KC ID #340 Question

Chapter 7 Direct strength assessment

Section 2 Global Strength FE analysis of cargo hold structures.

According to Ch.7 Sec.2 [3.2.3] "The reference stresses in FE model that does not include orthotropic elements, as specified in [2.2.4] are not to exceed 235/k N/mm2 (..)"

Q1: We assume item [3.2.3] is referring to membrane stress only. That is, local plate bending is neglected. Please confirm.

Q2: We assume the acceptance criteria of Ch. 7 Sec. 2 [3.2.3] is related to an element size of S x S. That is:
- a. all elements with size equal to the representative stiffener spacing S x S (as specified in sec. 2 [2.2.4]) is to be within the limit specified in [3.2.3]
- b. smaller elements when averaged over the representative stiffener spacing are to be within the limit specified in 3.2.3

    Please advice

Q3: A typical connection of a longitudinal girder to the lower stool is shown in the figure below. A typical utilization for yield in a heavy ballast cargo hold is indicated $\sigma_{eq}/\sigma_{accetp.[3.2.3]}$.
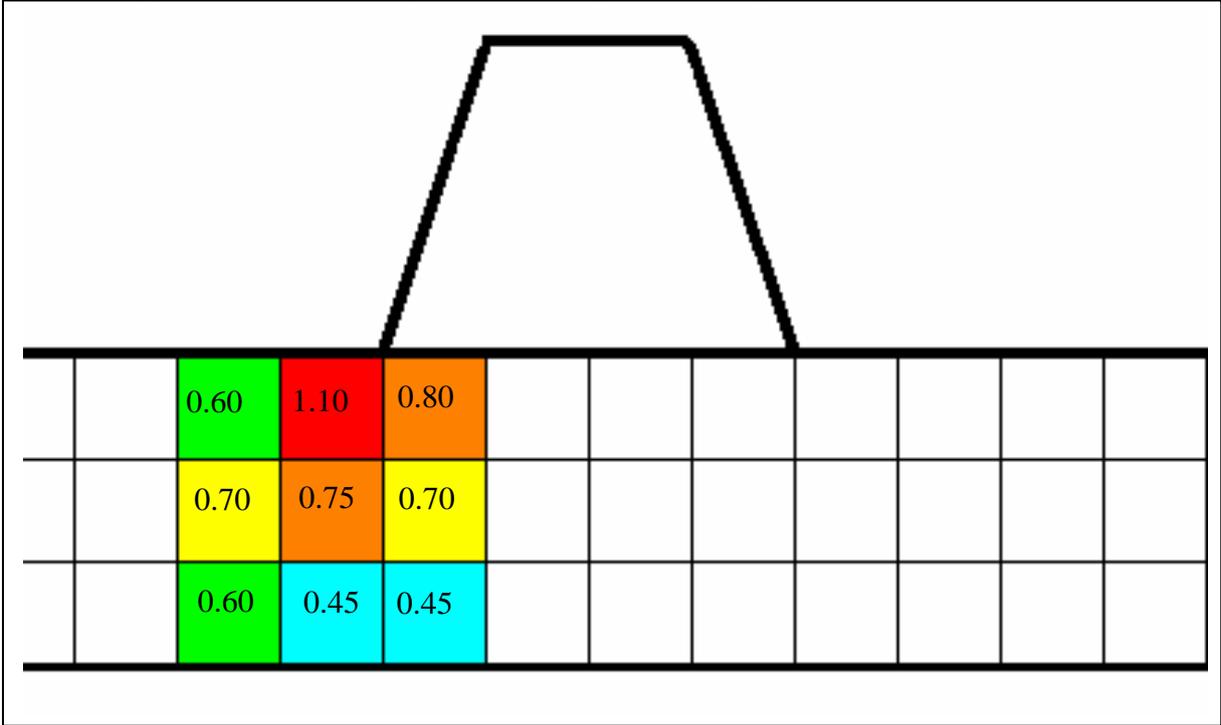
Assuming all 3 elements are equally sized over the height of the double bottom as indicated on the figure. What is the correct application of [3.2.3]?:
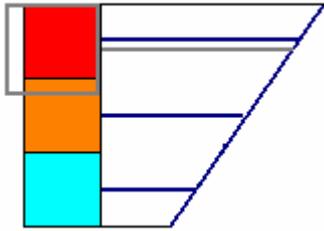
  a. Each individual element over the height has to be within the requirement of [3.2.3]. That is, the red element has to be reinforced until the utilization is < 1. ?

   or

  b. The results may be averaged over a typical stiffener spacing, SxS, in the double bottom as indicated with grey in the below figure. The averaged utilization should be <1?

Assuming the 3 elements are slightly different is size. What is the correct application of [3.2.2]?
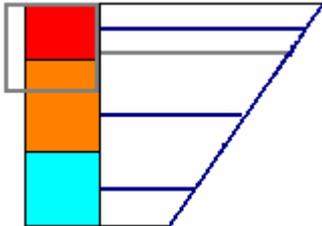
  c. Each individual element over the height has to be within the requirement of [3.2.3]. That is, the red element has to be reinforced until utilization is < 1.?

   or

  d. The results may be averaged over a typical stiffener spacing, SxS, in the double bottom. The averaged utilization should be <1?

   or

  e. The results may be averaged based on an element size = $H_{dblBottom}/3$?