

## Rod Boyer Publications and Presentations

1. R.R. Boyer, "**Fracture Across Zones of Varying Microstructures**," presented at ASTM Fractography Subcommittee Mtg, Cleveland, OH, 1966
2. M.J. Blackburn, R.R. Boyer and J.C. Williams, "**The Influence of Microstructure on the Fracture Topography of Titanium Alloys**", Presented at Nat'l ASTM Symposium, San Francisco, CA, 1968
3. above paper, published in ASTM STP 453, American Society for Testing and Materials, 1969, p. 215
4. R.E. Curtis, R.R. Boyer, and J.C. Williams, "**Relationship Between Composition, Microstructure and Stress Corrosion Cracking (in Salt Solution) in Titanium Alloys**," Trans. ASM, vol.62, 1969, p. 457
5. R.R. Boyer and P.T. Finden, "**An Elevated Temperature Exposure Study of Beta-III Titanium**," Met. Trans., vol.3, No. 3, 1972, p. 744
6. R.R. Boyer, R. Taggart, and D.H. Polonis, "**Effects of Thermal and Mechanical Processes on the Beta-III Titanium Alloy**," Metallography, vol 7, 1974, pp241-251
7. R.R. Boyer, S.D. Elrod and D.T. Lovell, "**Development and Evaluation of the Aluminum-Brazed Titanium System**," D6-60277-2, Report No. FAA-SS-73-5-2, SST Technology Follow-On Program - Phase II Final Report May, 1974
8. R.R. Boyer and W.F. Spurr, "**Characteristics of Sustained-Load Cracking and Hydrogen Effects in Titanium Alloy, Ti-6Al-4V**," Presented at TMS-AIME Fall Meeting, Niagara Falls, NY, Sept. 1976 see also 13.
9. R.R. Boyer and W.F. Spurr, "**Effects of Composition, Microstructure and Texture on Stress-Corrosion Cracking in Ti-6Al-4V Sheet**," Presented at Spring AIME Meeting, Atlanta, GA, March, 1977 see also 14.
10. W.F. Spurr, R.R. Boyer, R. Bajoraitis and D.C. Engdahl, "**Standardization of Ti-6Al-4V Processing Conditions**," AFML Interim Report AF 33615-75-C-5176 (D6-44167), Dec. 1976
11. R. Geisendorfer, W.F. Spurr, R.R. Boyer and R. Bajoraitis, "**Improved Damage Tolerance of Ti-6Al-4V Plate by Control of Microstructure and Composition**," Presented by WFS at 9th National SAMPE Technical Conference, Atlanta, GA, Oct. 1977
12. R.R. Boyer, W.F. Spurr, D.V. Lindh and S.D. Elrod, "**Metallurgical and Mechanical Aspects of Superplasticity in Ti-6Al-4V**," Presented at 1977 TMS-AIME Fall Meeting, Chicago, IL, Oct. 1977

13. R.R. Boyer and W.F. Spurr, "**Characteristics of Sustained Load Cracking and Hydrogen Effects in Ti-6Al-4V**," Met. Trans., vol. 9A, No. 1, Jan. 1978, pp 23-29
14. R.R. Boyer and W.F. Spurr, "**Effect of Composition, Microstructure, and Texture on Stress-Corrosion Cracking in Ti-6Al-4V Sheet**," Met Trans A, vol. 9A, No. 10, Oct., 1978, pp 1443-1448
15. R.R. Boyer and R. Bajoraitris, " **Standardization of Ti6Al-4V Processing Conditions**," Final AF Report AFML-TR-78-131, D6-48016, Sept. 1978
16. C.C. Chen and R.R. Boyer, "**Practical Considerations for Manufacturing High Strength Ti-10V-2Fe-3Al Alloy Forgings**," 1978 TMS-AIME Fall Meeting, St. Louis, Mo., Oct. 1978 see also 21.
17. S.P. Agrawal, R.R. Boyer, and E.D. Weisert, " **Effect of Small Amounts of Y<sub>2</sub>O<sub>3</sub> Particles on the Superplastic Behavior of Ti-6Al-4V Alloy**," 1978 TMS-AIME Fall Meeting, St. Louis, Mo., Oct. 1978
18. R. Boyer, "**Increasing Titanium Usage on Commercial Aircraft**,". Presented at Westech, March, 1978
19. R. Boyer, "**Considerations in the SPF Characteristics of Ti 6Al-4V**," Presented at Westech, March 1979
20. R.R. Boyer and J. Magnuson, "**An Apparent Anomaly in the Superplastic Behavior of Ti-6Al-4V**," Met Trans A, vol. 10A, No. 8, 1979, pp. 1191-1193
21. C.C. Chen and R.R. Boyer, "**Practical Considerations for Manufacturing High Strength Ti-10V-2Fe-3Al Alloy Forgings**," Journ. of Metals, vol. 31, No. 7, July 1979, pp. 33-39
22. R. Boyer, "**Effect of Texture on Mechanical Properties of Ti-6Al-4V**," Presented at Fall 1979 TMS-AIME Meeting, Milwaukee, Wisc. Sept. 16-20, 1979
23. R.R. Boyer, J.W. Tripp and J .E. Magnuson, "**Metallurgical Evaluation and Design Properties of High Strength Ti-10V-2Fe-3Al Forgings**," Presented at Fall 1979 TMS-AIME Meeting, Milwaukee, Wisc, Sept. 16-20, 1979.
24. R.R. Boyer, J.E. Magnuson, and J.W. Tripp, "**Characterization of Pressed and Sintered Ti-6Al-4V**," Presented at Spring TMS-AIME Meeting, Las Vegas, Nev., Feb. 1980
25. Ref. 24 was published in Powder Metallurgy of Titanium Alloys, F.H. Froes and John E. Smugeresky, eds., TMS-AIME, New York, NY, 1980

