



## Rodney R. Boyer

Rodney Boyer obtained his B.S. Degree in Metallurgical Engineering in 1963 and his M.S. in Metallurgical Engineering in 1973 both from the University of Washington. He specialized in titanium for 50 years.

At Boeing from 1965-2011, Rod was involved in basic research, development and application of titanium alloys for airframes. His efforts were directed toward furthering the understanding of the metallurgy of titanium, i.e., the effects of processing and chemistry variations, resulting in microstructural variations, and the resultant effect on the properties of titanium alloys. He has done research on all product forms used on airframes and studied almost all of the processes involved in the fabrication of titanium components, from mill processing to machining and chemical processing.

His efforts led to the implementation of several new technologies on Boeing (and other) aircraft, including, high strength Ti-10V-2Fe-3Al forgings (used at the 173 ksi strength level), Ti-3Al-8V-6Cr-4Mo-4Zr springs, Ti-15V-3Cr-3Al-3Sn high strength castings and clock springs, titanium wear coatings on bearing surfaces, Ti-15V-3Cr-3Al-3Sn pneumatic ducts, Ti-6Al-2Sn-2Zr-2Mo-2Cr forgings and Beta 21S nacelle components. The latter was an interesting experience in that it normally takes 10-20 years from the development of a new material to its production implementation. In this instance it was about 3 years. This meant that much of the process development, such as chemical processing, heat treating and welding, were being developed as production components were being built.

The above achievements were all first put into production at Boeing through the efforts of Mr. Boyer. Implementation of each of these technologies involved Mr. Boyer leading a team of Boeing and multiple industry participants. During this period, Rod was responsible for all of the titanium processing and procurement specifications, directing the company IR&D efforts, supporting any titanium fabrication or fleet problems, and qualification of new sources.

His last three years at Boeing, Rod had a strong focus on powder metallurgy, both blended elemental and pre-alloyed. He led the effort in obtaining the static design allowables for the blended elemental powder metallurgy product, which was approved at Boeing.

Rod then became a consultant for the US Government, US Navy, Conoco, TIMET, ATI, Norsk Ti, FalconTech, Cyril Bath, BaoSteel, Lockheed Martin, Cefival, and others, focusing on processing and additive manufacturing and helping customers become qualified for aerospace applications. He directed the industrial effort on titanium alloy development for the NASA sponsored High Speed Civil Transport Program and was involved in several Air Force sponsored Materials Affordability Initiative Programs.

He has co-edited 7 books, the most notable being the **Titanium Alloys Materials Properties Handbook** published by ASM. He has about 300 technical presentations and publications, including 40 invited presentations at regional, national and international levels, with 7 plenary/keynote presentations at the

national level and 16 at international symposia, including 3 plenary presentations for the US in World Titanium Conferences.

Mr. Boyer received many awards during his career, including TMS and ASM Fellow and Boeing Technical Fellow. He was named an adjunct professor at Monash University in Australia and an honorary professor at the University of Shanghai for Science and Technology in Shanghai, China. Additional detail can be found in the documents attached to this webpage.