

Midas Expert Network – Tips from the Experts

Yazeed AbuHassan, Structural Design Engineer, Bergmann PC (Rochester, NY)

One tip that could be useful to many is how he usually model the deck as an eccentric deck plate for moving load distribution purposes (creating an influence surface) without having to perform a beam/deck plate cut diagram to view the true moments in the composite girders.

He does this by setting the deck in-plane thickness as 0.00001 ft. by doing so, the deck plate elements will not create a composite behavior with the girder providing that there will be no compression force in the deck plate from bending due to lack of in-plane stiffness in the deck plate (This could be checked by viewing in the in-plane plate forces). The correct deck out-of-plane stiffness will still be used to distribute the out-of-plane loads assigned on the deck (surface live loads, bridge barrier and sidewalk pressure, etc.). Given that the deck now only acts as a surface to distribute loads, the forces due to all these loads will show up on the girders without the need to go the extra step to perform a plate cutting diagram.

Performing this method will result in having the deck only acts as a surface to distribute out of plane loads and will not create a composite action with the girders, meaning that the stiffness of the girders will be incorrect and based on the steel section only. This could be solved by assigning a composite section definition to the girders (Properties -> Section Properties -> Add -> Composite Tab) and then assign when this composite behavior becomes active (Load -> Construction stage -> Composite Section for C.S).

One other thing to mention is that this method will be helpful depending on what you need the deck slab to do. For load rating purposes, it works just fine cause you only need the deck to distribute loads (live loads) through the out-of-plane stiffness of the deck. But If the model intent was to show/use the deck in-plane stiffness in any way (temperature comes to mind for an example), this method won't be the best fit. So, the engineer must use his discretion when trying to implement this approach.

