Bellows Master II FAQ

This file contains information for versions 3.0 and later. Older versions use different database e.g. Borland Data Base Engine (BDE) or an older version of the current database.

Installation

Installation is fully automatic excluding:
- Registration
- Location of data files
- Preferences

After installation program has to be registered. Help file has full details how to do this.

Program needs to know where two data files are located. Default installation places these files into a folders:
NT/2000/XP: C:\Documents and Settings\User\Application Data\J Tolonen Services cc\BelData
Vista/7/8/10:   C:\Users\User\AppData\Roaming\J Tolonen Services cc\BelData

After starting the program you need to set the data files using menu Setup. Files are not set intentionally during installation. You may want to use totally different files. You can place the files on network for easy backing up, to use same files between users or for other reasons. If you are single user you can leave the files to default position and point the program to them.

After setting the databases you should set the program defaults using menu Setup.

Program setting

The installation program is purposely not creating setup entries into the registry. This is done after you set the defaults the first time. Until you have done these settings you may get minor abnormalities in prints. You make the settings via program menu Setup – Defaults. Second setting up are companies, where you set the company logo and name. This is done via program menu Setup – Companies.

Support

You are free to contact the developer. Valid contact details during August 2015 are:

E mail Jouko@jat.co.za
Windows and MSN messenger: Look for Jouko@jat.co.za
Yahoo Messenger: On request
Skype: Look for joukot (www.skype.com to get free program)
The updated latest contact details are available from www.jat.co.za
Latest telephone numbers are given on: www.jat.co.za

Issues

Why I cannot save calculations? Wrong date format warning. Most probably the short date format in your Windows is one where the month is shown with letters and not numbers. Change the short date format to show only using numbers. This problem is related to an external component, which we cannot change.

Help file doesn't work Bellows Master II has two help file formats. One is the old style HLP file and the other newer HTML file. Old format works better because of the pop-up windows but Microsoft has stopped support for it. If your operating system is Windows Vista, 7 or 8 you can download add on driver from Microsoft that allows HLP help file use. For Win 10 no such driver is available. HTML help file format works on all Windows operating systems. Simply go to program menu Setup – Defaults and make sure that the help file format is HTML. After the change restart the program and the help file works.

If you find any bugs or "issues" (Microsoft term) or you would like to have some other improvements please be free to contact the developer. It is in the developer's and your interest to report and ask improvements. It is better to ask than suffer. The program was designed for specific conditions, which may differ from your requirements.

Company Logo

There in a known issue concerning the creation of company logos for printing purpose. Logo files saved using some versions of Windows Paint program are not compatible with the graphical module used in Bellows Master. If you experience problem that after entering your logo file into Bellows Master it vanishes e.g. will not print or show your logo file is in wrong format. The solution is to open the logo file (*.bmp) in and other program and use "SaveAs" command. One program tested to give correct result (File format) is freely available IrfanView (http://www.irfanview.com/).

Use of program

Note Entries

When inside memo box you cannot use enter key. This moves cursor to the next TAB stop. To overcome this you must use Ctrl + enter. E.g. press control key and while it is pressed press Enter key. This is similar as in Word Perfect Hard Return.

Entering Movements

Program help file has a section how to enter the movements.

User questions

Why I cannot calculate either of the ASME calculations? Each code requires different material. The fatigue factors are different. When material is entered in MatTool a fatigue type is selected. This entry is used during bellows calculation to check that correct material is in use. Secondly the calculation button calculates generally only EJMA code. Clicking the button program tries to predict, which code is to be calculated. First the selected material is checked. Fatigue type

is used to identify the code. Then program checks if the bellows is reinforced. Toque calculation is not automatic. It has to be selected via Calculate menu.

Our own calculation results are different to BM II. Please send a copy of your calculations and BM print-out to the developers. They will compare the results and report back.

The program is not working on Windows 2003 server environment. Most probably your security settings are not correct. Each user must have full read and write access all project file directories. Also set each workstation user with "Domain Admin Rights".

Why do I get warning message about U shape? EJMA is for U shape bellows where angle alpha is 0 - see image. Originally EJMA code had no rule or limit or tolerance for alpha.
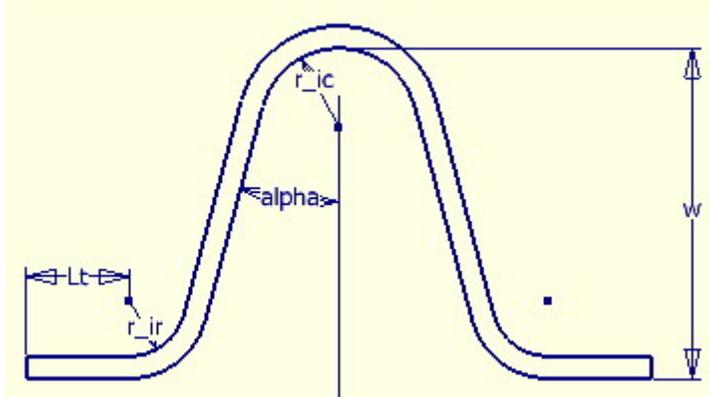
Basically the warning comes up is your tool radius, number of layers, layer thickness and pitch are such that bellows shape is not about U shape. In true U shape bellows the following formula applies:

Pitch = 4 * tool radius + 2* number of layers * layer thickness

EJMA code was changed 2005 and limit of 15 degrees was introduced. This is considered in the program.

