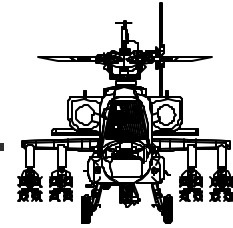
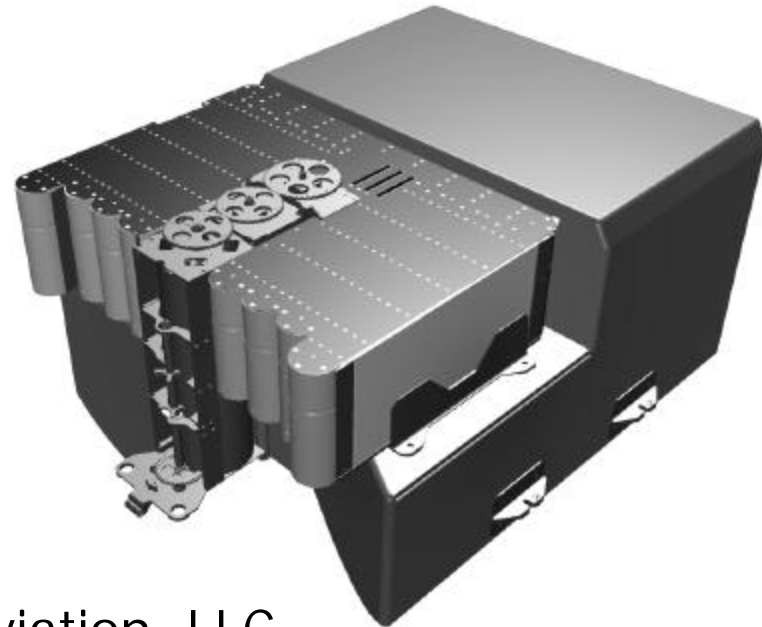


36th Annual Gun & Ammunition Symposium



APACHE – 30mm Combo-PAK

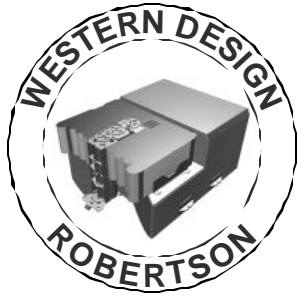
Presented By
Gregory C. Hill
Director of Marketing
Western Design
April 11, 2001



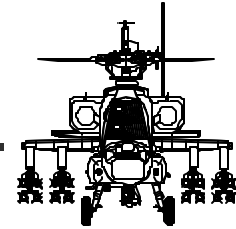
Program Prime: Robertson Aviation, LLC

Report Documentation Page

Report Date 11Apr2001	Report Type N/A	Dates Covered (from... to) -
Title and Subtitle APACHE 30mm Combo-PAK	Contract Number	
	Grant Number	
	Program Element Number	
Author(s) Hill, Gregory C.	Project Number	
	Task Number	
	Work Unit Number	
Performing Organization Name(s) and Address(es) Robertson Aviation, LLC	Performing Organization Report Number	
Sponsoring/Monitoring Agency Name(s) and Address(es) NDIA (National Defense Industrial Association) 211 Wilson Blvd, STE. 400 Arlington, VA 22201-3061	Sponsor/Monitor's Acronym(s)	
	Sponsor/Monitor's Report Number(s)	
Distribution/Availability Statement Approved for public release, distribution unlimited		
Supplementary Notes Proceedings from the 36th Annual Gun & Ammunition Symposium & Exhibition 9-12 April 2001 Sponsored by NDIA		
Abstract		
Subject Terms		
Report Classification unclassified	Classification of this page unclassified	
Classification of Abstract unclassified	Limitation of Abstract UU	
Number of Pages 15		



APACHE – 30mm Combo-PAK

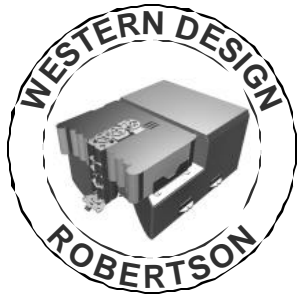


A Report:

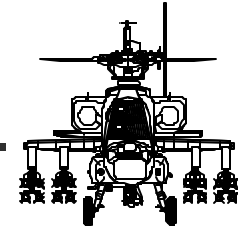
**'ENHANCEMENT OF A LEGACY SYSTEM
TO MEET EVOLVING COMBAT NEEDS'**

Providing:

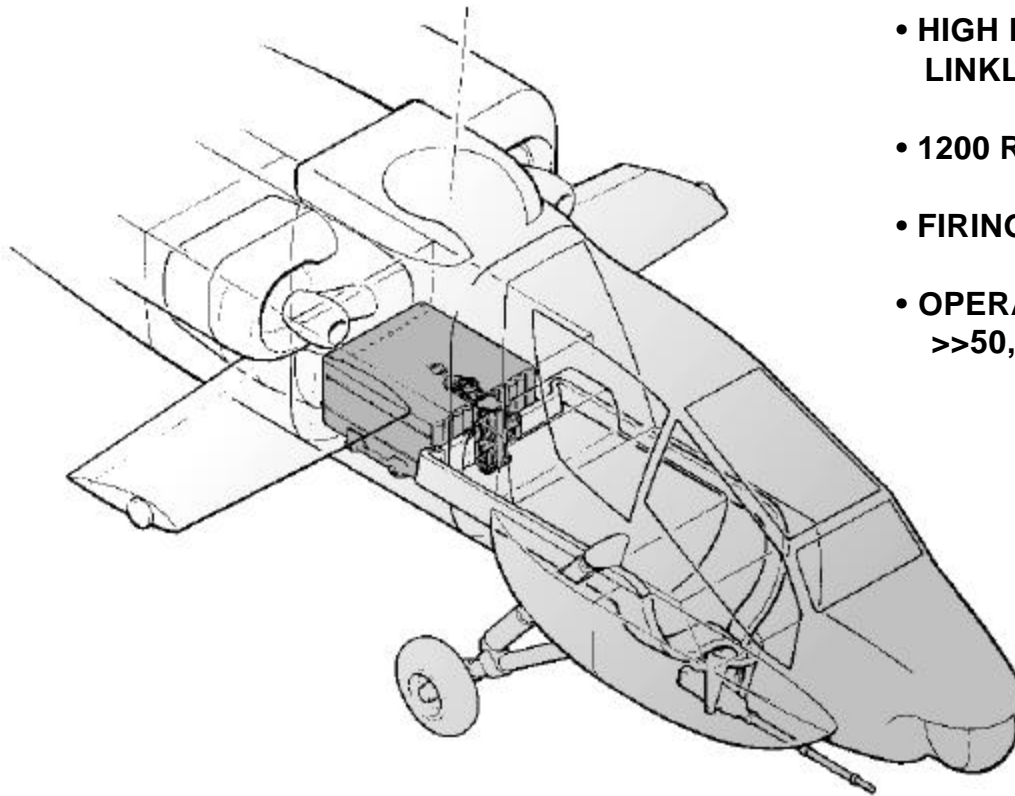
**'VERSATILITY FOR THE BENEFIT OF
A SMALLER, MORE CAPABLE FORCE'**



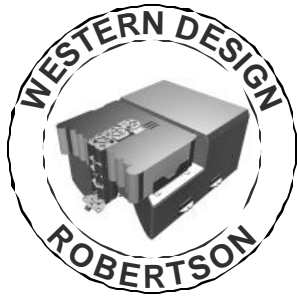
APACHE – 30mm Combo-PAK



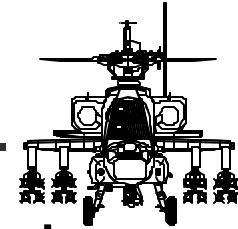
AH-64A 30mm 12-PAK Magazine



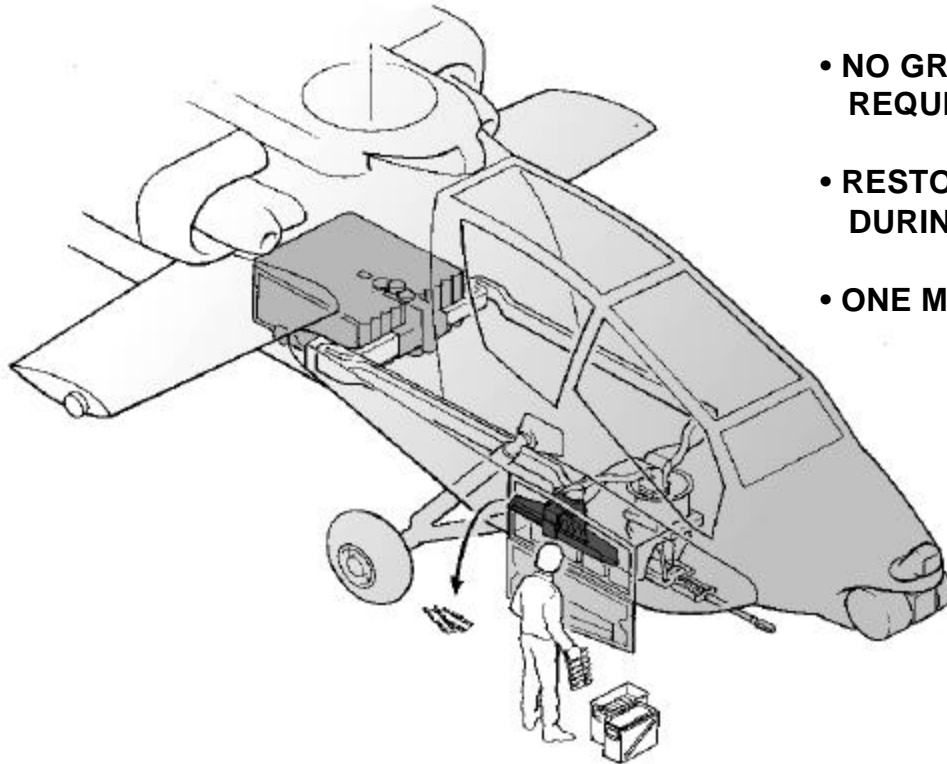
- HIGH DENSITY, TWO BAY, LINEAR LINKLESS MAGAZINE
- 1200 ROUND CAPACITY
- FIRING RATE 600 SPM
- OPERATIONAL RELIABILITY >>50,000 MRBF



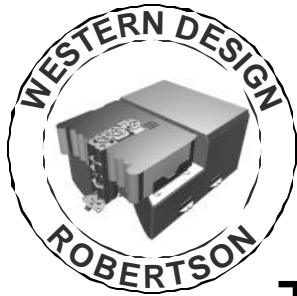
APACHE – 30mm Combo-PAK



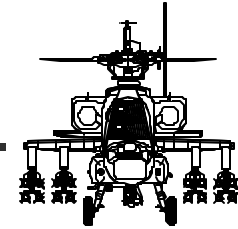
AH-64D 30mm 12-PAK "Sideloader"



- 1164 ROUND CAPACITY
- NO GROUND SUPPORT EQUIPMENT REQUIRED
- RESTORES AMMUNITION TO STRIPS DURING DOWNLOAD
