

# **Sixtieth Annual Meeting Papers**

*Symposium on*

## **LARGE FATIGUE TESTING MACHINES AND THEIR RESULTS**



Published by the  
AMERICAN SOCIETY FOR TESTING MATERIALS  
1916 Race St., Philadelphia 3, Pa.

***ASTM Special Technical Publication No. 216***

*Symposium on*  
**LARGE FATIGUE  
TESTING MACHINES  
AND THEIR RESULTS**

Presented at the  
SIXTIETH ANNUAL MEETING  
AMERICAN SOCIETY FOR TESTING MATERIALS  
Atlantic City, N. J., June 18, 1957



Reg. U. S. Pat. Off.

---

*ASTM Special Technical Publication No. 216*

---

Price \$4.25; to Members \$3.40

Published by the  
AMERICAN SOCIETY FOR TESTING MATERIALS  
1916 Race St., Philadelphia 3, Pa.

---

© BY AMERICAN SOCIETY FOR TESTING MATERIALS 1958

---

Printed in Baltimore, Md.  
January, 1958

## FOREWORD

---

Most of our knowledge of fatigue has come from tests of relatively small specimens. This is only natural since full scale tests are expensive, time consuming, and difficult.

Therefore the nine papers in this Symposium on Large Fatigue Machines and Their Results, representing the aircraft, electrical, marine, railroad, and earth removal industries, provide a valuable contribution to our knowledge of fatigue.

Seven of the papers were presented on June 18, 1957, during two sessions at the Sixtieth Annual Meeting of the American Society for Testing Materials. Two additional papers were submitted by Soviet Engineers from the Academy of Science, Moscow, USSR.

This symposium was sponsored by Committee E-9 on Fatigue with J. M. Lessells, Lessells and Associates, Inc., serving as symposium chairman. D. J. Richards of United Aircraft Corp. and O. J. Horger of Timkin Roller Bearing Co. presided over the morning session of the symposium. At the afternoon session J. F. Millan, Caterpillar Tractor Co. and H. J. Grover, Battelle Memorial Inst., presided.

---

**NOTE.**—The Society is not responsible, as a body, for the statements  
and opinions advanced in this publication.

---

## CONTENTS

---

	PAGE
Introduction—J. M. Lessells . . . . .	1
A Unique Machine for Large Scale Fatigue Testing—H. V. Cordiano . . . . .	3
Discussion . . . . .	18
Torsional Fatigue Testing of Axle Shafts—E. J. Eckert . . . . .	21
Discussion . . . . .	34
Fatigue Testing of Airframe Structural Components—H. W. Foster . . . . .	37
Disoussion . . . . .	54
Fatigue Performance of Marine Shafting—Laboratory and Service Tests—T. W. Bunyan . . . . .	59
Discussion . . . . .	79
Fretting Corrosion of Large Shafts as Influenced by Surface Treatments—O. J. Horger and H. R. Neifert . . . . .	81
Discussion . . . . .	94
Fatigue Tests of Large Alloy Steel Shafts—F. C. Eaton . . . . .	96
Discussion . . . . .	103
Influence of Operating Experience and Full Scale Tests on Propulsion Shafting Design of U. S. Navy Ships—R. Michel . . . . .	107
Discussion . . . . .	122
Sudden Fracture of Machine Parts and Structure Elements—G. V. Uzhik, M. J. Galperin and A. A. Zooykova . . . . .	132
Determination of Dynamical Loading in Full Size Fatigue Tests and Some Results—S. V. Serensen, M. E. Garf . . . . .	142

THIS PUBLICATION is one of many issued by the American Society for Testing Materials in connection with its work of promoting knowledge of the properties of materials and developing standard specifications and tests for materials. Much of the data result from the voluntary contributions of many of the country's leading technical authorities from industry, scientific agencies, and government.

Over the years the Society has published many technical symposiums, reports, and special books. These may consist of a series of technical papers, reports by the ASTM technical committees, or compilations of data developed in special Society groups with many organizations cooperating. A list of ASTM publications and information on the work of the Society will be furnished on request.



