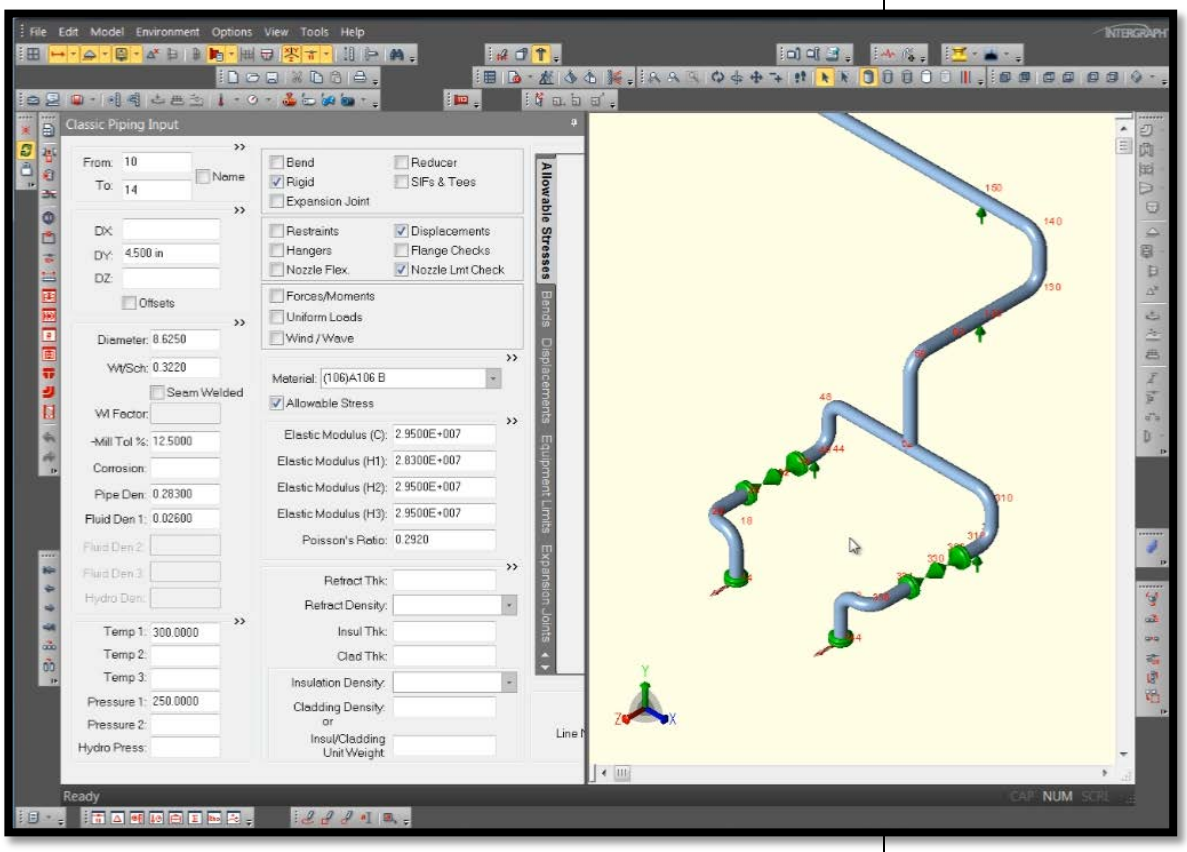
CAESAR II® Fundamentals - Example Four Video 7

1. **Open the CAESAR II file called: EXPORT_DUMMY_LEG_EXAMPLE.**

   In this lesson, we're going to take a look at this line. This is a modified version of the export line that we've been working with. It will serve as a good example for us to see about modeling a dummy leg. What happens when we analyze this line is that it's going to come in really close to passing the nozzle limit checks. But the way the geometry works in this line is that it pushes back in the -Z direction as it heats up and expands.



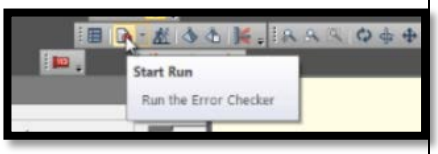
That results in a moment around the X axis that is greater than what's allowed in the nozzle limit checks. But this gives us an excellent opportunity to model a dummy leg in this line to reduce that moment. In the process we'll learn some new features and techniques in CAESAR II.

