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What's New in CAESAR II v13

CAESAR II v13

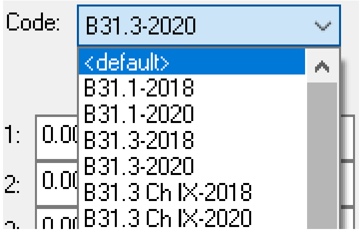
Co Nowego

Dodano wsparcie dla ASME B31J – 2017 dla współczynników SIF i sprężystości

Zaktualizowano:

- B31.1(power piping) – wydanie 2020.
- B31.3 oraz B31.3 Chapter IX (process piping) - wydanie 2020.
- B31.5 (refrigeration piping & heat transfer) - wydanie 2019.
- B31.8 oraz B31.8 Chapter VIII (gas transmission & distribution) - wydanie 2020.
- B31.9 (building services) – wydania 2017 oraz 2020.
- EN-13480-3:2017/A4:2021.

Dodano wsparcie dla wydań wielu norm rurociągowych – dla wszystkich wymienionych powyżej, poprzednie wydania z wersji v12 są wciąż dostępne



Dodano kreator podpory sprężynowej z tarciem tzw *Spring Can with Friction*, co upraszcza modelowanie tej podpory

Dodano współczynniki gęstości cieczy do edytora przypadków obciążeń tzw FDM (Fluid Density Multiplier). Ten współczynnik pozwala dopasować gęstość cieczy dla każdego przypadku obciążenia

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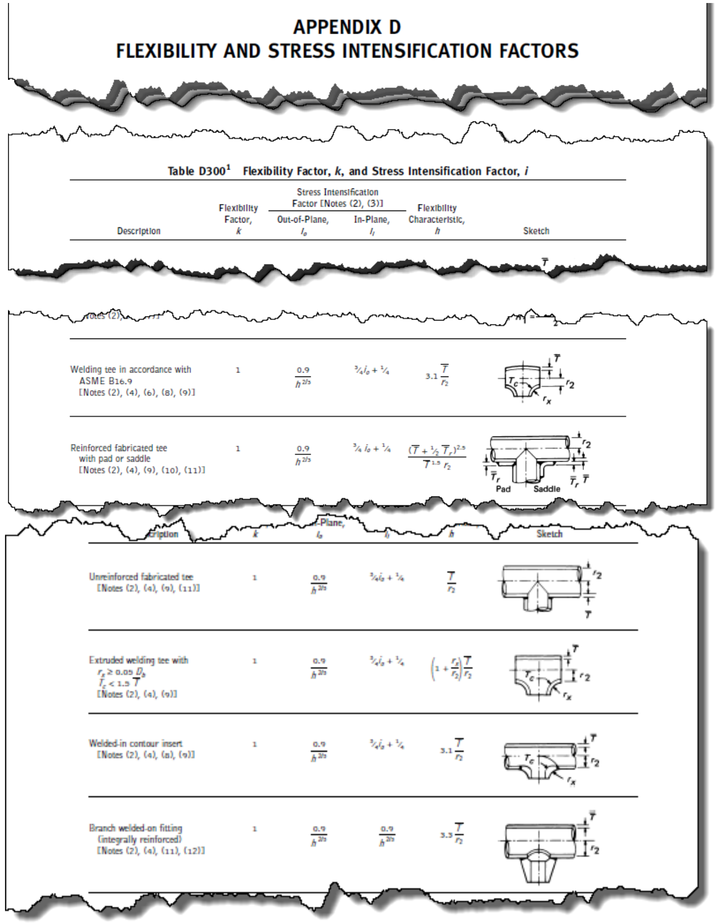
ASME B31.3 2020 Edition included 1 significant change