26. R.R. Boyer, "**High Strength Beta Titanium Forgings for Commercial Aircraft**," Presented at Westech, March 1980
27. R.R. Boyer, "**Design Properties of a High Strength Titanium Alloy, Ti-10V-2Fe-3Al**," Journ. of Metals, vol. 32, no. 3, March, 1980, pp 61-65
28. Served as rapporteur for session on "**Phase Transformations and Heat Treat**," 4th International Titanium Conference, Kyoto, Japan, May 19-22, 1980
29. S.P. Agrawal, R.R. Boyer and E.D. Weisert, "**Effect of Small Amounts of Yttria on the Superplastic Behavior of Ti-6Al-4V**," *ibid.*
30. J.A. Hall, C.C. Chen and R.R. Boyer, "**High Strength Beta Titanium Alloy Forgings for Structural Applications**," *ibid.*
31. J.E. Magnuson and R.R. Boyer, "**Characterization of Pressed, Sintered and Hipped Ti-6Al-4V**," Poster Session at 1980 Pacific Northwest Metals and Minerals Conference, Seattle, WA, May 7-9, 1980
32. Presented paper for F. H. Froes and D. Eylon, "**Titanium Powder Metallurgy-Current Status and Future Developments**," *ibid*
33. Invited by Los Angeles ASM Chapter to speak at their monthly meeting on "**Large Aluminum Castings and Ti Alloys for Commercial Aircraft Structures**," Sept. 9, 1980
34. C.C. Chen, J.A. Hall and R.R. Boyer, "**High Strength Beta Titanium Alloy Forgings for Aircraft Structural Applications**," Titanium '80 Science and Technology," H. Kimura and O. Izumi, eds., TMS, Warrendale, PA, 1980, 457-466
35. S.P. Agrawal, R.R. Boyer and E.D. Weisert, "**Effect of Small Amounts of Yttria on the Superplastic Behavior of Ti-6Al-4V**," Titanium '80 Science and Technology," H. Kimura and O. Izumi, eds., TMS, Warrendale, PA, 1980, 1057-1066
36. R.R. Boyer, "**Commercial Aircraft Applications of Ti-10V-2Fe-3Al**," Westech, March 1981, Los Angeles
37. R.R. Boyer, R. Bajoraitris, W.H. Kao, and R.D. Blunck, "**Vacuum Hot Pressing of Large Near Net Shape Spar Fittings**," Presented at 111th AIME Annual Meeting, Louisville, KY, Oct. 1981 see also 43.
38. R. Boyer "**Sustained Load Cracking in Ti-6Al-4V**," Presented at U. of W Graduate Seminar, Oct. 26, 1981

39. R. Boyer, "**Titanium Applications for Commercial Aircraft-Present and Future**," Westech 1982 (March 22)
40. R.R. Boyer, "**Titanium Alloys for Fuel Efficient Airframes**," Titanium for Energy and Industrial Applications, Daniel Eylon, ed., Metallurgical Society of AIME, New York, NY, 1981, pp 173-182
41. R.R. Boyer, R. Bajoraitis, D.W. Greenwood, and E.E. Mild, "**Ti-3Al-8V-6Cr-4Mo-4Zr Wire for Spring Applications**," Presented at 1983 Annual TMS-AIME Meeting, Atlanta, Ga, March 8, 1983 see also 56.
42. R.R. Boyer, R. Bajoraitis, W.H. Kao and R.D. Blunck, "**Vacuum Hot Pressing of Large Near Net Shape Spar Fittings**," Advanced Processing Methods for Titanium, D.F. Hasson and C.H. Hamilton, eds., Metallurgical Society of AIME, New York, NY, 1982, pp41-59
43. R.R. Boyer, F.H. Froes and J.C. Williams, "**Titanium - A Users Perspective**," Presented at Pacific Northwest Materials Conference, May 17, 1983, Seattle, Wa.
44. R.R. Boyer and W.F. Spurr, "**Titanium Castings for Airframes**," Presented at ASM 1983 Metals Congress, Philadelphia, PA, Oct. 6, 1983
45. R. Bajoraitis and R.R. Boyer, "**Vacuum Hot Pressing (VHP) of Large Titanium Powder Metallurgy (PM) Shapes**," Final Report, AFML Contract No. F33615-77-C-5173, General Dynamics P.O. No. 70-01555, July 31, 1981
46. R.R. Boyer and R. Bajoraitis, "**Evaluation of the Hot Isostatic Pressing (HIP) of Large Titanium Powder Shapes**," Final Report, AFML Contract No. F-33615-77-C-5005, Crucible Contract No. 6-12074, May 29, 1981
47. Invited presentation at U. of W. Graduate Seminar, "**Development and Implementation of High Strength Ti-10V-2Fe-3Al Forgings**," Dec. 15, 1983
48. R.R. Boyer, D. Eylon, and F.H. Froes, "**Powder Metallurgy of Ti-10V-2Fe-3Al**," Presented at Spring 1984 Annual AIME Meeting, Los Angeles, CA, Feb. 27, 1984
49. R.R. Boyer, D. Eylon and F.H. Froes, "**Powder Metallurgy of Ti-10V-2Fe-3Al**," Journ. of Metals, vol. 36, No. 6, June 1984, pp 39-40
50. R.R. Boyer, D. Eylon and F.H. Froes, "**Powder Metallurgy of Ti-10V-2Fe-3Al**," Titanium Net Shape Technologies, F.H. Froes and D. Eylon, eds., Metallurgical Society of AIME, New York, NY, 1984, pp 63-78

