual |  | Maint | Maintenance |
| Avg | Average |  | Man | Manager |
| Bal | Balance |  | Mktg | Marketing |
| Beg | Beginning |  | Mon | Month, Months, Monthly |
| Consum | Consumption |  | P | Per |
| Cum | Cumulative |  | PM | Per Month |
| Dep | Depreciation |  | Pmt | Payment |
| Disc | Discount |  | Rev | Revenue |
| End | Ending |  | Seas | Seasonal |
| Eqpt | Equipment |  | Serv | Serving |
| Exp | Expense, Expensed, Expenses |  | Util | Utilities |
| Expt | Expected |  |  |  |