Appendix D has now been removed from B31.3 and B31.1



APPENDIX D
FLEXIBILITY AND STRESS INTENSIFICATION FACTORS

Table D300[1] Flexibility Factor, k, and Stress Intensification Factor, i

Description	Flexibility Factor, k	Stress Intensification Factor [Notes (2), (3)] Out-of-Plane, i_o	In-Plane, i_i	Flexibility Characteristic, h	Sketch
Welding tee in accordance with ASME B16.9 [Notes (2), (4), (6), (8), (9)]	1	$\frac{0.9}{h^{2/3}}$	$\frac{3}{4}i_o + \frac{1}{4}$	$3.1\frac{\bar{T}}{r_2}$	
Reinforced fabricated tee with pad or saddle [Notes (2), (4), (9), (10), (11)]	1	$\frac{0.9}{h^{2/3}}$	$\frac{3}{4}i_o + \frac{1}{4}$	$\frac{(\bar{T} + \frac{1}{2}\bar{T}_r)^{2.5}}{\bar{T}^{1.5} r_2}$	Pad, Saddle
Unreinforced fabricated tee [Notes (2), (4), (9), (11)]	1	$\frac{0.9}{h^{2/3}}$	$\frac{3}{4}i_o + \frac{1}{4}$	$\frac{\bar{T}}{r_2}$	
Extruded welding tee with $r_x \geq 0.05 D_b$, $T_c < 1.5 \bar{T}$ [Notes (2), (4), (9)]	1	$\frac{0.9}{h^{2/3}}$	$\frac{3}{4}i_o + \frac{1}{4}$	$\left(1 + \frac{r_x}{r_2}\right)\frac{\bar{T}}{r_2}$	
Welded-in contour insert [Notes (2), (4), (8), (9)]	1	$\frac{0.9}{h^{2/3}}$	$\frac{3}{4}i_o + \frac{1}{4}$	$3.1\frac{\bar{T}}{r_2}$	
Branch welded-on fitting (integrally reinforced) [Notes (2), (4), (11), (12)]	1	$\frac{0.9}{h^{2/3}}$	$\frac{0.9}{h^{2/3}}$	$3.3\frac{\bar{T}}{r_2}$	

Appendix D was the guidance on SIF and flexibility factors

For SIF and flexibility factors B31.3 2020 now refers to ASME B31J

There is **now no Appendix D –** SIFs and k factors must be calculated according to B31J

Although the "…more applicable data" phrase remains

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ASME B31J

ASME B31.3 Appendix D Welding Tee

Term	Equation
Flexibility Characteristic, h	$(1+ r_x/r_2)T/r_2$
Out-of-Plane SIF, i_o	$0.9/h^{2/3}$
In-Plane SIF, i_i	$0.75i_o + 0.25$
Flexibility Factor, k	1

B31J 2017 Welding Tee

Term	Equation
Run In-plane Flexibility Factor, k_{ir}	$0.18\ (R/T)^{0.91}\ (d/D)^5$
Run Out-of-plane Flexibility Factor, k_{or}	1
Run Torsional Flexibility Factor, k_{tr}	$0.08\ (R/T)^{0.91}\ (d/D)^{5.7}$
Branch In-plane Flexibility Factor, k_{ib}	$(1.91(d/D) – 4.32(d/D)^2 + 2.7(d/D)^3)\ (R/T)^{0.77}\ (d/D)^{0.47}(t/T)$
Branch Out-of-plane Flexibility Factor, k_{ob}	$(0.34(d/D) – 0.49(d/D)^2 + 0.18(d/D)^3)\ (R/T)^{1.46}(t/T)$
Branch Torsional Flexibility Factor, k_{tb}	$(1.08(d/D) – 2.44(d/D)^2 + 1.52(d/D)^3)\ (R/T)^{0.77}\ (d/D)^{1.61}(t/T)$
Run SIF In-plane, i_{ir}	$0.98\ (R/T)^{0.35}\ (d/D)^{0.72}(t/T)^{-0.52}$
Run SIF Out-of-plane, i_{or}	$0.61\ (R/T)^{0.29}\ (d/D)^{1.95}(t/T)^{-0.53}$
Run SIF Torsional, i_{tr}	$0.34\ (R/T)^{2/3}\ (d/D)(t/T)^{-0.5}$
Branch SIF In-plane, i_{ib}	$0.33\ (R/T)^{2/3}\ (d/D)^{0.18}(t/T)^{-0.7}$
Branch SIF Out-of-plane, i_{ob}	$0.42\ (R/T)^{2/3}\ (d/D)^{0.37}(t/T)^{0.37}$
Branch SIF Torsional, i_{tb}	$0.42\ (R/T)^{2/3}\ (d/D)^{1.1}(t/T)^{1.1}$