51. R.R. Boyer, D. Eylon and F.H. Froes, "**Comparative Evaluation of Ti-10V-2Fe-3Al Cast, P/M and Wrought Product Forms**," Titanium Science and Technology, G. Lutjering, U. Zwicker, and W. Bunk, eds., DGM, Oberursel, Germany, 1985, pp1307-1313
52. R.S. Carey, R.R. Boyer and H.W. Rosenberg, "**Fatigue Properties of Ti-10V-2Fe-3Al**," *ibid*, pp 1261-1267
53. S. Krishnamurthy, A.G. Jackson, D. Eylon, R.R. Boyer and F.H. Froes, "**Rapidly Solidified Microstructures and Precipitation in a Ti-5.5 w/oNi Alloy**," Presented at 5th International Conference on Rapidly Quenched Materials, Wurzburg, West Germany, Sept. 3-7, 1984
54. Book Editor, Beta Titanium Alloys in the 1980's, R.R. Boyer and H.W. Rosenberg, eds., Metallurgical Society of AIME, New York, NY, 1984
55. R.R. Boyer and H.W. Rosenberg, "**Beta Titanium on the SR-71: Historical Note I**," Beta Titanium Alloys in the 1980's, R.R. Boyer and H.W. Rosenberg, eds., Metallurgical Society of AIME, New York, NY, 1984 1-8.
56. R.R. Boyer, R. Bajoraitis, D.W. Greenwood and E.E. Mild, "**Ti-3Al-8V-6Cr-4Mo-4Zr Wire for Spring Applications**," *ibid*, pp 441-456
57. R.R. Boyer and H.W. Rosenberg, "**Ti-10V-2Fe-3Al Properites**," *ibid*, pp441-456.
58. R.R. Boyer, D. Eylon, F.H. Froes, D. Stewart and C.F. Yolton, "**Forging of Powder Metallurgy Titanium Compacts for Improved Properties and Lower Cost**," Presented at TME-AIME 1984 Fall Meeting, Detroit, Mich.,Sept, 1984
59. R. Boyer, "**Flight Service Evaluation of Two Aluminum-Brazed Titanium Spoilers**," "NASA Contractor Report No. 172371, NASA Langley Research Center, Hampton, VA 23665, Aug., 1984, Contract No. NAS1-13897, Boeing Doc. D6-52046
60. R. Boyer, "**Titanium**," a one-night lecture for local Puget Sound Chapter of ASM Lightweight Structural Materials Course, Seattle Univ., Bannon Hall, Seattle, WA, 11/7/84.
61. R.R. Boyer and G.W. Kuhlman, "**Processing Properties Relationships of Ti-10V-2Fe-3Al Forgings**," Presented at the 1985 TMS Fall Meeting, Toronto, Ontario, Canada, Oct. 1985 (10/16) see also 77
62. R.R. Boyer, W.F. Spurr, and J. Michael Edwards, "**Current and Potential Usage of Titanium Castings for Airframe Applications**," Presented at 17th International SAMPE Technical Conference, Oct. 22-24, 1985, Kiamesha Lake, NY

63. R.R. Boyer, D. Eylon, and F.H. Froes, "**Comparative Evaluation of Ti-10V-2Fe-3Al Cast, PM and Wrought Product Forms**," Powder Metallurgy International, Vol. 17, No. 5, Oct. 1985, pp 239-240
64. R.R. Boyer, Metallographic Techniques and Microstructures: Specific Metals and Alloys - Titanium and Titanium Alloys, Metals Handbook, Ninth Edition, Vol. 9, Metallography and Microstructures, p 458
65. R.G.Vogt, D. Eylon, R.R. Boyer, ;and F.H. Froes, "**Production of High Strength Beta Titanium Alloys Through Powder Metallurgy**," Presented at TMS-AIME Annual Meeting, New Orleans, LA, March 2-6, 1986
66. above presentation published in Titanium Rapid Solidification Technology, F.H. Froes and D. Eylon, Eds., AIME, New York, NY, 1986, pp 195-199
67. R.R. Boyer, "**Ti/Cr<sub>2</sub>O<sub>3</sub> Grease Lubricated Spherical Bearings**," Presented at the 1986 International Conference on Titanium Products and Applications, Oct. 19-22, 1986, San Francisco, CA
68. Invited to participate in a roundtable discussion at the Los Angeles Chapter of ASM, "**Roundtable: Titanium and its Future in a Composite World**," Nov. 11, 1986 - my portion - "**Titanium as an ally to Composite Structures**"
69. R.R. Boyer, "**Ti/Cr<sub>2</sub>O<sub>3</sub> Grease Lubricated Spherical Bearings**," Proceedings of the 1986 International Conference on Titanium Products and Applications, Vol.1, Titanium Development Association, Dayton OH, 1987 (See also 68.)
70. R.R. Boyer, R. Bajoraitis and W.F. Spurr, "**The Effect of Thermal Processing Variations on the Properties of Ti-6Al-4V**," Presented at the 116th AIME Annual Meeting, Denver, CO, Feb. 24-26,1987
71. G.R. Yoder, L.A. Cooley, and R.R. Boyer, "**Microstructure/Crack Tolerance Aspects of Notched Fatigue Life in Ti-10V-2Fe-3Al Alloy**,"ibid.
72. G.R. Yoder, S.J. Gill and R.R. Boyer, "**Comparison of Notched Fatigue Life in Ti-10V-2Fe-3Al with Ti-6Al-4V**," Presented at the 28th Structures,Structural Dynamics and Materials Conference, Monterey, CA, April 6-8, 1987.
73. D. Eylon, W.J. Barice, R.R. Boyer and F.H. Froes, "**Beta Titanium Alloy Castings for Demanding Fatigue Applications**", Presented at the 116th AIME Annual Meeting, Denver, CO, Feb. 24-26,1987.
74. G.R. Yoder, S.J. Gill and R.R. Boyer, "**Comparison of Notched Fatigue Life in Ti-10V-2Fe-3Al with Ti-6Al-4V**", Presented at the 28th Structures, Structural Dynamics and

Materials Conference, Monterey, CA, April 6-8, 1987. Published in the proceedings, AIAA CP 872, Part 1, American Institute of Aeronautics and Astronautics, New York, N.Y., 1987.

