Refer to the main calculations for further details relating to the implementation of the Murray Allen method for the dynamic assessment of flooring systems.

Dynamic assessment using finite element analysis

Potentially FE modelling and analysis may be used for dynamic assessment of flooring systems, but there are problems as follows:

- Like all FE analysis great care is needed in order firstly to develop a model that is representative of reality and secondly to correctly interpret the output information
- There is a fair body of published information available relating the results of Murray Allen assessments to experimental data but little published information relating directly to FE predictions
- With the Murray Allen method, the “fiddles” involved in the assessment of W are difficult to duplicate in an FE analysis. While these fiddles may appear to be relatively ad hoc and approximate in nature, they do effectively represent an element of “wisdom” in the procedure that has been developed in order to match the results to experimental data.

Despite these problems FE analysis can be useful in visualising what is happening at a qualitative level. Figure 8 illustrates a model of a composite flooring system corresponding to that in the main design calculations. As far as possible, the model has been set up to conform with the expectations of a Murray Allen method.

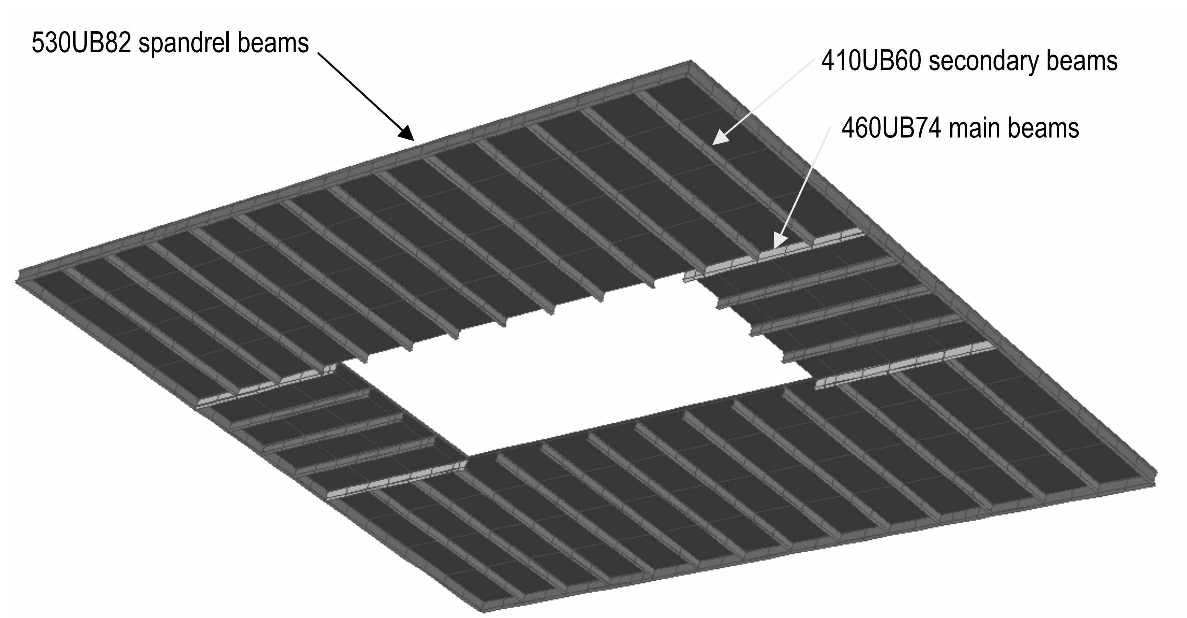

Figure 8 FE model of flooring system

Figure 9 shows the FE prediction of the first four significant natural frequency modes for this floor system. The natural frequencies predicted are generally similar to those predicted in the main calculations using equation 1, as modified to determine the combined frequency.

Note that with each of the modes there are effects similar to those illustrated in figure 6 though there may be a significant space between the different areas of dynamic movement. Modes 1 and 2 are clearly very similar. Mode 1 involves two corner regions moving in opposite directions. Mode 2 is similar but with both regions moving in the same direction. For both modes 1 and 2, it would appear that the area of slab involved in the mode is approximately twice the area of a corner panel.

Modes 3 and 4 are again similar with motion in the same direction for mode 3 and in opposite directions for mode 4. It would appear that the area of slab involved in the mode is the area of slab to the left of the core plus the area of slab to the right of the core. It would also appear that the area involved in modes 3 and 4 is significantly larger than the area involved in modes 1 and 2.

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