DISCUSSION

M. Nazmy[1] *(written discussion)*—(1) Have you tried approaches of lifetime prediction other than that of Ostergren? How was the fit?

(2) Have you applied the double damage rule, developed by Halford and Manson, to your results?

T. S. Cook et al. (authors' closure)—(1) A number of different parameters were fit to the low cycle fatigue for René 80. In addition to the Coffin-Manson and Ostergren approaches noted in the paper, the frequency-modified (FM) method of Coffin [*1*], the Leis parameter [*2*], the pseudostress ($E\Delta\epsilon$) approach, and the Basquin-Coffin-Manson [*3*] method were examined. In addition to our data, other René 80 data, including hold time results from the literature, were checked [*1,4*]. The average error of the curve fit was defined as

$$(\text{error})^2 = \frac{1}{n}\Sigma(1 - N_o/N_c)^2$$

where n is the number of data points, and N_o and N_c are the observed and correlated lives respectively. In virtually all situations examined, the approaches explicitly containing the frequency gave the smallest average error for the curve fits. The Ostergren approach was selected over the FM method for the reasons specified in the paper. However, a similar analysis could presumably be carried out using the FM method.

(2) We did not attempt to apply the double linear damage rule to the TMF analysis. As just noted, once the curve fits to the isothermal results are obtained, a double damage model could be applied. However, given the nature of the TMF cycle, a hysteretic energy analysis seems more satisfying.

Discussion References

[*1*] Coffin, L. F., *Metallurgical Transactions*, Vol. 5, May 1974, pp. 1053–1060.
[*2*] Leis, B. N., *Journal of Pressure Vessel Technology, Transactions of ASME*, Vol. 99, No. 4, Nov. 1977, pp. 524–533.
[*3*] Cook, T. S., Paper 84-PVP-27, 1984 ASME Pressure Vessel and Piping Conference, San Antonio, Tex.
[*4*] Antolovich, S. D., Liu, S., and Baur, R., *Metallurgical Transactions A*, Vol. 12A, March 1981, pp. 473–481.

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