

## Weapon System Expansion - Defense

Each weapon system maintained within ATLAST requires an initial fleet baseline database to be constructed. Currently, the Black Hawk, Apache, and Avenger systems have been baselined (initial databases complete) for use within ATLAST. Once a system is complete, the databases must be periodically refreshed with the latest supportability inputs.

Applicable weapon systems include the Kiowa, Chinook, UAV Systems, Fixed Wing Systems, SHORAD systems, etc. The systems will be selected for incorporation per AMCOM instructions and priorities. In addition, numerous Air Force, Navy and Marine Corps aviation program offices are currently evaluating ATLAST for use in various aspects of Performance-based Logistics forecasting and life cycle management.

## Wholesale and Retail Enterprise Integration

ATLAST models fulfill requirements for dynamic decision support tools within Fleet Management. To make ATLAST models, living models, they need to be tightly integrated with source data feeds. As the equipment within the model changes, the model needs to capture those changes prior to simulation analysis and supportability forecasting.

- **UH60 Fleet Management** – Integration with the HUMS/MMIS to utilize CBM & TAMMS-A data sources, automated log book data and equipment diagnostic data to further enhance confidence in supportability forecasting and analysis. (Retail Data Acquisition) A comprehensive fleet initial state update refresh will be developed in support of enterprise integration.
- **Logistics Modernization Program (LMP)** – Integration the Department of Army LMP system (Wholesale Data Acquisition) and Global Command Standard System as Army requirements dictate.

For more information on Clockwork Solutions or ATLAST, contact us at: [info@clockwork-solutions.com](mailto:info@clockwork-solutions.com)

Austin, TX – 512.338.1945

Huntsville, AL – 256.705.3582

## ATLAST User Community

### Utility Helicopter Program Management Office (UHPMO)

- Developed and expanded comprehensive UH60 Fleet Database.
- Supported A-A Recapitalization Planning Analysis
- Currently integrating ATLAST with the HUMS/MMIS to provide a near-real time decision support tool for strategic and tactical life-cycle fleet management

### SHORAD Project Office, Avenger System

- Develop initial Avenger system database for use within ATLAST
- Forecast 3-Year O&M Costs and Spares Requirements
- Support initiatives to quantify cost of non-reoccurring engineering due to equipment obsolescence

### Logistics Transformation Agency (LTA)

- Performed Data Sufficiency Study
- Performed Engine Model Validation

### AMCOM, IMMC, Utility Directorate

- Developed the T700 Engine Fleet Model. Perform buy plan analysis, OIF spares requirements analysis, and expected time on win analysis
- Updated and utilized the UH60 fleet database to provide comprehensive spares and funding requirements analysis for those aircraft operating in Iraq, Afghanistan, Ft. Rucker and Korea

### Corpus Christi Army Depot (CCAD), AMCOM Engineering

- Applied the ATLAST / T700 model to analyze the workload and parts requirements impacts due to proposed changes in depot remaining life screens on parts residing with the Power Turbine and GG Rotors.

### General Electric Aircraft Engines (GEAE)

- Developed additional functional capabilities within ATLAST to include improved data interface utilities, simulation reports and analysis graphs.
- Developed source data, data mining tools, to evaluate engine Time on Wing (TOW), Removal Causes, and Component Age Distributions.

### GMRDEC, AED, Sustainment Engineering Division/IMMC, Maintenance Directorate, Maintenance Support Division

- TAMMS-A (Maintenance Consolidated Database System) data support
- Facilitated the development, marketing, and training of Model in the Redstone Community
- Developed the baseline Apache fleet database to be used within ATLAST for fleet management purposes
- Worked with Corporate Analysis Directorate (CAD) in support of a CAD, LOGSA, AMSAA technology evaluation of ATLAST

# ATLAST

*Advanced Total Life-cycle Assessment Software Tool  
Capabilities, Users and Plans for Technology Expansion*



## ATLAST Description and Functionality

Clockwork Solutions, Inc. has developed the ATLAST simulation model to support life-cycle operations and maintenance impact forecasting for new and aging weapon system fleets.

Applications for use:

- **Total Life-cycle System Management (TLCSM)** – A system wide approach gives an extremely detailed and comprehensive picture of your system throughout the life-cycle.
- **Service Parts Management (SPM)** – Planning and alignment of service parts inventories, resources, and processes to ensure maximum system uptime with minimal risk and costs.
- **Performance Based Logistics (PBL) and Contractor Logistics Support (CLS)** – Proactively foresee unacceptable metrics prior to their occurrence, providing reasonable insight and time to correct the root cause supportability deficiencies.
- **Condition Based Maintenance (CBM)** – Incorporation into an existing condition monitoring system allows for real-time updating of the model.

