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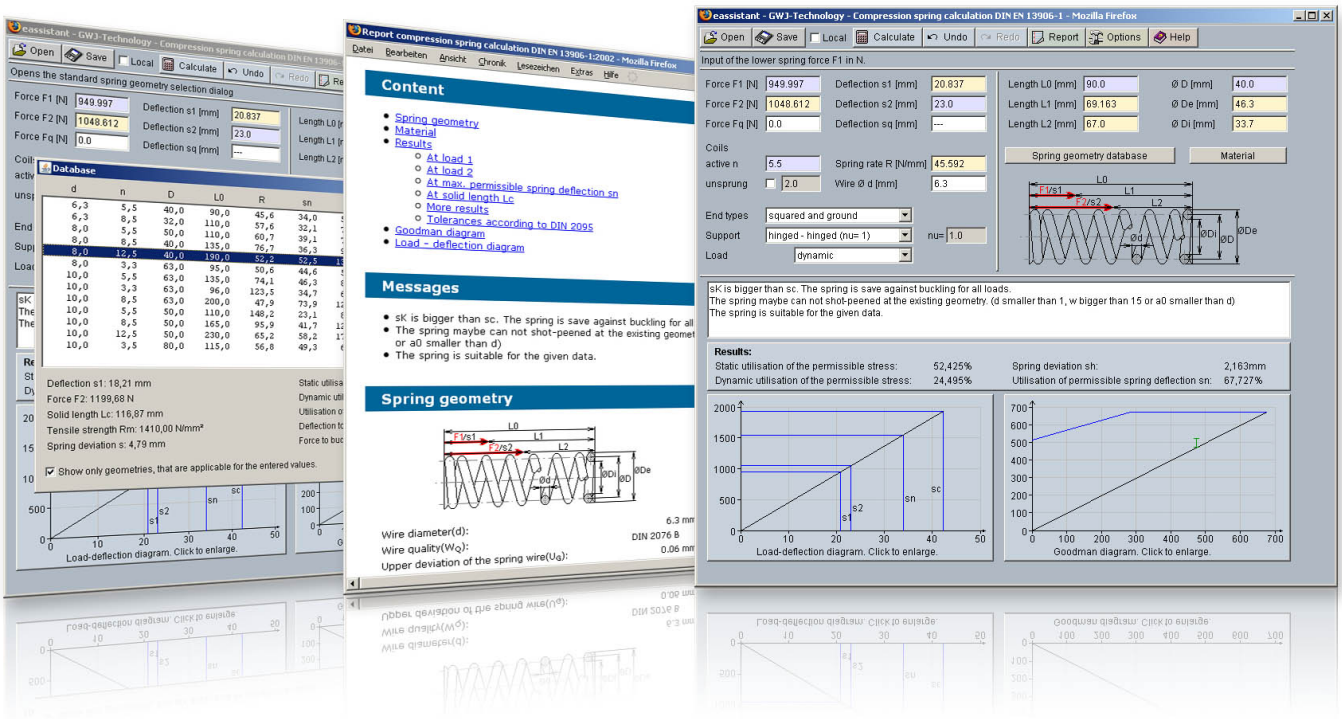
the engineering assistant

GWJ TECHNOLOGY

Calculation Example

Compression Spring According to DIN EN 13906-1, 2002



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Contents

0.1 Calculation Example: Compression Spring According to DIN EN 13906-1, Edition 2002

0.1.1 Start the Calculation Module

Please login with your username and your password. Select the module 'Compression spring' through the tree structure of the project manager by double-clicking on the module or clicking on the button 'New calculation'.

