2010 ACEIT User Workshop

25 – 27 Jan 10

Using SumIf and Category Features to Create Estimate Summary Sections

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This paper describes a process for developing tailored summary estimating sections using the new SumIf by Cat functionality in ACE for use there and in POST and PowerPoint. The fStarting from a completed a completed Army ACE estimate the paper shows how existing summary sections can be modified to take advantage of the new functionality. An attachment from a previous ACEIT Workshop shows how the summary sections are constructed using DECs, and how the results are then displayed in the POST environment and then into PowerPoint. The attachment finishes with the procedure of adding the tailored summary section information to a different completed ACE estimate and a comparison with other ACE summary procedures.

The final product of the cost estimating process often includes making summaries of the estimate for different stakeholders. Having a summary section makes it easier for the analyst to provide decision makers with the information they need without having to go through the entire estimate to find what they need. In this case the estimate involves a family of vehicles and the decision makers are interested in seeing both total program costs and costs by platform.

The Army Cost Manual contains the Army's Cost Element Structure (CES) and certain cost summary calculations using portions of the CES. This paper will highlight the modification of the Average Procurement Unit Cost (APUC) from using DECs to using SumIf on Category columns .

Advantages of moving the process to a Category column follow:
1. Custom summation within the ACE session
2. Category report filtering
3. POST report filtering
4. Allows for much faster calculation than using DECs. DECs are "dynamic equation columns" designed to be calculated and evaluated each time.
5. Category entries can be used at the parent or child level. (Using inherits feature of Cat function)
6. They are now unlimited and can be safely be used during copy/paste from one session to another (i.e., won't over-write existing data)
7. Handles "inheritance" issues with parent and child entries

Using DECS only gives custom summation within the ACE session
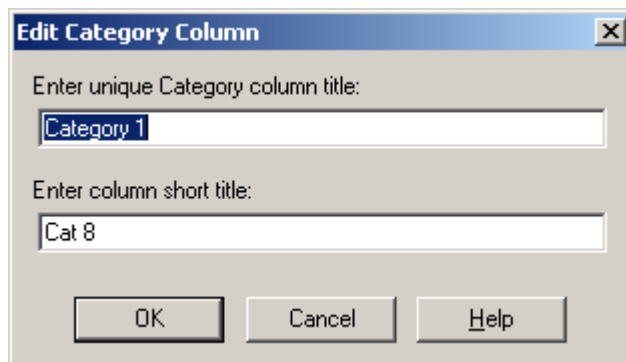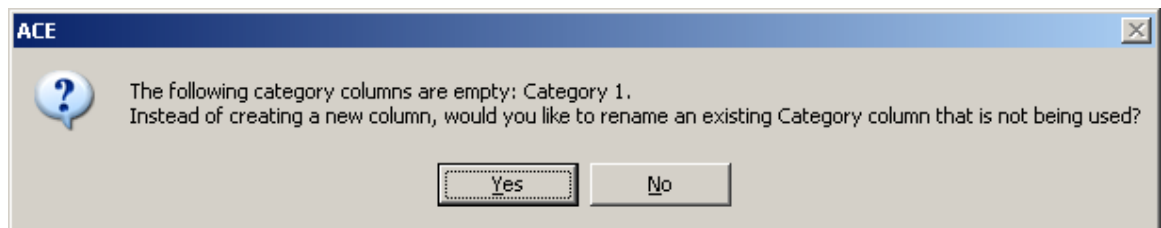
Disadvantages of using DECs follow
1. POST can't access DEC information
2. ACE report generator can't access DEC information
3. DECs are methodologies and cannot be used at any -parent level
4. DECs are calculated each time the session is, slowly down the results

The process of changing from DEC-based SumIf to a Category Column-based SumIf method is described below

Step #1: Create a Category Column

	WBS/CES Description	Platform_ID (!) Code	Unique ID	Equation / Throughput	Phasing
396	* Unit Costs by Platform				
397	APUC - Average Procurement Unit Cost				
398	ICV - Infantry Carrier Vehicle	1 [ICV]		If(Prod_Q_ICV >0, SumIf(ProcurementCost_ByVariant, Platform_ID, @MGV_Tot_$)/Prod_Q_ICV ,0)	A
399	MV-T - Medical Vehicle - Treatment	2 [MV-T]		If(Prod_Q_MEV_T > 0, SumIf(ProcurementCost_ByVariant, Platform_ID, @MGV_Tot_$) / Prod_Q_MEV_T, 0)	A

:

ACE

? The following category columns are empty: Category 1.
Instead of creating a new column, would you like to rename an existing Category column that is not being used?

[Yes]   [No]

Edit Category Column

Enter unique Category column title:

| Category 1 |

Enter column short title:

| Cat 8 |

[OK]   [Cancel]   [Help]

Add/Edit New Category dialog (From ACEIT Help)

The **Add/Edit New Category** dialog box allows you to add a new or edit an existing Category Column to your session. The dialog is accessed from the Edit menu by selecting **Add Category** or **Edit Column Properties**. The dialog contains the following options.

Column Title

Enter a description of the category column you wish to add. Column titles can be up to 120 characters in length.

Column Short Title

Enter a short title for the column. Short Titles can be viewed by opening the Workscreen Arrange dialog and checking the box entitled "Short Titles". The short title can be up to 15 characters long. They can contain any special characters or spaces, except for double quotation marks (").

Column entries as below

Edit Category Column

Enter unique Category column title:

Category: MGV Platform Identifier

Enter column short title:

MGV Platform

| OK | Cancel | Help |
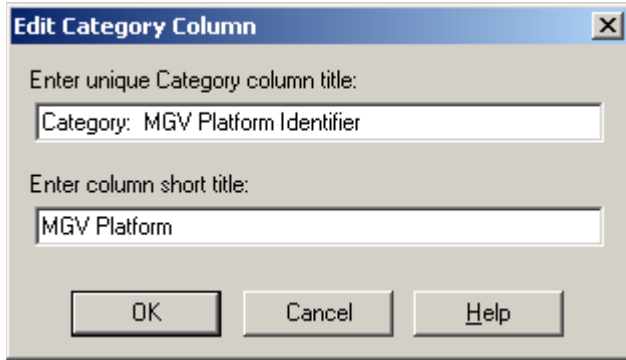
New category column is not automatically entered on the active workscreen. Need to do a workscreen arrange .

ACE 7.2 - [ACEIT - User Workshop, MGVs (25 - 27 Jan 10)

File   Edit   View   Documentation   Calc   Cases   Repor

John's Workscreen

399   MV-T - Medical Vehicl

Click on the Workscreen Arrange icon

Category shows up here

Looks like this when finished

Step #2: Use current DEC entries to populate the new category column

Highlight the column for copy/paste operation to the new category column

To change numbering scheme of the platforms to a more descriptive category entry use the Replace

The new Find and Replace dialog box appears.
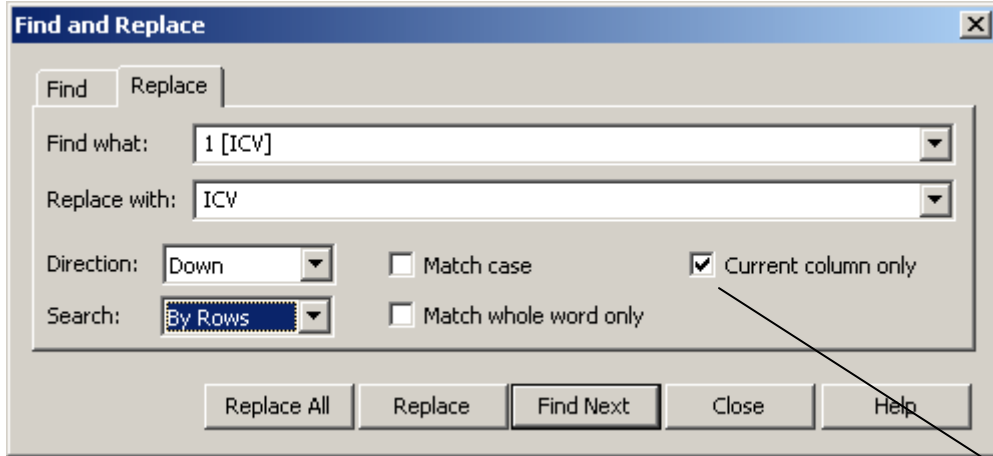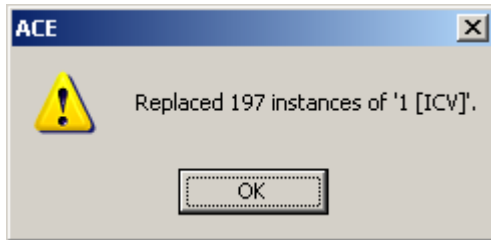
Find and Replace	
Find **Replace**	
Find what:	1 [ICV]
Replace with:	ICV
Direction: Down	☐ Match case ☑ Current column only
Search: By Rows	☐ Match whole word only
Replace All	Replace	Find Next	Close	Help

Make sure you click here!!!