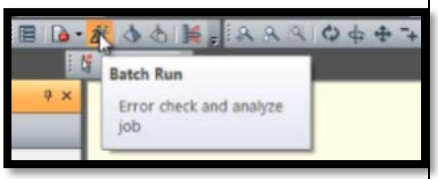
2. First let's run the analysis.

   Click the Error Checker button.

   We can see the system produces a center of gravity report for us, and there are no warnings in the report.

   Click the Running Man button to start the analysis.





3. **Click on the Operating Load case**.

   Click on the Nozzle Check report.
   Display it on the screen.

NOZZLE CHECK REPORT: Nozzle Loads Screening
CASE 1 (OPE) W+D1+T1+P1

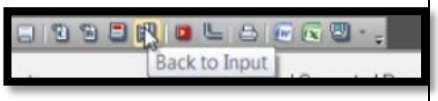
Node		fa lb.	fb lb.	fc lb.	Forces Check	ma ft.lb.	mb ft.lb.	mc ft.lb.	Moments Check
LOAD CASE DEFINITION KEY									
CASE 1 (OPE) W+D1+T1+P1									
10	Absolute Method								
	Limits	1100	850	700		1900.0	2600.0	1300.0	
	1(OPE)	-845	-165	-55	0.768	73.2	941.6	-1411.6	1.086 *
348	Absolute Method								
	Limits	1100	850	700		1900.0	2600.0	1300.0	
	1(OPE)	903	148	-180	0.821	1044.0	-1449.3	765.7	0.589
260	Absolute Method								
	Limits	2405	2405	1798		4720.6	3171.7	4130.5	
	1(OPE)	17	-926	125	0.385	-805.3	2043.7	1859.7	0.644

We can see that this is close to being within the recommended limits. It's just over 1 here - the bending moment around X is shown at 1.086 around node 10, which is at the first nozzle.

If you recall our local coordinate system A, B, C for the nozzle check: A is the pipe (defined in Y), B is the reference (specified as Z) and C=A cross B or X. Therefore mc is moment about the global X axis.

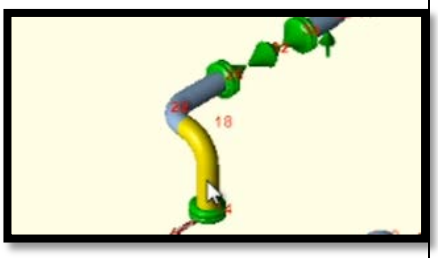
The other forces and moments are within range, so we won't need to be concerned about them. We just need to take care of this one issue, which is about 100 foot pounds or so excessive.

Close out this report.
Return to the Input Piping screen.

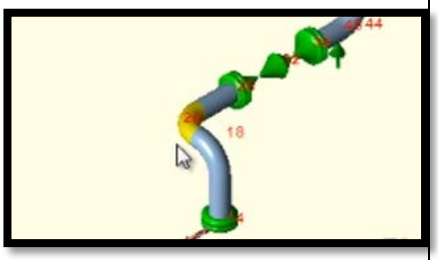


4. **Click on the second element.**

   This is the two foot six inch element.
   It has a bend on the end of it.

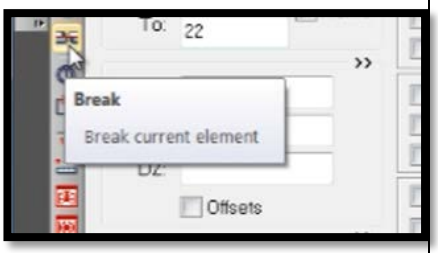


   The next element as we move along the line is going to be a two foot element. It also has a bend on the end of it.
   These two elements are modeled one after the next, and to insert a dummy leg starting between them we need to have a separate node where they touch.