In the interim report we don't get any result for bellows mass. Why? Mass is only calculated for manufacturing methods where the shape of the convolutions is known fully. In all cases the hydroforming is calculated. Unspecified is not calculated as the shape of the bellows is not fixed fully.

Why do we get a warning "Temperature is too high. Verify fatigue...." BM is giving this warning after comparing the design temperature to "Max fatigue temp" entry in MatTool for the selected bellows' material. EJMA has standard fatigue values for 300 series SS and some other listed types. According to EJMA values are valid below the creep limit. You must enter this limit in MatTool for the material. If your design temperature is over the set limit result is the warning. For high temperature application a good solution is to establish actual bellows element metal temperature instead of using the fluid temperature. You can do this by using HotBel program from J Tolonen Services cc.

Note that the fatigue above the creep limit is very problematic issue. Standard low temperature fatigue testing results cannot be used as a basis for the fatigue calculation.

"Yield and UTS warnings- verify by testing"? Most of the time UTS, Yield and allowable stress values are taken from ASME 2D. There is one big problem. UTS and Yield values are given most of the time only up to 1000 F but allowable stress values to a much higher. Program requires material values in all cases up to maximum value specified in entry "Max temp" This is very important to understand. BM doesn't verify this issue. In some cases it just calculates - but

wrongly if the material entries are wrong. In practice you have to create or by some other means to get required material values.

Entry "Max stress temp" is the highest temperature in F where official material UTS and Yield are available from the code. If you get the warning your design temperature is over this limit but below "Max temp". As a result you get the warning.

Temperature warnings are in a program for a very good reason. Designers would make designs without the warnings over all the temperature limits thinking that everything is OK.

Layer thickness after forming. Normally this should be a calculated thickness rather an input. Why is it put as an input? The issue is discussed into some extend in the help file but here is some additional information. All codes have a formula, which has to be used for thinning during manufacturing. This formula is built in to the program and result is used in calculations as specified in the various codes.

The additional entry is for the cases where you know that your thinning is more than the standard formula in the code. Program uses the thinner of the two e.g. the manual entry or the code formula result.

In case you do not know your thinning or the thinning is less than the code result double click in the entry field and it will enter automatically value. As this value is more than the code thickness it is not used. In case you know that your thinning is more than the code calculation enter the actual thickness.

So the reason for the entry is to make sure that the bellows is calculated correctly in all cases.

Can we be sure that the program calculates correctly? How can we verify it? This question can refer to two issues: individual calculation verification or general verification.

General verification

- We have verified the program against every available calculation from all manufactures and code samples we have been able to find. In each case if we have found differences we have investigated the issue in detail. Until now we have found problems in other calculations not in our results.

- We have done extensive check calculations using spread sheets etc

- We had full access to inhouse software for an older version of EJMA code from a company, which is EJMA member. Calculation results were identical.

- Some of our customers have done extensive checking. There have been queries but no issues until now

Individual calculation verification

In some parts of the world customers still ask line by line, formula by formula calculation where the code formula is shown plus variable values entered. Such calculation is not available from the program. If you are required to do such document you can use commercial word processing programs. To help the process you can print the full variable list from BM II. Form filling takes a lot of time and in our opinion is total waste of time. This type of checking will not find problems/mistakes. Only reliable design verification is if the inspection authority/customer makes a check calculation totally independent from the original program used. For this reason our report identifies the program used and also the version. Inspection authority can check if they have

verified the calculation before for this program/revision and therefore either sign immediately or make the verification.

As with any software we cannot guarantee 100% that there are no mistakes. We can guarantee that we do not ship a program with known calculation issues. If a problem is identified it is fixed and update is issued free of charge. Please see help file - Version history for such corrections. Not too many.

How can we E mail the calculation report?

Versions after 2.0: Start printing the report required. When the preview opens click Save button and on the save dialog look for "Save as type" in the bottom. Select PDF or HTM format, give file name and select where to save. After this you can e mail the newly created file. Alternative method of using PDF writer as described above works also.

We received the program. It has only few materials. What can we do? Bellows Master II has some common materials included into the data base. Each user is required to enter those materials they use. For this you use MatTool II program, which came with your Bellows Master II program. Unfortunately we cannot enter the materials into standard installation. There are hundreds if not thousands of potential materials. Values tend to change often and in addition material entries require factors, which each manufacturer has to verify. Material data base can have unlimited number of materials. You just have to be careful with your entries.