ACE	
⚠ Replaced 197 instances of '1 [ICV]'.	
OK	

At this point we look at the current formula and realize that we have chosen the wrong DEC for the equation. No problem, first go to Edit / Edit Column Properties. Next, do workscreen arrange and pull-in the ProcurementCost_ByVariant DEC. Then copy/paste that column's entries into the new category column. Then use Find/Replace to make the column entries more understandable

The syntax of the formula needs to be changed from a SumIf with a DEC to a SumIf using a category column. The two DECs highlighted below are no longer needed and will be replaced by the category based syntax. The Category entries are case insensitive in the Cat formula.

Take out & use Cat syntax.

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Category Feature Use (From ACEIT Help)

Cat()

Purpose:

This function retrieves information from existing Category columns. This function can be used within the IF, SumIf() or SumIfTot() functions to allow the user to do string comparisons.

Syntax:

Cat ([@var,] "Cat Title" [, Inherit])

@var

> This is an optional argument used to reference the ACE row where the category value is stored. The @var syntax identifies an ACE row, where var is the Unique ID of the row to reference. If no row is specified, the function defaults to retrieve the category value from the current row (the row where the function is called).

Cat Title

> This argument is the short title of the category column. By default, category columns can be found on the WBS workscreen. You can see a list of category columns by opening the Arrange dialog and clicking the radio button entitled "Display Category Columns". This lists the full title of the column. To view the short title, click on a category column and select Edit > Edit Column Properties. The resulting dialog shows both the full and short title of the column.

Inherit

> This optional parameter indicates how to treat inheritance of category codes. If not specified, the default is "0", which means that the cell must explicitly define the code; a value < 0 means that the parent's code will be used (even if the child code is different from the parent); and a value of "1" means that the parent's code will be used if the cell is empty.

Remarks:

1. This function is always used within another function as part of an expression (e.g., SUMIF, IF).
2. This function can be used to evaluate the result of complex functions.
3. *Cat Title* must be enclosed in quotation marks since it is a text string.

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Example:

SumIf(Cat("Appn"), "RDTEA", @Total$) - Returns the sum of all rows under "Total$" that have an appropriation of "RDTEA".

SumIf(Cat("Service"), "Army", @Total$) - Returns the sum of all rows that have a category code of "Army" in the Service category column.

SumIf(OR(Cat("Service")="AirForce", Cat("Service")="Army"), 1, @Total$) - Returns the sum of all rows that have a category code of "AirForce" or "Army" in the Service category column.

IF(Cat("Appn") = "3010", 10, 0) - Returns a value of 10 if the value in the Appropriation column is 3010; otherwise it returns 0.

After deciphering the syntax above the formula is entered

New portion of the formula

Unfortunately the Category columns and entries do not show up in the formula bar as do other items such IDs, functions, DECs and UDFs.

Attachment

The final product of the cost estimating process often includes making summaries of the estimate for different stakeholders. Having a summary section makes it easier for the analyst to provide decision makers with the information they need without having to go through the entire estimate to find what they need. In this case the estimate involves a family of vehicles and the decision makers are interested in seeing both total program costs and costs by platform. This paper assumes an Army cost estimating environment and stakeholders. However, the methodology could be modified to meet other needs. The information below is from the Stryker program, but any costs shown have been changed for example purposes and should not be used as representative of the Stryker program.

The Army Cost Manual contains the Army's Cost Element Structure (CES) and certain cost summary calculations using portions of the CES. This paper will highlight two calculations, the Program Acquisition Unit Cost (PAUC) and the Average Procurement Unit Cost (APUC). These calculations use selected CES items from the Research, Development, Test & Evaluation (RDTE) and Procurement appropriations. The table below shows the RDTE and Procurement appropriations and their respective ACE parent row variable names.

Cost Element Structure	Parent Row Variable Names in Estimating Section
1.0 - RDT&E Funded Elements	
1.01 - Development Engineering	Stryker_DevEng_1$
1.02 - Production Engineering & Planning (PEP)	Stryker_PEP_1$
1.03 - Development Tooling	Stryker_DevTool_1$
1.04 - Prototype Manufacturing	Stryker_ProtoMfg_1$
1.05 - Systems Engineering / Program Management	Stryker_SEPM_1$
1.06 - System Test and Evaluation	Stryker_STE_1$
1.07 - Training Devices	Stryker_TrngDevices_1$
1.08 - Data	Stryker_Data_1$
1.09 - Support Equipment	Stryker_SupEquip_1$
1.10 - Development Facilities	Stryker_DevFac_1$
1.11 - Other RDT&E	Stryker_Other_1$
2.0 - Procurement Funded Elements	
2.01 - Non-Recurring Production	Stryker_NonRec_2$
2.02 - Recurring Production	Stryker_RecProd_2$
2.03 - Engineering Changes	Stryker_ECO_2$
2.04 - Systems Engineering / Program Management	Stryker_SEPM_2$
2.05 - System Test & Evaluation	Stryker_STE_2$
2.06 - Training Devices	Stryker_TrngDevices_2$
2.07 - Data	Stryker_Data_2$
2.08 - Support Equipment	Stryker_SupEquip_2$
2.09 - Operational / Site Activation	Stryker_OperSiteAct_2$
2.10 - Fielding	Stryker_Fielding_2$
2.11 - Training Ammunition / Missiles	Stryker_TrngAmmo_2$
2.12 - War Reserve Ammunition / Missiles	Stryker_WarRes_2$
2.13 - Modifications	Stryker_Mods_2$

2.14 - Other Procurement	Stryker_Other_2$

3.0 - Military Construction Funded Elements	
3.01 - Development Construction	Stryker_DevConst_3$
3.02 - Production Construction	Stryker_ProdConst_3$
3.03 - Operational/Site Activation Construction	Stryker_OpSiteConst_3$
3.04 - Other Military Construction	Stryker_Other_3$
4.0 - Military Pay Direct Funded Elements	
4.01 - Crew	Stryker_Crew_4$
4.02 - Maintenance (MTOE)	Stryker_MTOE_Maint_4$
4.03 - System Specific Support	Stryker_SysSpecificSup_4$
4.04 - Systems Engineering/Mgt	Stryker_SEPM_4$
4.05 - Replacement Personnel	Stryker_RepPers_4$
4.06 - Other Military Pay	Stryker_Other_4$
5.0 - Operations & Maintenance Funded Elements	
5.01 - Field Maintenance Civilian Labor	Stryker_FMCL_5$
5.02 - System Specific Base Operations	Stryker_BaseOps_5$
5.03 - Reparables (Spares)	Stryker_Reparable_5$
5.04 - Consumables (Replenishment Repair Parts)	Stryker_Consumable_5$
5.05 - Petroleum, Oil, and Lubricants (POL)	Stryker_POL_5$
5.06 - End Item Supply and Maintenance	Stryker_EndItem_5$
5.07 - Transportation	Stryker_Trans_5$
5.08 - Software	Stryker_Software_5$
5.09 - System Test and Evaluation (Operational)	Stryker_STE_5$
5.10 - Systems Engineering/Program Management	Stryker_SEPM_5$
5.11 - Training	Stryker_Trng_5$
5.12 - Other O&M	Stryker_Other_5$

Cost calculations from the Army Cost Manual use the following CESs. While all the calculations are modeled in the presentation ACE session, only the PAUC and APUC are covered in detail.

Development Cost = 1.01 to 1.11
Fly-away = 2.01 to 2.05, 2.104
Fly-away (not used typically) = 1.01 to 1.06, 2.01 to 2.05, 2.104
Weapon System cost = 2.01 to 2.09, 2.103 to 2.106
Program Acquisition Cost = 1.0, 2.01 to 2.10, 3.0
Procurement Cost = 2.01 to 2.10 + 2.14
Ownership Cost = 2.11 - Training Ammo + 2.12 - War Reserve + 2.13 - Modifications + 2.14 - Other) + (4.0 - Military Pay + 5.0 - Operations & Maintenance, both post MS C).
Need MS C variable for Start Date DEC.