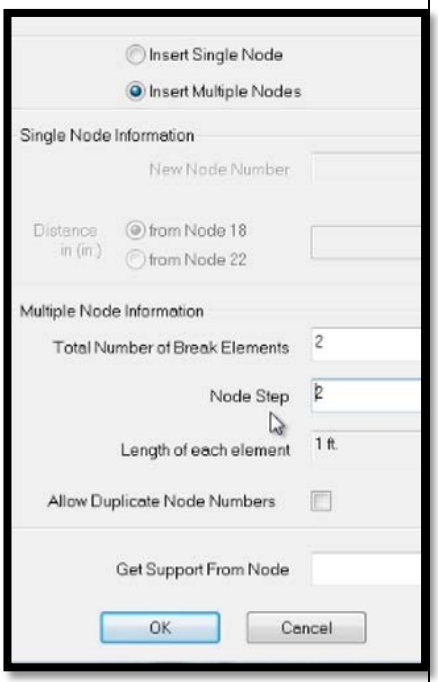


5. We'll break the third element.

   Select the third element.
   Click the Break button.

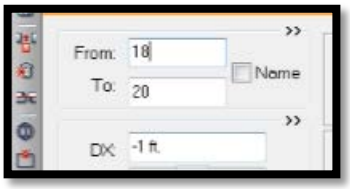


   In the dialog box, **set the break for two elements**.
   The system should split it for us.

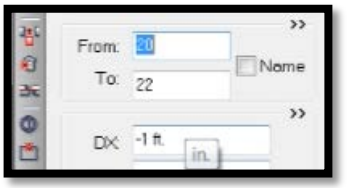


6. **Click in another field in the dialog box**.
   The system breaks the element at the midpoint and assigned node numbers for us. **The two elements each have a length of one foot.**

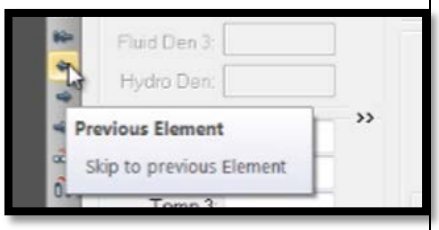
   Click OK.



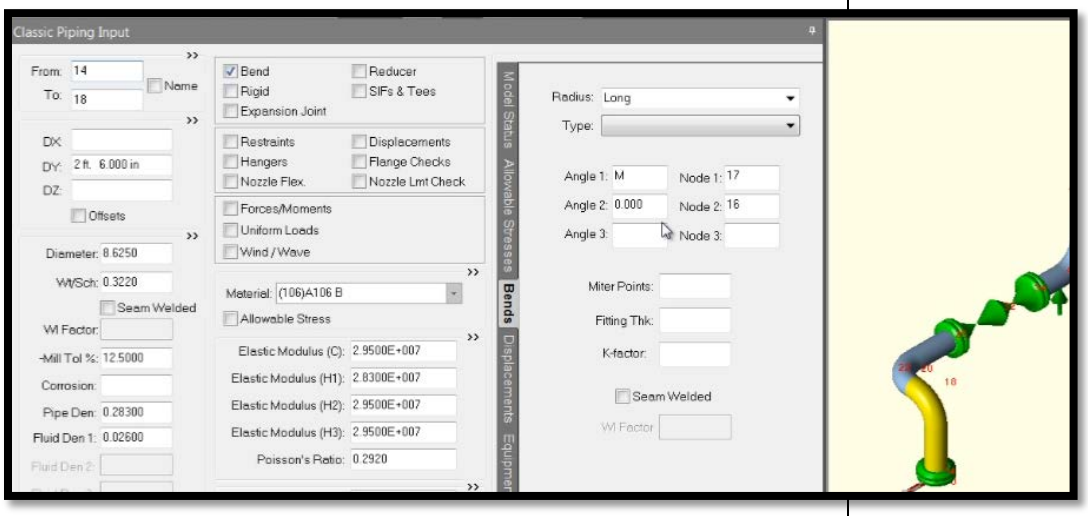
   We now have two elements. From node 18 to 20 is a one foot element, and if we click **Next Element** we'll see from 20 to 22 we have another one foot element.



7. **Select the Previous Element.**
   This is where we'll start the dummy leg.