75. R.R. Boyer, "**Boeing PM Overview**", invited presentation at the Air Force sponsored Titanium Powder Metallurgy Workshop at the Stouffer Dayton Plaza Hotel, 10/21-10/22/87

76. R.G.Vogt, D. Eylon, R.R. Boyer, and F.H. Froes, "**Production of High Strength Beta Titanium Alloys Through Powder Metallurgy**", Titanium Rapid Solidification Technology, F.H. Froes and D. Eylon, eds., The Metallurgical Society, New York, NY, 1987, pp. 195-199.

77. R.R. Boyer and G.W. Kuhlman, "**Processing Properties Relationships of Ti-10V-2Fe-3Al**," Met. Trans. A, Vol. 18A, Dec., 1987, pp 2095-2103, see also 58

78. R.R. Boyer, R. Bajoraitis and W.F. Spurr, "**The Effect of Thermal Processing Variations on the Properties on Ti-6Al-4V**", Microstructure, Fracture Toughness and Crack Growth Rate in Ti Alloys, A.K. Chakrabarti and J.C. Chesnutt, eds. TMS, Warrendale, PA, 1987, pp. 149-170

79. G.R. Yoder, L.A. Cooley and R.R. Boyer, "**Microstructure/Crack Tolerance Aspects of Notched Fatigue Life in Ti-10V-2Fe-3Al Alloy**", *ibid.*, pp. 209-230, see also 73.

80. G.R. Yoder, R.R. Boyer and L.A. Cooley, "**Corrosion Fatigue Resistance of Ti-10V-2Fe-3Al Alloy**", Presented at the 6th World Conference on Titanium in Cannes, France, June 6-9, 1988.

81. D. Eylon, W.J. Barice, R.R. Boyer, L.S. Steele and F.H. Froes, "**Beta Titanium Alloy Castings for Demanding Fatigue Applications**," Sixth World Conference on Titanium, eds. P. Lacombe, R. Tricot and G. Beranger, les edition de physique, 1989, pp 655-660

82. G.R. Yoder, R.R. Boyer and L.A. Cooley, "**Corrosion-Fatigue Resistance of Ti-10V-2Fe-3Al Alloy in Salt Water**," *ibid* pp 1741-1746

83. D. Eylon, W.J. Barice, R.R. Boyer, L.S. Steele, and F.H. Froes, "**Improved Properties in Beta Titanium Alloy Castings**", Presented at the 1988 ASM World Materials Congress, Chicago, Ill., Sept. 1988 and to be published in the conference proceedings entitled High Strength Castings, ed., C.V. White, D. Eylon, and F.H. Froes, ASM International, Metals Park, OH, 1988, pp. 17-22

84. E.R. Barta, R.R. Boyer and G.H. Narayanan, "**Delayed Hydrogen Embrittlement of C.P. Titanium**," Presented at the International Symposium for Testing and Failure Analysis by Eric, Los Angeles, CA, Nov. 88 E.R. Barta, R.R. Boyer and G.H. Narayanan, "Delayed Hydrogen Embrittlement in Commercially Pure Titanium," ISTFA 1988 – International Symposium for Testing and Failure Analysis, 1988, pp. 387-395

85. Above paper published, Conference Proceedings of the International Symposium For Testing and Failure Analysis, ASM International, 1988, pp 387-396
86. R.R. Boyer, "**Powder Metallurgy of Ti-10V-2Fe-3Al**", Presented at the Puget Sound Chapter of ASMI, Seattle, WA, Nov. 8, 1988
87. R.R. Boyer, E.R. Barta, and J.W. Henderson, "**Near-Net-Shape Titanium Alloy Extrusions**", Presented WesTech '89, March, 1989.
88. R.R. Boyer, E.R. Barta and J.W. Henderson, "**Near-Net-Shape Titanium Alloy Extrusions**", J.O.M., Vol. 41, No. 3, March, 1989, pp. 36-39.
89. G.R. Yoder, S.J. Gill and R.R. Boyer, "**Comparison of the Notched Fatigue Life of Ti-10V-2Fe-3Al and Ti-6Al-4**", AIAA Journal, Vol. 27, No. 6, June 1989, pp. 794-801, see also 74.
90. Spring '89 - Editor for ASM Titanium Handbook
91. D. Eylon, W.J. Barice, R.R. Boyer, L.S. Steele, and F.H. Froes, "**Casting of High Strength Beta Titanium Alloys**", Sixth World Conference on Titanium, Proceedings of, R. Lacombe, R. Tricot, and G. Beranger, eds., Les Editions de Physique, Les Ulis Cedex, France, 1989, pp. 655-660 (see also 86)
92. G.R. Yoder, R.R. Boyer and L.A. Cooley, "**Corrosion-Fatigue of Ti-10V-2Fe-3Al**", *ibid.*, pp 1741-1746 (See also 87)
93. R.R. Boyer, E.R. Barta, C.F. Yolton and R.R. Boyer, "**PM of High Strength Titanium Alloys**," Presented at the Powder Metallurgy in Aerospace and Defense Technologies Conference, Sheraton Hotel, Seattle, WA, Nov. 2-3, 1989 see (also 110)
94. D. Eylon and R.R. Boyer, "**Titanium Alloy Net-Shape Technologies**", Presented at the International Conference on Titanium and Aluminum, 27-28 Feb., 1990, Paris, France, Organized by the Institute Industriel de Transfer de Technologie (see also 115)
95. W.J. Porter, D.J. Evans, D. Eylon, W.J. Barice and R.R. Boyer, "**Fracture Mechanisms in High Strength Beta Titanium Alloy Castings**," Presented at the 119th TMS Annual Meeting, Anaheim, CA, Feb. 18-22, 1990
96. Invited as keynote speaker at a meeting of the Titanium Research Committee of the Iron and Steel Institute of Japan, March 26, 1990 at the Research Center for Advanced Science and Technology at Tokyo University. Subject: "**The Application of Beta Titanium Alloys to the Aerospace Industries**". Also made three presentations on "**Titanium Applications in Commercial Airplanes**" at Nippon Steel Yawata and Hikari Works and their Central Research Laboratory in Tokyo.