ACE Session Set-up

Added Needed Bookmarks. Bookmarks are useful for getting around sessions. If you re-name a row you need to toggle the bookmark icon to make the new title show up in on the bookmark list.
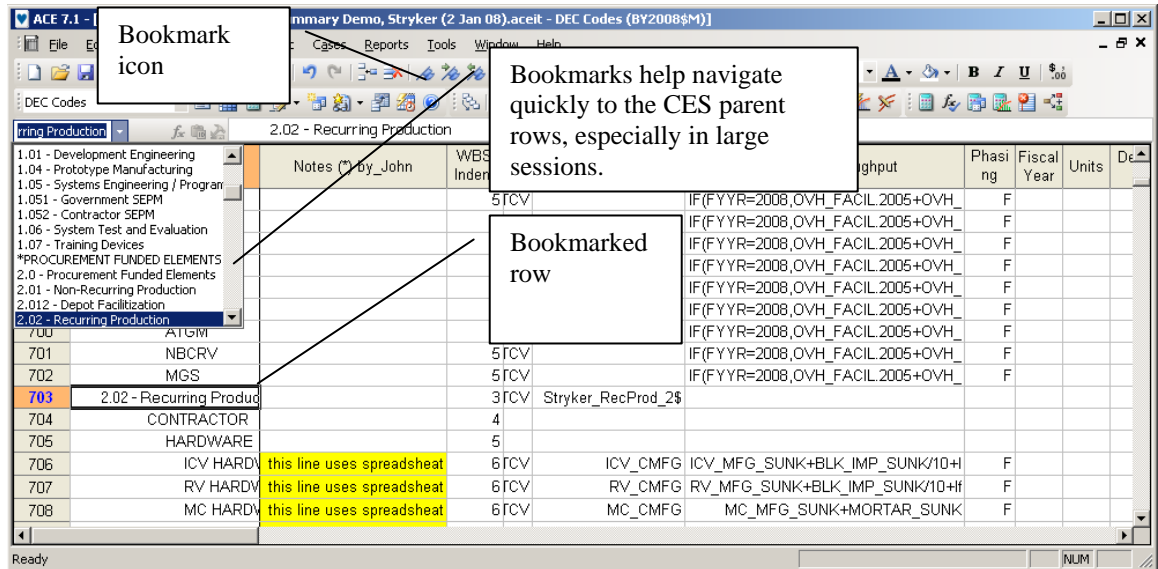
Determine Summary Cost and Data Needs. I created sections that would sum at the x.x CES level and at the x.xx CES level by total program and by variant as desired. These summaries are either simple pass-throughs of parent level information or they use the SumIf/DEC combination to filter data below the parent level for the summation. Formulas and phasing would appear as shown below.

x.x Level Summary

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x.xx Level Summary

Parent level Row Examples in the Detailed Estimating Section

x.x Level by all Variants Using SumIf/DEC combination SumIf causes ACE to go to row labeled Stryker_RDTE_1$ and looks in the LifeCycleCost_ByVariant DEC column for a value of 1 and then adds that rows value to the total. This continues through all the children of parent row and stops when it encounters the next same level parent row.

x.x level by variant (MGS only) Using SumIf/DEC Combination

Procurement and Program Acquisition Cost by Variant Using SumIf/DEC Combination

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APUC & PAUC by Total and by Variant Using SumIf/DEC Combination This section uses the
A phasing method which uses the sum of all the variables in the equation and produces the
overall avg in the baseline column instead of the sum of the averages with the F method.

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Modifications afterwards. Change DEC variable name. From the **Edit** menu select **Edit Column Properties** to bring up this dialog box
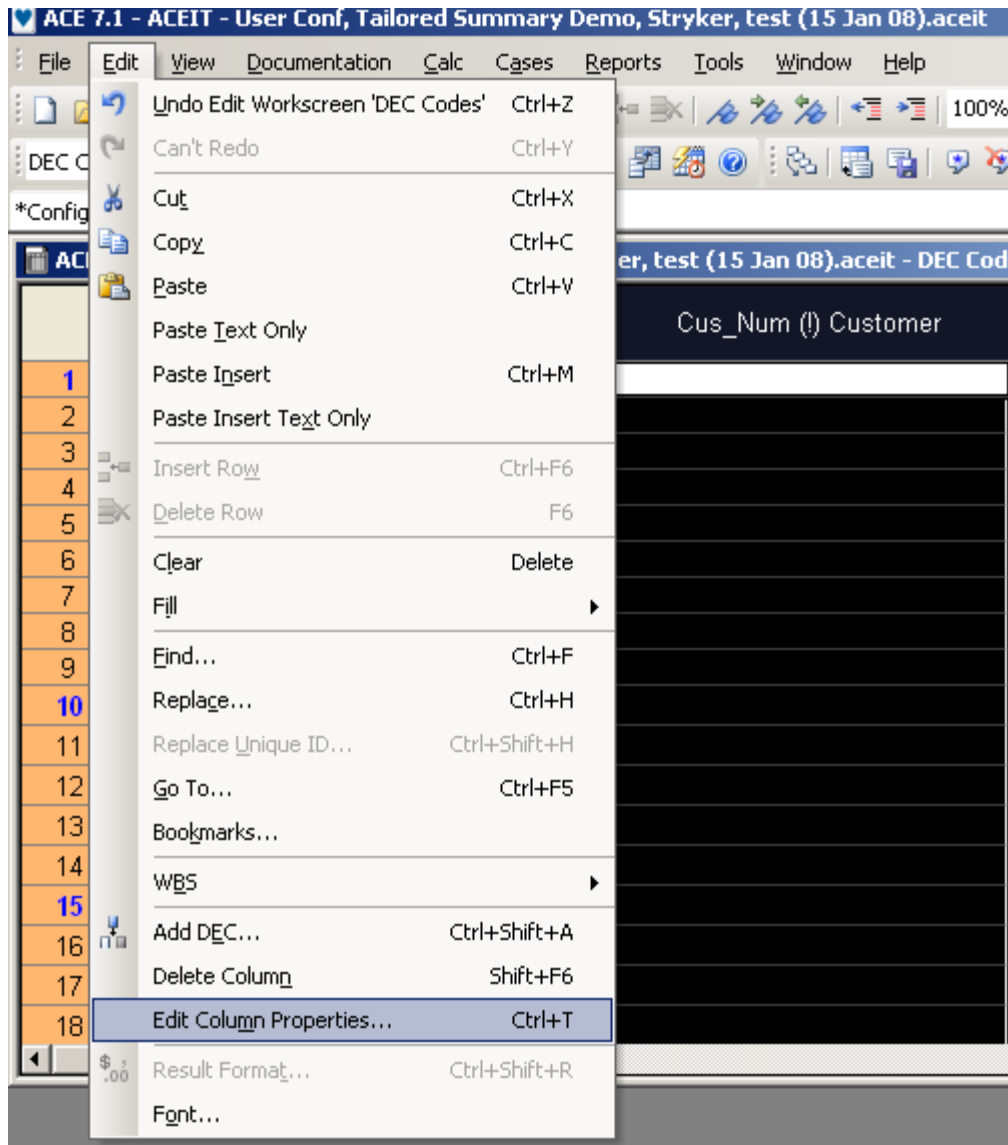
DECs are a form of variable, so it finds all places it was used and replaces the variable as shown below.

Shortened the name and added "2"

ACE

⚠ Replaced 20 instances of ID ProcurementCost_ByVariant.

OK
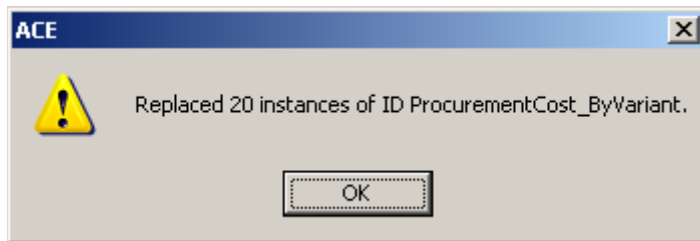
If you decide at a later time that a particular row should no longer be used in a DEC-based calculation you simply go to that row and DEC column and delete the entry. Likewise if you need to add another child row to calculation you add the row and make the appropriate entry in the DEC.