- ONE MAN OPERATION @ 100 RND/MIN

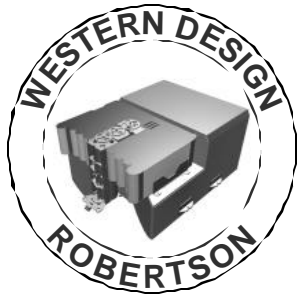


APACHE – 30mm Combo-PAK



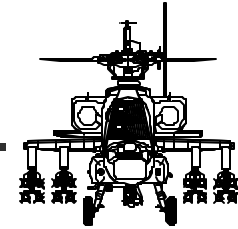
THE EVOLVING REQUIREMENT

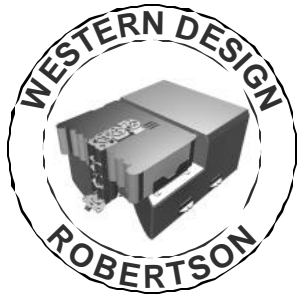
- **Operational need identified:**
"Greater range required for Apache"
(A lesson learned from Task Force Hawk in Kosovo)
- **Translated to a requirement:**
Extended Range Fuel System (ERFS) became a part of the Apache Operational Capabilities Improvements Priority List
- **Internal Fuel Solutions Developed:**
Reduction of ammunition load (full complement rarely used) to provide additional space for internal fuel (2 options)



