Strength Calculations for Crankshafts

Amended Guidance

Guidance for the Survey and Construction of Steel Ships Part D

Reason for Amendment

Requirements related to strength calculation methods for crankshafts are stipulated by IACS in Unified Requirement (UR) M53 and these requirements have already been incorporated into the ClassNK Rules.

UR M53 allows for determining the fatigue strength of crankpin fillets, etc. used in their strength calculations to be based upon fatigue testing either by full-size crankthrows or by small specimens according to each individual classification society's judgment.

In a similar manner, individual classification societies are allowed to individually deal with calculation methods for the fatigue strength of fillets and oil bore outlets subjected to surface treatments, such as induction hardening, and calculation methods for stress concentration factors in oil bore outlets in cases where the approximation formula specified in UR M53 is outside its applicable scope.

For the purpose of achieving uniform implementation of the above-mentioned requirements among its members, IACS decided to add guidance to UR M53 related to the evaluation of fatigue tests, the calculation for fatigue strength of surface treated fillets and oil bore outlets, and the calculations of stress concentration factors through utilization of the finite element method as an alternative to the approximation formula. These revisions were adopted as UR M53(Rev.3) in June 2017.

Accordingly, relevant requirements were amended in accordance with IACS UR M53(Rev.3).

Outline of Amendment

The main contents of this amendment are as follows:

(1) Added guidance for the evaluation of fatigue tests by full size crankthrows or small specimens as Appendix D2, Annex D2.3.1-2(2) of Guidance for the Survey and Construction of Steel Ships Part D.
(2) Added guidance for the calculation for fatigue strength of surface treated fillets and oil bore outlets as Appendix D3, Annex D2.3.1-2(2) of Guidance for the Survey and Construction of Steel Ships Part D.
(3) Added guidance for the calculation of stress concentration factors in oil bore outlets through utilization of the finite element method as Appendix D4, Annex D2.3.1-2(2) of Guidance for the Survey and Construction of Steel Ships Part D.

Amended Requirements

Guidance for the Survey and Construction of Steel Ships
Part D Annex D2.3.1-2(2): 1.3, 1.4, 1.7, Appendix D1, Appendix D2, Appendix D3, Appendix D4