

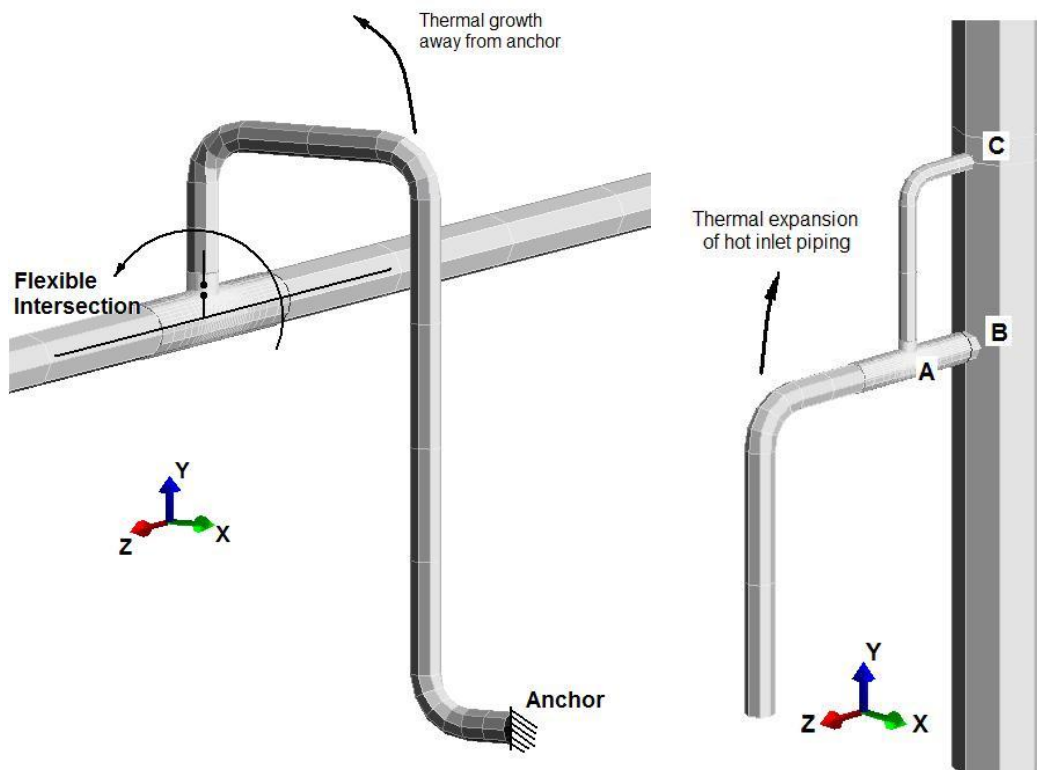
Pipe Stress Errors - When You're Off by 10 Times!

Question: If the SIF is off by 2 and the stiffness is off by 10, how far off is the calculated stress?

The answer, of course, is theoretically *twenty*. The solution could be *not conservative* by 20 times!

We are often asked if this can be possible – and the answer is YES, it is possible but not probable. It is more likely to expect errors of between 2 and 5 with the largest error being due to an inaccurate specification of the intersection stiffnesses.

FESIF or FE107 generate accurate stiffnesses that can be used in the pipe stress analysis to produce more accurate intersection loads and stresses. WRC 329 Section 4.9 shows how adding a repad may actually lower the fatigue strength of an intersection, because the load goes up more than the stress goes down when the pad is added! Typical geometries to watch for are shown below.



If there is no flexibility at intersection B, it carries all the thermal expansion displacement reducing the loads on intersections at A and C. When flexibilities are provided at B, the intersection B loads go down, but the loads at intersections A and C increase!

Is What You're Doing Correct?

FESIF compares WRC 107 calculated stress intensification factors to FEA and B31 stress intensification factors!

From these comparisons it's easy to know if you should feel safe with the design.

The table below shows an example of the output.

Source	Axial	In-Plane	Out-of-Plane	Torsion
FEA	9.91	2.57	5.66	2.42
WRC 107	11.69	3.54	6.90	6.90
WRC 297	22.52	4.36	9.41	9.52

Comparison of FEA, WRC107 and WRC297 Stress Intensification Factors (SIFs)

In the example shown above, the WRC 107 and 297 results are too conservative, with the 297 results being overly conservative by about two times as is often the case. The conservatism or lack of conservatism is a function of the geometry – which is why all critical analyses should be checked.

FESIF Features

1. Unbelievably easy to use.
2. All types of head and cone geometries are supported.
3. Laterals, hillsides and pad supported intersections are included.
4. All comparisons with different codes are generated automatically.
5. Stiffnesses and allowable loads are generated automatically – all the user has to enter is the geometry.