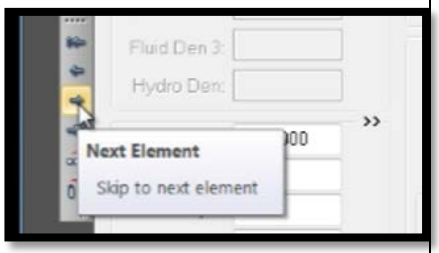
First let's take a look at these bends in this area.
Look at the element from node 14 to 18.
It has a bend.



If we look at the bend information we can see the node numbers around the bend. We also see that the first one is called a zero degree node.
That's at the start of the bend, and it's node 16.

Following node 16 comes node 17. This node occurs at the midpoint of the bend. Then, at the end of the bend is node 18. So that's the way CAESAR II defines its bends.

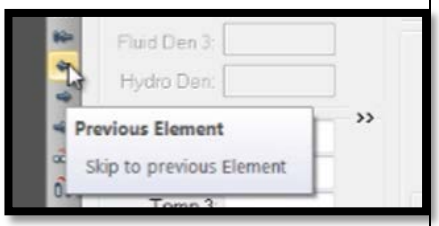
8. **Click Next Element.**
   Looking further we can see that from node 18 to 20 we have a one foot element. There's no bend on this element.



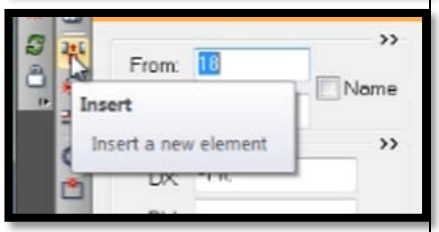
From node 20 to 22 there is another bend.
We might expect to see a zero degree node here on node 20, and then a midpoint at 21 and the end of the bend at 22.

The zero degree node is not on here. The reason for this is that the "zero degree point" on the second bend is the same as the "far point" on the first bend. You can't have two nodes at the same location (excluding CNODES).

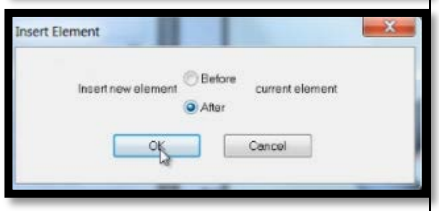
In the future, **if you have an element that you're trying to connect a dummy leg to and there's a zero degree node on that same node you're connecting to, you'll need to go ahead erase it. Then you can connect a dummy leg there.**

