

LIST OF TABLES

		<u>Page</u>
Table 1.	Billet Lubricants Evaluated in Current Hydrostatic Extrusion Program	4
Table 2.	Experimental Data for Cold Hydrostatic Extrusion of AISI 4340 Rounds	6
Table 3.	Experimental Data for Cold Hydrostatic Extrusion of 7075 Aluminum Rounds	11
Table 4.	Experimental Data for Cold Hydrostatic Extrusion of Ti-6Al-4V Alloy Rounds	15
Table 5.	Experimental Data for Cold Hydrostatic Extrusion of AISI 4340 Steel and 7075 Aluminum T-Sections	17
Table 6.	Experimental Data for Cold Hydrostatic Extrusion of AISI 4304 Steel and 7075 Aluminum Tubing	17
Table 7.	Torsional and Triaxial Fatigue Data of Vibrac Steel	28
Table 8.	Fatigue Strengths of High-Strength Steels from Room-Temperature Rotating-Beam Tests, $\alpha_m = 0$	30
Table 9.	Fatigue Strengths of High-Strength Steels from Room-Temperature Push-Pull Tests, $\alpha_m = \alpha_r$	30
Table 10.	Fatigue Strengths of High-Strength Steels from Push-Pull Tests at Elevated Temperatures	31
Table 11.	Elevated-Temperature Data for 18% Ni Maraging Steel and H-11 Steel	71
Table 12.	Liner-Bore Stress and Interferences for a 6-Inch Bore Multi-Ring Container with $K = 8.5$, $N = 5$, $K_1 = 2.0$, $K_n = 1.44$, $N \geq 2$, $\alpha_1 = 0.5$, $\alpha_m = -0.5$	73
Table 13.	Liner-Bore Stresses and Interferences for a 6-Inch Bore Multi-Ring Container with $K = 8.5$, $N = 5$, $K_1 = 2.0$, $K_n = 1.44$, $n \geq 2$, $\alpha_r = 0.5$, $\alpha_m = -0.3$	74
Table 14.	Stresses and Deflections in a Ring Segment, $K_2 = 2.0$, $\alpha = 60^\circ$, $\nu = 0.3$	83
Table 15.	Deflections in Ring Segments, $\nu = 0.3$	84
Table 16.	Stresses and Deflections in a Pin Segment, $k_2 = 4.0$, $\alpha = 60^\circ$, $\nu = 0.3$	91
Table 17.	Displacements and Maximum Hoop Stresses in Pin Segments, $\nu = 0.3$	93

LIST OF FIGURES

	<u>Page</u>
Figure 1. Assembly Drawing of Tooling for Hydrostatic Extrusion	3
Figure 2. Effects of Stem and Billet Speed on Stem Pressure for Cold Hydrostatic Extrusion of AISI 4340 at an Extrusion Ratio of 5:1	8
Figure 3. Effect of Extrusion Ratio on Pressure for Cold Hydrostatic Extrusion of 7075-0 Aluminum	13
Figure 4. Die Configurations Used for Extruding T-Sections	16
Figure 5. Hydrostatic Extrusions of Tubing and T-Section Produced From 7075 Aluminum at Room Temperature	18
Figure 6. Mandrel Tooling Arrangement for Hydrostatic Extrusion of Tubing	20
Figure 7. Schematic of High-Pressure-Container Design Concepts Analyzed in the Present Study	23
Figure 8. Notations Used for Analysis of Container Design Concepts.	24
Figure 9. Fatigue Diagram for 10^4 - 10^5 Cycles Life for High-Strength Steels at Temperatures of 75 F - 1000 F	32
Figure 10. Maximum Pressure- to -Strength Ratio, $p/2S$, in Multi-Ring Container Designed on Basis of Static Shear Strength	39
Figure 11. Maximum Pressure- to -Strength Ratio, p/σ , in Multi-Ring Container Designed on Basis of Fatigue Shear Strength.	41
Figure 12. Maximum Pressure- to -Strength Ratio, p/σ_1 , in Multi-Ring Container With High-Strength Liner Based on the Fatigue Tensile of Liner.	43
Figure 13. Limit to Maximum Pressure- to -Strength Ratio, p/σ , in Multi-Ring Container With High-Strength Liner Based on Shear Fatigue Strength of the Outer Rings	45
Figure 14. Influence of Number of Rings on Maximum Pressure- to -Strength Ratio, p/σ , in Multi-Ring Container With High-Strength Liner	46
Figure 15. Influence of Liner Size on Maximum Pressure- to -Strength Ratio, p/σ , in Multi-Ring Container With High-Strength Liner	47
Figure 16. Comparison of Multi-Ring Container With Ring-Segment Container for Various k_1	51