97. R.R. Boyer, E.R. Barta, C.F. Yolton and D. Eylon, "**PM of High Strength Titanium Alloys**," P/M in Aerospace and Defense Technologies, Vol. 1, MPIF, Princeton, N.J., 1990, pp 99-115, see also 90.
98. R.R. Boyer and E.R. Barta, "**High Strength Titanium Castings**", presented at Aeromat '90, Long Beach, CA, May 21-24, 1990
99. Daniel Eylon and Rodney R. Boyer, "**Titanium alloy net-shape technologies**," Proceedings of the International Conference on Titanium & Aluminum, IITT-International, Paris, France, 1990, pp 131-137
100. R.R. Boyer, W.J. Porter, E.R. Barta, and D. Eylon, "**Microstructure/Properties Relationships in Ti-15V-3Cr-3Al-3Sn High Strength Castings**," *ibid*
101. Presented a titanium, steel and fastener short course to the 777 weights engineers to guide them toward weight savings.
102. R.R. Boyer, "**Titanium Applications on Commercial Aircraft**", Oremet Annual Sales Conference, Kah-Nee-Ta, OR, 10/9/91
103. Book Editor, Microstructure/Property Relationships in Titanium Aluminides and Alloys, Y-W. Kim and R.R. Boyer, eds., TMS, Warrendale, PA, 1991
104. R.R. Boyer, W.J. Porter, E.R. Barta and D. Eylon, "**Microstructure/Properties Relationships in Ti-15V-3Cr-3Al-3Sn High Strength Castings**", Microstructure/Property Relationships in Titanium Aluminides and Alloys, Y-W. Kim and R.R. Boyer, eds., TMS, Warrendale, PA, 1991, pp 511-520 see also 97
105. R.R. Boyer, "**Titanium Usage on Commercial Aircraft**", Journ. of Matls. Engr. (China), No. 2, April, 1992 pp 1-3
106. R.R. Boyer, "**New Titanium Applications on the Boeing 777**", a seminar at the University of Idaho, 4/6/92
107. R.R. Boyer, "**New Titanium Applications on the Boeing 777 Airplane**," Journ. of Metals, Vol. 44, No. 5, May, 1992 pp23-25
108. R.R. Boyer and J.A. Hall, "**Microstructure Property Relationships in Titanium Alloys (Critical Review)**", Presented at the 7th World Conference on Titanium, San Diego, CA, 6/28-7/2/92
109. R.R. Boyer and A.E. Caddey, "**The Properties of Ti-6Al-2Sn-2Zr-2Mo-2Cr Sheet**," *ibid*.

110. W.J. Porter, R.R. Boyer and D. Eylon, "**The Effects of Microstructure on the Mechanical Properties of Ti-15V-3Cr-3Al-3Sn Investment Castings**," *ibid.*
111. R.R. Boyer, "**Applications of Beta Titanium Alloys in Airframes - Keynote Lecture**," Presented at the 1993 TMS Annual Meeting, Denver, CO, 2/22-2/2/93
112. D.A. Wheeler, R.G. Vogt and R.R. Boyer, "**Processing and Properties of Investment Cast Beta Titanium Alloys**," Presented at Aeromat '93, Anaheim, CA, June 7-10, 1993.
113. R.R. Boyer, "**New Titanium Applications on the Boeing 777**," presented to the Puget Sound Chapter of ASMI, 3/9/92
114. R.R. Boyer, "**Advanced Materials Applications for the 777 Airplane and Beyond**," Presented at Aeromat '93, Anaheim, CA, June 7-10, 1993.
115. R.R. Boyer, "**Applications of Beta Titanium Alloys in Airframes**," *ibid*
116. D.A. Wheeler, R.G. Vogt and R.R. Boyer, "**Processing & Properties of Investment Cast Beta Titanium Alloys**," *ibid.*
117. Beta Titanium Alloys in the 1990's, D. Eylon, R.R. Boyer and D.A. Koss, eds., TMS, Warrendale, PA, 1993
118. R.R. Boyer, "**Applications of Beta Titanium Alloys in Airframes**," *ibid*, 335-346
119. R.R. Boyer and J.A. Hall, "**Microstructure-Property Relationships in Titanium Alloys (Critical Review)**," Titanium '92 Science and Technology, F.H. Froes and I.L. Caplan, eds., TMS, Warrendale, PA, 1993, 77-88
120. W.J. Porter, R.R. Boyer and D. Eylon, "**Effects of Microstructure on the Mechanical Properties of Ti-15V-3Cr-3Al-3Sn Castings**," Titanium '92 Science and Technology, F.H. Froes and I.L. Caplan, eds., TMS, Warrendale, PA, 1993, 1,511-1518
121. R.R. Boyer and A.E. Caddey, "**The Properties of Ti-6Al-2Sn-2Zr-2Mo-2Cr Sheet**," Titanium '92 Science and Technology, F.H. Froes and I.L. Caplan, eds., TMS, Warrendale, PA, 1993, 1,647-1,652
122. R.R. Boyer and D.R. Wallem, "**The Effect of Cooling Rate on the Properties on  $\beta$ -Annealed Ti-6Al-4V**", Presented at the Harold Margolin Symposium on Microstructure/Property Relationships of Titanium Alloys at the TMS Annual Meeting, Feb. 27-March 3, 1994, Moscone Center, San Francisco, CA

