Questions & Answers

Webinar: Static Load Case Editor

Aired March 10, 2020

Questions	Answers
For the HGR LC discussion, the conventional "hot load approach" was discussed. There is also the "cold load approach" and when it is advantageous to use it?	The difference between hot load design & cold load design is the application of the "balancing load" for the support. Hot load design has the balancing load applied to the operating state and cold load design has the balancing load applied to installed state. Use cold load when attempting to align nearby equipment in the cold system.
Should Fatigue Load Case/s be included in the analysis, even for known non-vibrating piping systems?	The expansion stress range calculations by most piping codes considers fatigue. Performing a CAESAR II "fatigue evaluation" is a more rigorous method.
Is KHK Level 2 similar to "strain-based design" methodology in buried pipeline analysis, where the piping system can slightly exceed the Sy or SMYS of the pipe material but still maintain pressure containment?	Not really, as indicated in the webinar, KHK2 analysis addresses bend plasticization and soil liquification.
Can CAESAR II alert the Analyst for the onset of an upheaval buckling or potential, for onshore buried piping, similar to subsea DNV pipeline analysis? Most stress software cannot alert the Analyst of buckling, but we still have to use another specific software for Buckling Analysis. Or any feature in CAESAR II?	Not at this time. The CAESAR II analysis assumes the soil provides the (non-rigid) restraint stiffness. Global buckling is not addressed. We have added a new buckling scratchpad (calculator) in Version 12 to address the latest B31.8 revision.
I came across high-temp creep situation for alloy piping systems around chemical reactors, design temperatures close to 1000 F. But I was not very familiar with including CREEP LC and just went with the conventional static Load Cases. Should I have considered it?	Start with the allowable stress, how are they computed (are they based on 100K life or more) and what is the design life that you need for your system/process. The B31 codes incorporate creep in pipe stress analysis by adjusting the basic allowable stresses. The (CRP) stress category was added for the EN piping code.
How do we get a Certificate for this webinar?	For certain presentations, a PDH certificate for attendance is available upon request. Please contact Andrea Velazquez: andrea.velazquez@hexagon.com
When a snubber is in the system, and the displacements are applied to the "snubber active" load cases, are the displacements carried over to the scalar occasional load conditions?	Yes, the effects of the displacements would be included.

Is elastic modulus on each temperature recommended to be inputted or use the default by CAESAR EC? How about for cold temperature which has higher value?	Most piping codes expect the use of EC in the analysis. EN-13480 is an exception where the use of Eh is required. The allowable stresses are then reduced by Eh/Ec. Piping codes typically reference E(ambient) -the reference modulus of elasticity - for expansion stress range calculations. That's our EC.
Should be consider the seismic loads for nozzle check?	Yes, they should be considered but I am unsure if there is a standard supplying an allowed limit.
When/where are we supposed to use the 0.7/0.6 multiplier?	For the (stress) code compliance cases. There is a link below to an earlier webinar on this subject.
CAESAR II do not have options in seismic wizard for UBC code what will do	Calculate the g-loads to be applied manually.
What's the benefit of OCC multiplier?	Using a multiplier on a (CAESAR II) load primitive allows you to alter the load at the load case level, instead of adjusting your model input. In the case of wind or seismic loads from ASCE-7, the reduction factors (multipliers) are applicable for stress compliance. In addition, at the load case level you can set the OCC multiplier (usually 1.2 or 1.33) which defines the value for "k" in the OCC stress allowable. This k value comes from B31.1 (SUS)+(OCC)<kSh where k=1.15 or 1.2 depending on the frequency of the occasional load. You set k in the static load case editor to choose between these. We have expanded its use to work as an allowable stress factor for all piping codes.
Do you recommend to always assign support with 0 gap and without friction as these will make the system condition a linear system?	No, you should model what is (or will be) actually in the field. I would not consider gaps on all guides if they are "non-engineered" gaps, i.e., simple clearance to allow axial displacement without binding. Perhaps ignore friction at all non-gravity supports where the normal load changes with strain.
What are min. and average creep rupture? What are the differences?	That depends on the material in use.
On the extreme expansion range for b31.3 check, would this range include both expansion (from installation to hot deg F) and contraction (from installation to minus deg F)?	Yes.
To check b31.3 allow displ stress range Sa, and given T1 max and T3 min, would two OPE cases or two EXP cases be subtracted in a similar way?	The two OPE cases would be subtracted.