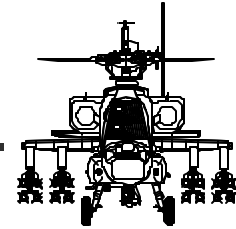
APACHE – 30mm Combo-PAK

**COMBINATION:
FUEL AND AMMO FOR VERSATILITY**



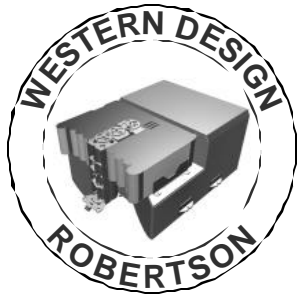


APACHE – 30mm Combo-PAK



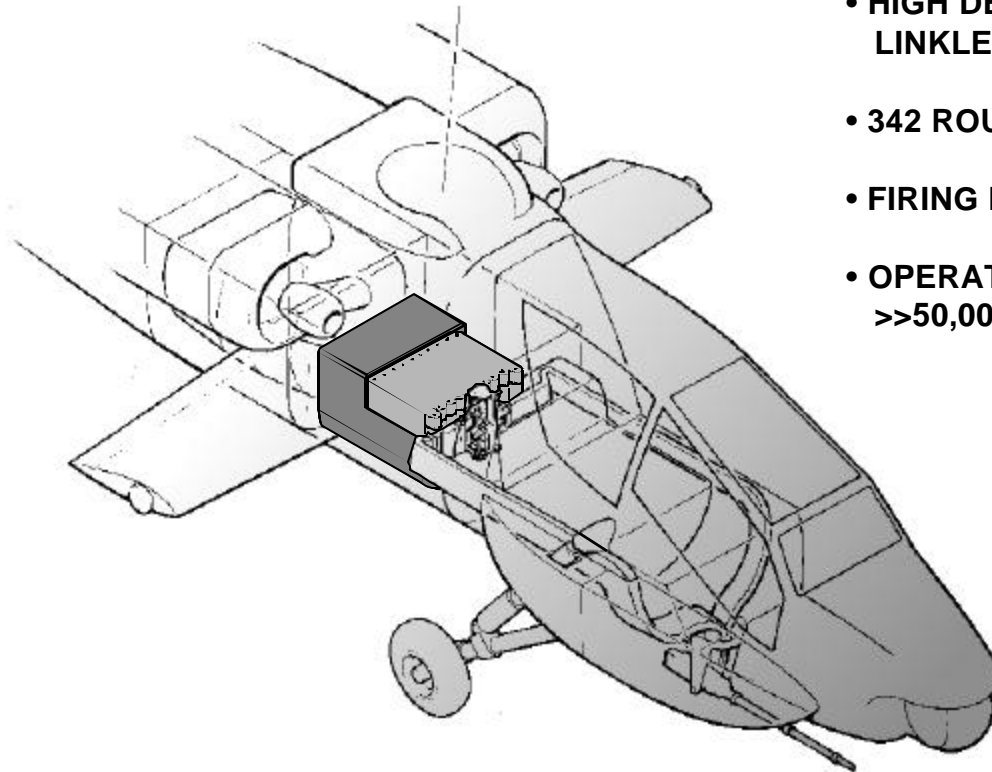
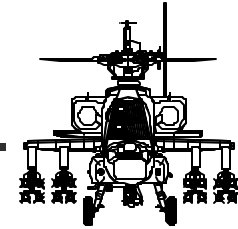
APACHE HISTORY: AMMUNITION/FUEL

Six-PAK	Original design, 600 round capacity
12-PAK	Original fielded system, 1200 rounds
230 Gallons Fuel	External, Pylon-mounted tank
TIME PASSED: Concepts developed for reduced weight and/or additional internal fuel	
130 Gallon Tank	Developed to eliminate use of external tanks
Combo-PAK	Compromise on fuel/ammo/weight to provide longer legs and a meaningful amount of ammunition

