

khs



instruments

bom manager
demo quick start

1.0

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2) The pnp data

The pnp data is generated with place.ulp and generates the file opt_s_04.plc.
Here a part of the file.

```
P02 P:C_T_SIEB V:T10µ X-17.496 Y33.388 R270.000 C321
P02 P:C_KS1206 V:µ1 X-26.132 Y20.790 R0.000 C322
P02 P:C_T_SIEB V:T10µ X-25.928 Y23.432 R180.000 C323
P01 P:SO08 V:- X-7.834 Y21.806 R0.000 IC300
P01 P:MI_MELF@2 V:470R@inverting_opamp X-9.002 Y13.272 R270.000 R301
P01 P:MI_MELF@2 V:100R@not_inverting_opamp X-6.970 Y13.272 R270.000 R302
P01 P:SO08 V:- X-7.834 Y21.806 R0.000 IC300
P01 P:SO-08 V:79L05 X-17.130 Y13.322 R180.000 IC310
P01 P:MI_MELF@2 V:470R@inverting_opamp X-9.002 Y13.272 R270.000 R301
P01 P:MI_MELF@2 V:100R@not_inverting_opamp X-6.970 Y13.272 R270.000 R302
P01 P:MI_MELF@2 V:100R X-4.938 Y13.272 R270.000 R303
P02 P:MI_MELF@2 V:100R@F-12V X-26.690 Y16.370 R0.000 R310
P02 P:MI_MELF@2 V:47R@F-5V X-26.640 Y14.338 R180.000 R312
P01 P:MI_MELF@2 V:100R@F+12V X-16.165 Y25.565 R180.000 R320
P01 P:MI_MELF@2 V:47R@F+5V X-16.114 Y28.105 R0.000 R321
P00 P:M09HP V:DSUB_9 X24.902 Y19.520 R270.000 X1
P00 P:BU-SMA-V V:SMA_V X8.545 Y6.210 R0.000 X301
P00 P:BU-SMA-V V:SMA_V X6.970 Y33.338 R90.000 X302
P02 P:MI_MELF@2 V:12K@not_inverting_opamp|47R@inverting_opamp X-28.976 Y29.731 R270.000 R304
```

P00 is manual placement, P01 is top and P02 is bottom.

2.1) Reading Kicad Board data

To transfer kicad data to plc format please export via File->Export->Specctra DSN...

This generates a *.dsn file.

Then

```
run sp2plc <filename>
```

sp2plc generates an additional part

```
P00 P:PLT <filename> X0 Y0 R0 Board
```

not existing in any of the exported files. As shown later the board file is the central file for manufacturing data/information and price calculation.

2.2) The Flag to change the value of a component

The @ character of a value is a flag like V:100R@F-12V. The Value R310 is set to 100R if the Flag F-12 is set in the means the file BOMM_PLACE.INI File else the R310 is not used.

V:12K@not_inverting_opamp|47R@inverting_opamp means
R304 is set to 12K if the flag not_inverting_opamp is used and
R304 is set to 47R if the flag inverting_opamp is used
in the file BOMM_PLACE.INI.

3) The BOMM_PLACE.INI file

In our case the file BOMM_PLACE.INI looks like

```
FLAG    inverting_opamp           //Flag
FLAG    F+12V                     //Flag
FLAG    F-12V                     //Flag

UNITS    10                       //number of units
PLACE    opt_s_04.plc             //the filename of the plc file
NAME     OPTTEST                  //name of the output file.
BRD      517.49  26.7              //Offset of the board for the CSM60 output.
```

So we have a setup file BOMM_PLACE.INI and the file with pnp data opt_s_04.plc. To get information about the component we need additional information. This information is stored in the feeder files. Every component has it's own feeder file.

