Notes on ISO Critical Joints - GeniE V6.0 – July 2011

Setting Parameters

The user can start by defining set of joints in order to code check them. It is not mandatory to create separated sets for critical or non-critical joints. In this example we will create a separated set just for sake of organization of the critical joint data.

Create a set of critical joints.

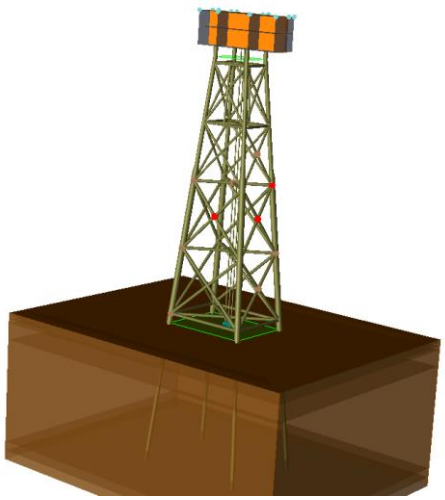

Figure 1 – Jacket

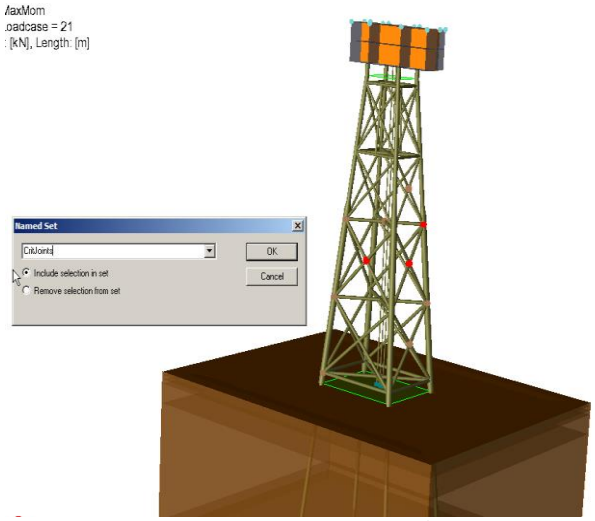

Figure 2 - Critical Joints: set definition

Run a Code Check Analysis as usual.
The code check must include Member code check and joint code checks. The reason why we have to insert the member code check is related to the fact that we need to have access to brace's usage factors. These will be relevant input data to Joint code check.
Create Joint capacity model from the defined set of Critical Joints.
Create member capacity model for all members. All structure criteria should be selected.

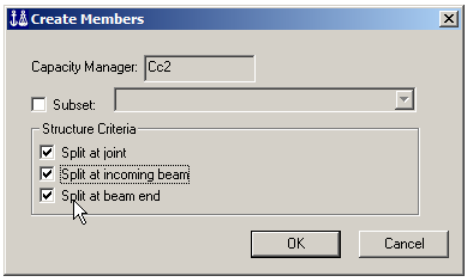

Figure 3 - capacity model: member structure criteria

Next, the user should identify the joints that are critical. In this case we select a set of critical joints, so all will be set as critical, however is possible to select subsets of critical joints.

First of all, the user has to create a new run and set some input parameters, as depicted on the picture below:

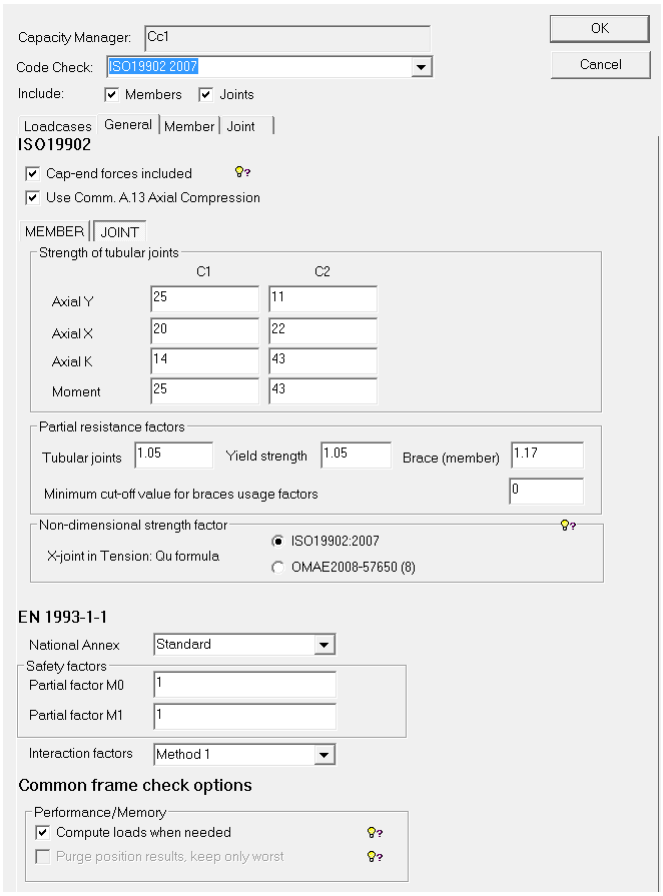

Figure 4 - General Tab - Create Code Check Run

Minimum cut-off value for braces usage factor can be inserted as a global value. This will set the reference value above it will be considered the members usage factors (have the role of brace on joint code checks) in joint code checks according ISO 19902 Standard (14.3-13). The default value is 0 leading to activate this option for all braces. This option is valid only for critical joints. Typical values should be in the range of 0.5 – 0.8.

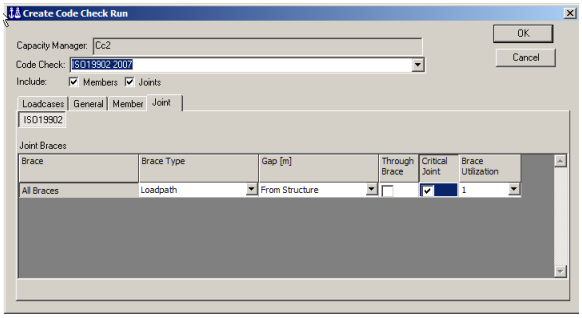

Figure 5 - Set Joints as critical - All Joints

If a subset of joints needs to be defined, the user should selected all the joints from the Capacity model browser.

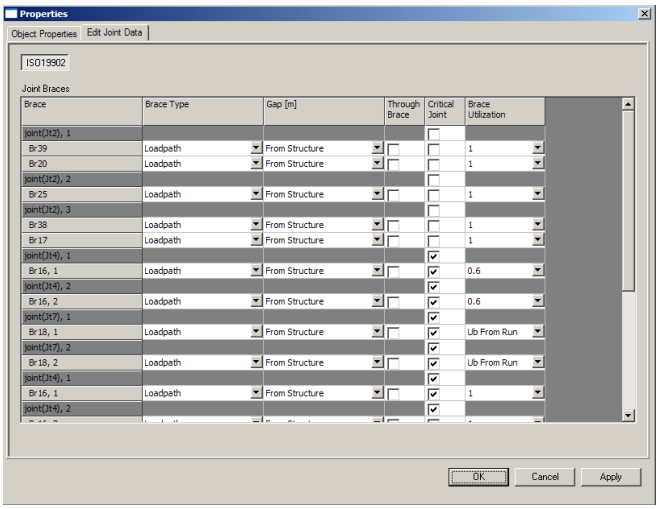

Figure 6 - Edit Joint Data - assign critical joint status

Once the user set a joint as critical he can also set data related to the brace utilization. The user can set a "*Manual*" value or set "*Ub From Run*". The latter will read member code check results and will set it as input data into the joint code check.

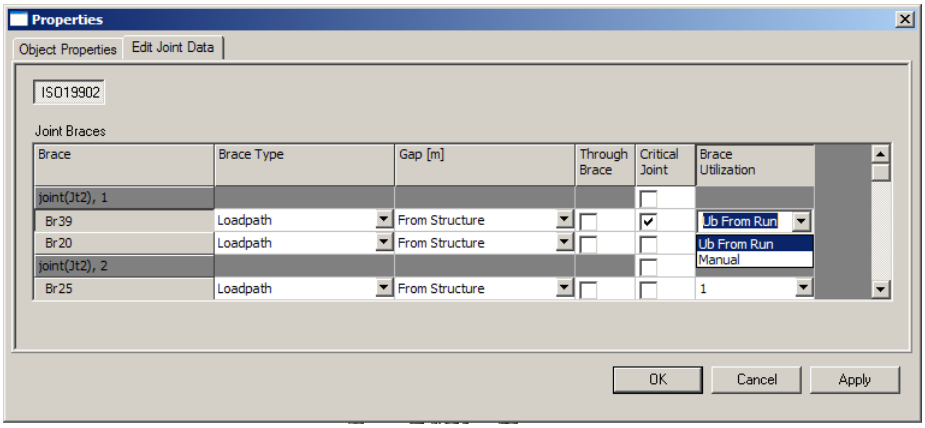

Figure 7 - Edit individual brace utilization data.

The Code check routine reads brace critical information.

Internal default values are: *Ub*(-1.0) and *Ubrace*(1.0)

Ub - brace usage factor from critical joint (highest usage factor identified for each brace)
gammaZj - is the extra partial resistance factor. This factor can be changed. It can be changed on the General tab, Joint button, Partial resistance factors, Brace (member). By default is set to 1.17.