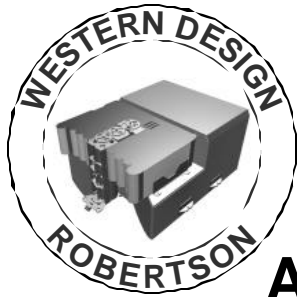


APACHE – 30mm Combo-PAK

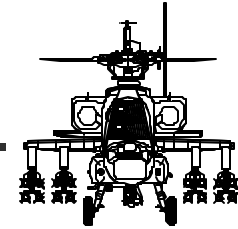
AH-64A 30mm Combo-PAK



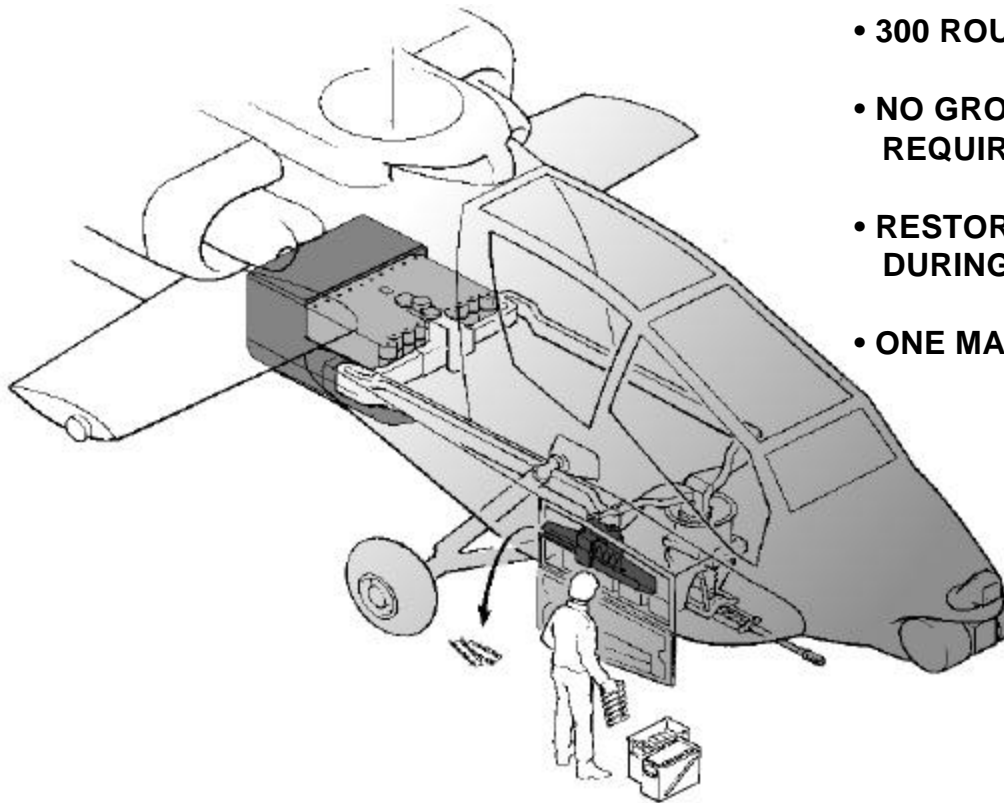
- HIGH DENSITY, SINGLE BAY, LINEAR LINKLESS MAGAZINE
- 342 ROUND CAPACITY
- FIRING RATE 600 SPM
- OPERATIONAL RELIABILITY >>50,000 MRBF



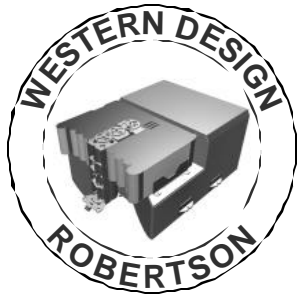
APACHE – 30mm Combo-PAK



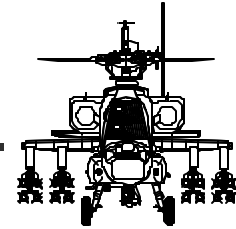
AH-64D 30mm Combo-PAK "Sideloader"



- 300 ROUND CAPACITY
- NO GROUND SUPPORT EQUIPMENT REQUIRED
- RESTORES AMMUNITION TO STRIPS DURING DOWNLOAD
- ONE MAN OPERATION @ 100 RND/MIN



APACHE – 30mm Combo-PAK



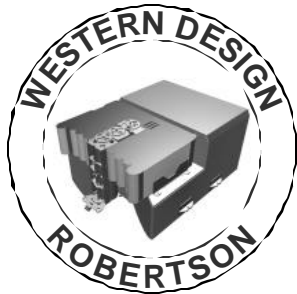
Combo-PAK: A SOLUTION FOR VERSATILITY

Reduced Size Magazine:

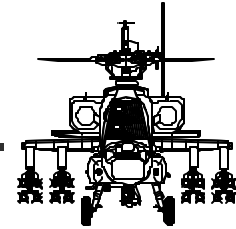
- Capacity: -246 30mm rounds
- Construction: -Light weight honeycomb Aluminum
 - Linear Linkless Chain Ladder

New Fuel Cell:

- Capacity: -100 gallons
- Construction: -Honeycomb/Fiberglass Outer Container
 - Crashworthy, Self-Sealing Bladder