3.1) The directories of the feeder files

The feeder files are stored in folders of the file bomm_feeder_dir.ini. In our case it looks like:

```
.\feeder
.\feeder\R
.\feeder\C
.\feeder\CONN
.\feeder\Board
```

3.2) The feeder files

In the directories of the bomm_feeder_dir.ini file the feeder files are stored.
The file C:\BOMM_DEMO\FEEDER\C\PSIEB_10u.fed looks like

```
DEVICE "C-Tantal-B"           //description
MFG     Vishay Sprague         //Manufacturer

DB      C\Tantal\0900766b80d97b37.pdf //link to the datasheet

STOCK    1186                  //actual stock
STOCK_MIN 200                  //minimal stock

DISTRIBUTOR DK_718-1120-2-ND@2000 //ordernumber
PRICE      0.121              //price

DISTRIBUTOR Fa_3366040@2000      //ordernumber of next distributor
PRICE      0.129

PACK  P:C_T_SIEB      POL  1.9      //package, not symmetrical , High 1.9 mm
PACK  P:C_T_SIEB_1    POL  1.9      //another package
PACK  P:C_T_SIEB_2    POL  1.9
PACK  P:C_T_SIEB_1@1  POL  1.9
PACK  P:C_T_SIEB@1    POL  1.9

VAL    V:T10u          //Value Don not use 'µ'
POS    19      0      100 //feeder number, pick angle, head select for CSM60
```

The other feeder files are similar.

4) The output files

If there existing some feeder files, the pnp file in bom_place.ini the output data can be generated by enter

```
bomm <enter>
```

This generates following files:

BOMM_FEEDER.TXT	//List of feeders
BOMM_FEEDER_BOM.TXT	//BOM list with manufacturers
BOMM_FEEDER_FEEDER_ORDER#.HTML	//All order numbers of components
BOMM_FEEDER_PLACE.TXT	//Here you find manual placed components
BOMM_FEEDER_USED.HTML	//HTML File with all used components
BOMM_FEEDER_USED_MODIFY.HTML	//HTML file with all components and a list of feeders
BOMM_MISSING.TXT	//List of all files without feeder files
ZFEEDER_STOCK.TXT	//Stock list with low and empty stock
FILE_NAMEBT.BRD	//CSM60 file for top side fiducial test
FILE_NAMEBS.BRD	//CSM60 file for top placement
FILE_NAMELT.BRD	//CSM60 file for bottom side fiducial test
FILE_NAMELS.BRD	//CSM60 file for bottom placement
FILE_NAME TT.BRD	//do not use
FILE_NAME_BOM.CSV	//CSV List of components
FILE_NAMEBS.CSV	//CSV file for top placement
FILE_NAMELS.CSV	//CSV file for bottom placement

4.1) The BOMM_FEEDER_PLACE.HTML File

The next important file is BOMM_FEEDER_PLACE.HTML. This is the central file to order missing components. Just open it with an internet explorer.

```

*** PARTS *****
http://www.kalender-365.eu/kalender-2014.html

*** CSM PARTS.INI; *****

Project[0]: opt_s_04.plc, units 10
Flags [0]: inverting_opamp
Flags [1]: F+12V
Flags [2]: F-12V

*** BOMM_FEEDER_PLACE.TXT; *****

#1: Mount: 3.0 sec (0.05 min) / Setup min : 10.00
V:u1 : [C-1206-ceramic X7R]; P:C_KS1206@1; Parts: 40.0; place[s]: 3.0; (stock = 1617 /STOCK_MIN = 50)(Avail 0-[]); File: \\..\Feeder\C\P1206\_0u1.fed ;
-Part# DK_1276-2744-2-ND@4000; price 0.00
-Part# RS_766-6947@4000; price 0.00
-Part# B_53D336@2500; price 0.03
Cheapest Part# RS_766-6947@4000; price 0.0013, sum = 0.05

#2: Mount: 3.0 sec (0.05 min) / Setup min : 10.00
V:T10u : [C-Tantal-B]; P:C_T_SIEB; Parts: 40.0; place[s]: 3.0; (stock = 1186 /STOCK_MIN = 200)(Avail 0-[]); File: \\..\Feeder\C\PSIEB\_10u.fed ;
-Part# DK_718-1120-2-ND@2000; price 0.12
-Part# Fa_3366040@2000; price 0.13

```

Link to datasheet Link to Feederfile

There is a link to the data sheet (if it is in the feeder file) and a link to the feeder file.

Below the link to the data sheets there are different order numbers from the feeder file and the order number with the lowest price. The code for the order numbers is distributor_ordernumber together as one order number. In this case DK is Digikey, RS is RS-components and B is Bürklin.