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POST Worksheet Set-Up

Locating the File and Case. From the **POST** menu in Excel chose **Reports**, then select the type of report desired. For cost element summary sections I want a **Time Phased Report**.
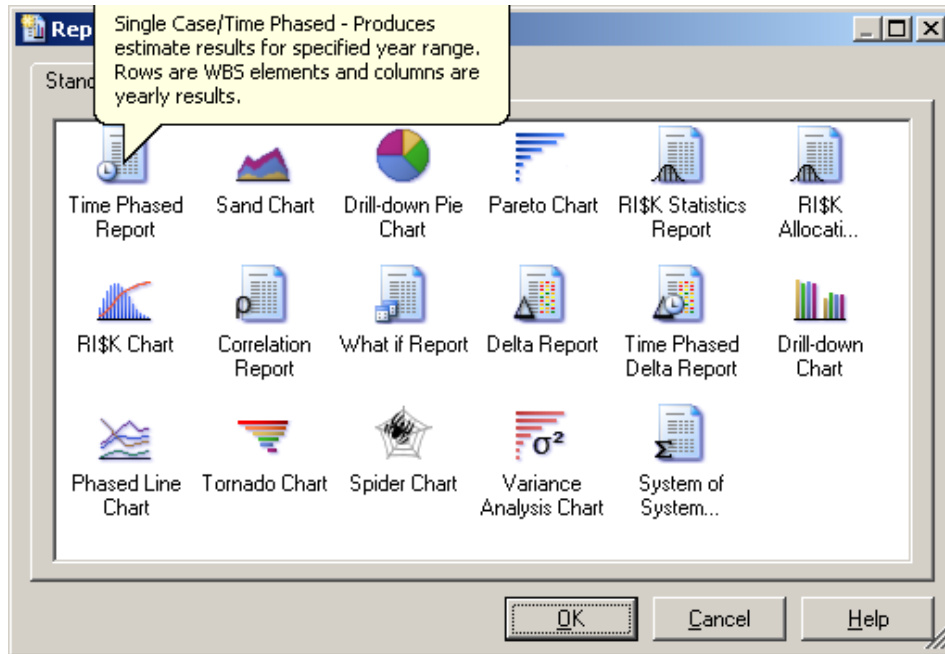
.
For summary info on **unit costs** I choose the **What if Report**.
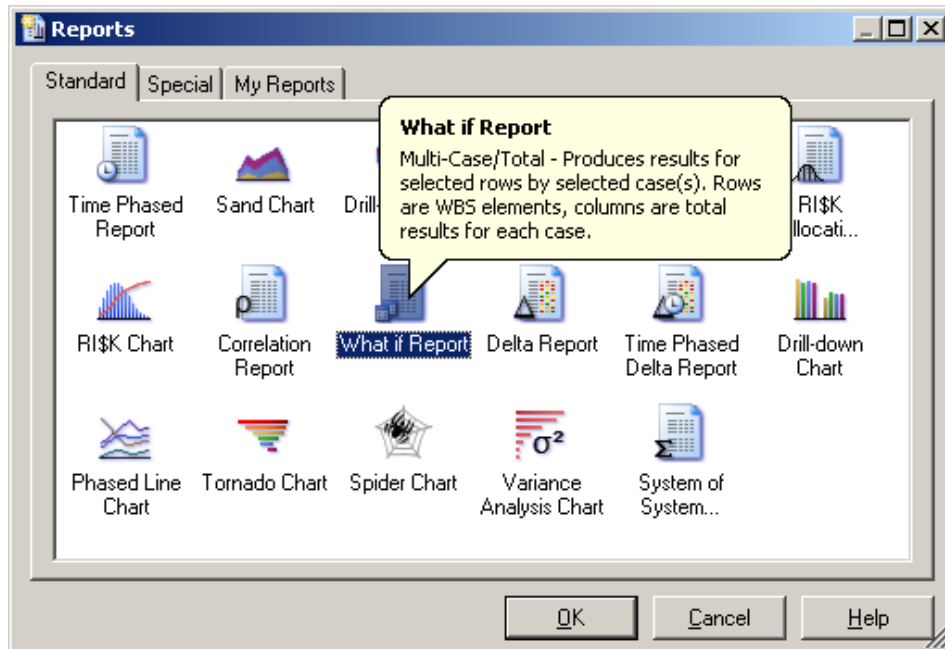
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Selecting Sections to Display

Just want the baseline for now.

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What if Report

Data | Rows | Filter | Options

Selected Rows

- ☑ 💬
- ☐ ☑ § CES Level x.x by Variant
  - ⊞ ☑ 💲 CES Level x.x by Variant
  - ☑ 💬
- ☐ ☑ § Costs by Variant
  - ⊞ ☑ 💲 Costs by Variant
  - ☑ 💬
- ☐ ☑ § Average Unit Costs by Variant
  - ⊞ ☑ 💲 Average Unit Costs by Variant
  - ☑ 💬
  - ☑ 💬 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
- ☐ ☐ § *RDT&E FUNDED ELEMENTS
  - ☐ 💲 *RDT&E FUNDED ELEMENTS
  - ☐ 💬 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
  - ⊞ ☐ 💲 Total Stryker Program
  - ☐ 💬

Don't want to use Category Filters.
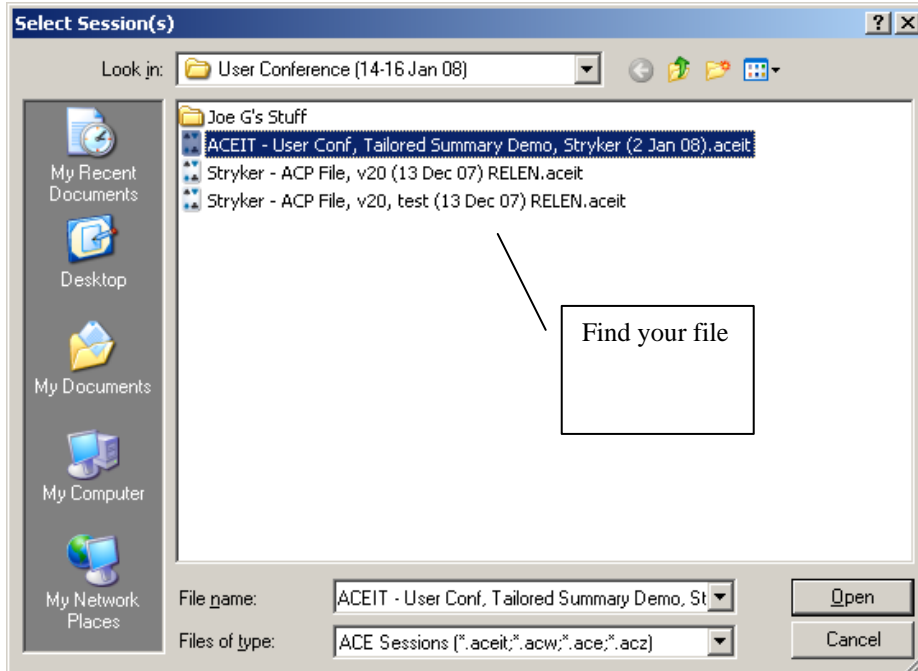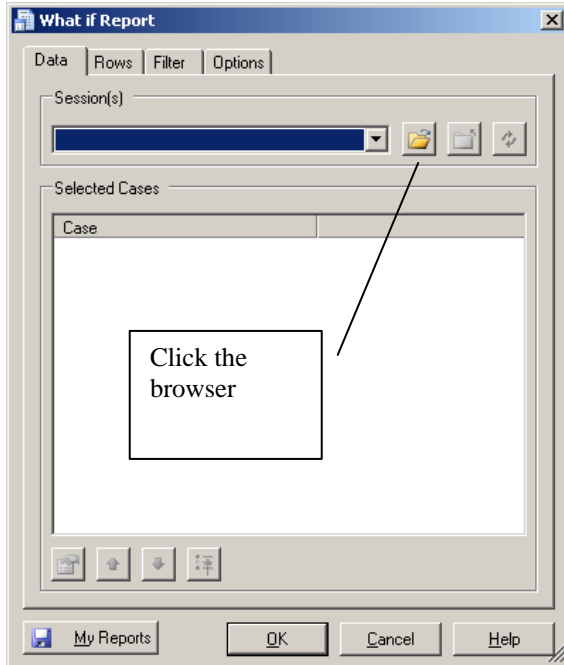
De-select all the items below the summary section

☑ Cost ☑ Non-Cost ☑ Information ☑ Comments

Levels of Indenture [10] ▲▼

💾 My Reports   OK   Cancel   Help

Calculate

Case	Session	Description
Baseline	ACEIT - User Conf, ...	The case has not been calculated