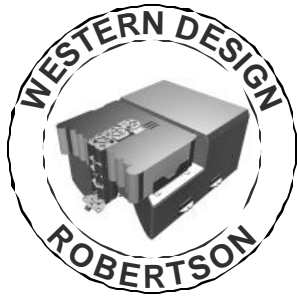
APACHE – 30mm Combo-PAK



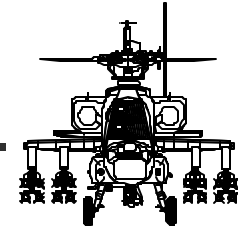
MISSION COMMANDER NOW HAS OPTIONS

- 1) Existing 30mm 12-PAK Magazine
- 2) Robertson GUARDIAN Apache Auxiliary Fuel System
 - AH-64A Capacity: 130 gallons/96 rounds
 - AH-64D Capacity: 130 gallons/54 rounds
- 3) Robertson/Western Design Fuel/Ammunition Combo-PAK
 - AH-64A Capacity: 100 gallons/342 rounds
 - AH-64D Capacity: 100 gallons/300 rounds

Interchangeable in less than 30 minutes

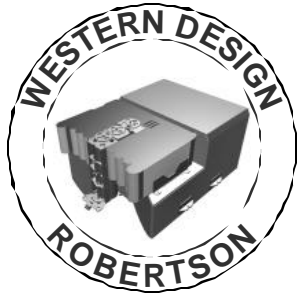


APACHE – 30mm Combo-PAK

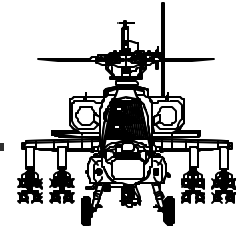


STATISTICAL INFORMATION

Equipment	Empty Wt.	Wt. of Fuel and/or Ammo	Full Wt.
12-PAK Magazine	182 lbs	855 lbs (alum.)	1037 lbs (alum.)
		1156 lbs (brass)	1338 lbs (brass)
130 Gallon Tank	215 lbs	871 lbs	1086 lbs
100 Gallon Tank	205 lbs	671 lbs	876 lbs
246 Rd. Magazine	75 lbs	190 lbs (alum.)	265 lbs (alum.)
		256 lbs (brass)	331 lbs (brass)
100 Gal + 246 Rd. Combo-PAK	280 lbs	861 lbs (alum,)	1141 lbs (alum.)
		927 lbs (brass)	1207 lbs (brass)



APACHE – 30mm Combo-PAK

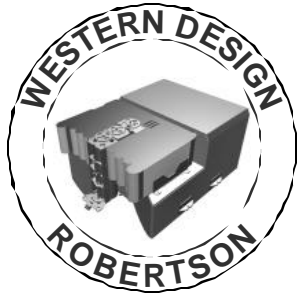


Combo-PAK BENEFITS

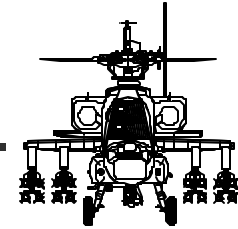
Increased Effectiveness for the Mission Commander through operational flexibility

APACHE Force Effectiveness enhanced:

- **Increased range (40 minutes flight time) without using external tanks**
- **'Off-axis Drag' condition removed**
- **Pylon hard-point retained for maximum ordnance load**



APACHE – 30mm Combo-PAK



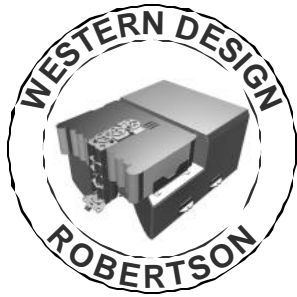
WHY THESE COMPONENTS?

Western Design Magazine:

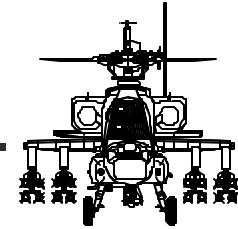
12-PAK Design Technology proven highly reliable over many years of low maintenance field use. A low risk system.

Robertson Aviation Fuel Cell:

Demonstrated long history with Auxiliary Tanks having crash worthy safety features that include self-sealing breakaway valves, Frangible Fasteners and Puncture/Tear Resistant Bladders



APACHE – 30mm Combo-PAK



Concluding Thoughts:

Field Commander: Options for Needed Mission
FLEXIBILITY

Industry: **Innovative Thinking** on Legacy
Systems leads to effective
Product Improvements

Combo-PAK: Available for field use in '02