Condition for Ubrace values:

$$Ubrace > \frac{1.0}{\gamma_{zj}} \quad \text{or} \quad Ubrace < 0.001 \Rightarrow Ubrace = \frac{1.0}{\gamma_{zj}}$$

Results Presentation

The affected usage factors are scaled against the *Ubrace* parameter.
One typical example can be referred to formula (14.3-13)
The initial formula is given by:

$$U_j = \left|\frac{P_B}{P_d}\right| + \left(\frac{M_B}{M_d}\right)\Bigg|_{ipb}^{2} + \left|\frac{M_B}{M_d}\right|_{opb} \leq \frac{U_b}{\gamma_{zj}}$$

identified the joint as critical this formula will be updated accordingly to:

$$U_j^* = \frac{\left|\frac{P_B}{P_d}\right| + \left(\frac{M_B}{M_d}\right)\Big|_{ipb}^{2} + \left|\frac{M_B}{M_d}\right|_{opb}}{\frac{U_b}{\gamma_{zj}}} \leq 1$$

Other relevant usage factors are updated on the same way: *Ujmod* and *Ujove*.

The results are presented as usually for any GeniE code check.

Capacity Model	LoadCase	Position	Status	UfTot	Formula	SubCheck	GeomCheck
joint(Jt2)	WestMaxMom	Br39	OK	0.27	Uj	ISO19902 joint	Geom OK
joint(Jt4)	WestMaxMom	Br16, 2	Failed(uf)	1.36	Uj	ISO19902 joint	Geom OK
joint(Jt7)	WestMaxMom	Br18, 2	OK	0.47	Uj	ISO19902 joint	Geom OK
member(Br01)	WestMaxMom	0.00	OK	0.82	(13.2-31)	ISO19902 member	Geom OK
member(Br02)	WestMaxMom	0.00	OK	0.82	(13.2-31)	ISO19902 member	Geom OK
member(Br03)	WestMaxMom	0.00	OK	0.82	(13.2-31)	ISO19902 member	Geom OK

Figure 8 - Code check results - members and joints

Inspecting a specific capacity model from the browser (for instance Jt4) we can have access to data, loads and results. Notice the highlighted value on Figure 9. It represents the usage factor for the correspondent brace (Ub – "*Ub from Run*").

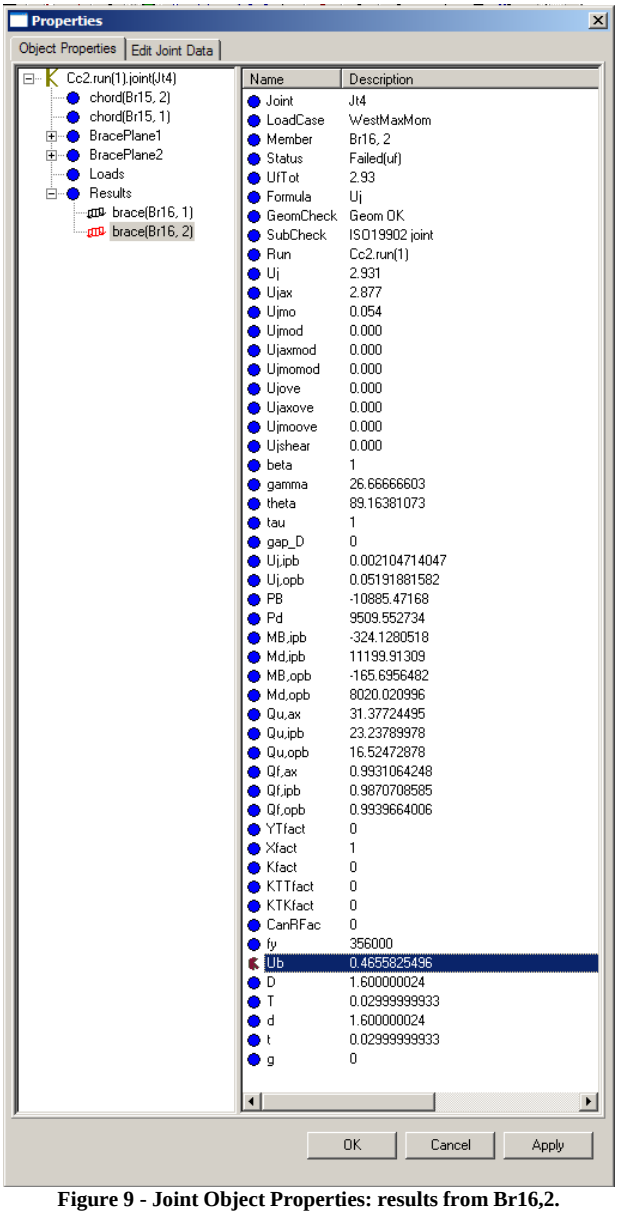

Figure 9 - Joint Object Properties: results from Br16,2.