Contents

		Pag			
Executive Summary Synthèse Preface		iii iv vi			
			Struc	tures and Materials Panel	vii
			I.	Background	1
II.	Historical Advantages and Performance Capabilities of the Forging Process and Hand and Closed-Die Forging Products	3			
III.	Microstructural Basis for Fatigue Performance of 7050-T74XX and Other High Strength Aluminum Alloys	4			
IV.	Microstructurally Based Life Prediction Tools	7			
v.	Forged Product Process-Performance Relationships	8			
VI.	Thick Component Life Prediction; Forgings vs. Machined Plate	10			
VII.	Full-Scale Fatigue Evaluation of Prototypical Parts	12			
VIII.	Other Property/Performance Attributes for Aerospace Forgings	13			
IX.	Conclusions	14			
References		15			
Figures		19			

Preface

Historically, many aluminum aircraft components have been made from forgings. However, to reduce airframe manufacturing cost aircraft manufacturers are converting to parts machined from thick plate. The results of recent research indicates that forgings often offer significant advantages over components machined from plate. The purpose of this report is to present this information.

This report was prepared by technical personnel who work in the research laboratory and the forged products organization of a major aluminum producer (Aluminum Company of America). The authors of this report are: R.J. Bucci, R.W. Bush, A.J. Hinkle, H.J. Konish, M. Kulak, R.H. Wygonik and G.W. Kuhlman.

On behalf of the Structures and Materials Panel, I would like to thank the authors for preparing this report.

Jeffrey Waldman Structures and Materials Panel

Structures and Materials Panel

Chairman:

Prof. R. Potter Business Manager Structural Materials Center Griffith Building (A7) Room 1014 DERA Farnborough United Kingdom

Deputy Chairman:

Ir. Harold H. Ottens Head of Structures Department National Aerospace Laboratory-NLR P.O. Box 153 8300 AD Emmerloord Netherlands

Panel Executive:

Dr. J.M. Carballal, SP

Mail from Europe:

Mail from US and Canada:

RTA-OTAN
7, rue Ancelle
92200 Neuilly-sur-Seine
France

RTA-NATO/AVT PSC 116 APO AE 09777

Tel: 33 (01) 55 61 22 90 & 92 Telefax: 33 (01) 55 61 22 99 & 98