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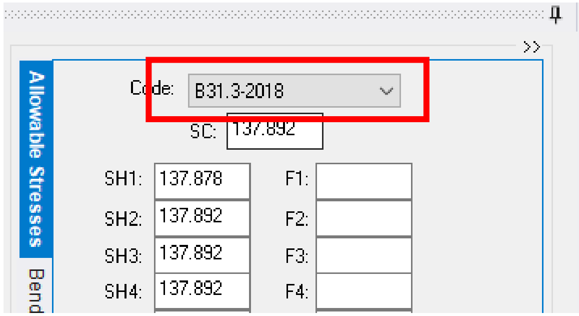
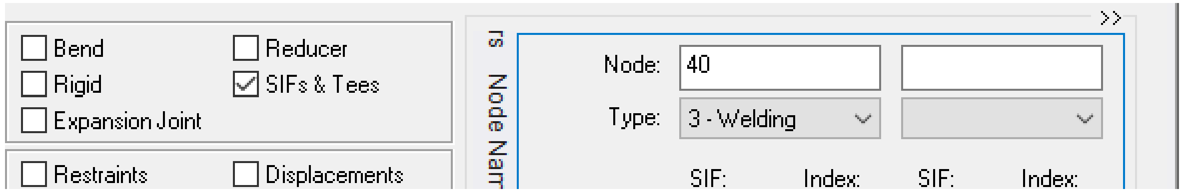
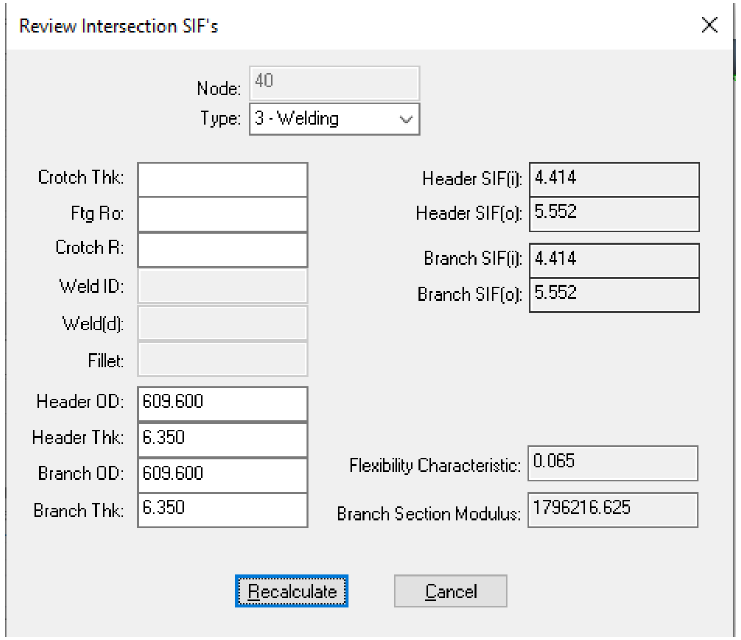


If a piping code is chosen that includes SIF/k calculations, CAESAR II will use the code guidance





B31.3 2018 Appendix D would be used to calculate SIFs here

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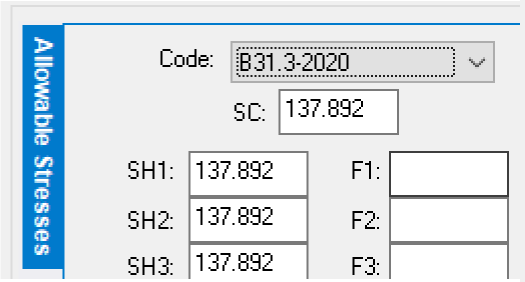