Click Calculate

Calculate   Cancel
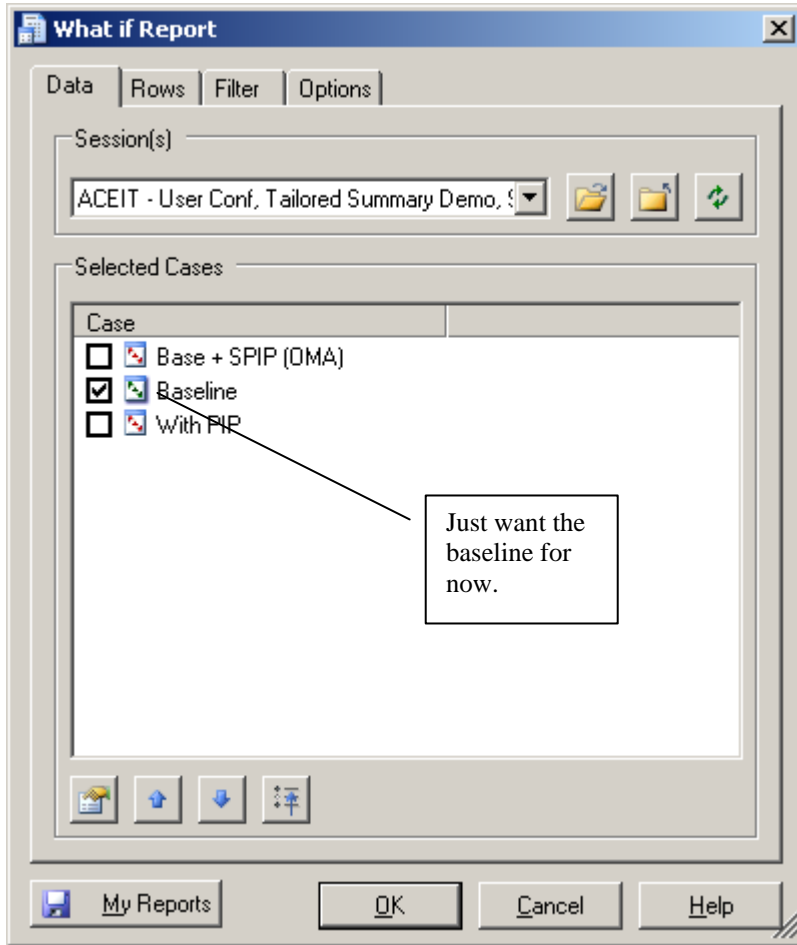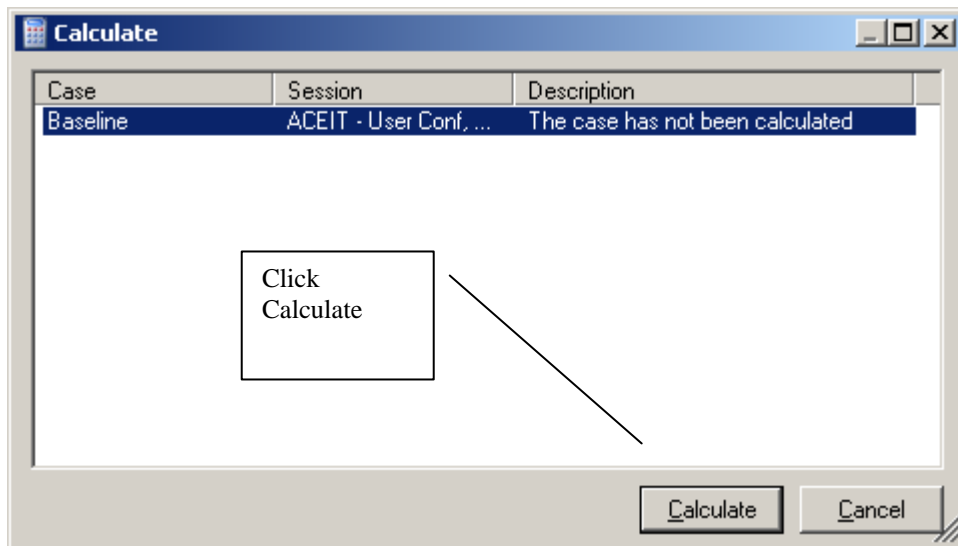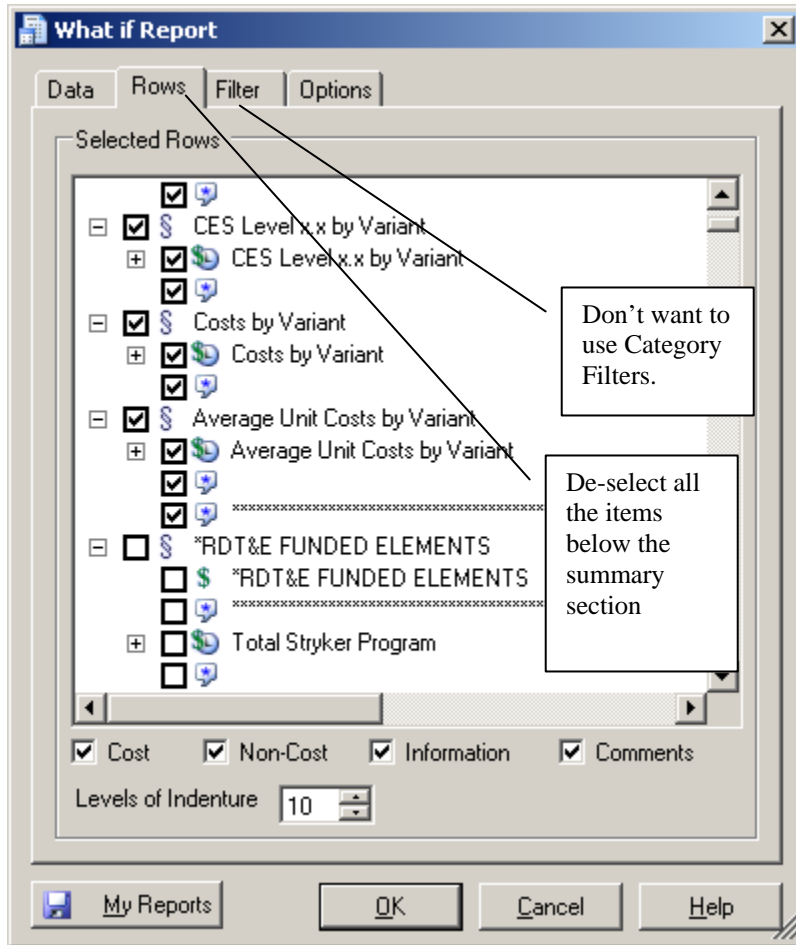
Results in Excel The result would look something like this, only it would look a lot better in Excel

What if Report for Baseline in ACEIT - User Conf, Tailored Summary Demo, Stryker (15 Jan 08).aceit

Costs in BY2008 $M

Tuesday, 08 January 2008, 10:24 am

Rows	Filter	BaseYear ▼	Cases

What if Results

Costs in BY2008 $M	
WBS	Baseline
*Configuration Functions	
*Base Year of Calculation	2008
*Units of Calculation	Millions
*System Inflation Table for Calculation	US Government Indices for FY 2007 11/29/2007
*Time of Calculation	10:24 AM
*Date of Calculation	08 Jan 2008
*Time ACE Session Last Saved	10:13 AM
*Date ACE Session Last Saved	08 Jan 2008
Costs by Variant	$138335.961
Procurement Cost by Variant	$68852.180
ICV - Infantry Carrier Vehicle	$13265.100
RV - Reconnaissance Vehicle	$3361.718
MCV - Mortar Carrier Vehicle	$2740.271
CV - Commander's Vehicle	$6436.618
FSV - Fire Support Vehicle	$1486.724
ESV - Engineer Squad Vehicle	$4046.283
MEV - Medical Evacuation Vehicle	$8205.333
ATGM - Anti-Tank Guided Missile Vehicle	$1452.194
NBCRV - NBC Reconnaissance Vehicle	$19157.201
MGS - Mobile Gun System	$8700.737

<u>*Manipulating Data to Get the Desired Slide*</u> You can link POST generated worksheets to normal Excel worksheets to get your desired summary calculation comparison as shown below.
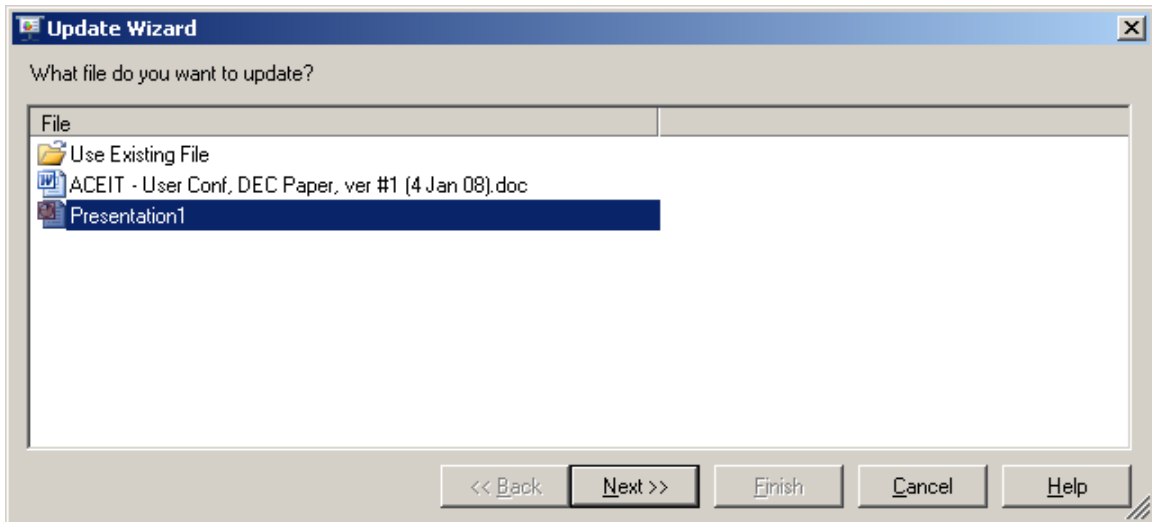
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Export to PowerPoint Slide Choose **POST**, then **Data**, then **Export to PowerPoint/Wor**d. The following wizard dialog box appears.