## ATLAST Features/Highlights

### Component Removals and Demands

In the model, a triggering event (such as a life-limit or failure) will lead to an LRU or SRU assembly removal or multiple removals. Each removal may result in one or more lower level components or assemblies being removed, depending on the work rules, engine condition, etc.

This treatment will allow the model to compute the source of part demands, whether it be from work on a depot engine overhaul, a next higher assembly, or the base sending a failed part to the depot.

### Component Age and Aging

The probability of a component failure typically increases as the component ages (i.e. tired iron). The model uses distributions created by historical data analysis and distribution fitting to capture these aging processes.

During each model run, the model will age each component according to the flying hour and consider the variability in the ratio between flying hours for the different aircraft types and units to which they are assigned.

### Repairs and Condemns

The model uses time distributions to describe repair flow times. However, the recently upgraded modeling tool, used for multi-indenture, multi-echelon analysis, simulates the logistics repair processes within the depot.

Queues exist at LRU/SRU disassembly and assembly, due to resource constraints which may be applied to repair and material supply processes. This allows for calculations of anticipated "Awaiting Maintenance" (AWM) and "Awaiting Parts" statuses (AWP).

### Supply System

The repair process consume parts. The supply system maintains stocks of parts to meet these demands and to cover variability in the demand and repair times. Over time, the model generates demand for parts due to condemnations, changes in wear out rates, increased flying hours, part obsolescence, opportunistic maintenance, etc.

The model includes an explicit representation of the stock levels for the various parts.

## ATLAST Inputs

**Asset, Assembly, and Component Inventory Data** – serial number; location; installed spare, or in repair  
**Asset Structure Data** – breakdown structure (bill of materials)  
**Component Data** – serial numbers if tracked; Flight hour tracking methods and limits; current ages; location  
**Program Data (by engine and by Unit)** – Flying hour programs  
**Supply Data** – current inventories; past supply demands and factors; part costs; shipment times between O, I and D locations  
**Failure Data** – incidences of failure by serialized part, date, root cause  
**Removal Data** – engine disposition; what parts were removed/replaced; how mal code; total repair cycle time; time waiting for parts; repair induction schedules  
**Shop Rules** – criteria for opportunistic replacements, standard shop flow days, repair to like new conditions rules, recapitalization policies as identified

## ATLAST Outputs

**System Availability**  
**Life Cycle Costs (LCC)**  
**Achieved Operating Hours**  
**Time On Wing (TOW)**  
**Failure Occurrences**  
**Planned and Unplanned Removals by Cause**  
**Repairs, Repair Turn Around, and Condemnation Levels at Base and Depot Levels**  
**Demands for Parts by Source** – From Field, From Overhaul, From Repair of Next Higher Assembly  
**Spare Parts Availability, High/Low/Average Stock Levels**  
**Push Pack Spares Lists, Pricing and Associated Fleet Availability**

## Advanced Utilities

Clockwork Solutions is continuously striving to add valuable new modules to the ATLAST software to aid in decision making processes. Advanced utilities include:

- **Buy Plan Analyzer** – Tool to assist with the development of affordable spares buys within 2 and 3 level maintenance concepts when it is necessary to maintain an objective fleet readiness.
- **Deployment Push Pack Optimizer** – Tool to calculate optimal Line Replaceable Unit (LRU) Spares Push Packs considering select aircraft deployments, operations and serviceable spare logistics turn around time.
- **Historical Performance Data Miner** – Tool used to quickly and graphically assess current fleet condition metrics to include component failure types, removal rates, age distribution and number of repairs. (This data is then used to initialize the fleet model prior to predictive simulation analysis)

## Upcoming Advanced Utilities

The ATLAST technology will provide increasing analysis support for Performance Based Logistics (PBL), Condition Based Maintenance (CBM), and Continuous Technology Refresh (CTR) business case analysis.

These upcoming utilities include:

- **Continuous Technology Refresh (CTR) Assessment Utility** – Generates post simulation reports that provide business case assessments of proposed technology insertion options for a system, configuration or entire fleet.
- **Fleet Spare Part Optimizer** – The integration of multi-echelon, multi-indenture optimization techniques with the discrete event simulation. This tool will reduce the time involved in the buy plan development and analysis.
- **Maintenance Resource Optimizer** – Location specific resource optimization based on simulated projections of workload categories.
- **Risk Assessment Profiler** – Each forecasted metric contains a range of probable values. This range can be visualized through histograms which display the confidence in the numbers, and highlight areas of low confidence (i.e. high risk).