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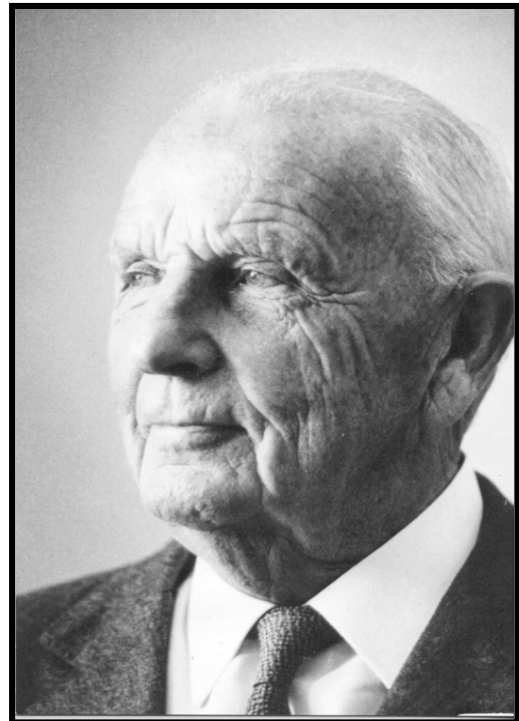
Dr. E. H. Wallodi Weibull
 1887-1979
 By Dr. Robert B. Abernethy

The Weibull distribution is by far the world's most popular statistical model for life data. It is also used in many other applications, such as weather forecasting and fitting data of all kinds. Among all statistical techniques it may be employed for engineering analysis with smaller sample sizes than any other method. Having researched and applied this method for almost half a century, I am honored to write this short biography of this remarkable man from Sweden.

Wallodi Weibull was born on June 18, 1887. His family originally came from Schleswig-Holstein, at that time closely connected with Denmark. There were a number of famous scientists and historians in the family. His own career as an engineer and scientist is certainly an unusual one.

He was a midshipman in the Royal Swedish Coast Guard in 1904 was promoted to sublieutenant in 1907, Captain in 1916, and Major in 1940. He took courses at the Royal Institute of Technology where he later became a full professor (1924) and graduated in 1924. His doctorate is from the University of Uppsala in 1932. He worked in Swedish and German industries as an inventor (ball and roller bearings, electric hammer,) and as a consulting engineer. My friends at SAAB in Trollhatten Sweden gave me some of Weibull's papers. SAAB is one of many companies that employed Weibull as a consultant.

His first paper was on the propagation of explosive waves in 1914. He took part in expeditions to the Mediterranean, the Caribbean, and the Pacific ocean on the research ship "Albatross" where he developed the technique of using explosive charges to determine the type of ocean bottom sediments and their thickness, just as we do today in offshore oil exploration.



Wallodi Weibull 1887-1979
 Photo by Sam C. Saunders

In 1941 BOFORS, a Swedish arms factory, gave him a personal research professorship in Technical Physics at the Royal Institute of Technology, Stockholm.

He published many papers on strength of materials, fatigue, rupture in solids, bearings, and of course, the Weibull distribution. The author has identified 65 papers to date plus his excellent book on fatigue analysis (1), 1961. 27 of these papers were reports to the US Air Force at Wright Field on Weibull analysis. (Most of these reports to WPAFB are no longer available even from NTIS. The author would appreciate copies of Weibull's papers from the WPAFB files.) Dr. Weibull was a frequent visitor to WPAFB and many of our universities.

His most famous paper (2) presented in the USA, was given before the ASME in 1951, using seven case studies with Weibull distributions. Many, including the author, were skeptical that this method of allowing the data to select the most appropriate distribution from the broad family of Weibull distributions would work. However the early success of the method with very small samples at Pratt & Whitney Aircraft could not be ignored. Further, Dorian Shainin, a consultant for Pratt & Whitney, strongly encouraged the use of Weibull analysis. The author soon became a believer.

Robert Heller (3) spoke at the 1984 Symposium to the Memory of Waloddi Weibull in Stockholm, Sweden and said,

In 1963, at the invitation of the Professor Freudenthal, he became a Visiting Professor at Columbia University's Institute for the Study of Fatigue and Reliability. I was with the Institute at that time and got to know Dr. Weibull personally. I learned a great deal from him and from Emil Gumbel and from Freudenthal, the three founders of Probabilistic Mechanics of Structures and Materials. It was interesting to watch the friendly rivalry between Gumbel, the theoretician and the two engineers, Weibull and Freudenthal.

