Use SIFs and Flexibilities in CAESAR II®

The following methods are recommended for pipe intersections when the stress intensification factors (SIFs) need to be considered per ASME B31.3 Appendix D Note 12. Simple and comprehensive methods are described below for using SIFs and flexibilities in a pipe stress analysis.

Simple Method

1. Insert in-plane and out-plane SIFs for the branch element as shown below (next page).
2. Specify the general intersection type on any of the elements framing into the intersection. CAESAR II will provide header SIFs.
3. Model the intersection using three pipe elements. Do not enter stiffnesses and do not use any rigid elements to define the intersection.

Notes:

1. *Use the typical intersection model with three beam elements (not rigid elements) framing into the common intersection point.*
2. *The SIF should be specified on the intersection node of the branch element (node 10120 on the element 10110 to 10120 in the example below).*
3. *Specify the intersection type and any other data that is applicable in CAESAR II. CAESAR II will automatically calculate B31 SIFs for the header elements.*
4. *Always check the CAESAR stress reports to be sure that entered SIFs are used properly. (Input values for ii and io override the effective section modulus calculation. Stresses (even at intersections) are calculated using (i)(M/Z) when the SIF is entered.)*
5. *CAESAR II will properly orient the SIFs providing all three elements that frame into the intersection are pipe elements.*
6. *Users can override CAESAR calculated header SIFs also. FESIF calculates SIFs for header elements. These SIFs are often considerably lower than Code calculated values when branch to header diameter ratio (d/D) is much less than 0.5.*
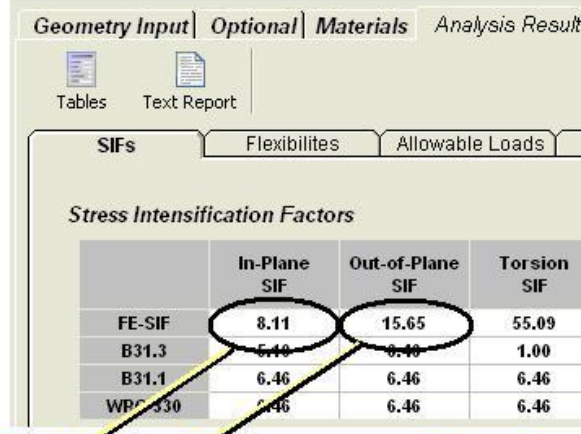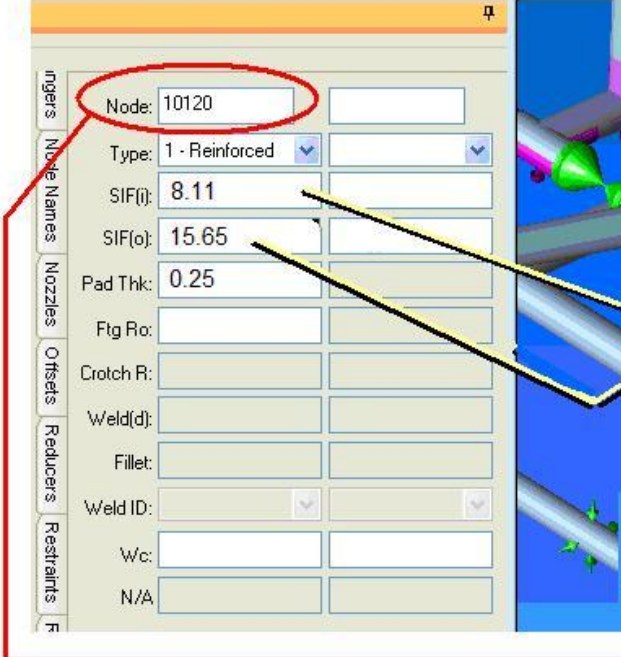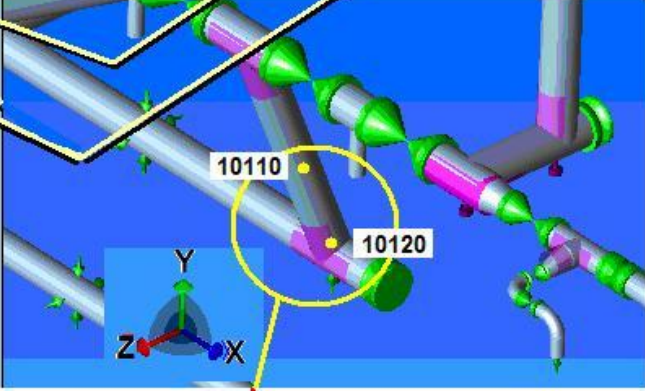
Using SIFs and Flexibilities in CAESAR II®
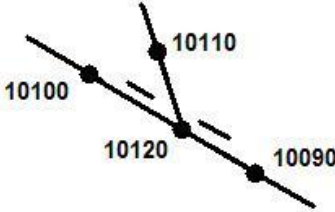
10110
10100
10120
10090

Element:
FROM 10110
TO 10120

Node: 10120

Type: 1 - Reinforced

SIF(i): 8.11

SIF(o): 15.65

Pad Thk: 0.25

Ftg Ro:

Crotch R:

Weld(d):

Fillet:

Weld ID:

Wc:

N/A

Geometry Input | Optional | Materials | Analysis Result

Tables   Text Report

SIFs | Flexibilites | Allowable Loads

Stress Intensification Factors

	In-Plane SIF	Out-of-Plane SIF	Torsion SIF
FE-SIF	8.11	15.65	55.09
B31.3	5.10	8.10	1.00
B31.1	6.46	6.46	6.46
WRC 330	6.46	6.46	6.46

10110
10120

Applying SIFs at Pipe Intersection in CAESAR II