- Material entry is critical. Mistakes results in difficult to detect errors in design calculations

- You can enter unlimited number of materials

- Use the short code to separate different material types. Each material must have own code. If you try to use same code as before you get Key violation error

- If your allowable stress is different for different material thicknesses enter each thickness range as a separate material. Use codes like Grade 70 >40 mm

- In the new program you have to separate materials for ASME B31.3, ASME VIII Div I app 26 and EJMA calculations. Use code to do this. For instance 304 2001 ed EJMA and 304 2002 ASME

- Help file for MatTool II program has a lot of information. Please use it. Use F1 key! Content page has general information to read. Each form has its own help page. Images in the help file have "Hot Spots" Use your mouse to click the image to get more information. Nobody likes help files. This time you have to look at it. Even we do so each time we enter new material.

- How to add new material is done using the General info form. On top is a set of buttons. Please use help file to get more information.

- Back ups are important. We have had no corruptions in the last 5+ years. Be safe and not sorry. Computers fail, they are stolen etc. If you are uncertain how and what to back up please ask. (At one time we lost two hard drives within 6 months! Without back ups we would have been in trouble. Hard drives were under 2 years old.)

- If you are not sure how to enter materials please ask our support. Let us know your most common material and if possible we will send you data to enter with answers to your queries.

- You have to enter all the information required. There are several different forms: General, Allowable, Yield, UTS, Poisson and E. We do not enter always all the information but we know when this can be done. We do not recommend this method as sooner or later it gives problems. The trick is to limit the maximum temperature on the main form. Those who wish to know more please ask details.

- Developers have additional material database for sale. It has most of the commonly used materials to latest ASME standards.

Could the material denomination be changed in order to meet the European standard? Like for example 1.4541 instead of AISI 321. You can enter as many materials as you like. You can use any denomination you like. The following are limitations:

- short code that is used for selection is limited to 30 characters

- Full material description (this is printed) is limited to 80 characters but the program reports are not designed for so long - have to be fixed if users start to use so long descriptions.

- You can have only unique short codes e.g. you cannot have twice 1.4541 (one for ASME calc, next for EJMA etc). To differentiate you can use 1.4541ASME, 1.4541EJMA etc

Problem using European or any other than ASME materials is always where to get all required information. ASME has most of the required data in ASME IID. You cannot just take those values and call the material to German or European standard. Standards have different values for certified UTS, Yield and allowable stresses - unfortunately. ASME values are generally the most conservative - lowest allowable stresses.

We have received the program. What do we do now? Program has to be installed first. After that you have to register it. Help file has information but here are the main steps:

Request certificate

1. Install program on the computer you are going to use. We recommend you use standard installation and default file locations.

2. Start the program.

3. New form opens. This is for registration. If the form doesn't open automatically use program menu: Help – Register to open the form.

4. Press F1 key to open help file. There is some additional information

5. Click last button with hint "Request for certificate"

6. New form opens

7. Enter requested information

8. Click second button "Collect information"

9. Click last button "Copy to clipboard"

10. Open your e mail program and start a message to us

11. Paste the clipboard content into the e mail. Result looks something like the following:

Friday, January 13, 2017

----------Do not change the following-------
Jouko Tolonen
jouko@jat.co.za

Bellows Master
1.2.4.0
39072
B6-ED-21-2E-37-89-K2-78
----------End of request-------
Comments to developers:

12. Send the e mail to us

After receiving the request we will send you the activation key.

If the computer you are using has no E mail possibility then you can use notepad program to transfer the encrypted to an other computer. Notepad is part of each Windows operating system and makes simple text files *.txt. Save the file onto a disket or memory stick for the transfer.

Please note that the activation key/certificate is a computer specific. It will not work in any other computer.

After receiving certificate similar to:

O3AOYZIR-KC4MCVQ2-BNCAI7CB-J4F2K5PQ-BKPNQYI2-CZLRRTFR-NFGQQAHS-YUNOEBCP-432BKAGS-JLQPXYY5-4EK6WUET-G357EH7W-5YFKGRII-AMAEHBQN-BULV5MRQ-FUBBIDSQ-ZN5IMTSQ-53WBYM7W-4RW6WMGP-W7ITEAQV-AD6OY5VF-X2OEHROX-HBO74HJB-RRBWZ5IC-XIHQAOTQ

1. Copy the received certificate from the first to the last character using copy command or key combination CTRL plus key C. Exclude text "Key:" if it is included.

2. Start the program you are registering.

3. Registration form opens. If this doesn't happen use menu option Help - Register

4. Click second button from left on the registration form. This has a hint "Load license from clipboard. Do not click with mouse inside the white entry field. If you do this the registration most probably fails.

