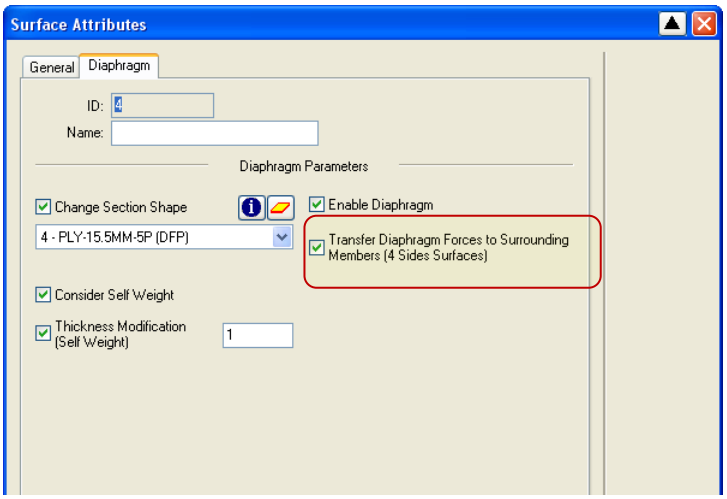
DIAPHGRAM ANALYSIS IN SAFI

When a diaphragm is activated, the program creates a finite elements mesh in the plane of the surface. The plates used in this mesh have no bending stiffness; they have only membrane stiffness (stiffness in the plane).

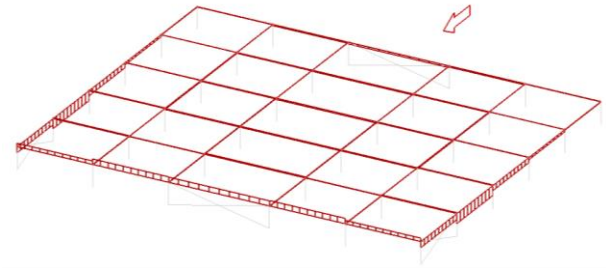
These plate elements have an axial and a shear stiffness called diaphragm effect which transfer Nx, Ny and Nxy forces directly to the joints. In the case of a floor, these surfaces are surrounded by beams. When a force flows in the floor, a part of this force passes directly from one joint to the other through the plate elements of the diaphragm. The direct effect of this behavior is that the axial forces in the surrounding beams are lowered. This effect increases with the increase of the diaphragm thickness.

Depending on the real nature of the floor and the construction methods, it is possible that the diaphragm may not be capable of transferring axial forces (e.g. steel deck floor). In this situation, the new option called **Transfer Diaphragm Forces to Surrounding Members (4 Sides Surfaces)** should be activated.

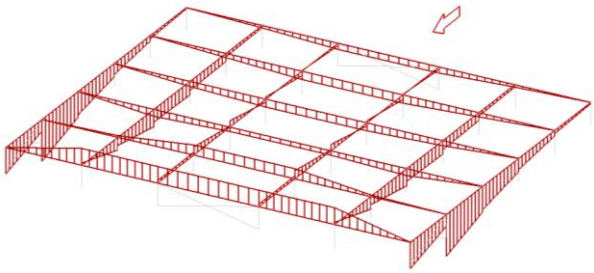


The figure below illustrates the variation of the axial forces in the floor beams for two situations. We note that the axial forces vary greatly from one model to the other. The user should adapt the model according to the desired result.

STEEL DIAPHRAGM USING A 2 MM THICK STEEL PLATE.

