HOW TO SET UP EXCEL SPREADSHEETS TO MEASURE, TRANSFER AND BILL BILLS OF QUANTITIES IN A REAL TIME MANNER

by

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at

15th Pacific Association of Quantity Surveyors Congress
23rd - 26th July 2011
Colombo, Sri Lanka
What if you don’t have

BIM (Building Information Modelling), or proprietary software, or in-house software capable of measuring accurate quantities, and suitting your local method of measurement, and your financial capability?
Traditionally

paper based
dimension sheets and schedules to measure

Now

Excel to measure and bill
Excel good

schedules for measuring inter-related items
instant calculation
save a lot of calculation time

Care required

proper format
good looking and meaningful
correct formulae
correct transfer of totals
integrity of the cross-references in the formulae
How to Set Up Excel Spreadsheets to Measure, Transfer and Bill Bills Of Quantities in A Real Time Manner

Template

uniform format over and over
a few simple formulae
simple set-up
simple formula checking
entirely user-defined coding
instant updating of final quantities
measurement by composite items first
Applications

bills of quantities
cost estimates
bills of variations
remeasurement bills
etc.

where extensive measurement and billing are required
Excel functions used

PRODUCT(range_of_cells)

SUM(range_of_cells)

SUMPRODUCT(range_A_of_cells, range_B_of_cells)
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Excel functions used

**VLOOKUP**(search_value, lookup_table, return_column, FALSE)

**IF**(criteria, A, B)

**COUNTIF**(range_to_search, search_value)
Excel functions used

\{=\text{SUM}(\text{IF}(\text{criteria}, \text{range}_A, \text{range}_B))}\}

curly brackets \{\} by pressing key F2 to edit the formula cell, then press Ctrl+Shift+Return

\text{SUMIF}(\text{range}_\text{to}_\text{search}, \text{criteria}, \text{range}_\text{to}_\text{sum})

no curly brackets but can handle only one criterion
Excel functions used

ROUND(number, number_of_digits)

“$” for anchoring column or row reference
Worksheets

One “Primary” Worksheet for generating Primary Quantities

One “Secondary” Worksheet for generating Secondary Quantities using the Primary Quantities

More than one “Bill Page” Worksheet using the Secondary Quantities
Work Flow

Use Primary Worksheet →
measure work items →
get Primary Qty →
assign Primary Codes →

Switch to Secondary Worksheet →
enter Primary Codes →
obtain totals of Primary Qty →
process further to generate Secondary Qty →
assign Secondary Codes
Work Flow

Switch to Bill Page Worksheet →
enter Secondary Codes →
obtain totals of Secondary Qty →
assign BQ descriptions

For experienced users

write up BQ Descriptions first →
assign Secondary Codes →
assign Primary Codes →
measure following the normal flow
Composite measurement

<table>
<thead>
<tr>
<th>Primary Quantities</th>
<th>Further processing (where “*” = multiplied by)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column height</td>
<td>* cross section = column concrete;</td>
</tr>
<tr>
<td></td>
<td>* column girth = column formwork</td>
</tr>
<tr>
<td>Beam length</td>
<td>* cross section below slab = beam concrete;</td>
</tr>
<tr>
<td></td>
<td>* beam soffit = soffit formwork;</td>
</tr>
<tr>
<td></td>
<td>* beam side * 2 = side formwork</td>
</tr>
<tr>
<td>Window number</td>
<td>* window width * window height = total window area;</td>
</tr>
<tr>
<td></td>
<td>* window width = total window cill length;</td>
</tr>
<tr>
<td></td>
<td>* (window width + window height * 2) * reveal width = total wall reveal area</td>
</tr>
</tbody>
</table>
### Primary Quantities

<table>
<thead>
<tr>
<th>Further processing (where “*” = multiplied by)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door number</td>
</tr>
<tr>
<td>* door leaf width * door leaf height = total door leaf area;</td>
</tr>
<tr>
<td>* frame or architrave girth per door = total door frame or architrave girth;</td>
</tr>
<tr>
<td>* ironmongery number per door = total ironmongery number</td>
</tr>
<tr>
<td>Room internal area</td>
</tr>
<tr>
<td>= ceiling plan area = floor area</td>
</tr>
<tr>
<td>Room internal girth</td>
</tr>
<tr>
<td>* ceiling height = wall area;</td>
</tr>
<tr>
<td>= skirting length</td>
</tr>
</tbody>
</table>
### Primary Quantities

<table>
<thead>
<tr>
<th>Primary Quantities</th>
<th>Further processing (where “*” = multiplied by)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaster and paint composite area</td>
<td>= Plaster area = Paint area</td>
</tr>
<tr>
<td>Tile and screed composite area</td>
<td>= Tile area = Screed area</td>
</tr>
<tr>
<td>Roof area</td>
<td>= Roof tile area = Roof screed area = Waterpoof area = Insulation area = Levelling screed area</td>
</tr>
</tbody>
</table>
User-defined Codes

systematic
structured
readily understandable

e.g.
RC30-CL, RC30-BM, RC30-WL
FWK-CL, FWK-BM, FWK-WL
Cautions

Cut and paste: would corrupt integrity of formulae

Use “copy and paste”: to replicate the contents and then delete the original contents

Insertion and deletion: borrow format and formulae from existing rows or columns
Cautions

Upper and lower boundary rows: common error to insert a row before or after the rows to be summed up – to prevent this, use pair of specially narrowed rows as the upper and lower boundaries of the formulae

Seed rows: do not disturb seed rows for replication of format and formulae to other rows, use them to ‘refresh’ all formulae of the same kind
Cautions

**VLOOKUP**: watch out whether the formulae using this function is disturbed by reason of insertion or deletion of columns

**Assigning sequence number**: to record the original or logical sequence of the dimension rows

**Advanced filtering and sorting**: to obtain a unique and sorted list

**Insufficient row height**: in case of long BQ Description
Counter-checks

**Integrity of Units:** units to be consistent with the number of dimensions used

**Sum totals:** sum totals of the relevant table columns are given for cross-checking

**Replication of the columns by “copy and paste”:** to maintain the same formula pattern
Counter-checks

Times of Row Qty used: to ensure that measured quantities are actually used and not left out

Revealing the formulae: to see all the cell formulae and print them out
Floor Analysis
Miscellaneous

Drafting descriptions and coding first

Frozen view panes

Print page headers

Print page footers

Word-wrapping
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Miscellaneous

Alignment

BQ item references

Smaller font size of Bill-Column C (Code)

Indentation of headings at the third or lower level of BQ Descriptions
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Miscellaneous

Use of `Sum()` to deal with non-numeric entries like “Rate only”, “Included”, etc.

Anchoring by “$” as appropriate

Before distribution: converting formulae to values; hiding or deleting the unnecessary
Epilogue

Excel easy, powerful and flexible

but needs cautions and a lot of safety belts

dangerous to set-up ad-hoc worksheets

worksheet with a uniform format, proven formulae and safety belts more desirable

- End -