5. Click button Activate Program

6. Read all messages. You should get information that the program is registered. If you receive an error message write it down (each error) and send them to us.

6. Close and restart the program.

After licensing the program we get an error message that the databases are not set. What do we do now? This is not an error. It is a warning. Program has two databases that are used for the calculations. One is for material data and the other is to save calculation inputs. When you install the program empty calculation database and demo material database are installed to default folder/directory. This is:

NT/2000/XP: C:\Documents and Settings\User\Application Data\J Tolonen Services cc\BelData
Vista/7/8/10:   C:\Users\User\AppData\Roaming\J Tolonen Services cc\BelData

In the path shown "User" is your user name in the computer.

For good reasons the installation is not setting the databases. After registration go to program menu Setup – Set Material database and Setup – Set calculation database. Looking at the file names you will easily recognize which is for what purpose.

You can move the two databases to different location. If you do this you just need to point the program to the correct file. This is especially handy if you have multiple licenses or you wish to have the databases backed up during server backup. Simply copy the files to your server and all the users can use the same databases. If you do this:
- User must have read and write permissions to the folder
- Path to the file location must be permanently mapped

Can you please explain us in which case we can use Full Area type or Ring Area type. When discussing and calculating pressure trust you normally use the full area. That is the pressure force, which is calculated using bellows effective diameter Dm. Ring area is the full area less cross sectional area of the pipe. Typical use of this force is shown in the nozzle force calculation in EJMA section C. Please see the calculation sample. In EJMA 8 it is on page 99, In EJMA 7 page 96 and EJMA 6 page 96.

How we will take the step by step calculation print-out? Bellows Master does not have "Step by Step" report. It is not spread sheet program. To make an additional full report listing formulas and inserted values would most probably add at least 50% to the program price and therefore is not viable. However you can print very detailed list of variables out of the program. Go to menu - Utilities - Print variables. This print-out is intended for in-house use and therefore is not formatted to be very nice. Also you have to first calculate before printing.

After adding ASME B31.3 calculation this detailed print can be misleading. We are still looking into it if we can make it a bit better.

Can you please give us the Step by Step Calculation & formula Print-out of your software for reference (Both Unreinforced and Reinforced). BM is not spread sheet program. It is written using Delphi. This means Pascal. If we would print the source code it would be at least 700 A4 pages. We have never printed and will never do so.

To give you some idea how the code looks:

```
*******************************************)
(* Function for stress S1              *)
(*******************************************)
 var
  TempCollar : double;

begin
 With BellowInfo do
 begin
  Case IsExternalPressure of
   {0 is no and 1 is yes}
   0: TempCollar := Tc*C_k*Ec*Lc*CDc;
   1: TempCollar := 0;
  end;
   CS1 := ((GetP * (DiEnd+CNt_Act*T)*(DiEnd+CNt_Act*T)*Lt * Eb * C_k) / (2
```

```
*(CNt_Act*T*Eb*Lt*(DiEnd+CNt_Act*T)+TempCollar)));
 end;
end;

Function CS11 : double;

(********************************************)
(* Function for stress S`1            *)
(********************************************)
begin
  With BellowInfo do
  begin
   Case IsExternalPressure of
    {0 is no and 1 is yes}
    0: CS11 := ((GetP * CDc * CDc * Lt * Ec * C_k) / (2
*(CNt_Act*T*Eb*Lt*(DiEnd+CNt_Act*T)+Tc*C_k*Ec*Lc*CDc)));
    1: CS11 := 0;
   end;

  end;
end;
```

It is about unreadable if not in Delphi. (The code sample is outdated and is not from the latest version of the program)

In Reinforced Bellows, we have not received the limiting design pressure value and based on column instability. This is a regular query and the issue is a problem all the time. The problem is in the code.

Please see paragraph above formula 4-57 of EJMA code. Wording is very confusing but we read it as follows:

Formula 4-57 is valid for reinforced designs where reinforcing rings are used.

Formula is not valid in case where equalizing rings are used.

Considering the above Bellows Master doesn't give the pressure for equalizing ring designs. Please look at Figure 4.14 (in EJMA), which shows equalizing ring design. Sometimes the gap between the rings is so small that there is absolutely now possibility of column instability. In such case formula 4-57 could give "failure" and you would have million questions from your customer. Also note the wording at the bottom of the BM calculation "Confirm instability...". This is in line with our understanding of the code. Using this issue you can give to your customer any value you can prove.

