

Quick Start for Operations Process Flow Analysis

How to use your Custom Excel Workbook

Quick Start Instructions

Here are simple, step by step instructions to get your Operations Process Flow Analysis working for you as quickly as possible. Just follow the steps below in order and you'll be on your way.¹

A Note about Input Cells: Enter input data only in shaded blue cells. These input cells are found mostly on the 'Inputs' worksheet and also on the 'Labels' worksheet. Some blue input cells contain Excel formulas that copy data from adjacent input cells. (For example, if you enter data in the first period, the model will usually copy it to the other time periods to the right.) This feature is a convenience for those inputs that sometimes have repeated values. You can overwrite any formula in a blue input cell; they are just there to provide starting data to get you going quickly.

Step 1: Edit Names of Process Stages

Select the Labels worksheet. You can edit the lists of names of dimension items in the bottom section starting around row 60 or 90.

1. Edit the names of process stages. Note that you must edit the names of stages in three places: the dimensions named "Stages" and "StagesX" and "StagesY" (which should be exact copies of "Stages").

These names will already be what you want if you entered your preferred stage names during the customization process. If you want to increase the numbers of stages in the model, you must return to the ModelSheet website and customize a new spreadsheet.

2. Check the start date of the model at the top of worksheet 'Labels' and change it if necessary.

Step 2: Enter Transition Rates Between Stages and Process Yield Rates

Select the Inputs worksheet.

1. Enter transition rates for good work units from one stage to another stage.
 - Read the table like this: when good units exit Stage A (on the left), the percentage that goes to the Stage B (on top) is found in the cell in the row of Stage A and the column of Stage B. The transition rates must add across a row to 100%.
 - These transition rates are for good work units. Any scrapped units are not counted in computing transition rates between stages..
 - The transition rates do not depend on time.
 - If your model includes several scenarios, then you must fill in the rates for each scenario. (This enables you to easily compare scenarios with different transition rates.)
2. If your model includes scrap then, for each stage, enter the yield percentage (which is the percentage of good units entering a stage that exits as a good unit).
 - Yield rate = 1 – scrap rate

¹ You can find more explanation of how the model works in the section "Operations Process Flow Analysis Explained in a NutShell" below.

- The yield rate can vary by process stage and by time period. (For example, you can model the effect on the overall process if one or two yield rates change over time.)
- If your model includes several scenarios, then you must fill in the yield rates for each scenario. (This enables you to easily compare scenarios with different yield rates.)

Step 3: Enter Numbers of Work Units Entering the Process and Units Capacity

1. Enter the number of work units that are injected as inputs to the process flow at each stage in each time period. (For example, if a stage is the first in the processing of some units, then you should enter a number of work units that are started at that stage in each time period.)
2. Enter the number of processing stations at each stage in each time period. (For example, if you have three identical machines performing the same functions at a stage, then enter 3.)
3. Enter the number of work units that each processing station can handle in each time period. (For example, if each machine can handle 10,000 production units per day, enter 10000.)

Step 4: Enter Processing Costs Input Data

1. Enter the processing costs per unit at each stage in each time period.
 - Processing costs per unit are broken down into material, labor, allocation of fixed expense, and overhead. (If you want to change the cost types in the model, please contact us.)
 - Do not enter numbers for fixed expense per unit unless you want to override the model defaults. The model computes fixed expense per unit from inputs for fixed expense and data about how many units are processed. Entering numbers will overwrite these formulas.
 - If your model has several scenarios, then enter processing costs per unit for each scenario.
2. Enter the cost per unit brought into the process flow from outside. (For example, if you buy a subassembly from vendors to start the process, enter the price you paid for the subassembly.)
3. If your model includes scrap, enter the salvage value of a scrapped unit. (For example, if you can salvage some of the parts in the bad unit, or sell it for its metal content, then enter that value.)
4. Enter the fixed expense per processing station, at each stage in each time period. (Here, fixed expense means expense that doesn't change as the number of units processed changes.)

Step 5: Enter Selling Input Data (If your model includes sales)

1. Enter the number of units of market demand for the output of each stage in each time period.
 - If you do not sell the output of a particular stage, leave then numbers set to zero.
 - You cannot sell more units that market demand.
2. Enter the selling price for a good unit of output from each stage that is sold.

Step 6: See Your Results!

Now that you've entered your data, take a look at worksheet 'Units', where you can see the number of good work units exiting each stage in each time period. It also shows the number of good units entering the stage, the units of buffer stock, and units scrapped (if your model includes scrap).

Worksheet 'Cost Flow' shows the total processing cost in each stage in each time period. It also shows cost of good units entering from outside the process, and the cost value of work-in-process inventories. Worksheet 'Unit costs' shows similar information for cost per unit. Worksheet 'Cost Flow detail' shows the costs broken down by material, labor, allocation of fixed expense, and overhead.