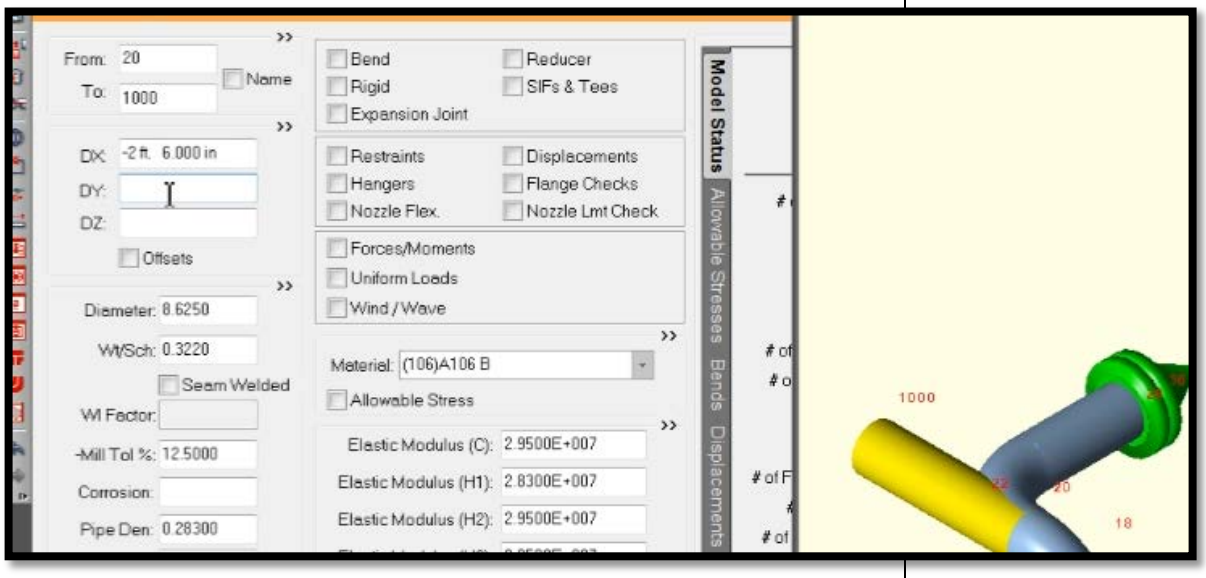


9. **Click Previous, and return to the element from node 18 to 20.** This is where we're going to connect our dummy leg.



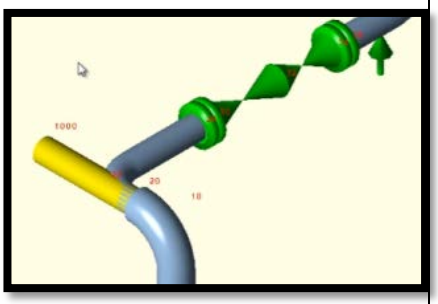
10. **Click Insert**.
We'll put a new element after the current one.
This will be from node 20 to node 1,000.
In the -X direction,
Type: -2-6 <Enter>.





The system added the pipe at the same diameter, and when modeling a dummy leg it's common to make it a smaller diameter, typically smaller by one or two sizes.

For this example, we'll just go down one size.

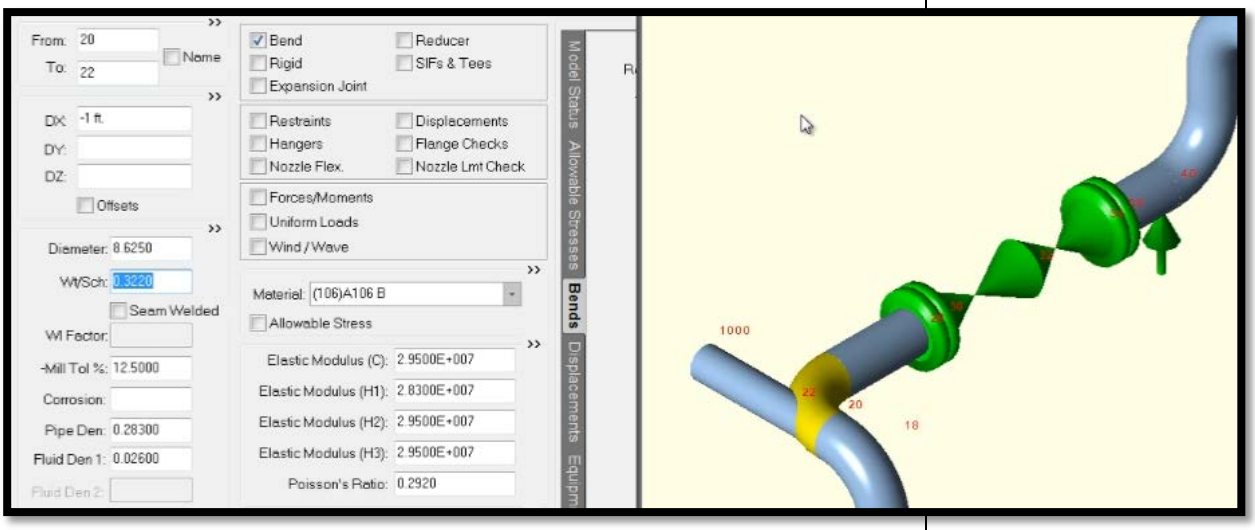


In the Diameter field,
Type: 6 <Enter>.
Now the dummy leg is a six inch diameter pipe.

11. When we changed the size to 6", the system set all the following pipes to that same diameter.

12. **Click on the element following the dummy leg**.

In the Diameter field,
Type: 8 <Enter>.



Click on some of the following elements and verify everything is 8" except the dummy leg, which is 6".

All right, I think this is a really good stopping point. Why don't you get your model to here, and then we'll continue after this.