Instability pressure issues are further complicated if the design pressure is external. The program was corrected in version 1.1.24 for EJMA and ASME B31.3 calculations. In summary the following applies:

- If pressure is external then EJMA note 4.12.1.6 applies according to which external pressure doesn't produce column instability. Pressure is calculated for designs without equalizing rings but not evaluated against the design pressure
- If pressure is external inplane instability pressure is calculated and evaluated based on EJMA paragraph C-5.3
- If pressure is internal and bellows is reinforced inplane instability pressure is not calculated. Code has no formula for it

- If the pressure is internal and reinforcing is using equalizing rings then column instability pressure is not calculated – see above
- If the pressure is internal and reinforcing is not using equalizing rings then column instability pressure is calculated – see above

After entering the material values of ANSI 304, and we run the program, we will receive a error of "Selected Bellows material is not for EJMA calculation" and also we will not get the results as per ASME/ANSI B 31.3. Please advise us what to do in this case. Small misunderstanding. The issue is discussed in MatTool II and Bellows Master II help files. We recommend that you study them also.

After the updates over the years BM II has several calculation methods. Because of the code differences the same material cannot be used for all of them. Program identifies for which specification material is for based on fatigue entry (Small drop down list on MatTool II General Properties form). The following applies:

Fatigue dropdown:
ANSI: This material is for ASME B31.3 calculation only
ASME: This material is for ASME VII app 26 calculation only
SS: This is for EJMA calculations
CS: Is unsupported Carbon steel type fatigue. We recommend you not use it.
EA and EF: These are for Bellows Master EN program calculating EN bellows (Discontinued)

Fatigue factors A to D (all of them) have to be entered correctly considering the selected Fatigue type. If you change the type you have to change the factors also. Basic factors are given in EJMA, ASME VIII and ASME B31.3 for SS materials. Each fabricator should verify the factors by testing. Please see codes for details.

Material you have entered has fatigue type ANSI. Therefore it can be used only for ASME B31.3 calculations. Note also that the allowable stress values should be from ASME B31.3. They are different to ASME IID, which are generally used for EJMA calculations. You have clicked the calculation BUTTON.
After sorting the above you will have similar issue with the printing. The print button has as a default either EJMA 5 or EJMA latest print (You can set this in program defaults). To access other you can use the small arrow on the right hand side of the print button and select the one you need to print. Alternatively you can use File - Print menu.

Where can we get required material values? To find material values is sometimes difficult. Some tips:

- www.specialmetals.com
- creep limit is in notes of ASME II D
- Moduli is in EJMA and ASME codes
- Allowable stresses for American materials are in ASME II D and ASME B31.3

We have encountered that for the universal expansion joint design, when we increase the no. of cons, all else constant, the column instability increases (Design without tie-rods) in our existing Bellows Master II calculation. In practical, the inclusion of the tie-rods will increase the expansion joint's column stability. Double bellows unit is very sensitive for the change in number of convolutions. If you look into formula 4-43 "N" is into power of 2 and is the total number of convolutions in the two bellows unit. Therefore small increase in one bellows N is dropping Psc a lot.

Tie rods or other supporting items that prevent centre pipe excessive movement will improve the situation. Unfortunately there is nothing in the code we can substantiate this. Therefore to include some different kind of formula is not possible within the code.

Generally the code takes an approach that you can overwrite it if you have some proof - practical tests for instance.

As we see you have 3 possibilities to solve this issue:

- Use EJMA 5 calculation. It is far less strict with the stability issues. This is the reason EJMA 5 is still in the program. Less critical customers accept this EJMA.

- Make tests and therefore have a proof to your customer that design is not instable.

- Calculate compensator twice. One time as individual elements and one time as a unit. Unit calculation result is to get the centre pipe angle and spring rates. Using the centre pipe angle and other applicable movements to one bellows element calculate element on its own. You have to have a proof that centre pipe is supported/guided fully. In such case you should be able to take the stability pressures from the individual calculation.

As a small additional issue when calculating a double unit do not forget to include the centre pipe expansion into bellows movement. Bellows Master II is not doing this automatically - it cannot do this - and such movement is hardly ever given in any compensator technical document. We have had a case where this expansion was 70 mm! Latest EJMA makes actually a note that often the lateral movement is so small compared to the axial movement that the lateral movement can be excluded!

The program requires input for the pipe ends. I assume this is only used for external pressure calculations. Basically correct. It is used to calculate overall length and record on the report pipe end material also. You can click "No pipe ends"

Why does the cycle life go down when switching from 304 to inco 625 and even lower for 625LCF? All material values are entered into the data base by the user. In the demo fatigue factors are standard EJMA values even for 625 and 625LFC. 625 and 625 LFC have higher moduli of elasticity compared to 304. Therefore stresses S5 and S6 are higher. Therefore St is higher and as the factors a, b, and c are same cycles come down. If you have verified a, b and s values for 625 then you can use those and get the cycles up. This was the situation until EJMA 10 edition. Since EJMA 10 625 has substantially better fatigue values than 300 series SS.

Any reason why the diameter is limited to 1650mm? Not limited. Standard sizes are only entered up to that value. You can enter anything you like. NB is used to select hydro forming tools. It is not very common to have hydro forming machines larger than about 1600. List should be actually up to about 2000 in the program but as mentioned you can enter your value.