4.2) Missing Parts

It is important to know the parts listed in the bomm_feeder_place.html are parts with existing feeder files. If there is a part in the *.plc file without feeder file it is not listed in bomm_feeder_place.html, but you get a link to the file bomm_missing.txt.

```

#10: Mount: 3.0 sec (0.05 min) / Setup min : 10.00
V:79L05 [VREG -5V]; P:SO-08; Parts: 10.0; place[s]: 3.0; (stock = 13 /STOCK_MIN = 10) (Avail 0-[]); File: \\..\Feeder\PUS08\_79L05.fed ;
-Part# DK_497-1218-1-ND@10; price 0.43
-Part# DK_LM79L05ACM/NOPB-ND@10; price 0.98
-Part# RS_686-9492@25; price -0.34
Cheapest Part# DK_497-1218-1-ND@10; price 0.4300, sum = 4.30

*** PARTS WITHOUT FEEDER FILE : 1 ; *****

```


and in the file bomm_missing.txt you get the entry:

```
***** Missing BS *****

open file for place [0] opt_s_04.plc
---FLAGS ---

    inverting_opamp
    F+12V
    F-12V
    ---

    P:MI_MELF@2,          V:12K not found  x=  -11.80 y=    21.20 name >>R300<<
```

so R300 with value 12K and package P_MI_MELF@2 is missing.

Make new Feefer files

Make a new feeder file is quite simple. A feeder file is a text file with an extension *.fed.

In most cases there are similar parts we can use for copy and past. So we need a part with the package MI_MELF@2. So let's look.

With CTRL-F we search for [MI_MELF@2](#) and we get a 47R resistor.

```
#6: Mount: 3.0 sec (0.05 min) / Setup min : 10.00
V:47R [R-MELF]; P:MI_MELF@2; Parts: 10.0; place[s]: 3.0; (stock = 0 /STOCK_MIN = 0) (Avail 0-[]); File: ..\Feeder\R\P_MELF_47R.fed;
Part# Bü_26E232; price 0.0070; sum = 0.07
```

By opening the link we get the feeder file for a 47R MI_MELF@2 resistor.

```
//-----
//
//-----
DEVICE  "R-MELF"

STOCK    0

DISTRIBUTOR  Bü_26E232
PRICE    0.007

PACK      P:MI_MELF@2      BIPOL    0.8
PACK      P:MI_MELF_A      BIPOL    0.8

VAL       V:47R
POS       1          0          100
```

Now we store the file as P_MELF_12K.fed and modify the line

to

```
VAL      V:47R
```

```
VAL      V:12K
```

and modify the order number to get a 12K resistor

from

```
DISTRIBUTOR  Bü_26E232
```

to

```
DISTRIBUTOR  Bü_26E348
```

Don't forget to set

```
STOCK      0
```

because it's a new part and save the file P_MELF_12K.fed. Now the 12K MELF resistor is in your database and can be used for all or your new or existing projects.

5) Include Partial Component

A partial component is a component only a partial amount of the component is used. A typical partial component is solderpaste. One unit is 50g but for one board only 0.5g are used. Because parts are integers only partial units can be entered as include or ADD_FED only.

Assume the package and the value of solder paste is

```
PACK    P:Tool  VAL    V:Solderpaste
```

then we can add 0.5 g of solder paste with.

```
*ADD_FED      0.5    P:Tool V:Solderpaste
```

But solder paste is sold in 50g to 250g boxes so it would be convenient to normalize the price to one unit or 1g.

This can be made with the entry

```
CONTENT_PER_UNIT      n
```

So if the price per 50 g of solder paste is EUR 17.78 and the CONTENT_PER_UNIT is 50, the price per unit is $17.78 / 50 = 0.36$

But this is not the only application the partial component can be used.

5.1) Components generated from different parts

*ADD_FED entry can be used to make component with more than one part, by example a transformer.

The feeder file is the coil former and the we add the transformer core and the wire

```
*ADD_FED      2.0    P:Transformer V:Core
*ADD_FED      5.0    P:Transformer V:Wire
*ADD_FED      2.5    P:Transformer V:Wire
PACK    P:Transformer V:Coil_former
```

6) Price Calculation

Because all feeder files includes a price, price calculation is simply just adding the lowest prices from all distributors and the BOMM_FEEDER_UESD.HTML outputs the price or the bom.

***** 10 different (220) COSTS 106.32 ***** (138.22) *******

// *** Part Price per Unit EUR 10.63 *** (EUR 13.82) ***

So in our case one board the cost is 10.63 EUR. This is sufficient for hobbyist because there time is more or less free.