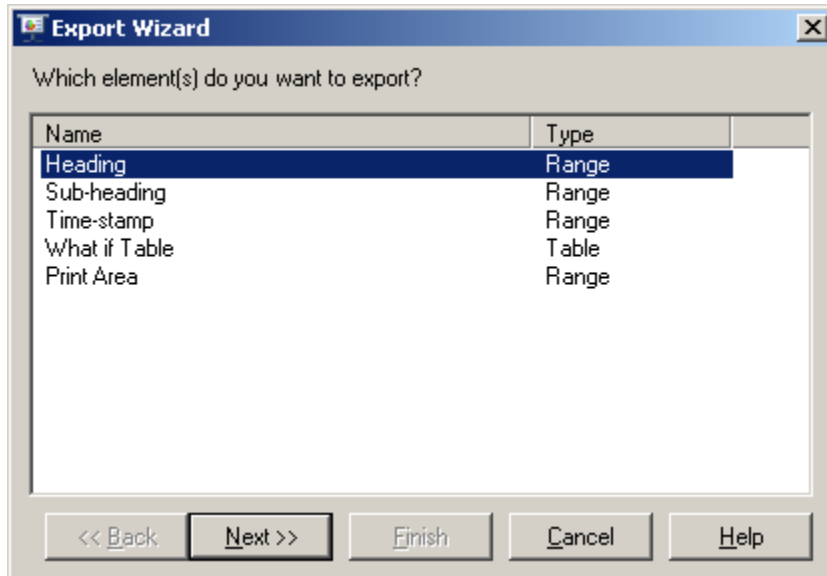If you are on a regular Excel sheet you can only select Print Area for export
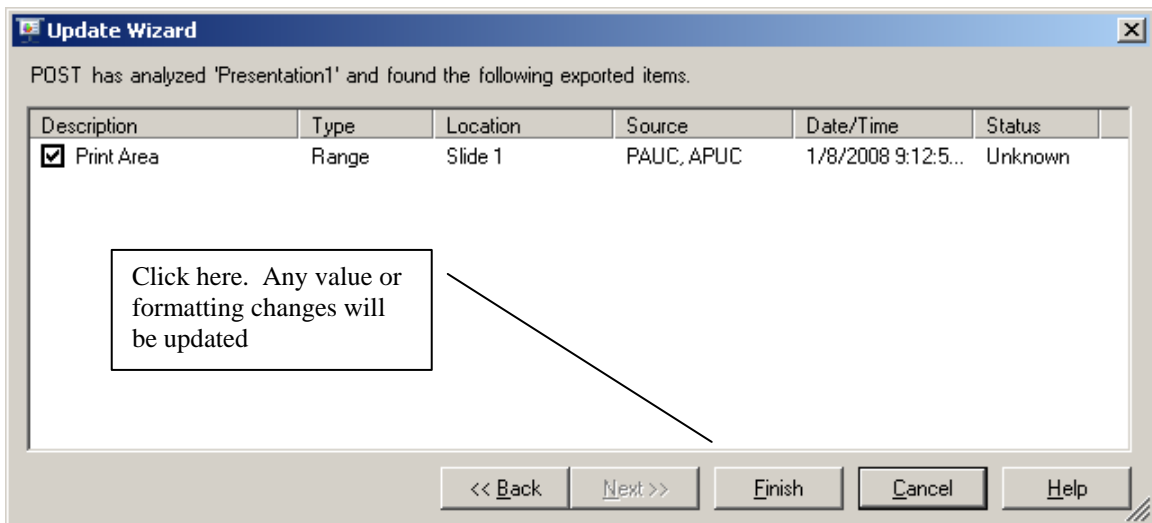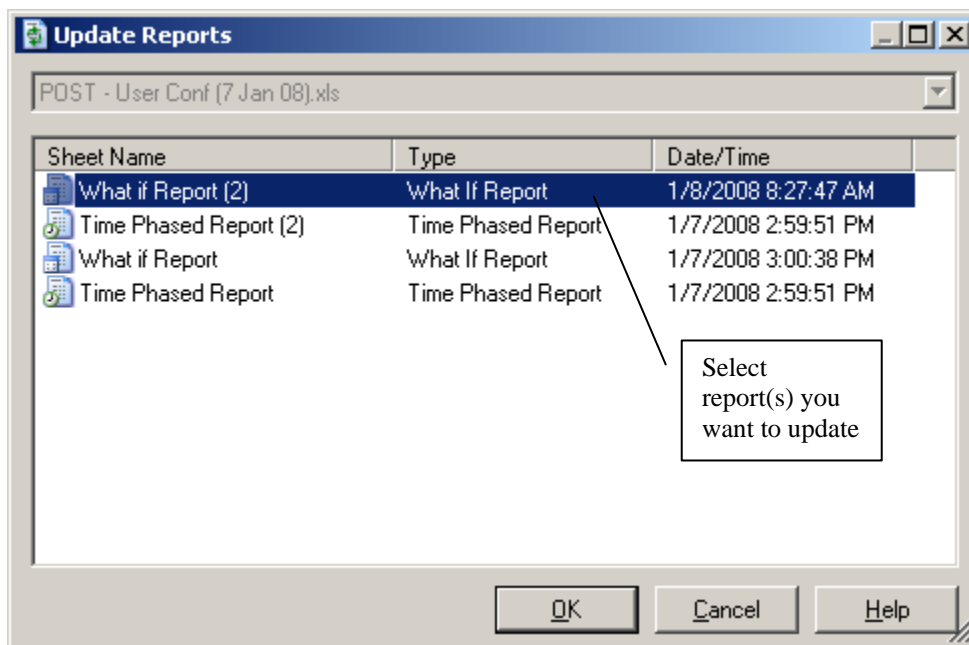

Click here. Any value or formatting changes will be updated

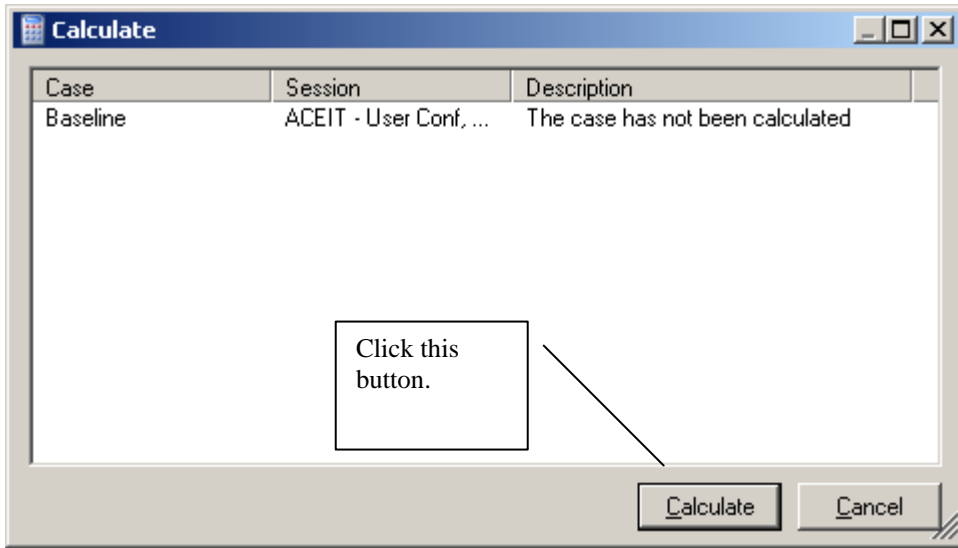If you are exporting from a POST worksheet you have more choices