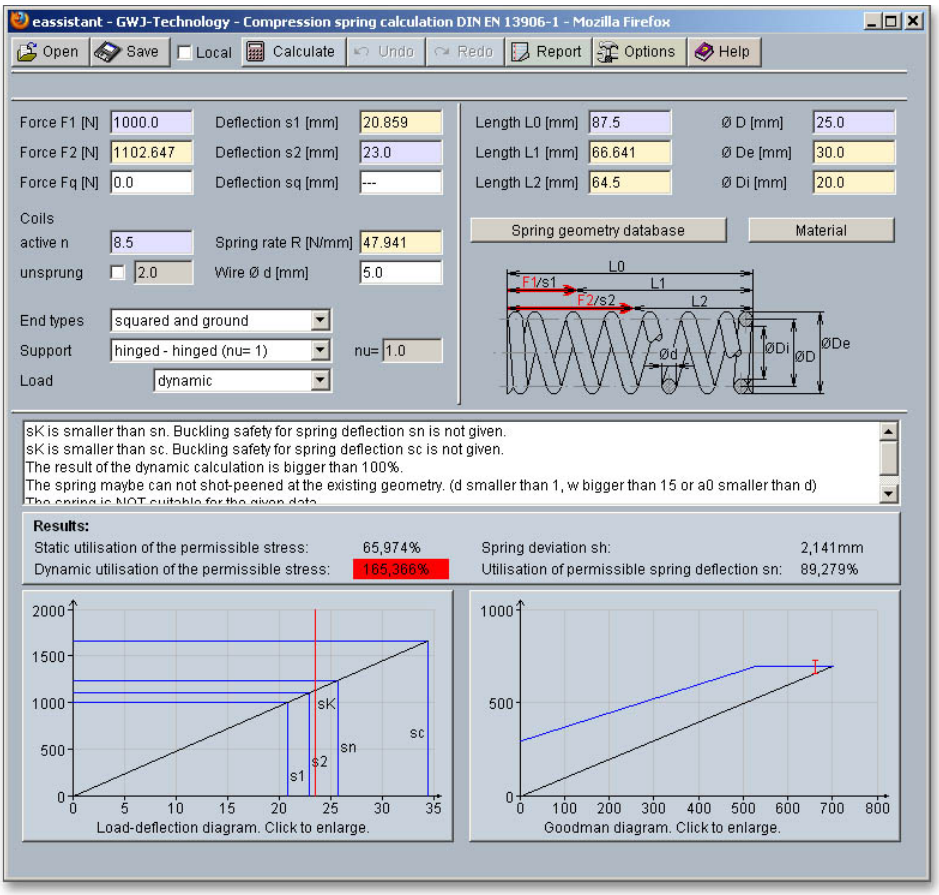

Figure 1: Calculation module

0.1.2 Input Values

A cold coiled compression spring 4 x 32 x 120 is made of patented cold drawn spring steel wire

Wire diameter d	= 4 mm
Diameter D	= 32 mm
Coils n	= 8.5
Length of the unloaded spring L_0	= 120 mm

is alternately loaded with

Spring force F_1	= 300 N
Spring force F_2	= 500 N

We are looking for the spring rate R, the corrected shear stress τ_{k2} for the spring force F_2 = 500 N and spring deviation s_h.

0.1.3 The Calculation

Enter Spring Forces

Please start to enter the spring forces F_1 and F_2. During entering the spring forces, the corresponding spring deflections are automatically determined and will be highlighted in a different color.

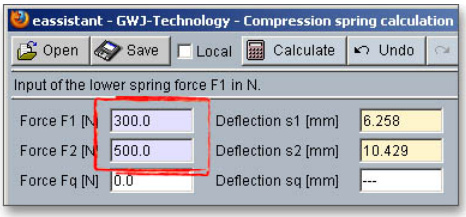

Figure 2: Input of spring forces

Enter Coils and Wire Diameter

Enter the number of coils n as well as the wire diameter d. The settings for the spring ends, the support of spring as well the load will not be changed.

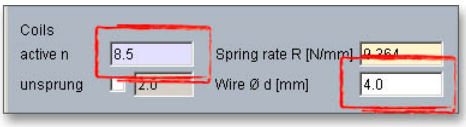

Figure 3: Input of coils d and wire diameter d

Enter Spring Length and Spring Diameter

Enter the spring length L_0 and the spring diameter D.

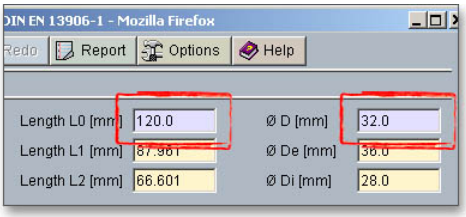

Figure 4: Input of length and diameter

Material Selection

Click the button 'Material' to open the material database and to find the required material for the compression spring.

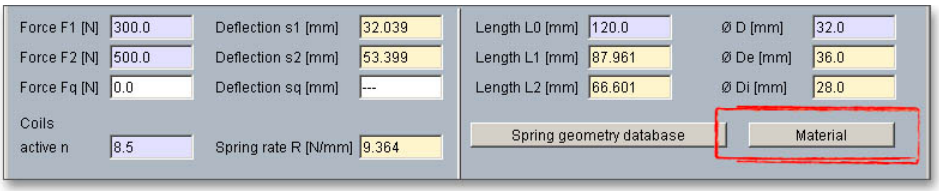

Figure 5: 'Material' button

Select the following material from the listbox: patented cold drawn wire DH according to EN 10270-1: 2001, shot peened, $N = 10e^7$.

