CI-T 5
(Mar. 2008)

Calculation of equivalent moment of inertia/stiffness

Rule Section

3/5.3.3.4 Bending requirements of primary support members
Knowledge Centre Question No 151

Description

Procedure of calculation of equivalent moment of inertia / stiffness when web depth is less than rule required minimum.

Common Procedure

Where it is impracticable to fit a primary support member with the required web depth, then it is permissible to fit a member with reduced depth provided that the fitted member has:

(A) the same moment of inertia or
(B) the same maximum deflection

as that of an imaginary member, which is equivalent to the Rule required member. The following procedure should apply.

1. Create an imaginary member equivalent to that required member with the following properties:
   Web
   - Web depth is to satisfy the required depth
   - Web thickness is to satisfy the minimum thickness and slenderness (s/t) ratio
   - Shear area is to satisfy the required area

   Attached Plate
   - Effective width of attached plate is to be taken at mid-span in accordance with Section 4/2.3.2.3
   - Thickness of attached plate is to satisfy the local thickness requirements required at the mid-span

   Face Plate
   - In association with the above web and attached plate, face plate having sufficient area is to be attached to meet the required section modulus of mild steel. For this purpose, the face plate need not satisfy the minimum thickness and proportion (breadth and thickness) requirements.
   - The required section modulus may be reduced to 85% provided that the reduced scantlings comply with the Finite Element cargo tank structural analysis
2. In case where the offered member has uniform beam properties, then the moment of inertia of the imaginary equivalent member as calculated in item 1 is the required moment of inertia.
3. In case where there is significant variation of beam properties along the length, then it would be adequate to demonstrate that, under the Rule loading, the offered member of non-uniform cross section gives equal or less maximum deflection than that of the imaginary equivalent member as calculated in item 1. Then the moment of inertia of the proposed member may be partially less than the required moment of inertia.
4. The offered member is to satisfy all the requirements except the required depth. The section modulus requirement is to be satisfied with the effective width of attached plate at the ends.

Implementation date

This CI is effective from 1 April 2008.

Background

This procedure is based on the existing ABS practice.