Is there any way to keep the tabs from changing locations? This is a standard behavior. This is the same in all programs. We cannot control where they go. You can hide some of the tabs in defaults.

We have tried to calculate the samples results given in EJMA 8 addenda 2005 but we get different results. Is BM calculating wrongly? EJMA samples are made "difficult". Part of the required information is missing and sometimes the given values are unexplained. We have done the full verification and we do get results we consider same within calculation accuracy. Here are some of the issues you need to do to get same results:

- There is no design temperature given. Based on the material values we have used 500 F in our calculations (Set BMII to run in imperial system!)
- Material values do not match 100% any material we know of. Best is to set up 2 test materials and enter specified values. It is best to enter same values for 450, 500 and 550 F. These material values is one area where there seems to be inconsistency. Looking

into sample 2 you have moduli of elasticity for collar equal to CS at 500 F. Bellows material value is different to any material listed in EJMA. It is possible that different design temperature (Metal temperature) is used for bellows and collar. BM II has no such facility and we do not recommend to do this in any case.

- Movements are specified and calculated in a way that practically all computer programs will not be able to calculate. For instance sample 1 stress S2 and Psi are calculated using only axial extension movement and but stresses S5 and S6 are calculated using axial movement of 1.5 with lateral and rotation movements. How to consider movements has always been unclear. It would be possible to program BMII to have possibility to enter movements as in the sample. In practice this is not feasible when possibilities like note 3 of the samples is considered plus possibility of multiple lateral and rotation movements similar to axial should be considered. Program would require far more entries and most of the users would get totally confused. Movements as specified are rare. The result can be achieved with multiple calculations combined external calculation for fatigue cycles if required. **Update:** Movement entries were changed in version 2.2.0 and later and now BM II can calculate the EJMA samples.

- Psi formula includes parameter Sy. In the samples value is given. In reality it is calculated using entries of several values. To enter required values to PMII is possible but they have to be first "calculated" from given Sy. You can do this for instance using Solver in Excel.

- Minor differences in Cf, Cd and Cp values resulting from interpolation calculations. BM is using semilogaritmic interpolation for Cf and Cd instead of fully linear. Cf and Cd graphs are semilogaritmic. This was changed to calculation used in ASME VIII Div 1 App 26, see below.

- Bellows Master is using "full accuracy" of any interim calculation result (Double in Pascal). EJMA samples (and ASME VIII) may have had some of the values rounded during calculations.

- Sample calculations are in Imperial. Bellows Master is calculating internally metric even if program is set imperial. All conversions are done using standardized factors but these conversions may result in minor discrepancies especially when considering rounding issues.

Note: EJMA 10 has also metric calculations and the samples are this time error free. BMII calculates the same values with minor rounding differences and differences in Cf, Cd and Cp. BMII uses ASME VIII Div 1 App 26 method of calculation the factors. Both codes use identical graphs but they have been digitized differently. As it is acceptable to use approximate reading of the graphs there is no reason to have multiple digitized factor methods.

Upgrading instructions and help file refer to an entry field we cannot see on our program. What is the problem? First you need to verify that you have updated your program. You can identify the version via Help menu – About. On the About form is the version of the program. Practically all BM II forms have facility, which remembers the position and size of the form when it was last time closed. If you upgraded the program the old form size may be too small to show all the details. Use Windows' standard method to increase the form size by dragging the bottom, left side or bottom right corner to show form in larger size.

Clarification from EJMA for Zc: Wording in EJMA is not 100 % clear for Zc. They have clarified as shown in the image.
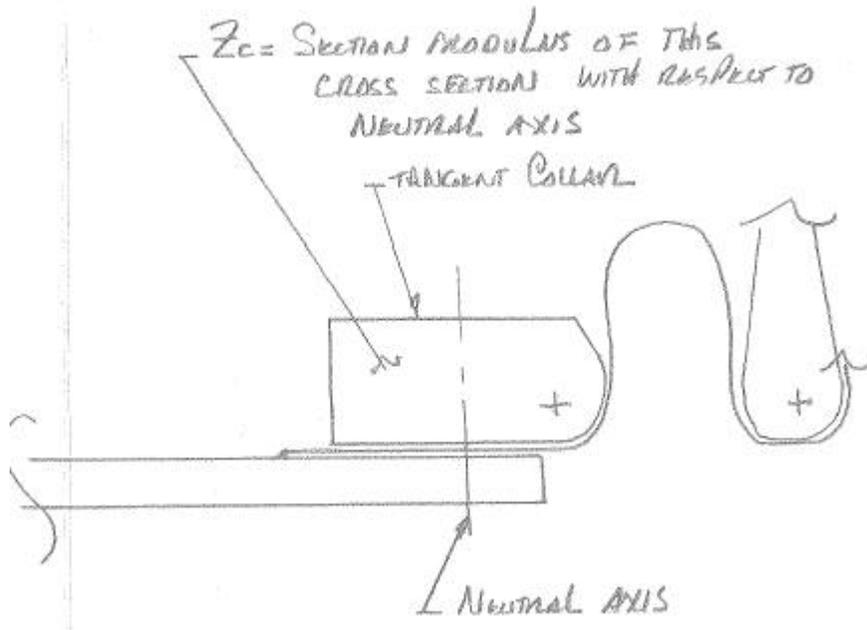
Our customer requires material XXX and it is not in the program/do we have values for material XXX? Bellows Master II is using material values from a database. We supply only some sample materials to use. Even these materials have to be checked by each user as we may have made mistake or user's company has different fatigue values etc. When new material is required it is entered using MatTool II program. See this FAQ, MatTool II help file and Bellows Master II support page on internet for additional information.