123. R.R. Boyer, "**Aerospace Applications of Beta Titanium Alloys**," Invited paper and Keynote Lecture, presented at the International Workshop on Beta Titanium Alloys, Paris, France, March 14-16, 1994
124. K. Wurzwallner, G. Lütjering, H. Puschnik and R.R. Boyer, "**Microstructure and Properties of  $\beta$ -CEZ**," *ibid.*
125. Presented paper T. Ahmed, M. Long and H.J. Rack, "**Phase Transformations in Ti-(24-26 at. %) Nb Alloys**," *ibid.*
126. K. Wurzwallner, H. Puschnik, R. Boyer and G. Lütjering, "**Microstructure and Mechanical Properties of Beta-CEZ**," Presented at Aeromat '95, Anaheim, CA, June 6-9, 1994.
127. R.R. Boyer, "**Conference Review: The International Workshop on Beta Titanium Alloys**," *Jour. of Metals*, vol. 46, No. 7, July, 1994, pp12,13
128. R.R. Boyer, "**Overview: Aerospace Applications of Beta Titanium Alloys**," *ibid.*, pp 20-23
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140. R.R. Boyer, "**R&D and Applications Developments in the Titanium Industry in the USA**", Presented at the 8th World Conference on Titanium, Birmingham, England, Oct. 22-26, 1995 (Plenary lecture for the United States)
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168. R.R. Boyer, "Commercial Aircraft: Current and a Look-Ahead," Presented at the *World Business and Technical Outlook for Titanium and Titanium Alloys,*" Conference, Atlanta, GA, Dec. 7-9, 1998
169. R.R. Boyer, O.N. Senkov and F.H. (Sam) Froes, "Recent Titanium Developments Parts I and II," and invited presentation at the 1998 TMS Annual Meeting, San Diego, CA, Feb. 28-Mar. 4, 1998
170. J.C. Williams and R.R. Boyer, "Properties and Applications of  $\beta$  Ti-Alloys," invited presentation at a TUHH-GKSS Titanium Metallurgy Workshop at TUHH in Hamburg, Germany, April 20, 1999
171. R.R. Boyer, "Advanced Aerospace Materials," Invited Keynote Presentation at Spring Industry Technical Symposium, Radisson Hotel, Rosemont, IL, May 18, 1999
172. R.R. Boyer, J.C. Williams and N.E. Paton, "Evolving Aerospace Applications for Ti Alloys," Invited Keynote Presentation at the 9<sup>th</sup> World Conference on Titanium, St. Petersburg, Russia, June 7-11, 1999
173. Presented, for John Fanning, "Ballistic Evaluation of TIMETAL®6-4 Plate for Protection Against Armor Piercing Ammunition," *ibid.*
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176. R.R. Boyer, O.N. Senkov and F.H. Froes, "Recent Titanium Developments," Synthesis of Lightweight Metals," F.H. Froes, S.M. Ward-Close, P.G. McCormick and D. Eliezer, TMS, Warrendale, PA, 1999, 21
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181. R.R. Boyer, "Titanium Trends in the Aerospace Industry," Presented at Aeromat 2000, Bellevue, WA, June 26-29, 2000
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183. D. Krueger, R. Boyer, D. Furrer, M. L. Gambone, and B. Lewis, "Value Stream Improvements for Aerospace Forged Components," *ibid.*
184. Rod Boyer, "Materials Technology at Boeing: A Metals Perspective," lecture at the University of Washington, Oct. 10, 2000
185. Rod Boyer, "Materials and Trends on Boeing Aircraft," presented to the Milwaukee Chapter of ASM, Milwaukee, WI, 10/17/00
186. Rodney R. Boyer, "Titanium Aerospace Applications: Past, Present and Future," invited presentation at Taiwan Titanium Association 1st International Titanium Applications Conference and Exposition, Kenting, Taiwan, October 26, 27, 2000
187. Rodney R. Boyer, "Forgings on Boeing Aircraft," presented at a Gorham conference on "Castings and Forgings for Aircraft and Gas Turbine Engines," Atlanta, GA, Nov. 29-Dec. 1, 2000

188. S.L. Semiatin, P.A. Kobryn, E.D. Roush, D.U. Furrer, T.E. Howson, R.R. Boyer and D.J. Chellman, "Plastic Flow and Microstructure Evolution During Thermomechanical Processing of Laser-Deposited Ti-6Al-4V Preforms," *Met. And Mat. Trans. A*, Vol. 32A, no. 7, July 2001, pp 1801-1811
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191. R.R. Boyer, "Materials Trends on Boeing Aircraft," presented to the Los Angeles ASM Chapter, October 16, 2001
192. R.R. Boyer and J.E. Pillers, "Castings: A Boeing Perspective on Advantages and Issues," presented at Government/Industry (TICAS) Workshop on Issues Impacting Further Implementation of Aluminum and Titanium Investment Castings for Airframe Structures, Charleston, VA, February 11-12, 2002.
193. Boyer R, "2001 Airframe Materials," *Encyclopedia of Materials: Science and Technology*, Buschow K H J, Cahn R W, Flemings, M C, Ilshner B, Kramer E J, and Mahajan S, Elsevier, Oxford, 2001, vol. 1, pp 66-73 (invited manuscript)
194. F.H. (Sam) Froes, E. Chen, R.R. Boyer, E.M. Taleff, D. Eliezer, C.M. Ward-Close, L. Li, and G. Zhang, "Cost-Effective Synthesis, Processing and Applications of Lightweight Metallic Materials," Presented at the TMS 2002 Annual Meeting, Seattle, WA, February 17-21, 2002
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196. *High Performance Materials for Cost Sensitive Applications*, eds., F.H. (Sam) Froes, E. Chen, R.R. Boyer, E.M. Taleff, D. Eliezer, C.M. Ward-Close, L. Li, and G. Zhang, eds. TMS, Warrendale, PA, 2002
197. R.R. Boyer, "Materials Technologies and Trends on Boeing Aircraft," presented to the Oak Ridge ASM Chapter, Oak Ridge, TN, Sept. 19, 2002
198. R.R. Boyer, Lecture at University of Washington on Materials Technologies in the Aerospace Industry to a Junior class of non-materials engineers, Oct. 15, 2002