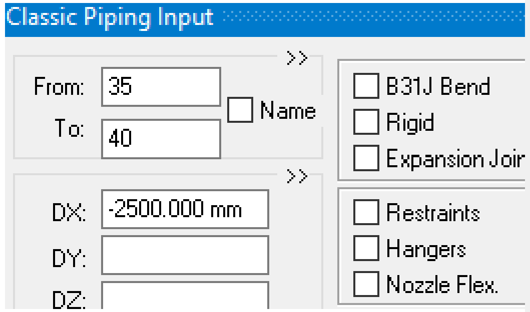

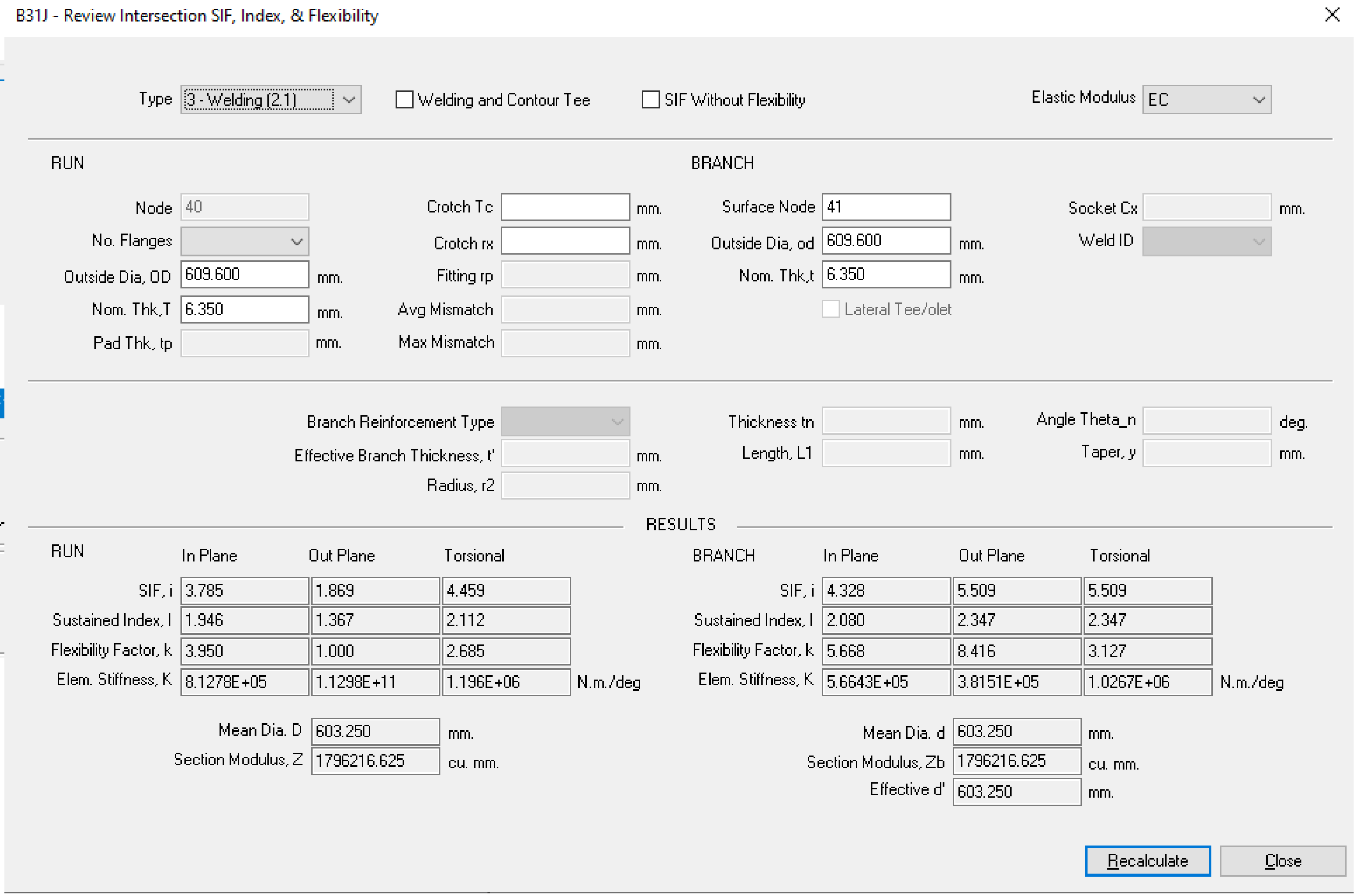

The bend, reducer and SIFs & Tees check boxes are now labelled as B31J

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