If your model includes selling features, then worksheet 'Financials' contains a statement of operating income down to the gross margin (revenue less cost of goods).

If you want to learn more what these quantities mean, read the comment on the table by hovering the mouse over the cell with the small red triangle (which is Excel's way of telling you that cell has a comment). There you'll also find a "formula name" that defines the table. You can look up that name on the 'Formulas' worksheet to see the human-readable formulas that are used to define the values in the table.

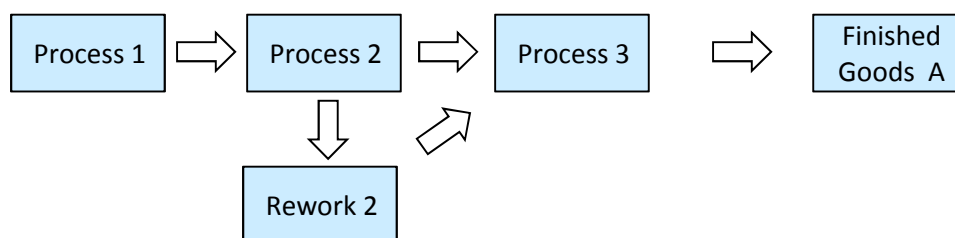
Operations Process Flow Analysis Explained in a NutShell

Your Operations Process Flow Analysis model tracks work units through a manufacturing or business process flow that is broken down into discrete processing stages, with transitions of finished work units from each stage to another stage for further processing. It also tracks the processing costs of the work units flowing through the process to yield various cost measures.

The model tracks process flow through time, so you can model transient (temporary) effects as you change the process.

For example Figure 1 depicts a process flow with five stages, including one rework stage for defective work units, and a final stage that stores the finished work units.

Figure 1: A sample process flow with five process stages and transitions between stages



The following information describes the process flow.

- A list of processing stages and the processing capacity per time period of each stage.
The model tracks the number of processing stations at each stage, and the processing capacity of each station.
- Transition rates for how many of the good units exiting a stage that go to other stages.
- Scrap rates that indicate the percentage of work units that must be discarded in each stage.
- The rate at which work units enter each stage of the work flow from the outside (that is, not including the work units that enter a stage after coming from another stage in the flow).

The model tracks the cost of processing that occurs in each stage. Processing costs are determined by the flow of units into and out of each stage, and the following cost data.

- Variable processing cost per good unit entering each stage
- Fixed costs of operating each stage in each time period. (Example: depreciation or lease expense for equipment).
For each stage, the model tracks the number of processing stations, and the fixed expense per processing station per time period.
- The cost per unit of good units entering the process from outside (such as raw materials inputs or purchased work-in-process units)

- The salvage value of a scrapped unit at each stage.

The main outputs of the model are of two types.

1. Measures of the flow of work units through the process
 - Good units entering, good units exiting, and scrap units for each process in each time period
 - The capacity utilization percentage of each process stage
 - The buffer stock of good units available for input to each stage at each time period.
2. Measures of the value of good work units that are in the process and exiting the process.
 - Cost per unit processed
 - Processing cost of each good unit in each stage, segmented by material, labor, allocations of fixed expense, and overhead.
 - The cost of each work-in-process unit entering and exiting each stage
 - The cost of scrap per unit at each stage, excluding salvage value. The cost of units scrapped in each stage is born by the good units produced in that stage.
 - Total costs flowing through the process
 - Total processing cost in each stage in each time period
 - Total cost of work-in-process units entering and good units exiting each stage in each time period
 - Total cost of scrapped units (excluding salvage value) at each stage in each time period
3. The model includes optional selling model (market demand, selling prices) that computes revenue and units sold, so that it can produce an operating income statement down to the gross margin line. (Available in Advanced versions only)

Other features: The model includes graphs of some of the output information. The model allows you to store up to three scenarios, each with its own transition rates between stages, processing costs per unit, and yield rates = (1- scrap rates).

That is basically all there is to it.

Not all features mentioned here are present in the Light and Standard versions of the model.

Where to Get More Information

Read the Excel comment on each table on every worksheet. Each comment contains important information about what the table contains or what it does in the model.

Worksheet 'Formulas' contains a list of the named variables in the model and formulas that define each variable in terms of other variables. This worksheet is often the best way to understand how the entire model fits together.

The user guide for this product contains more information. See

<http://templates.modelsheetsoft.com/modelsheettemplates/operations-process-flow-templates-user-guide.aspx>

The introductory webpage for the Sales Plan template is

<http://templates.modelsheetsoft.com/modelsheettemplates/operations-process-flow-templates.aspx>

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