Updating. Save any changes to the ACE session. If you don't save any changes since the last save will not show up. Choose **POST**, then **Reports**, then **Update** and the following dialog box appears
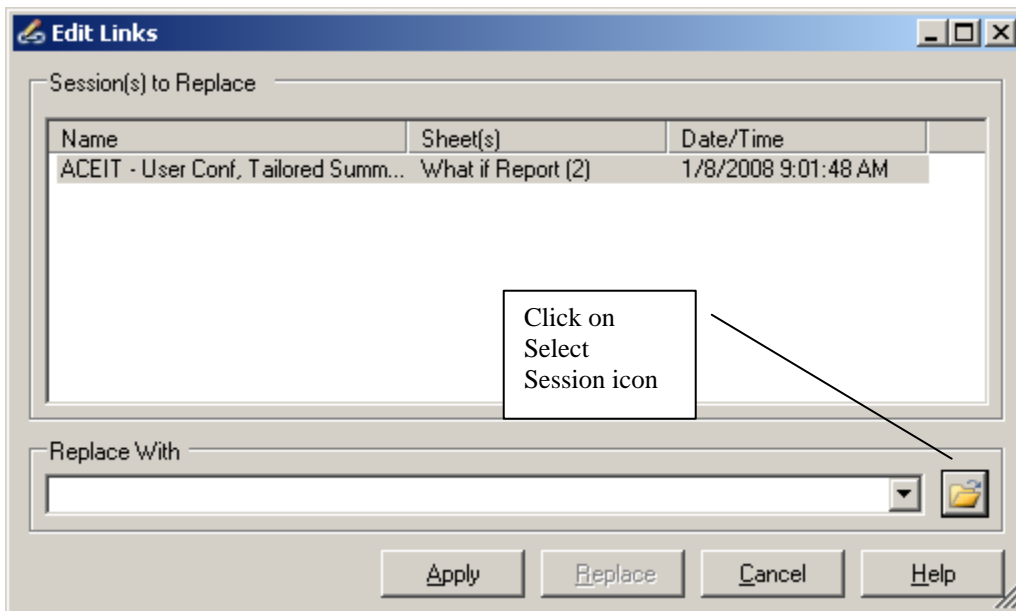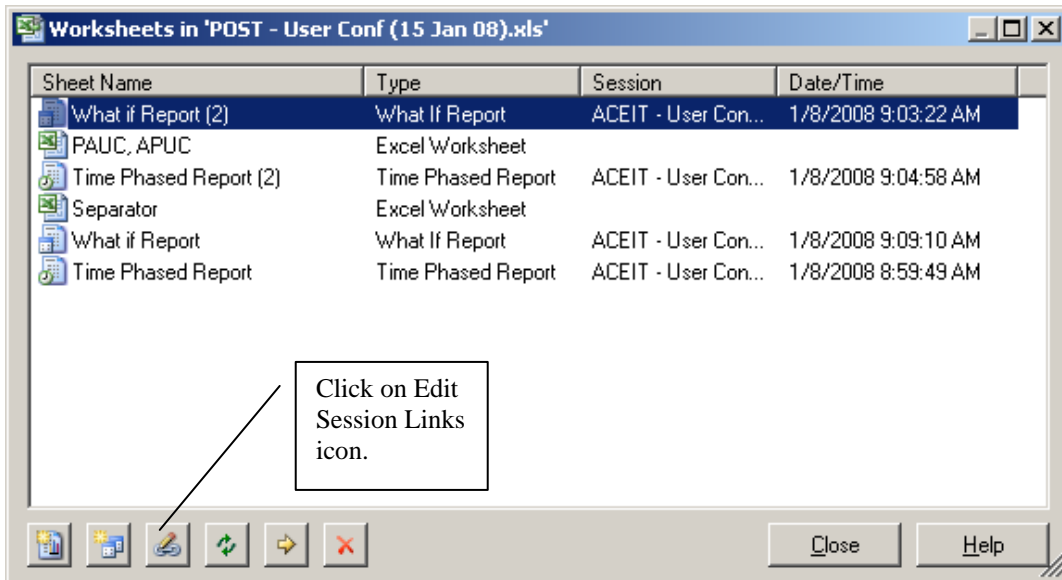

Select report(s) you want to update

If the session/case needs to be re-calculated this dialog box appears.

Click this button.

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Portability When you change the filename or path you need to re-link the POST worksheets to the correct location. Choose **POST**, then **Manage**, then **Worksheets**.
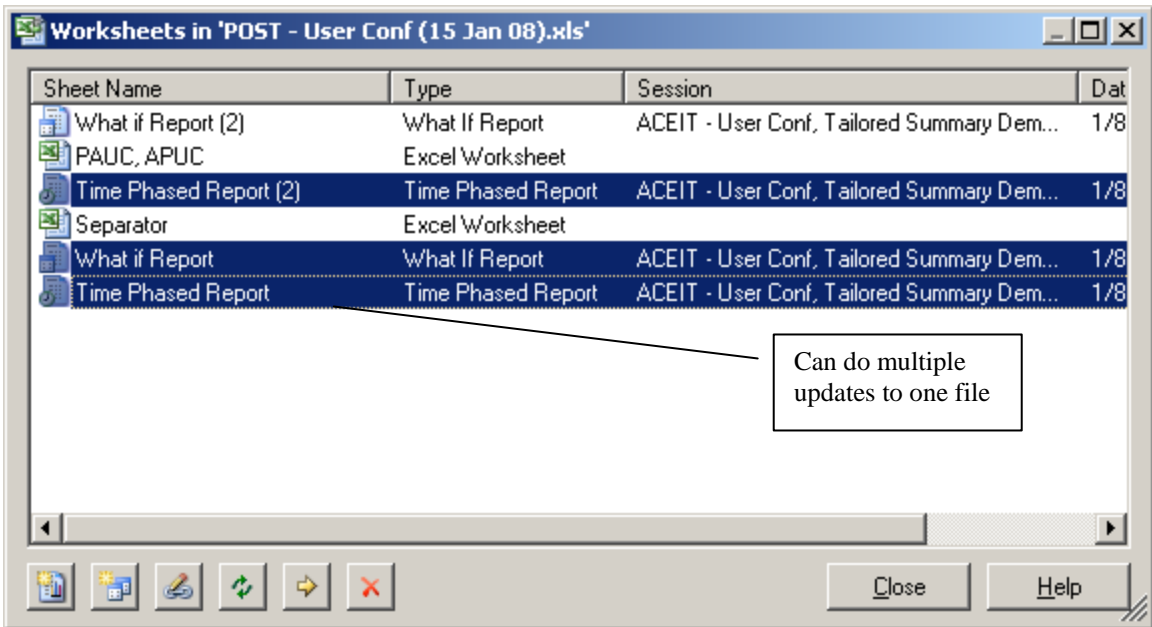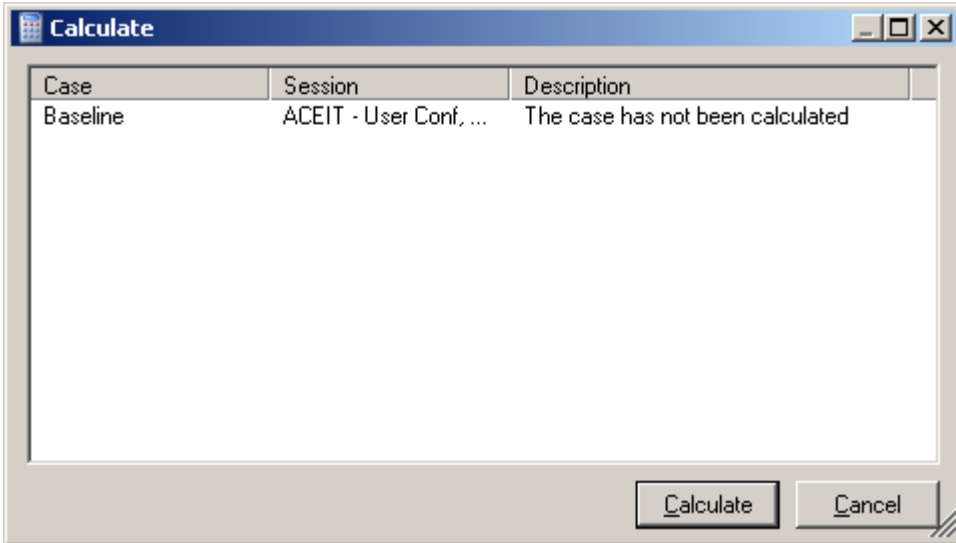

Click on Edit Session Links icon.