199. R.R. Boyer, "Materials Technologies and Trends on Boeing Aircraft," presented to the Boston ASM Chapter, Boston, MA, Feb. 13, 2003
200. R.R. Boyer, "Materials Technologies and Trends on Boeing Aircraft," presented to the Columbus, Ohio ASM Chapter, Columbus, OH, March 26, 2003
201. R.R. Boyer, "An Overview of Titanium Use in the Aerospace Industry – Applications and Trends" presented to Puget Sound ASM Chapter, Seattle, WA, April 8, 2003
202. S. Axter, R. Boyer, I. Burford, K. Davis, M. Guiffre, M. Mohaghegh and J. Pryor, "Evolution of Aircraft Materials: Keynote Presentation", presented at Aeromat 2003, Dayton, Ohio, June 9-12, 2003
203. S. Veeck, R. Briggs and R. Boyer, "The Castability of VT22-1 Alloy: Its Microstructure and Properties," presented at Aeromat 2003, Dayton, Ohio, June 9-12, 2003
204. D. Furrer and R. Boyer, "Forging of LasForm Preforms," *ibid.*
205. R.R. Boyer, "Titanium Airframe Application: Brief History, Present Applications and Future Trends: Keynote," presented at Thermec 2003, International Conference on Processing & Manufacturing of Advanced Materials, Madrid, Spain, July 7-11, 2003 – see also 209
206. D. Furrer and R. Boyer, "Laser Deposited Titanium for Forging Preforms," Presented at Ti-2003, 10<sup>th</sup> World Conference on Titanium, Hamburg, Germany, July 13-18, 2003
207. R.R. Boyer, J.D. Cotton and D.J. Chellman, "Titanium for Airframe Applications: Present Status and Future Trends – Keynote address," *ibid*
208. J.C. Fanning and R.R. Boyer, "A New Near-Beta Titanium Alloy for Airframe Applications," *ibid*
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210. R.R. Boyer, "Materials Technologies and Trends on Boeing Aircraft," presented to the New York-New Jersey Metro Chapter of ASM, Newark, New Jersey, September 30, 2003
211. R.R. Boyer, "Aerospace Materials Technologies," presented to graduate class at Washington State University, Pullman, WA, November 17, 2003
212. R.R. Boyer, "Materials Technologies and Trends on Boeing Aircraft," presented to the Northeast Iowa Chapter of ASM (Waterloo), February 11, 2004

213. R. Boyer, "Materials Technologies and Trends on Boeing Aircraft," presented to the Canton-Massillon Chapter of ASM (Canton, OH), April 14, 2004
214. R.R. Boyer and D.U. Furrer, "The Potential Advantages of Microstructural Modeling of Titanium on the Aerospace Industry," Presented at Numiform 2004, Columbus, Ohio, June 16, 2004. See also 215
215. R.R. Boyer and D.U. Furrer, "The Potential Advantages of Microstructural Modeling of Titanium on the Aerospace Industry," Numiform 2004, S. Ghosh, M.M. Castro and J.K. Lee, eds., American Institute of Physics, Melville, NY, 2004, pp. 1694-1699
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217. R.R. Boyer, J.D. Cotton and D.J. Chellman, "Titanium for Airframe Applications: Present Status and Future Trends – Keynote address," *ibid*, pp 2615-2626
218. J.C. Fanning and R.R. Boyer, "Properties of TIMETAL 555 – A New Near-Beta Titanium Alloy for Airframe Applications," *ibid*, 2643-2650
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220. Stewart Veeck, David Lee, Rodney Boyer and Robert Briggs, "The Castability of Ti-5553 Alloy," *AM&P*, Vol. 162, No. 10, 2004, pp 47-49
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222. R.R. Boyer and R.D. Briggs, "Titanium Cost Reduction Strategies for Boeing Aircraft," presented at ICAMP-3, Melbourne, Australia, Nov. 29-Dec. 1, 2004
223. R.R. Boyer and R.D. Briggs, "Titanium Cost Reduction Strategies for Boeing Aircraft," *Materials Forum: Advanced Materials Processing*, J.F. Nie and M. Barnett, eds., Institute of Materials Engineering Australasia, (IMEA), (Melbourne, Australia), vol. 29, 2005 edition, pp 47-54
224. L.M. Gammon, R.D. Briggs, J.M. Packard, K.W. Batson, R. Boyer and C. W. Dombly, "Metallography and Microstructures of Titanium and Its Alloys," *ASM Handbook, Metallography and Microstructures*, G.F. Vander Voort, ed., Vol. 9, ASM, (Materials Park, Ohio), 2004, pp. 899-917