Developers have substantial amount of material values and can get more. To extract the values takes time and therefore will be charged.

For a minimal cost you can purchase from us larger material database based on latest ASME code. We keep our program pricing low and do not charge any monies for most of the updates or annual maintenance fees. Material values have to be checked and updated every time ASME codes are changed and this is very time consuming and we simply have to cover at least the cost of the new material standards.

After installing the new version of the program we have lost our calculations and materials. Why? Installation programs are set not to write over user data. The most probable reason for missing information is that the newly installed program is version 2.0 or later and the old is older than version 2.0. These programs use different data files (database) New version cannot read the old and old cannot read the new. Old information is still available if the older program version is used. There is no electronic method available to program users to transfer the information from one database to another. Bata base version was changed between 2.*.* and 3.0.0. Older version can be updated to the new version with the tools available from the developers.

How to make ASME VIII App 26 reinforced bellows calculation? ASME calculation is an extra to the program. Primary purpose of the program is EJMA. When user is entering the required information BM II doesn't know which code will be used for calculation. For this reason there are entries that are not required for ASME VIII calculations. Here is a list of most of them and recommended entry:
Forming method factor: Enter what would be correct for EJMA

Fatigue safety factor: User definable. Normally one is entered. Version 3.0.0 changed the use of this factor. See help file for details.
Thermal expansion: Leave it as "Yes"
Bellows Ends: Leave it as "Fixed"
No of collar gussets: Either leave it as 0 or what would be correct for EJMA
Shape factor: Either enter 1 or what would be correct for EJMA

If you enter what would be correct to EJMA you can switch the calculation code simply by changing the bellows material. EJMA and ASME require different materials because of different fatigue values!

How to make check calculation as shown in ASME VIII div 1 app 26 26-14.2.1? It is always difficult to make check calculation because of different material values etc. Our verification calculation is done using MathCAD. First we build MathCAD calculation sheet, which calculates identical to BM II using entry data from the source. In this case ASME VIII. When we are satisfied that the calculations are identical we enter source material values into MathCAD and compare the calculated results to source results. If the results are identical the formulas in MathCAD and also in BM II are correct. Alternative method is to enter source material values into the material database.

Source data is never clear. Same applies into ASME samples. This case is one of the best. Second issue is rounding. BM II is using metric system internally. Externally it can use imperial or metric. Conversion formulas are using full accuracy as published in international standards. However there is possibility of small deviations because of conversion. Also when BM II is calculating it reads values from the entry fields. In some cases if you use saved calculation your original entry with 3 or 4 decimals is shown only with 2 decimals. If you now calculate you will get different result. To overcome this you can enter full accuracy. Typical example could be any length dimension. Inch is over 25 mm and therefore second and third decimal has some impact. Using mm with 3 decimals would be "crazy". Program tries to handle such issues but cannot be perfect. Cp, Cd and Cf values always differ in 3rd and 4th decimals. This is causing small deviation. Another issue is how the sample calculation was done. Was there interim rounding, which is typical when using a calculator, was it calculated using with computer, spread sheet, calculator memory... These can result in substantial differences.

Our check calculation has proven that BMII calculates ASME sample correctly.

When doing bellows calculation or in general any engineering calculation it is important to understand that the calculations use often factors and formula that are approximations. It is totally meaningless and wrong to give calculated stresses with multiple decimals. Calculations are hardly standard slide rule accuracy!

When we start new calculation our defaults for forming method, materials etc are not automatically entered. Why? Check your Program Default Setting "Clear Display on New Calc". Default values are entered only if this option this selected, e.g. ticked.

We are going to reformat our computer's hard drive. What do we do? Our strong opinion is that the reformatting of a hard drive is not a good idea. There is a very simple reason. It is not possible to back up all the data and you always loose too much. For us the best option is to buy new hard drive and keep the old. We would buy external casing for it. Then it is easy to recover any files. After few months it can be formatted and then there is additional hard drive space to be used for what ever purpose. If you use this option you need to decrypt any files and remove "Make private" option for MyDocuments.