Click on Select Session icon

Select Session

Look in: Demo Files

ACEIT - User Conf, Tailored Summary Demo, Stryker (15 Jan 08).aceit

My Recent Documents
Desktop
My Documents
My Computer
My Network Places

Find your session

File name: ACEIT - User Conf, Tailored Summary Demo, St

Files of type: ACE Sessions (*.aceit;*.acw;*.ace;*.acz)

Open
Cancel

Edit Links

Session(s) to Replace

Name	Sheet(s)	Date/Time
ACEIT - User Conf, Tailored Summ...	What if Report (2)	1/8/2008 9:01:48 AM

Click on Replace

Replace With

F:\ACEIT Stuff\User Conference (14-16 Jan 08)\Demo Files\ACEIT - User Conf, Tailore

Apply   Replace   Cancel   Help
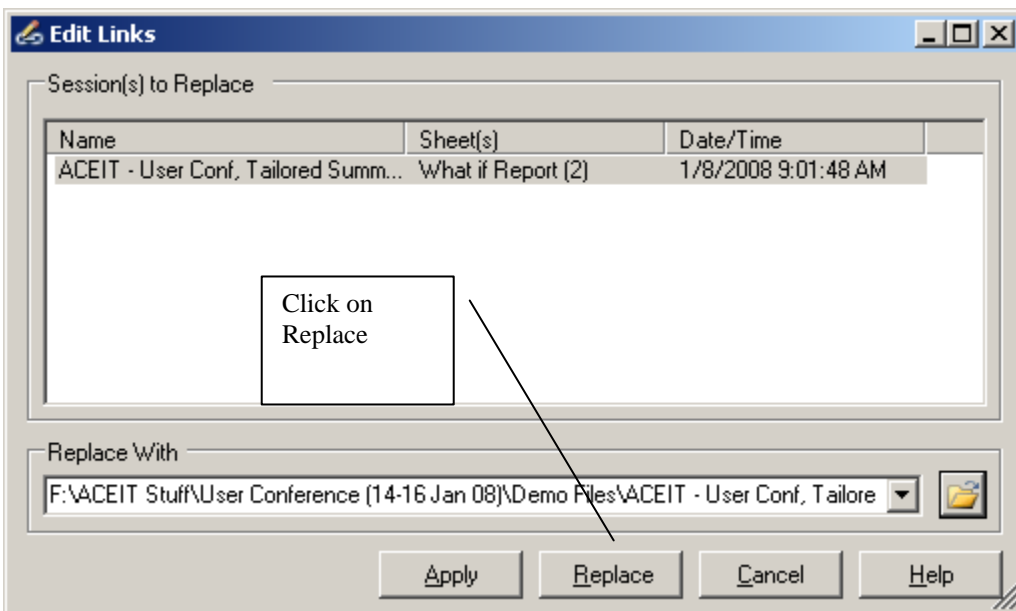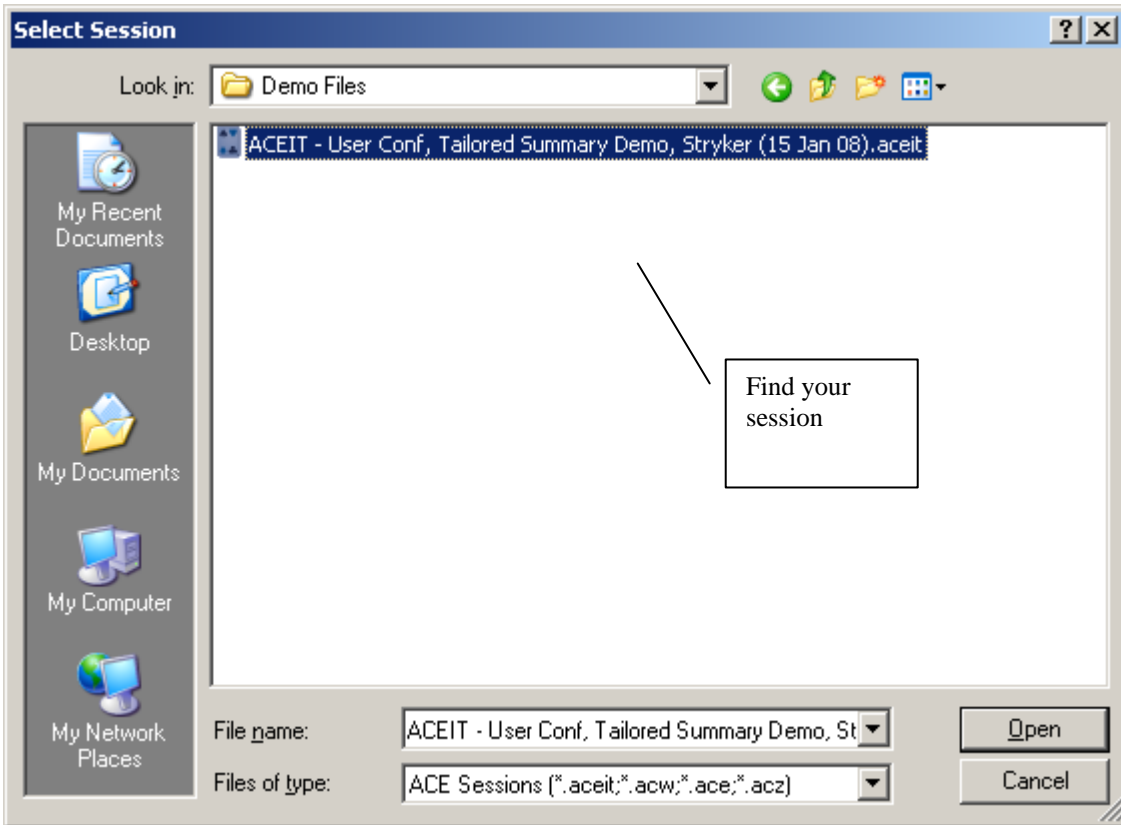
Calculate dialog box shows up.

Can do multiple updates to one file

Using This Summary Section in Other Sessions You can copy and paste the summary section into other session. Upon pasting the rows to the destination ACE session the dialog box below appears. At this point you can accept all the summary section DECs and others if you want.
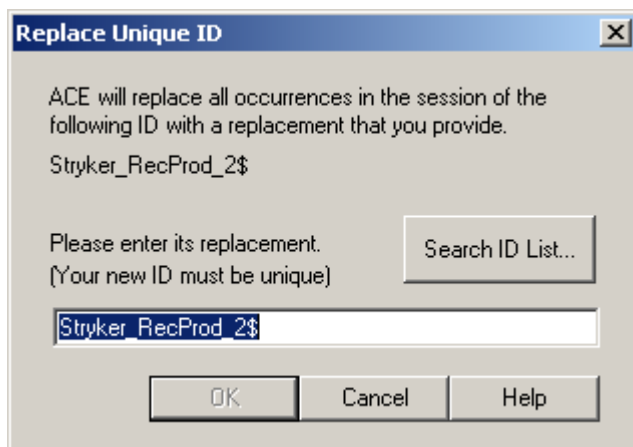
At this point you can you copy and paste the parent level CES variable name to the appropriate Unique ID column in your estimating section.

If there is already something there you can right click in the cell and select the Replace Unique ID feature. You would probably want to change all of them to your program name instead of Stryker in any case.

Then you would populate the children level rows with the appropriate DEC column entries.

DEC Summaries vs. Other Summaries

Dynamic Equation Columns DECs totals are available within the ACE session using SumIf Function. SumIf Can be Used on Several DECs in the Same Formula (Multiple-Criteria SumIf). There are no limits on the number of DECs. Since DECs are a form of a variable, name changes cascade throughout the estimate similar to the Replace Unique ID feature.

Category Columns The nice thing about Category Columns is that the allow text strings. However, Report results are not available in ACE and there are a limited number of Category Columns and you can only sort on one criterion per report. Column name changes need to be updated in Reports. As shown below, category column have some issue when copying and pasting to another file.

> ***Row Paste Overwrites Existing Category Columns*** ACEIT does not appear to handle Categories well in Copy/Paste from another session. ACEIT allows you to change category column titles, but it appears that ACEIT remembers the default column names and when you copy/paste it goes to that column in the destination session regardless of the current column title.

Source file Category Column entries pasted to destination file

Source file Category Column and entries
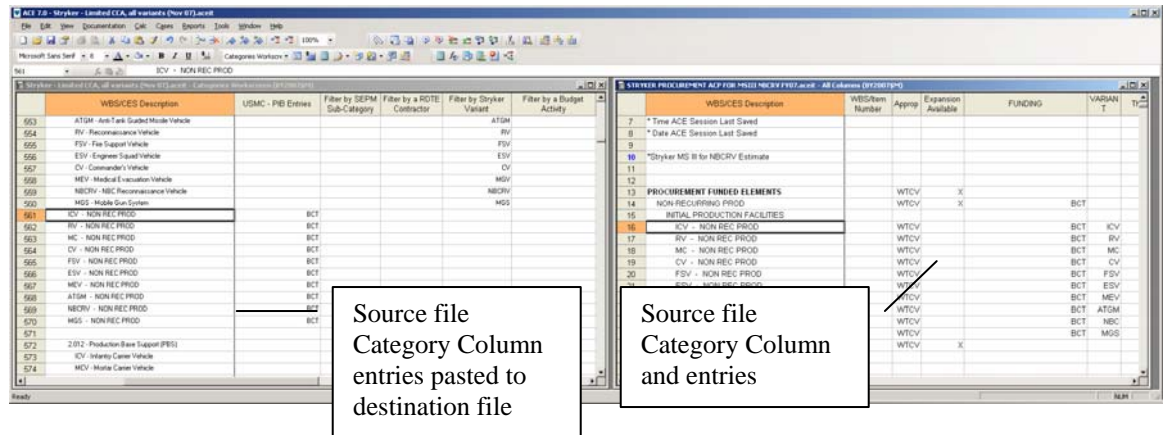
Summation Formula Another method is to use a summation formula using a Unique ID for Each Row. However this gets very long, fairly quickly.