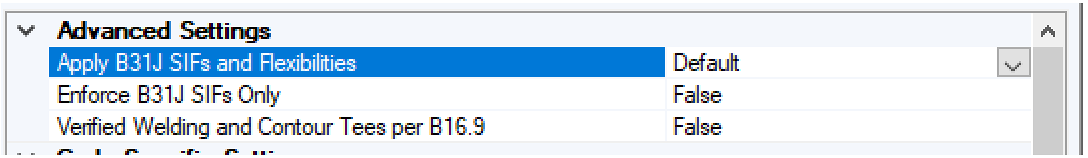
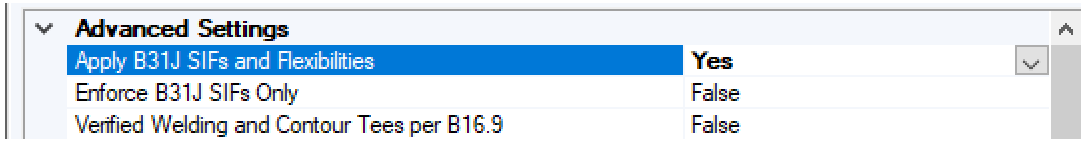
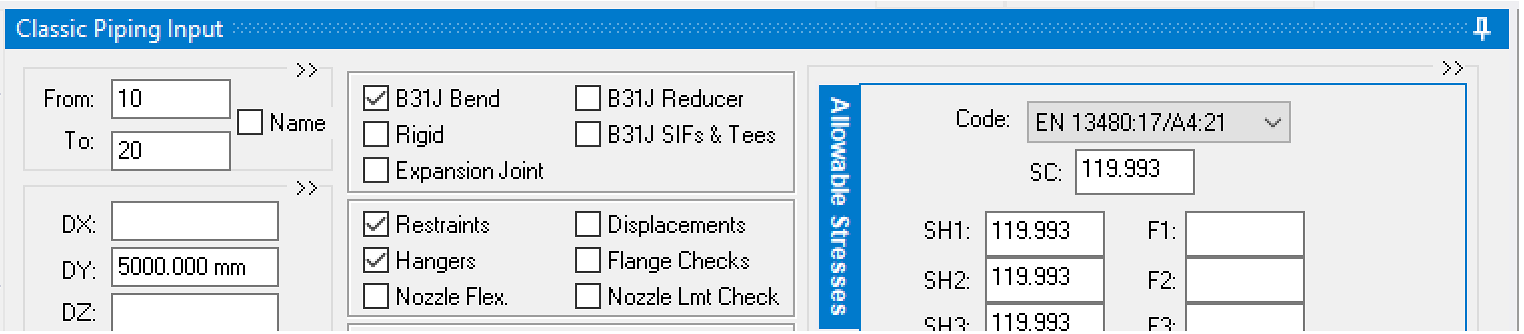
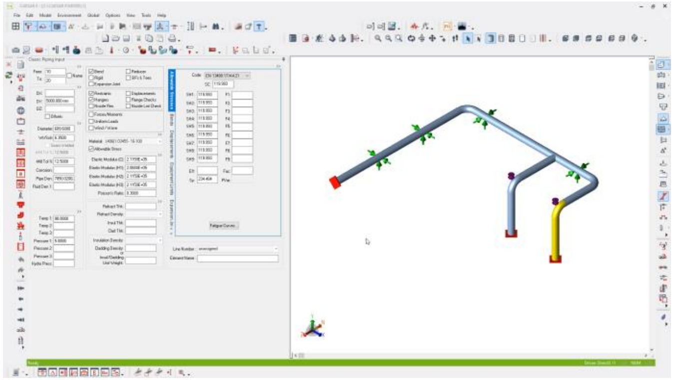




