

Contents

1	Introduction	1
1.1	Survey of Fatigue Life Assessment Methods	2
	Reference	3
2	Metallurgy and Microstructure	5
2.1	The General Metallurgy of Titanium Alloys	5
2.2	Conventional Thermomechanical Processing of Alloys Like Ti-6Al-4V	6
2.3	β Processing and/or β Heat-treatment	7
2.4	Crystallography of the $\beta \rightarrow \alpha$ Phase Transition	8
2.5	Microstructure of β Annealed Ti-6Al-4V ELI Thick Plate	8
	References	9
3	Fatigue Initiation Sites	11
3.1	Microstructural Initiation Sites in Near- α and α - β Alloys: Literature	11
3.2	Microstructural Initiation Sites: β Annealed Ti-6Al-4V ELI Thick Plate	13
3.3	Metallurgical Defects	14
	References	16
4	Fatigue Initiation Lives	19
4.1	Microstructural Factors	19
4.2	Fatigue Life–Microstructure Trends	20
4.2.1	Unnotched (Smooth Specimen) Fatigue	21
4.2.2	Notched Fatigue	23
4.3	Summary	25
	References	25

5	Short/Small Fatigue Crack Growth	27
5.1	Introduction	27
5.1.1	Significance of Short/Small Cracks	27
5.1.2	Definitions of Short and Small Cracks	28
5.1.3	Size Criteria	28
5.2	Short/Small Fatigue Crack Growth Data from the Literature	31
5.2.1	Coarse-Grained Fully Lamellar IMI 685	31
5.2.2	Effects of Microstructure: Fully Lamellar	33
5.2.3	Effects of Microstructure: Different Types of Microstructures	35
5.3	Summary	37
	References	39
6	Long/Large Fatigue Crack Growth	41
6.1	Introduction	41
6.2	Fatigue Thresholds	41
6.2.1	Fully Lamellar Microstructures	41
6.2.2	Different Types of Microstructures	43
6.3	Regions I and II Fatigue Crack Growth in Fully Lamellar Microstructures	43
6.4	Regions I and II Fatigue Crack Growth in Different Types of Microstructures	44
6.5	Region II Bilinear log da/dN–log ΔK Fatigue Crack Growth	46
6.6	Summary	48
	References	49
7	Concluding Remarks	51

Fatigue of Beta Processed and Beta Heat-treated
Titanium Alloys

Wanhill, R.; Barter, S.

2012, X, 51 p. 33 illus., 27 illus. in color., Softcover

ISBN: 978-94-007-2523-2