Given the basis of displacement cycles 0 to +Sy and 0 to -Sy (elastic shakedown), would this mean that the b31.3 Sa check be for each positive range and neg range?	We want the total strain range, not just neutral to positive and zero to negative. I propose no, don't monitor the two amplitudes, the Code want the strain range to evaluate fatigue.
On spring hanger load cases, and to account for existing springs, W+H would appear for the restraint weight calcs for the spring. Then, when specifying the existing spring in the input, would the operating or installation weight be input for the existing springs?	The theoretical cold load which equals the design load (or balancing load, usually the hot load) plus the spring rate times the free travel for the spring from the neutral position to the hot position.
If a governing piping code is defined and KHK is not a governing code, would CAESAR still calculate seismic stress to KHK requirement? NRC does not recognize KHK, nor does ASME III	Yes, CAESAR II will perform the computation.
Where does the damping values for seismic load input in CAESAR?	Damping is considered by increasing or decreasing the applied load.
Damping is a system dependent factor; the analyst will not know the limits on load increase or decrease.	Damping is included in the seismic analysis not as a modifier of dynamic response but as a change in the magnitude of dynamic load applied system. The ASCE 7 seismic maps are set for 5% critical damping. Increase these accelerations if damping is lower and decrease them if higher. (5% is acceptable for most piping.)
Previous version of CAESAR II uses scalar version of occasional cases, but with new version has alt-occ case option which doesn't give same results. Can you please explain?	The (Alt-OCC) case will provide response to the occasional load alone using the support configuration determined from the previous load case - usually, "operating plus occasional", e.g., W+T1+P1+U1. These stresses, too, must be summed with (SUS) in a scalar fashion.
For multipliers: if we're providing loads to structural for them to design supports, we should be running stress without the multiplier, correct?	Important point – the structures people need the full, structural load (so yes, the multiplier could be left out, or set to 1). Use those 0.7 or 0.6 multipliers only for pipe stress calculation.
How to build relaxation case?	See below.
More precisely, some turbine makers need to evaluate nozzle load for relaxation case. How to build this load case in CAESAR II?	We will have to evaluate this question in detail and get back to you. Can you please provide a more detailed question?
While the 0.7 multiplier is correct for pipe stress, the reactions on the structure must be modified if they are designed using LRFD.	Answered previously. (Yes, non-stress results, i.e. loads and displacements should be based on full load.)
The Seismic wizard applies the 0.7 factor automatically doesn't it?	Very important point. Earlier versions of CAESAR II included the 0.7; the current version does not.

For what purpose, alt-sustained load cases are used?	This will be discussed later in presentation, and a link to the earlier WebEx on this subject is provided below.
Rich, any character limitations on the LC names?	132 characters.
Note that the Vessel codes and Structural code stress and load evaluations are closely aligned with the 06. and 0.7 factors etc... The B31 piping codes still uses the traditional methods	Yes.
Where/how do you enter the materials fatigue curve?	In the piping input, on the Allowable Stress dialog. Click the button for "Fatigue Curve."
Are there any options I can perform the wind only above 10 m and below 10m I no need to apply the wind	For elements below 10m, set the wind shape factor to zero, or turn off wind.
In your example on nonlinear boundary condition, pipe close the gap at L3, what if the gap is open after L3 applied?	Then there won't be a boundary (support) at that location for that load case.
Alt-sus: would this be applicable load case to consider for shipping analysis when piping undergoes hog and sag?	Alt-SUS is applicable (in my opinion) to any system that has multiple Operating conditions leading to different positions of the piping and restraints.

Links to additional resources:

https://connect.hexagonppm.com/CAESARIIWebinarNewLoadCaseEditor
https://connect.hexagonppm.com/CAESARIIWebinarUsingLoadCaseMultiplierstoExpandLoadCondition
https://connect.hexagonppm.com/CAESARIIWebinarAlternateSustainedCase-Session1
https://connect.hexagonppm.com/CAESARIIWebinarLoadCaseEditor
https://blog.hexagonppm.com/watch-the-video-using-the-static-load-case-editor-in-caesar-ii/