A simple change to a config switch tells CAESAR II to use B31J for any code (metallic piping codes only)





e.g. with EN-13480 as the code, B31J is still active

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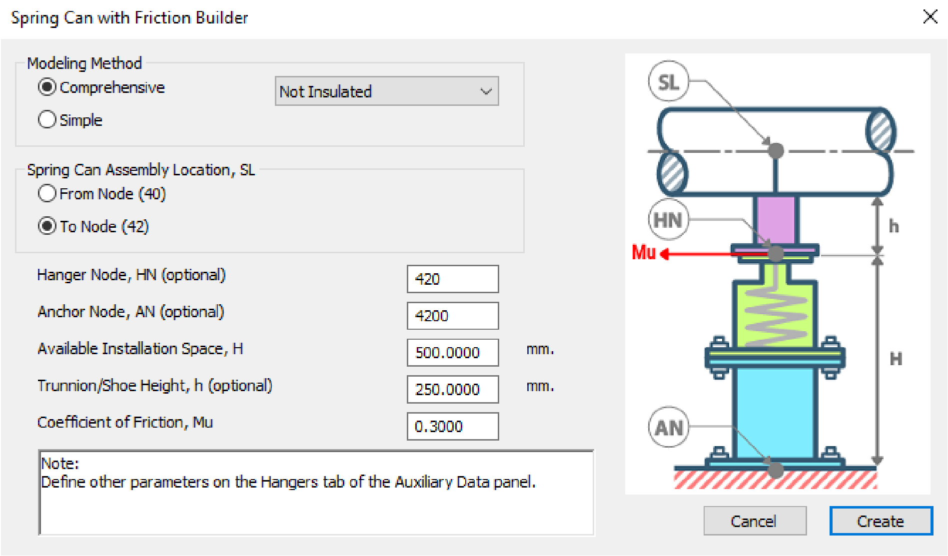
Spring Can with Friction

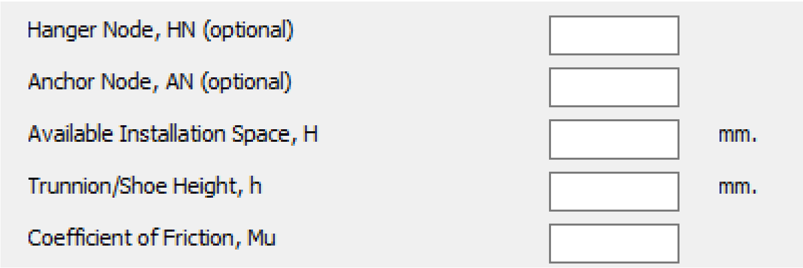


A long-requested feature from the user base has been the ability to add friction onto spring cans.

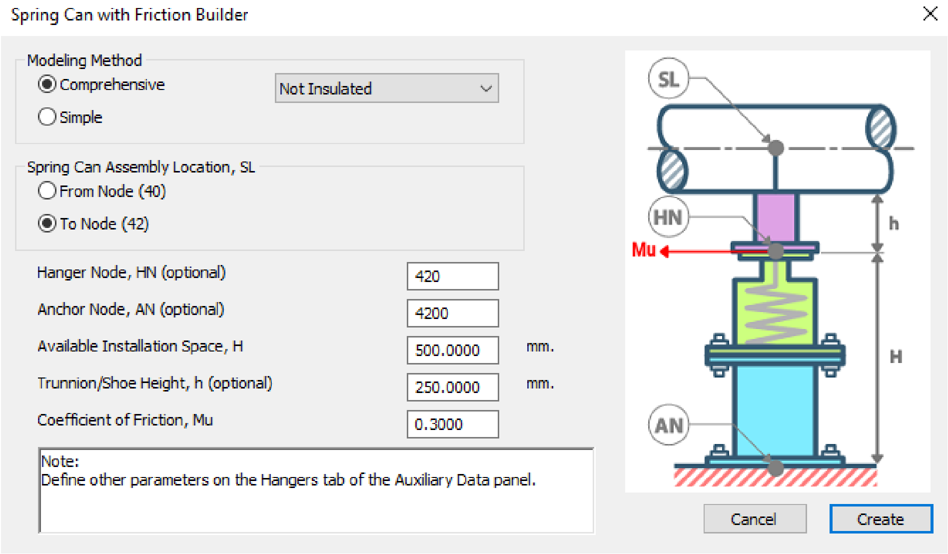
This has been possible for some time using a set of restraints and hangers connected with Cnodes

