Waloddi Weibull

(Excerpt from The New Weibull Handbook(C) by Dr. Robert B. Abernethy)

Dr. E.H. Waloddi Weibull

1887-1979

By: Dr. Robert B. Abernethy

Waloddi Weibull 1887-1979

Photo by Sam C. Saunders

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. It may be employed for engineering analysis with smaller sample sizes than any other statistical distribution. Having researched and applied this method for almost half a century, I was recently honored to be asked to write a short biography of this remarkable man from Sweden.

Waloddi 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 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 wave 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.

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.) Dr. Weibull was a frequent visitor to WPAFB and many of our universities.
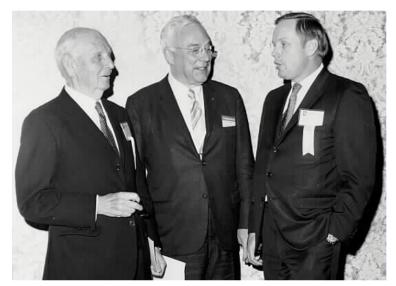
His most famous paper (2), at least in the USA, was given before the ASME in 1951, seven case studies using the Weibull distribution. Many including the author were skeptical that this method of allowing the data to select the most appropriate distribution from the broad family of Weibull distributions 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 reused 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.

Professor Sam C. Saunders took the first picture above in 1971 when Dr. Weibull was visiting Seattle. In correspondence with the author he comments: "During that visit he bragged to me that his second wife was younger than mine! (My wife was 39.) When I met his second wife in Stockholm during the cocktail party at the 1984 Symposium dedicated to his memory, she said her youngest daughter much resembled Waloddi and she called her over to introduce her to me. The daughter was then about 20 and the mother about 50, and both were very handsome women." I thank Professor Saunders for permission to reproduce the picture and for sharing his memories of this great man. Dr. Weibull would have been 84 years old in 1971.

The second picture above was obtained from Professor Nowak at the University of Warsaw, Poland, a much younger Professor Weibull.

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 very few universities in the USA teach Weibull analysis to engineering students. 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 web site. (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.

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