PART IV. EXTERNAL TANK

Introduction

The external tank (ET) was the largest element of the STS and the only non-reusable major component. The complete ET structure measured approximately 154' in length, more than 30' longer than the orbiter. Since it was expendable, the ET was designed "to minimize active or moving parts."[1225] The ET contained and delivered approximately 1.6 million pounds of propellants (fuel and oxidizer) for the three SSMEs. The LO2 oxidizer was held in a forward tank, while the larger, rear tank contained the LH2 fuel. A structural connector called the intertank separated the two propellant tanks. In addition to serving as the shuttle's "fuel tank," the ET also was the backbone structure for attachment of the orbiter and SRBs. It accommodated the stresses created by both its own weight and that of the orbiter prior to launch, as well as the stresses generated by the SSMEs and SRBs during launch.

The ET was designed by the Martin Marietta Corporation, and manufactured and assembled by the Lockheed Martin Space Systems Company[1226] at NASA's government owned - contractor operated Michoud Assembly Facility (MAF) in New Orleans, Louisiana.[1227] The ET program was managed by the ET Project Office at MSFC. Lockheed Martin had approximately 2,000 subcontractors and suppliers located across the United States who provided materials for the ET. Historically, the suppliers included the Aluminum Company of America for SRB attachment fittings, ball forgings, longerons, forward ogive forgings and diagonal struts; both Reynolds Metals and Kaiser Industries Corporation for machined aluminum for LH2 tank barrel panels; Kaman Aerospace for slosh baffle segments; Aerochem for LO2 tank barrel panels; and Aircraft Hydroforming, Inc. for gore and ogive panels, as well as outer, inner and intermediate chords.[1228]

Historical Overview

Early Design Concepts

The tank design concepts developed in the late 1960s for the USAF Flight Dynamics Laboratory foreshadowed the Shuttle ET designs of the early 1970s. Both Lockheed and McDonnell Douglas submitted their early designs, prepared for the USAF, to NASA as part of the Phase A

[1225] Martin Marietta Corporation, *System Definition Handbook, Space Shuttle External Tank (Lightweight Model), Configuration & Operation Volume I*, (New Orleans, LA: Martin Marietta Corporation, August 1980), III-5, MSFC History Office, Huntsville.
[1226] In March 1995, the Martin Marietta Corporation and Lockheed Corporation merged to form the Lockheed Martin Corporation.
[1227] MAF was previously used for building the first stage of the Saturn IB and Saturn V rockets for the Apollo Program.
[1228] Edward H. Kolcum, "Space Shuttle Lightweight Tank Production Begins," *Aviation Week & Space Technology*, November 16, 1981: 135.