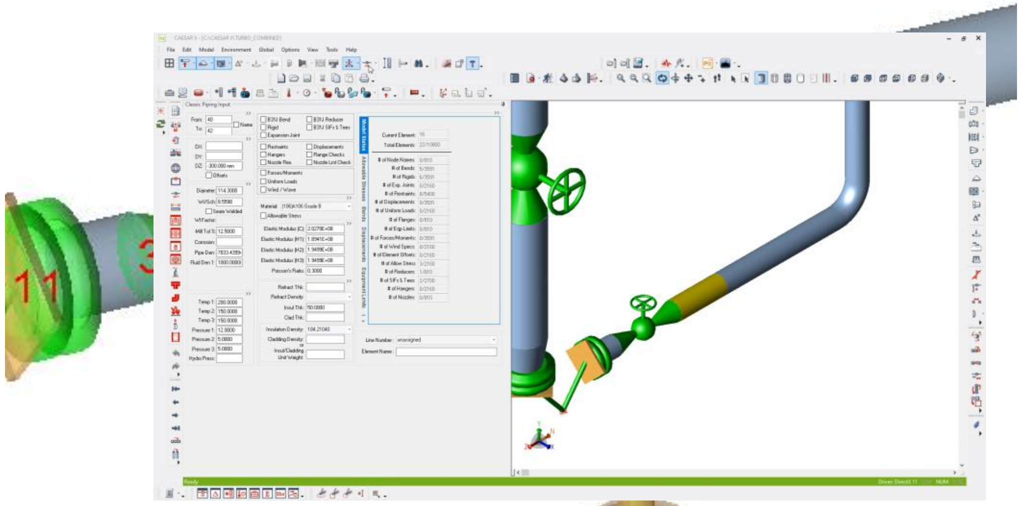
Zero weight rigids could also be added for a comprehensive design – but this added further complexity to the modelling

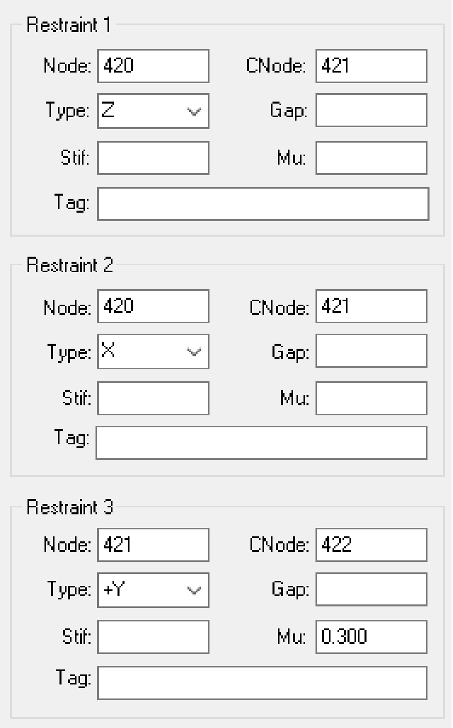
The new Spring Can Modeller can build these arrangements automatically with just a few values from the user

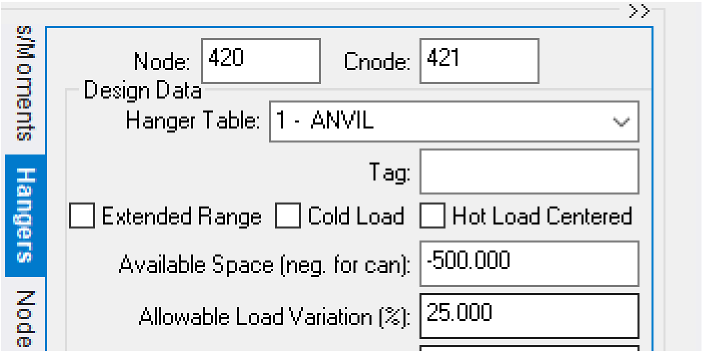


Spring Can with Friction









CAESAR II adds the Spring Can and connects via CNode to the restraints, with friction added appropriately