"The Extreme Value family of distributions, to which both the Gumbel and the Weibull type belong, is most applicable to materials, structures and biological systems because it has an increasing failure rate and can describe wear out processes. Well, these two men, both in their late seventies at the time, showed that these distributions did not apply to them. They did not wear out but were full of life and energy. Gumbel went skiing every weekend and when I took Dr. and Mrs. Weibull to the Roosevelt Home in Hyde Park on a cold winter day, he refused my offered arm to help him on the icy walkways saying: "A little ice and snow never bothered a Swede."

In 1972, the American Society of Mechanical Engineers (4) awarded Dr. Weibull their gold medal citing Professor Weibull as "a pioneer in the study of fracture, fatigue, and reliability who has contributed to the literature for over thirty years. His statistical treatment of strength and life has found widespread application in engineering design." The award was presented by Dr. Richard Folsom, President of ASME, and President of Rensselaer Polytechnic Institute when the author was a student there. By coincidence the author received the 1988 ASME gold medal for statistical contributions including advancements in Weibull analysis.

The author has an unconfirmed story told by friends at Wright Patterson Air Force Base that Dr. Weibull was in a great state of happiness on his last visit to lecture at the Air Force Institute of Technology in 1975 as he had just been married to a pretty young Swedish girl. He was 88 years old at the time. His first wife has passed on earlier. It was on this trip that the photo above was taken at the University of Washington where he also lectured.

The US Air Force Materials Laboratory should be commended for encouraging Waloddi Weibull for many years with research contracts. The author is also indebted to WPAFB for contracting the original USAF Weibull Analysis Handbook (5) and Weibull video training tape, as he was the principal author of both. The latest version of that Handbook is the fourth edition of The New Weibull Handbook (6).

Professor Weibull's proudest moment came in 1978 when he received the Great Gold medal from the Royal Swedish Academy of Engineering Sciences, which was personally presented to him by King Carl XVI Gustav of Sweden.

He was devoted to his family and was proud of his nine children and numerous grand and great-grandchildren.

Dr. Weibull was a member of many technical societies and worked to the last day of his remarkable life. He died on October 12, 1979 in Annecy, France.

The Weibull Distribution was first published in 1939, over 60 years ago and has proven to be invaluable for life data analysis in aerospace, automotive, electric power, nuclear power, medical, dental, electronics, every industry. Yet the author is frustrated that only three universities in the USA teach Weibull analysis. To encourage the use of Weibull analysis the author provides free copies of The New Weibull Handbook to university libraries in English speaking countries that request the book. The corresponding SuperSMITH software is available from Wes Fulton in demo version free from his Website. (www.weibullnews.com)

The author would appreciate comments and questions about Waloddi Weibull and Weibull analysis. E-mail: weibull@worldnet.att.net Mail: 536 Oyster Road, North Palm Beach, Florida, 33408. Phone/FAX 561-842-4082.

References:

1. Weibull, Waloddi, "**Fatigue Testing and Analysis of Results**", Pergamon Press, 1961.
2. Weibull, Waloddi, "**A Statistical Distribution Function of Wide Applicability**," Journal of Applied Mechanics, 1951. *The hallmark paper of Weibull analysis...and easy reading.*
3. S. Eggwertz & N.C. Lind, Editors: "**Probabilistic Methods in the Mechanics of Solids and Structures**," Symposium Stockholm Sweden, June 1984, To the Memory of Waloddi Weibull, Springer-Verlag. *(The author would love to have a copy of this if any reader can loan him their copy to reproduce he will respond with a copy of The New Weibull Handbook.)*
4. ASME New Release: Waloddi Weibull Receives the ASME Medal., November 1972.
5. Abernethy, Robert B.; J. E. Breneman; C. H. Medlin; G. L. Reinman; "**Weibull Analysis Handbook**", U.S. Air Force AFWAL-TR-83-2079, November 1983, AD #A143100 Approximately 14,000 copies were distributed by the US Air Force, Pratt & Whitney, and the author.
6. Abernethy, Robert B. "**The New Weibull Handbook**," Fourth Edition, November 2000, published by the author. ISBN 0-9653062-1-6. Over 13,000 copies are in circulation.

7. Weibull, Waloddi, "Estimation of Distribution Parameters by a Combination of the Best Linear Order Statistic Method and Maximum Likelihood", USAF AFML-TR-67-105, April 1967.

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For more details regarding Weibull distributions visit

<http://www.weibullnews.com> or send Email to Wes Fulton at Wes@weibullnews.com Wes writes [WinSMITH™ Weibull](#) and [WinSMITH Visual](#) software to support The New Weibull Handbook

<http://www.bathtubsoftware.com> or send Email to Carl Tarum at cdtarum@bathtubsoftware.com Carl writes [YBATH™](#) software to solve complicated Weibull mixtures of data as described in The New Weibull Handbook

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