225. R. Boyer and A.G. Miller, "The Boeing 7E7 Dreamliner: A New Airplane for a New World," presented to a joint meeting of the Milwaukee ASM Chapter and EAA Chapter 838, Racine, WI, Jan. 11, 2005
226. R.R. Boyer and R.D. Briggs, "The Use of Beta Titanium Alloys in the Aerospace Industry," presented at TMS 2005, the 134<sup>th</sup> Annual TMS Meeting and Exhibition, San Francisco, CA, Feb. 13-17, 2005
227. S.L. Nyakana, J.C. Fanning and R.R. Boyer, "Quick Reference Guide for Beta Titanium Alloys, *ibid.*
228. R.R. Boyer and A.G. Miller, "The Boeing Dreamliner: A New Airplane for a New World," presented to the Philadelphia Liberty Bell Chapter of ASM, Philadelphia, PA, March 17, 2005.
229. R.R. Boyer, "An Overview of Titanium Use in the Aerospace Industry – Applications and Trends," Notre Dame Chapter of ASM, South Bend, IN, April 19, 2005
230. R.R. Boyer, "Materials Technologies and Trends on Boeing Aircraft," presented to the Cleveland Chapter of ASM, Materials Park, Ohio, May 9, 2005
231. R.R. Boyer, "The Boeing 787: An Update," presented at Aeromat 2005, June 6-9, 2005, Orlando, FL
232. D.S. Lee, S.J. Veeck, B. Briggs and R.R. Boyer, "Investment Cast Ti-5553 Alloy: Its Physical and Mechanical Property Behavior," *ibid.*
233. R.R. Boyer, J.S. Tiley, H. Fraser and D.U. Furrer, "Keynote: The Role of Microstructure Modeling in the Airframe Industry," Presented at MS&T 2005, Pittsburgh, PA, September 25-28, 2005
234. R.R. Boyer, "Materials Technologies and Trends on Boeing Aircraft," presented to the Birmingham Chapter of ASM, Birmingham, Alabama, Sept. 15, 2005
234. R.R. Boyer, "Advanced Titanium Alloy Applications for Affordability," Titanium Alloys Modified with Boron Workshop, Dayton, OH, October 11-13, 2005
235. R.R. Boyer, lecture at the University of Washington to Junior MSE class on Aerospace Materials, Oct. 19, 2005
236. R.R. Boyer and R.D. Briggs, "The use of  $\beta$  Titanium Alloys in the Aerospace Industry," *Journ. Of Matls. Engr. And Performance*, Vol. 14, no. 6, December, 2005, pp 681-685
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239. M.J. Russell and R.R. Boyer, "Recent Developments in Linear Friction Welding of Ti for Aerospace Applications," Seattle 2006 Aeromat Conference, May 15-18, 2006, Seattle, WA
240. M. Mohaghegh, R.R. Boyer, I.C. Burford, R.G. Maguire and J.M. Pryor, "An Integrated Approach to Integrated Aircraft Material Development," presented at the Northwest Structural Mechanical Systems Technical Excellence Summit Boeing Conference, June 14, 2006, Seattle, WA
241. Taught a class through the Boeing Employees Network, Titanium Metals and Alloys for the 787 with Dan Sanders and Jim Cotton, Oct. 24, 2006.
242. J.D. Cotton, R.R. Boyer and G.A. Tomchik, "Titanium Use in Commercial Airframes – Applications and Trends," Presented at VSMPO Avisma 50<sup>th</sup> Anniversary Conference, Salda, Russia, March 13-15, 2007
243. J.D. Beal, R.R. Boyer and D.G. Sanders, "Forming of Titanium and Titanium Alloys," Metalworking: Sheet Forming, S.L. Semiatin, ed., ASM Handbook, Vol. 14B, 2006, pp 656-659
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245. J.D. Cotton, R.R. Boyer, R.D. Briggs, R.G. Baggerly, C.A. Myer, M.D. Carter, W. Wood, G. Tewksbury and V. Li, "Phase Transformations in Ti-5Al-5Mo-5V-3Cr-0.5Fe," *ibid.*
246. R.R. Boyer, "Boeing Titanium Vision," presented at Wah Chang International Business Meeting, September 6, 2007, Albany, OR
247. R.R. Boyer, "The Boeing Perspective on Titanium Development," invited participation on Aerospace Panel, Titanium 2007, International Titanium Association Conference, Orlando, FL, Oct. 7-9, 2007
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250. J.D. Cotton, R.R. Boyer, G.R. Weber and K.T. Slattery, "Titanium Alloy Development for Commercial Airframes," presented at Ti 2008 in the CIS, St. Petersburg, Russia, May 19-21, 2008
251. J.D. Cotton, R.R. Boyer, G.R. Weber and K.T. Slattery, "Titanium Alloy Development Needs for Commercial Airframes," presented at Aeromat 2008, Austin, Texas, June 23-26, 2008
252. B. Slaughter, K.T. Slattery, R. Martin, D. Heck, A.M. Helvey and R.R. Boyer, "Progress in Deposited Titanium: Drafting MAI," *ibid.*
253. K.T. Slattery, J.D. Cotton, R.R. Boyer and G.R. Weber, "Titanium Alloy Development for Commercial Airframes," 2<sup>nd</sup> SAIAS Conference, Stellenbosch, South Africa, Sept. 14-16, 2008
254. R.R. Boyer, "Titanium Usage on Commercial Airframes: Rationale, Usage and Development Needs," presentation to Univ. of Wash. Seminar for MS&E Dept., University of Washington, Seattle, WA, Oct. 13, 2008
255. R.R. Boyer, J.D. Cotton, J.C. Fanning, S.L. Nakayana and M.L. Harper, "Machining Advantages of Ti-54M (Ti-5Al-4V-0.6Mo-0.4Fe)," presented at TMS 2009 Annual Meeting and Exposition, San Francisco, CA, Feb. 15-19, 2009
256. R.R. Boyer, K.T. Slattery, J.D. Cotton and T.W. Morton, "The Boeing Approach to More Cost Effective Ti Components," *ibid.*
255. K. Slattery, R. Boyer, J. Cotton and G. Weber, "Future Titanium Needs for Aerospace," presented at European Titanium Conference, Birmingham, UK, June 23-24, 2009
257. J. Cotton, R. Boyer, T. Morton and K. Slattery, "More Cost Effective Titanium Components," Aeromat 2009, Dayton, OH, June 7-11, 2009
258. R. Boyer, "Titanium: Its Attributes, Characteristics and Applications," Extraction and Processing/Materials Processing & Manufacturing Joint Division Awards Luncheon Lecture, TMS 2010, Seattle, WA, February 14-18, 2010
259. P. Edwards, M. Petersen, M. Ramulu, and R. Boyer, "Mechanical Performance of Heat Treated Ti-6Al-4V Friction Stir Welds," *Key Engr. Matls.*, Vol. 436, 2010, 213-221

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261. R.R. Boyer, "Attributes, Characteristics, and Applications of Titanium and Its Alloys," JOM, vol. 62, No. 5, 2010, 21-24
262. J.D. Cotton, R.R. Boyer, G.R. Weber and K.T. Slattery, "Titanium Alloy Development Needs for Commercial Airframes: An Update," Presented at AeroMat 2010, Seattle, WA, June 21-24, 2010
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