For professional users time is money so it must be added to the bom cost, so the professional edition provides additional information:

```
// *** Part Price per Unit EUR 10.60 *** ( EUR 13.78 ) ***

// *** Setup feeder 110.00 min = 1.83 h; For 9 feeder: 11.00 min / unit -> Cost 13.75;
// *** Mount: 69.0 min = 1.1 h; Mount per unit: 6.9 min -> Cost 8.62;
// *** Total: 17.90 min / unit -> Cost 22.38;

// *** Mount Minutes 69.00; ** Mount Hours 1.15; ** Mount Days 0.14
// *** Mount Per part (10 units) Minutes 6.90; ** Hours 0.12; ** Days 0.01 -> Cost 8.62
// Total 2.98 h

// *** Admin Per part (10 units) Minutes 6.00 -> Cost 7.50;

// *** Price per unit ****;
// *** Parts EUR 10.60
// *** Work: EUR 22.38
// *** Admin: EUR 7.50
// Total: EUR 40.47 /unit

// Price EUR/h = 75.00 /h -> real is EUR 66.28 /h

// *** Price VK/unit EUR 37.00
// *** Part-Cost/unit EUR 10.60
// Diff/unit: EUR 26.40
// Factor without work: 3.49
// Factor with work: 1.12

// *** Cost development EUR 3750.00; (weeks 1.0)
// Cost per unit EUR 3.71

// *** Price per unit
// *** Parts 10.60
// *** Development: 3.71
// *** Work: 22.38;
// *** Admin: 7.50;
// Total: 44.19 /unit
//VK: 37.00
//Diff: -7.19
```

Calculating the price for the work is made by multiplying time * cost per hour.

The time is separated into setup time and mount time per part multiplied by the number of units. The times can be entered into the feeder file:

```
SETUP_TIME_MIN n
MOUNT_TIME_MIN m
```

Because it's quite uncomfortable to enter mount and setup times into the feeder files, default parameters can be entered into the bomm_place.ini file.

```
PRICE_PER_HOUR          n.n
*FEEDER_MOUNT_SETUP_MIN m.m
*FEEDER_MOUNT_SEC       n.n
*FEEDER_MOUNT_THT_SEC   o.o
```

So there we have all times required to mount the boards.

But there is more required than just the time mounting the parts. There is time required to order the parts, setup the pnp, preparing the board for pnp and so on.

6.1) The Board Feeder File.

At the first view the name of this feeder file looks a little bit confusing, because it's the component the parts of the feeders are placed on.

But it had shown it's the best place to place here all the information required and or helpful to manufacture the board. Here an example:

```
SETUP_TIME_MIN      10      // order parts
SETUP_TIME_MIN      10      // setup pnp
SETUP_TIME_MIN      3       // setup soldering

MOUNT_TIME_MIN      1       // solder paste bs
MOUNT_TIME_MIN      1       // solder paste ls

SETUP_TIME_MIN      2       // cleaning
SETUP_TIME_MIN      5       // setup test
MOUNT_TIME_MIN      1       // test

ADMIN_TIME_MIN      1       // invoice
ADMIN_TIME_MIN      3       // packaging
ADMIN_TIME_MIN      2       // UPS

WEEKS_DEVELOPMENT   1
UNITS_PLANNED        1000
PRICE_VK_PER_UNIT    37
```

There are four new variables to calculate the times:

```
ADMIN_TIME_MIN
WEEKS_DEVELOPMENT
UNITS_PLANNED
PRICE_VK_PER_UNIT
```

Admin time is the time required for additional administration work like writing the invoice and preparing shipment.

The initial costs required for development can be entered via WEEKS_DEVELOPMENT and UNITS_PLANNED, so the shared cost for development can be calculated. PRICE_VK_PER_UNIT is the price it looks possible unit to get for one unit.

```
// *** Price per unit
// *** Parts 10.60
// *** Development: 3.71
// *** Work: 22.38;
// *** Admin: 7.50;
// Total: 44.19 /unit
//VK: 37.00
//Diff: -7.19
```

In our case a unit price is a little but not too far from the real price. By fine adjusting the parameters in the board file and changing the number of units you may play around to improve the results and / or lower the price.

7) Using the Database

Because after a time all parts (or components) ever used are stored in the database, the database can be used for new development using parts in stock.

