

TECHNICAL CALENDAR

March 23-25 14th Annual AGMA Gear Manufacturing Symposium

Holiday Inn, Airport
Indianapolis, Indiana

AGMS's 1986 Manufacturing Symposium will offer an open forum with industry experts and papers on topics of interest to everyone involved in gear manufacturing. The focus of this year's Symposium will be Hard Finishing, Heat Treatment, Process Control and Basic Gear Technology. As with past symposiums, the papers presented will provide the latest information on each of the subjects. Attendees will have the opportunity to ask questions of the speakers following each presentation.

For further information call: Polly MacKay, Meetings Coordinator, American Gear Manufacturers Association — (703) 684-0211.

April 7 Deburring & Surface Refinement by Mass Finishing Methods

Contact Anna Guy at SME, (313) 271-1500, ext. 370.

April 8-9 Applying Modern Buff, Brush & Polish Techniques

Contact Dianne Leverton at SME, (313) 271-1500, ext. 394.

April 10-11 Nontraditional Deburring & Final Finish Machining Methods

Contact Dianne Leverton at SME, (313) 271-1500, Ext. 394.

DESIGN AND SELECTION OF HOBS . . .

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life is very much dependent on the adherence between the substrate and the titanium nitride layer.

Measuring the ability to adhere is a difficult problem. The most common method is the "scratch test". A small radius diamond is scratched across the surface of the titanium nitride coated sample. The load on the diamond is successively increased until flaking occurs. The load at which flaking occurs is referred to as the critical load. This critical load, however, is also dependent on hardness of the substrate material, cleaning process, and the method of titanium nitride application. It is not possible to rate present high speed steels according to adherence capability due to the measuring difficulty described above. It can be said, however, that generally the same tool life relation between the different high speed steels also exists after the titanium nitride coating, but at a higher level.

CONTROLLING TOOTH LOADS . . .

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last two designs are much easier to set up and measure. Also, $L_1/L_2 = N_1/N_2$ for the exact designs, but not for the conventional design.

If L is chosen to be $L = A/P_{nc}$, where $A =$ any integer, then equating this expression for L with the previous equation for L and solving for $\sin \psi_1$ yields $\sin \psi_1 = \pi/A$. Table 2 lists ψ_1 for various values of A . If a helical gear pair is to be redesigned to use exact leads, then a value of A can be chosen from Table 2 to give approximately the same helix angle as the original design. (Refer to Table 1 and compare $\psi_1 = 16.26020470^\circ$ for the original design to $\psi_1 = 16.26020470^\circ$ for the improved designs.)

To accommodate the same center distance, one or both of the gears may be enlarged or reduced slightly. If, for some reason, the helix angle must be closer than those listed in Table 2, a decimal value for A can be used (9.1 or 9.3 for example). This approach is still preferable to trying to make L accurate to eight places.

Approach vs. Recess

Helical gears are best used in single pairs only. When the operating conditions are such that one gear is always the driver and the other always the follower, all recess action should be specified. This design places the pitch line of the driver at the bottom of the working tooth depth and the pitch line of the follower at the outside diameter. The result is low noise and friction, improved lubrication characteristics, and increased surface endurance. If the drive is used in an application where either gear is the driver, then the pitch line should be at the center of the tooth working depth.

E-2 ON READER REPLY CARD

Once the titanium nitride begins to flake or abrade away, the wear resistance of a coated tool depends to a great extent on the substrate material. For this reason along with previous comments on crater resistance, it is suggested that the best results (tool life) of coated tools have been obtained using the high alloy powdered metal tools steels.

E-4 ON READER REPLY CARD

This paper was presented previously at the SME Gear Processing and Manufacturing Clinic, November 1985.

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