If a comprehensive build is selected, the trunnion is also built and anchored at the base

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Fluid Density Multiplier

Drag a column header and drop it here to group by that column

	Exclude	Definition	Name	Stress Type	Alternate SUS/OCC	Fluid Density Multiplier
L1	☐	W+T1+P1	OPERATING CASE CONDITI	OPE		1.00
L2	☐	W+T2+P2	OPERATING CASE CONDITI	OPE		0.50
L3	☐	W+T3+P3	OPERATING CASE CONDITI	OPE		1.50
L4	☐	W+P1	SUSTAINED CASE CONDITI	SUS	☐	1.00
L5	☐	W+P2	SUSTAINED CASE CONDITI	SUS		0.50
L6	☐	W+P3	SUSTAINED CASE CONDITI	SUS		1.50
L7	☐	L1-L4	EXPANSION CASE CONDITI	EXP		

Fluid Den 1: 1000.00000

Another long-requested feature is the ability to utilize multiple fluids.

CAESAR II v13 includes a “Fluid Density Multiplier” in the load case editor to achieve this

The multiplier factors the Fluid Density specified in the input for the selected load case for the weight computation

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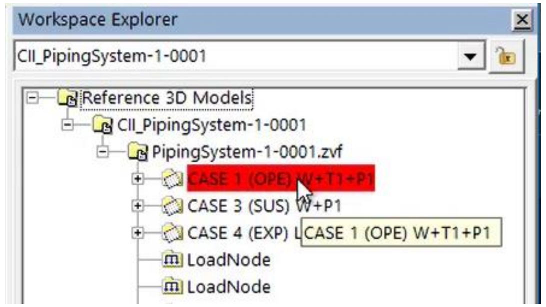
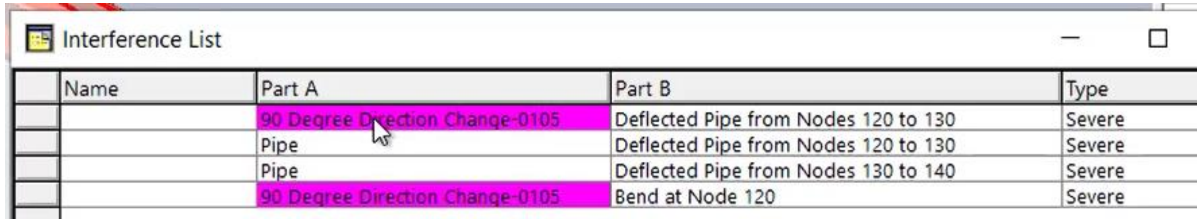
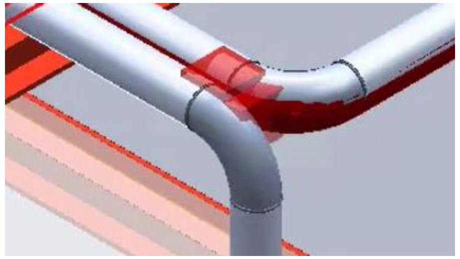
CAESAR II® 13: Enhancements

Smart 3D Integration - Displacements for Load Cases – Deflected Pipe Interference Detection

- An integration enhancement was made by Smart Interop Publisher (SPIOP) to retrieve the CAESAR II displacement values per load case made available by the Data Export Wizard creating an Access MDB.
- Using SPIOP with data imported from the CAESAR II MDB data export, translate the data into a Deflected Piping Intelligent 3D model.
- Attach the Deflected Piping Intelligent 3D model as a Reference 3D file in Smart 3D. This includes the displacement values per load case.
- Review and analyse the deflected piping clashes in Smart 3D using the Interference Detection functionality.







This integration feature allows detecting, and correcting, early during the design phase. These clashes would only occur during normal operation or transient conditions. Resolving these piping clash issues early can result in significant cost savings as well as improving operational safety and reducing overall risk.

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Thank you!

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