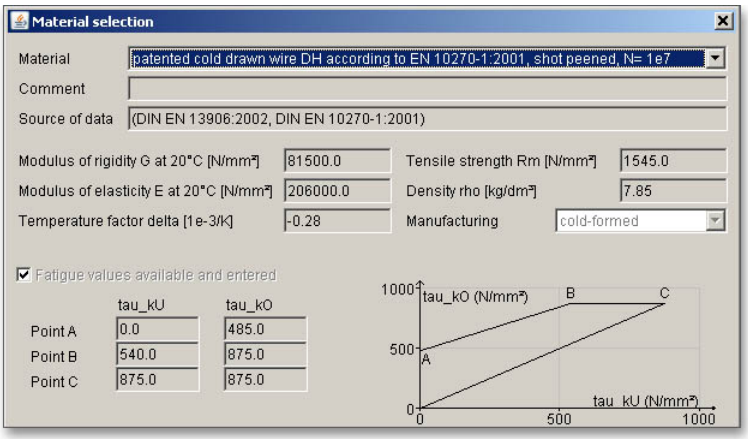

Figure 6: Select the material

0.1.4 Calculation Results

All important calculation results, such as the static and dynamic utilization of the permissable stress, the spring deviation s_h and the utilization of the permissable spring deflection s_n, will be calculated during every input and will be displayed in the result panel. A recalculation occurs after every data input. Any changes that are made to the user interface take effect immediately. Press the Enter key or move to the next input field to complete the input. Alternatively, use the Tab key to jump from field to field or click the 'Calculate' button after every input. Your entries will be also confirmed and the calculation results will displayed automatically.

Spring Rate

The spring rate R is = 9,364 N/mm and is displayed above the input field for the wire diameter.

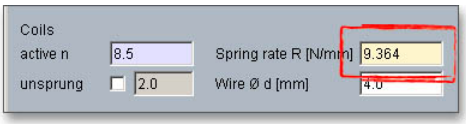

Figure 7: Result for the spring rate

Shear Stress for the Spring Force

The calculation report provides the result for the shear stress. Click the button 'Report' to open the calculation report. The shear stress τ_{k2} for the spring force F_2 is = 636,62 N/mm^2.

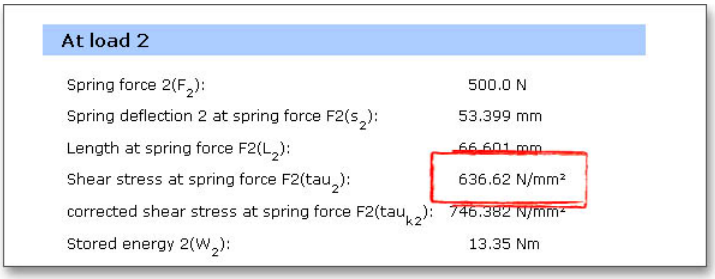

Figure 8: Result for the shear stress

Spring Deviation

You will find the value for the spring deviation s_h in the result panel. The spring deviation s_h is = 21,36 mm.

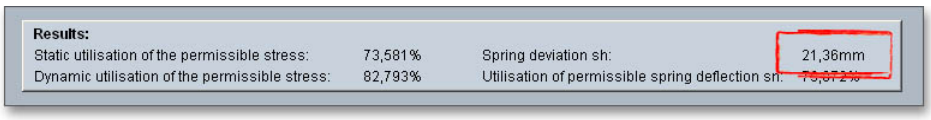

Figure 9: Result for the spring deviation

0.1.5 Documentation: Diagrams and Calculation Report

Diagrams

The results are clearly displayed in the diagrams. Click on the diagram to see the full image and details.

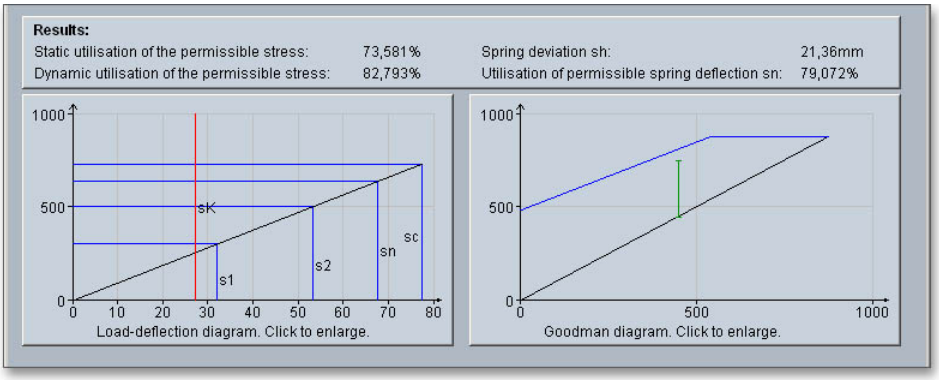

Figure 10: Diagrams

Calculation Report

After the completion of your calculation, you can create a calculation report. Click on the 'Report' button.

