HEXAGON Newsletter 213 Oct. - Dec. 2025

by Fritz Ruoss

FED3+: Factor q for Torsion Springs with Bent Legs

For torsion springs with tangential legs, the stress coefficient q for the increased bending stress on the inner side of the coil is calculated from the coil ratio, similar to how shear stress is calculated for helical compression springs. However, for torsion springs with bent legs, it is also calculated from the bending radius, and this factor q is usually higher than the one calculated from Dm/d. Enter the bend radius as large as possible. The theoretical mean coil diameter here is 2*(rbending+d/2) = 2*rbending+d. w=Dm/d is then (2*rbending+d)/d = 2*rbending/d+1.

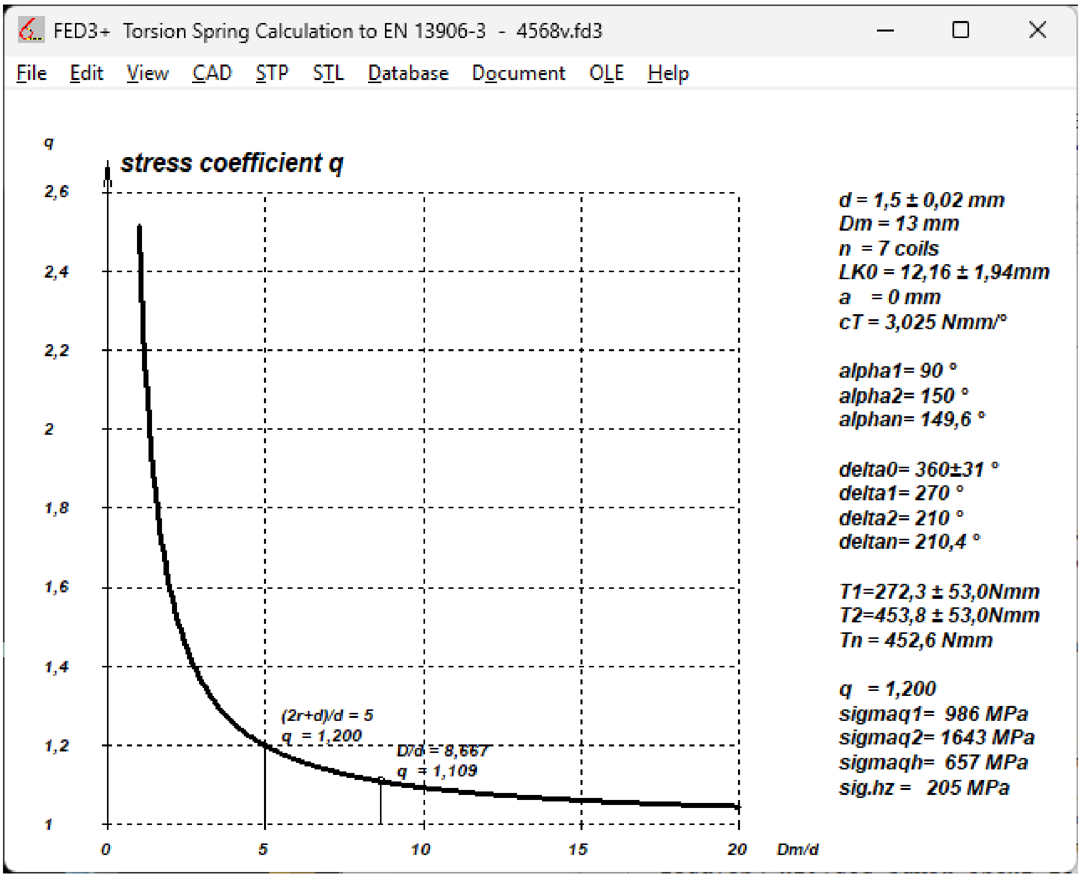
EN 13906-3 uses an approximation equation for q:

$$q = (w+0.07)/(w-0.75)$$

FED3+ uses a more accurate approximation equation (according to Göhner):

$$q = 1 + 0.87/w + 0.642/w^2$$

For w < 2, there are significant deviations. For an extreme bending radius of 0 (w = 1), q is 2.5 according to Göhner, but 4.3 according to EN 13906-3. The stress coefficients on the inside of the coil and at the bend radius are displayed under "View\Stress\q".



In FED3+ the diagram starts at w=1, in EN 13906-1 at w=2.5. The bending radius according to EN should therefore be at least as large as the wire diameter.

FED1+,2+,3+,5,6,7,8,17: New Material Nimonic 75

Nimonic 75, a chromium-nickel steel for an exceptionally wide temperature range of -200 to +1000 °C, has been added to the database. However, it is only suitable for statically loaded springs. Nimonic 90 should be used for dynamically loaded springs.

FED5: taukh in the Goodman Diagram

The stroke stress taukh is tauk2 - tauk1. However, this is not the case for FED5. Here, the stress correction factor k is not constant if the spring is used in the progressive range. The stroke stress tauh (static) is, as usual, tau2 - tau1. But because k1 and k2 are different, the dynamic stroke stress tau2*k2 - tau1*k1 is not taukh. This is because the largest coil diameter Dm (with the highest stress) changes due to the adjacent coils. The following formula is used for calculating the lifting stress used to determine service life: taukh = tauk2 * (1 – F1 / F2).

SR1: Permissible pressure of clamping plates

Question: We have noticed that the material properties differ significantly between the material databases. Unfortunately, I haven't found any information about the meaning of the individual databases. It seems that mat_p_2 contains more "standard-compliant" values (taub/Rm, permissible surface pressure), while pressung.dbf contains more conservative values. Could you please provide a brief explanation of the different databases?

Answer: Only the permissible surface pressure pG differs significantly. mat_p_2.dbf contains only the data from VDI 2230:2015; mat_p_1.dbf contains only the data from VDI 2230:2003; pressung.dbf contains all materials, many of them multiple times. The database has an information field with source information. The oldest data is from VDI 2230:1986.
The conservative values are from VDI 2230 of 1986. It's possible that the permissible surface pressure was set at that time to ensure the bolted joint is creep-resistant.

SR1/SR1+ FAQ: Minimum Thread Engagement Depth

Because VDI 2230 doesn't clearly define what the calculated minimum thread engagement depth mgesmin refers to, there are frequent questions about this. The calculated minimum thread engagement depth according to VDI 2230 must be large enough to prevent thread stripping under all circumstances and to ensure that the bolt breaks at the shank in case of overload. This allows for easy replacement of the broken bolt with a new one during repairs.
Therefore, this error message appears even if the calculated force and stress on the thread are very small and the thread will never strip under the calculated load.

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DI1 Version 2.2 O-Ring Seal Software	190.-
DXF-Manager Version 9.1	383.-
DXFPLOT V 3.2	123.-
FED1+ V32.2 Helical Compression Springs incl. spring database, animation, relax., 3D,..	695.-
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- **Italiano**: FED1+, FED2+, FED3+, FED4, FED5, FED6, FED7, FED9+, FED13, FED14, FED17.
- **Swedish**: FED1+, FED2+, FED3+, FED5, FED6, FED7.
- **Portugues**: FED1+, FED17
- **Spanish**: FED1+, FED2+, FED3+, FED17

Updates:
Software Update Windows: 40 EUR, Update Win64: 50 EUR
Update Mechanical Engineering Package: 800 EUR, Update Complete Package: 1200 EUR

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