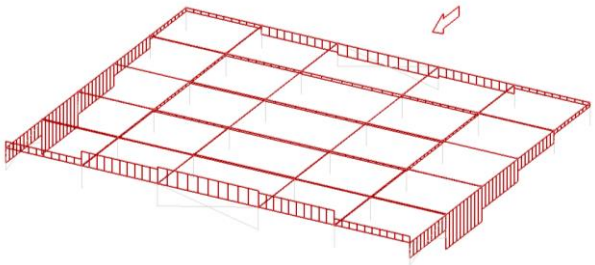


Force transfer option **deactivated**

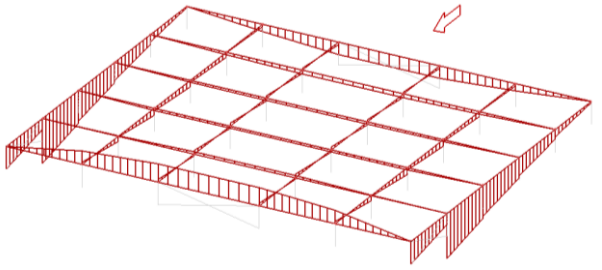


Force transfer option **activated**

STEEL DIAPHRAGM USING A 0.1 MM THICK STEEL PLATE.

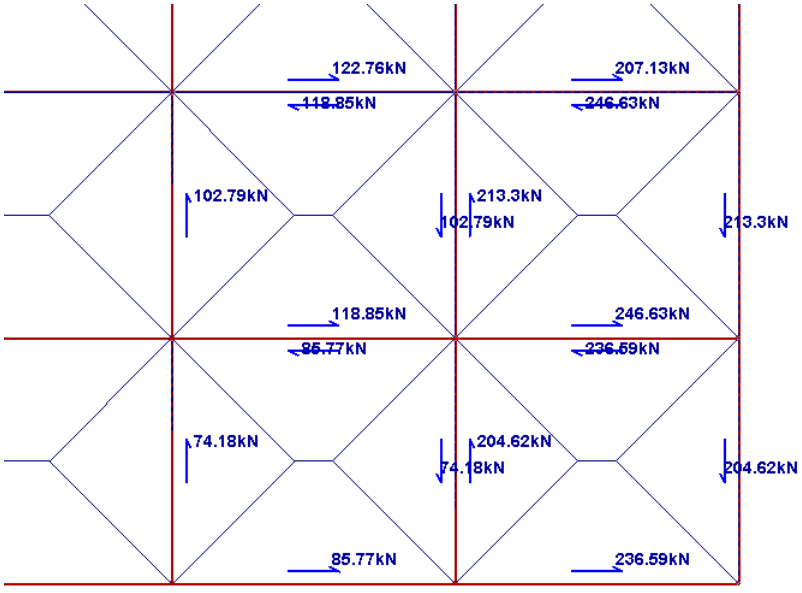


Force transfer option **deactivated**

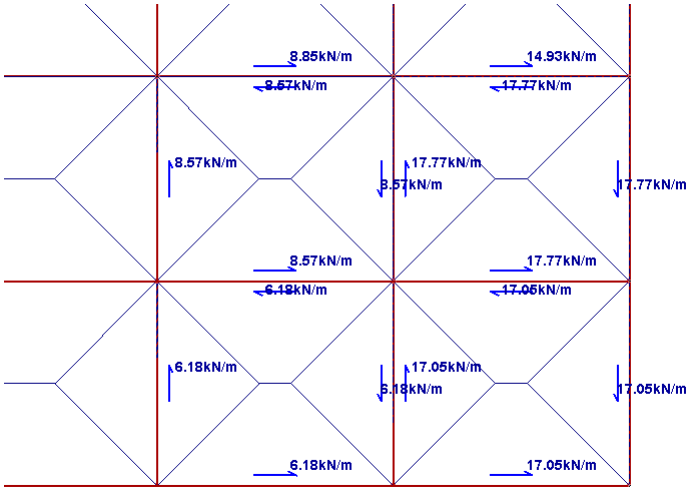


Force transfer option **activated**

When the **Activate Diaphragm** option of the load surfaces is activated, shear forces are transferred by the diaphragm. It is possible to display the **Total shear forces** along each side of the surfaces.



It is also possible to display **Mean unit shear forces** (the forces per unit length) along each side of the load surfaces. Note that this option is not available for three sided surfaces.



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