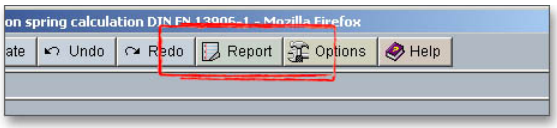

Figure 11: 'Report' button

You can navigate through the report via the table of contents that provides links to the input values, results and figures. This calculation report contains all input data, the calculation method as well as all detailed results. The report is available in HTML and PDF format. The calculation report saved in HTML format, can be opened in a web browser or in Word for Windows. You may also print or save the calculation report:

- To save the report in the HTML format, please select 'File' → 'Save as' from your browser menu bar. Select the file type 'Webpage complete', then just click on the button 'Save'.
- If you click on the symbol 'Print', then you can print the report very easily.
- When you click on the symbol 'PDF', then the report appears in the PDF format. If you right-click on the PDF symbol, you should see the 'Save Target As' option. Click on that option and you will see the dialog box for saving the report.

0.1.6 How to Save the Calculation

When the calculation is finished, you can save it to your computer or to the eAssistant server. Click on the button 'Save'.

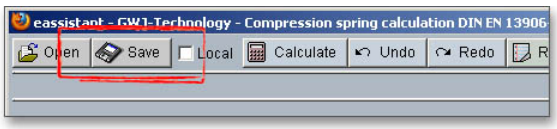

Figure 12: 'Save' button

Before you can save the calculation to your computer, you need to activate the checkbox 'Enable save data local' in the project manager and the option 'Local' in the calculation module. A standard Windows dialog for saving files will appear. Now you will be able to save the calculation to your computer.

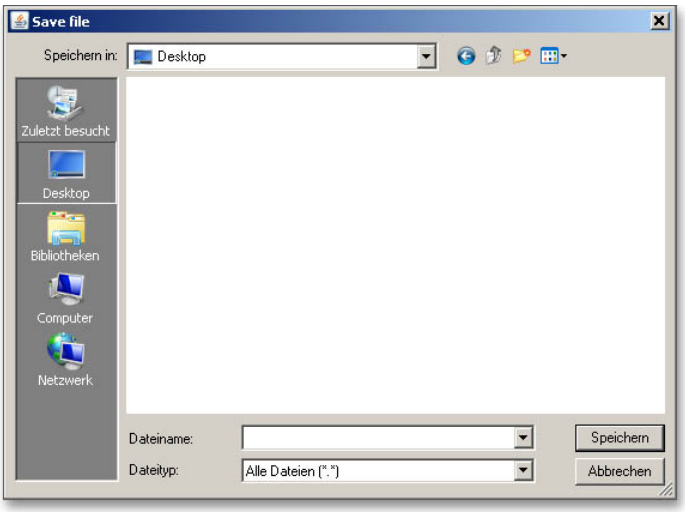

Figure 13: Windows dialog for saving the file

In case you do not activate the option in order to save your files locally, then a new window is opened and you can save the calculation to the eAssistant server. Please enter a name into the input field 'Filename' and click on the button 'Save'. Then click on the button 'Refresh' in the project manager. Your saved calculation file is displayed in the window 'Files'.

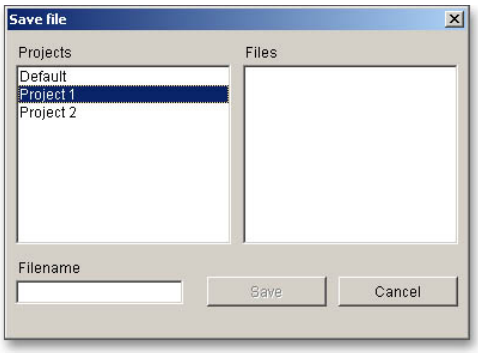

Figure 14: Save the calculation

Our manual is improved continually. Of course we are always interested in your opinion, so we would like to know what you think. We appreciate your feedback and we are looking for ideas, suggestions or criticism. If you have anything to say or if you have any questions, please let us know by phone *+49 (0) 531 129 399-0* or email *eAssistant@gwj.de*.