A feeder file can have a DEVICE entry. By example the P_MELF_47R.fed has the entry:

```
DEVICE "R-MELF"
```

Opening BOMM_FEEDERS.HTML shows all feeder files listed and sorted by the DEVICE entry.

```
V:u1; [C-1206-ceramic X7R, price 0.00]; P:C_KS1206@1; (stock = 1617); File: ..\Feeder\C\P1206_0u1.fed;
V:T10u; [ C-Tantal-B, price 0.12]; P:C_T_SIEB; (stock = 1186); File: ..\Feeder\C\PSIEB_10u.fed;
V:SMA_V; [ CON SMB, price 3.44]; P:BU-SMA-V; (stock = 0 ); File: ..\Feeder\CONN\T_CON_SMA_V.fed;
V:DSUB_9; [CON-SDUB-09-Stift Angle, price 4.82]; P:M09HP; (stock = 0 ); File: ..\Feeder\CONN\T_CON_DSUB9_ST_W.fed;
V:F:/platine/Test/OpAmp/SMD; [ PLT, price 1.00]; P:plt; (stock = 10 ); File: ..\Feeder\Board\opt_s_04.fed;
V:47R; [ R-MELF, price 0.01]; P:MI_MELF@2; (stock = 0 ); File: ..\Feeder\R\P_MELF_47R.fed;
V:10K; [ R-MELF, price 0.04]; P:MI_MELF_A; (stock = 0 ); File: ..\Feeder\R\P_MELF_10K.fed;
V:18K; [ R-MELF, price 0.02]; P:MI_MELF_A; (stock = 0 ); File: ..\Feeder\R\P_MELF_18K.fed;
V:100R; [ R-MELF, price 0.01]; P:MI_MELF@2; (stock = 0 ); File: ..\Feeder\R\P_MELF_100R.fed;
V:470R; [ R-MELF, price 0.01]; P:MI_MELF@2; (stock = 0 ); File: ..\Feeder\R\P_MELF_470R.fed;
V:12K; [ R-MELF, price 0.04]; P:MI_MELF@2; (stock = 0 ); File: ..\Feeder\R\P_MELF_12K.fed;
V:79L05; [ VREG -5V, price 0.43]; P:SO-08; (stock = 13 ); File: ..\Feeder\PUSO8_79L05.fed;
V:78L05; [ VREG 5V, price -0.16]; P:SO-08; (stock = 8 ); File: ..\Feeder\PUSO8_78L05.fed;
```

So all capacitors, all connectors, all resistors and voltage regulators are together.

Finding a part is quite simple via CTRL-F and enter 47R. You get all 47R resistors of your stock.

You may add additional information like

```
DEVICE "OPAMP-SGL-12V 36µA RR-- GBW=400MHz Mark OQAI"
```

This is a single opamp with max. 12V, rail to rail input, gain bandwidth product of 400 MHz and is marked with OQAI.

So if there is a part in the desk marked OQAI it's quite easy to find via CTRL-F. Then you get the data sheet, part number, package, price, your stock and a link to the feeder file.

So if there is a part in the desk marked OQAI it's quite easy to find via CTRL-F. Then you get the data sheet, part number, package, price, your stock and a link to the feeder file.

7.1) Preparing Firefox to edit Feeder Files

To edit the feeder files firefox must be configured:

- Enter `about:config`
- Search for `view_source.editor.path`
- Enter the path to your editor e.g. `c:\windows\system32\notepad.exe`

8) Removing Stock

After manufacturing the parts are no longer in stock and should be removed. To remove stock just run

```
bomm -r
```

Then the stock required for the project is removed. Every feeder file gets an additional entry with date, removed stock and the name of the project. This makes it easy to find out often used feeders and it's possible to estimate average demand if the part.

```
//STOCK      40      -50 **** OPTTEST  ** 2023/8/13  
STOCK        -10
```

Removing stock renames the *.fed files to *.bak and generated a copy of the feeder files with removed stock. All modifies feeder files are listed in BOMM_FEEDER_USED_MODIFY.HTML.

To undo removing stock run

```
bomm -u
```


9) License

The demo edition is licensed for evaluation an non commercial use only. There are other editions with different features. Please contact khs-instruments for more information please.

Changes:

JJ	MM	TT	Version	Change
23	08	12	1.0	First version