New HD or reformat the steps for BM II are the same. Before reformatting:

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- Back up the installation directory where the program is plus directory where the data files are. Default installation locations are:
NT/2000/XP: C:\Documents and Settings\User\Application Data\J Tolonen Services cc\BelData
Vista/7/8:   C:\Users\User\AppData\Roaming\J Tolonen Services cc\BelData

After backing up start BMII and go to Help menu and click Transfer license. Follow instructions. Remember to copy the license transfer file or send it to us before reformat.

Make sure your back ups are safe and working

After reformat (or new HD):
- Install Windows and other programs and make sure that everything works
- Install BMII and ask for new license. Include with the request also the transfer license file (Name given in help file and dialogs during the process)
- We will send new license

From your back ups you need to copy 3 files to new installation:

- From the program installation directory:
Company_V5.adb (Your logo file)

- From the Data directory:
EJMA Calculations_5.adb (Or similar name)
EJMA Material_5.adb (Or similar name)

Replace newly installed files with your back up files. If your data files are in an other location you need to copy those!

We are going to replace our computer. What do we do? The procedure is the same as for replacing the hard drive as described above.

We are not able to download programs from the FTP site. What do we do? There can be many reasons including mistakes in codes, line problems etc. One possibility is that you are behind Proxy server, which prevents downloads from any FTP site. If this is the case and you cannot do downloads from an other location please contact the program suppliers and special arrangements will be made. FTP site download is used for cost reasons. We try to eliminate all additional costs and therefore keep the software prices to minimum.

We are using Vista. Help files do not work. We get error message only. What do we do? Our help files are "old" Microsoft format with "hlp" file extension. This is reliable fast loading format that can be used from Win 95 to WinXP without any problems. For Vista operating system Microsoft discontinued the inclusion of the support program required to use the hlp files. Newer help file format is supported. This "chm" format has its problems and for this reason we have not yet converted our files. However it is easy to solve the hlp file problem on Vista. Microsoft provides add on download. To install this program to any Vista installation is recommended as there are may hlp help files still in use. August 2008 the program was available from address: http://www.microsoft.com/downloads/details.aspx?familyid=6EBCFAD9-D3F5-4365-8070-334CD175D4BB&displaylang=en
After installation any "hlp" help file works as normal.

Why do we get 100 000 cycles even when we change bellows' convolution dimensions? How can we get higher than 100 000 cycles? EJMA code fatigue values are given in figure 4.20. There is a note that the values are valid primarily in the range of 1000 to 100 000 cycles

(until EJMA 10, see below), due to limited data available for very low and very high cycle ranges. For this reason program has a user definable limit for each material. It can be set to any value. Understandably the user has to satisfy himself that the maximum validity range can be justified. This entry can be set by using MatTool II program. Different limits can be set for each material, calculation code and reinforced or unreinforced designs.

If you wish to change the value you start MatTool II program and change the entries in material general properties. Detailed information for each entry is available by pressing F1 key, which opens help file. Help file has images, which have hot spots. My clicking the hot spots detailed info is available.

BMII is using the limit value as part of a function: Calculated cycles reported = MINIMUM OF(Calculated values, Given limit)

Most of the sample materials supplied with the program have the limit set at 100 000. There are few cases where this limit is set at 1 000 000. These higher values are more of a demonstration than result of some additional information.

New material databases issued after EJMA 10 have the limit set at 1 000 000.

How to make check calculation for ASME VIII div 1 app 26 2013 edition? ASME moved the sample calculations to a separate document PTB-4-2013. Unfortunately the only sample calculation has errors. One is the value of the convolution height and the other is the delta q. More information on both of these issues is in BMII help file – Code issues.

It is always difficult to make check calculation because of different material values etc. Our verification calculation is done using MathCAD. First we build MathCAD calculation sheet, which calculates identical to BM II using entry data from the source. In this case ASME VIII. When we are satisfied that the calculations are identical we enter source material values into MathCAD and compare the calculated results to source results. If the results are identical the formulas in MathCAD and also in BM II are correct. Alternative method is to enter source material values into the material database.

Can Bellows Master II prepare a drawing? No. Firstly BMII is design program for the bellows element only. Secondly all engineering programs where we have seen model or drawing modules become very expensive, nearly impossible to maintain and contain increasing number of mistakes. In addition models and drawings created are something software developer thought and not what the bellows designer needs. Far more productive is to use special modelling and software package. We use internally Inventor 3D software but any drawing package will work. As Inventor is fully parametric 3D package we have developed library parts linked to Excel sheet. To issue high quality manufacturing drawing using this methods can be done in minutes for simple designs and in hours for complex designs.

Another critical issue is that the codes require design calculations for all ancillaries. BMII is for element calculation only. Developers have separate programs for all of the ancillary designs but they are not incorporated intentionally with BMII. This gives far better control to the designers and more robust and easier to maintain software.