summary

A large part of the currently used oil and gas is produced from reservoirs that are located under the oceans and seas. To make offshore production possible, platforms are installed in these sea areas. A common platform type is a steel framework or space frame structure that is founded on the sea floor and that supports a deck on which all the needed equipment and installations are installed. The installation operations of these decks often are performed by heavy lift vessels. Decks up to 12.000 tons can be installed in one lift, but often the installation and equipment is built in several modules that are installed in more separate lifts. During the engineering of these installation operations the properties like weight and centre of gravity location of the various objects to be lifted is exactly known.

During the, sometimes more than 20 years production period of an offshore installation, several modifications are made. Not all these changes are well registered, so during the pre-engineering of the removal operation the exact weight can't be retrieved straightforward from available data.
If the weight of the load is not well defined it is hard to imagine that the position of the centre of gravity (CoG) is exactly to determine. This centre is important when modelling the rigging.

To reduce the effort of calculating the centre of gravity, one possibility is to establish two areas. One is the area where the centre is located for sure. For sure is that the CoG is located somewhere within the whole object, but these area can be reduced with simple data assessment and calculations. The other area is the range of locations where the CoG may be located to guarantee a save and secure lift operations. This area is related to the used sling configuration and criteria for a save and secure lift operation are the allowable forces in the slings.

The sling forces can be calculated using a finite element approach.
When for CoG locations distributed over the whole object the sling force are calculated, an area can be constructed for those locations that result in sling forces that meet the criteria.

With the MATHLAB based program SLINGASS it is possible to model lift configurations with up to 6 slings. The sling criteria are defined by means of maximum and minimum allowable forces. The program constructs the area with allowable CoG locations.
Modifications of the sling configuration model, based on the assessment of the result are easy to apply in the program and the calculation sequence is started again to construct the new area with allowable CoG locations for this modified configuration. In this way a optimum sling arrangement can be designed in a few calculation runs.