## Strengths of Gears

AGMA publishes bending strength data and has determined the following formula should be used as the corrected fatigue strength:

$$S_{f_b} = \frac{K_L}{K_T K_R} S'_{f_b}$$

$S'_{fb}$ can be determined from AGMA standards, but some are published on page 732, Table 11-20.
If the Brinell Hardness value is known, Figure 11-25, page 733 can be used to find the uncorrected bending strength.

The reliability built into this expression for fatigue strength by AGMA is for 99%. Also, the number of cycles for infinite life is considered to be 1E7, instead of 1E6.

**$K_L$** is the life factor. KL is determined by using the empirically determined equations shown on page 731. These equations are good for steel only.

**$K_T$** is the temperature factor. For steel, and up to 250°F, KT can be set to one. Otherwise, for steel and higher temperatures use:

$$K_T = \frac{460 + T_F}{620}$$

**$K_R$** is the reliability factor. If 99% reliability is acceptable for an application, KR = 1; other wise use values in Table 11-19, page 732.

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For **surface strength**

Use the following

$$S_{f_c} = \frac{C_L C_H}{C_T C_R} S'_{f_c}$$

S'fc can be determined from Table 11-21, page 736 or from Figure 11-27, page 737, if the Brinell Hardness number of the material is known.

Correction factors are as follows:

**$C_T$** is the temperature correction factor and is the same as KT for bending strength correction.

**$C_R$** is the reliability correction factor and is the same as KR for bending strength correction.

**$C_L$** is the surface life correction. CL values can be determined from AGMA empirically derived formulas given on page 734.

**$C_H$** is the hardness correction factor. (Should be applied only to the gear--not the pinion).

For through hardened pinions running against through hardened gears:

$$C_H = 1 + A(m_g - 1)$$

$$m_g = gear\ ratio$$

$$if\ \frac{HB_p}{HB_g} < 1.2\ A = 0$$

$$if\ 1.2 \le \frac{HB_p}{HB_g} \le 1.7\ A = .00898\frac{HB_p}{HB_g} - .00829$$

$$if\ \frac{HB_p}{HB_g} > 1.7\ A = .00698$$

For surface hardened pinions (>48 HRC) meshing with through hardened gears:

$$C_H = 1 + B(450 - HB_g)$$

$$B = .00075e^{-.0112R_q}$$

Rq is the root mean square value of surface roughness of the pinion teeth.