Feedback from the Field

Dear Mr. Goldstein:

I was very pleased to see that *Gear Technology* is celebrating its 20th anniversary. May I offer my congratulations on reaching this milestone. It is an excellent journal that has achieved worldwide recognition, and I wish it continued success.

It was interesting to see the article by Bob Smith on "Single-Flank Testing of Gears" (pp. 18–21, May/June 2004), and I agree with you that its message of 20 years ago is just as relevant today. You may be interested to know that I presented much of the same message at an AGMA technical meeting even longer ago, in August 1967, entitled "Gear Transmission Error," paper No. 239.10. Bob Smith's article made use of diagrams contained in that paper and in other Goulder Mikron literature (in the 1960s and 70s, Goulder Mikron pioneered the measurement of transmission error with their opto-electronic single-flank gear tester).

The story of single-flank testing goes back still further to the 1950s, when Professor Stephen Harris at Cambridge University came up with the concept of transmission error. He went further by predicting the effects of tooth deflection under load, and the possible modes of vibration that could be excited. I was fortunate enough to work with him there from 1957 to 1964, and much of our work is referenced in the above AGMA paper.

I have always felt that the gear world did not give Stephen the recognition that he deserved, and faced with so little encouragement, he moved on to other research areas. Sadly, he died two years ago, and I wrote the following obituary for the bulletin of the British Gear Association:

Professor Stephen Harris died in March 2002 at the age of 82. His main professional interests were teaching and civil engineering, where he enjoyed a distinguished international reputation, but for a short period he carried out some outstanding research on gear vibration and noise.

He qualified in engineering at Cambridge University, and returned there in the 1950s as a lecturer, where the head of the engineering department at that time, Sir John Baker, invited him to look into the dynamic loading of gears. Stephen protested that he knew nothing about gears, but was told that this was a very good reason for asking him, because a fresh mind was needed for the problem!

At that time, the problem was regarded as a series of isolated impacts as each tooth pair came into mesh, but Stephen discovered that even at low speeds, the problem was one of continuous vibration. The vibration was excited by a combination of tooth profile deviations (deliberate reliefs and manufacturing errors) and elastic deformations of the teeth under load. He called this excitation the "static" transmission error, and by means of an elegant graphical presentation he showed how it varied with tooth load and rotations. Appropriately this presentation is now called the "Harris map."

Not content with this innovative achievement alone, he went on to predict what types of vibration might be excited. He suggested that the principal excitation would be at mesh frequency, but additionally the many harmonics of mesh frequency would also create excitation. Boldly, he went further to suggest that violent nonlinear vibrations might occur if the amplitudes were large enough to cause periodic tooth separation.

Stephen's concepts and predictions are now familiar to those concerned with gear vibration and noise, but few appreciate the magnitude of his contribution to the subject. One is left wondering what other innovative contributions to gearing would have been made if he had been encouraged to stay in this field, but we should be grateful to him for his brief period of gear research.

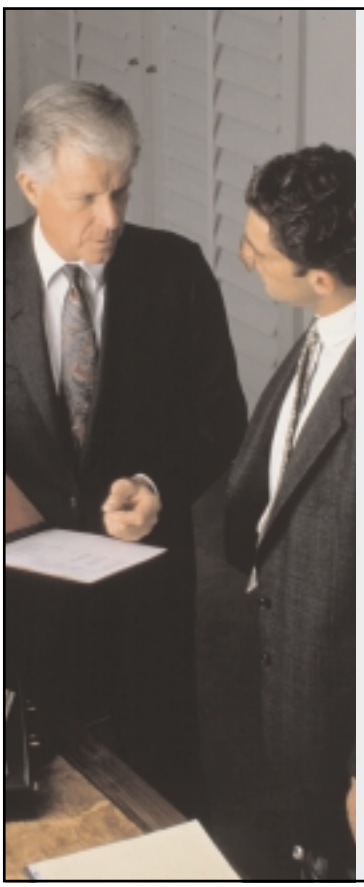
I hope that the above puts the story of single-flank gear testing in its proper historical context and that it may be of some interest to readers of *Gear Technology.*

I look forward to the next 20 years of *Gear Technology.*

Yours Sincerely,
Bob Munro, Emeritus Professor of Precision Engineering, University of Huddersfield, U.K. (formerly managing director of Goulder Mikron, Huddersfield, U.K.)

Dear Colleagues:
My best congratulations with the 20th anniversary of Gear Technology. Your journal is the best gear technical journal in the world. On behalf of the IFToMM Gearing and Transmissions Journal, I wish you all the best in your activity and life.

Sincerely yours,
Veniamin Goldfarb
Editor-in-Chief of the IFToMM Gearing and Transmissions Journal



Clarification

The article "The Gearless Hydrostroke," from the July/August 2004 issue of *Gear Technology*, included the statement: "To date, CNC guide technology hasn't allowed shapers to be used for high production. The technology can't produce helical gears at a rate as high as a dedicated mechanical system."

The statement should have read: "***In some cases***, CNC guide technology hasn't allowed shapers to be used for high production. ***Some CNC guided shapers*** can't produce helical gears at a rate as high as a dedicated mechanical system."

A number of manufacturers produce CNC guided gear shapers for high production environments. We apologize for any confusion the statement may have created.
—The Editors

LETTERS TO THE EDITOR

Dear Editors:

Thank you for another issue full of interest. I would like to comment on the paragraphs under the heading "Falk: A Gear Company" from the article on The Falk Corp. (pp. 9–13 in the July/August 2004 issue).

I disagree that the electric motor led to the rise of gear driven machinery at this time (the 1890s). The AC motor was introduced as a machine drive in 1887, but it was very slow to catch on. By 1909 in well over 100 gear machines, only four were available with an electric motor—one each in France and England and two in the U.S.A.

The gear market was going through a dramatic increase, firstly for chainless bicycle bevel gears, secondly for a variety of road and rail transport gears and third for helical and herringbone gears for steam turbines, electric trams and locomotives.

The herringbone patent mentioned in the article was, I deduce, for the special "Wüst" tooth form, as the herringbone gear was included in James White's "Century of Inventions" in 1821. The Wüst helical hobbing machine was made by C.E. Wüst of Zurich, Switzerland. Whereas other machines were cutting herringbone gears by the two-piece method, this was the first one-piece herringbone hobber. The cuts were staggered so the hob runs into space. It had a very large capacity, was belt-driven and, I suspect, took a great amount of skill to operate.

Yours truly,
William P. Crosher

(Editor's note: Mr. Crosher, a consultant working with Flender Graffenstaden, is also a historian of the gear industry. He is currently writing a book on gearing that includes many historical details like the ones above.)

Do you have comments on a recent issue of Gear Technology? Do you have valuable information to add to any of the subjects we've discussed? Please send your letters and comments to:

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