

THE VARIATION OF THE Y_S BENDING STRESS CORRECTION FACTOR FOR EXTERNAL CYLINDRICAL GEARS

MOLDOVEAN Gheorghe, DEAKY A. Bogdan, VELICU Radu
Transilvania University of Braşov

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The bending stress calculus of external cylindrical gears is very important because, many times, this calculus imposes the gear overall dimension. The ISO contact stress calculus method considers two situations of tooth contact in which maximum contact stress could appear. One of these considers the teeth contact in the external point of single tooth contact, in which case the Y_S bending stress correction factor can be determined only analytically which involves knowing the gear dimensions. This paper presents the analysis of the Y_S correction factor varying with the gear teeth number, the sum of addendum modification coefficients and of the analyzed gear pinion or wheel addendum modification coefficient.

The Y_S correction factor is determined with equation (1):

$$Y_S = (1.2 + 0.13L)q_s^{\left(\frac{1}{1.21+2.3/L}\right)} \quad (1)$$

Based on developed software, the influence of the specified geometrical parameters on the Y_S correction factor was studied, and some output diagrams are presented in fig. 1 and 2.

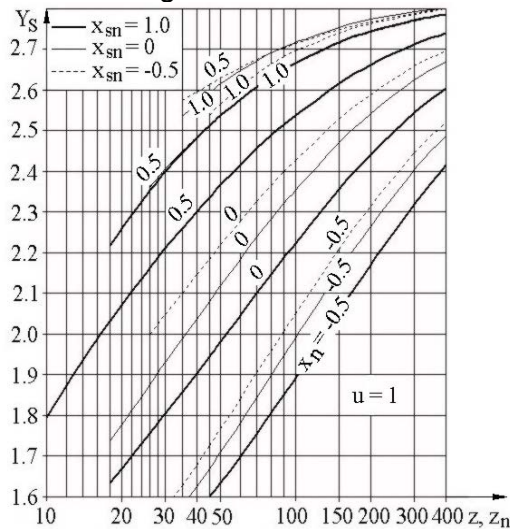


Fig. 1. $Y_S = f(z(z_n), x_{sn}, x_{n1}, u=1)$

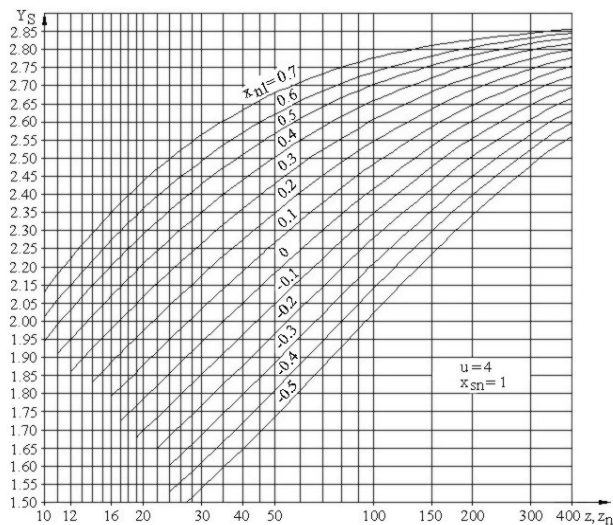


Fig. 2. Y_S diagram

The Y_S correction factor increases with the increase of the toothed wheel teeth number (z – for spur gears, z_n – for helical gears) and decreases with the x_{sn} sum of addendum modification coefficients. The increase of the x_{n1} pinion addendum modification leads to a great increase of the Y_S factor. The increase of the u gear ratio leads to the increase of the $Y_{S1,2}$ factors.

References

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