

Strength of Bevel Gears

Amended Guidance

Guidance for the Survey and Construction of Steel Ships Part D
Guidance for the Survey and Construction of Inland Waterway Ships

Reason for Amendment

The ClassNK Rules currently specify requirements for the strength of the interiors of bevel gear teeth to prevent them from being damaged due to internally generated stresses. Although these requirements apply to bevel gears of all sizes, they were primarily established in response to reports of the gear teeth of large surface-hardened bevel gears suffering damages due to such stresses.

It was pointed by some relevant industry members, however, that increasing the depth of the hardened layer in order to increase the strength of the interior of gear teeth of small bevel gear causes a corresponding decrease in toughness, which in turn may make gear teeth susceptible to other types of damages. In response, NK reviewed the applicable scope of the requirements, and decided to revise them so that they are no longer applicable to small bevel gears because there have been no reports of cases where the gear teeth of small bevel gears were damaged due to principal shearing stresses generated insides of gear teeth.

Accordingly, relevant requirements were amended based upon the above.

In addition, relevant requirements were amended in order to bring them up-to-date with respect to standards relating to the interior strength of gear teeth referenced therein as well as such standards referenced within requirements relating to the bending strength and surface strength of bevel gears.

Outline of Amendment

The main contents of this amendment are as follows:

- (1) Specified that the requirement related to minimum value of the Vickers hardness for the interior of gear teeth does not apply to bevel gears whose tip diameters (outer ends) are smaller than 1100 *mm*.
- (2) Specified that upper limit of real Hertzian stress which is used in calculations of minimum values of the Vickers hardness for the interiors of gear teeth is to be 1500 *MPa*.
- (3) Amended the standards referenced within requirements related to strength of the interior of gear teeth, and within the requirements related to the bending strength and surface strength of bevel gears in order to bring them up-to-date.

Amended Requirements

Guidance for the Survey and Construction of Steel Ships
Part D: D5.3.1
Guidance for the Survey and Construction of Inland Waterway Ships
Part 7: 3.3.1