Opus Suite: Systems & Logistics Cost Optimization

Simplifying Life Cycle Decisions and Readiness Analysis
Overview

• The Optimization Trade Space
• Current Customers
• Programs Supported
• Opus Suite for Decision Support Across the Life Cycle
• Tool Suite Detail
• Modeling Example
The Optimization Trade Space

Optimal Balance Between Operational Effectiveness and Cost

Our software has undergone a full V&V and is the tool of record for logistics analysis, readiness simulation, and LCC in the UK and Australia. The Defense components of 30 countries use Opus Suite.
Opus Suite’s Unique Capabilities

Strategic & Tactical Analysis and Decision Support in Systems and Logistics to Lower Costs and Increase Capability

- **RESOURCES**
  - Optimize the performance and product support concept over time
  - Dimension facilities, personnel, equipment, etc.
  - Manpower trade studies

- **SPARES**
  - LORA
  - Resource optimization
  - Mission simulation
  - Readiness based sparing
  - PBL contract design
  - ODBC import/export

- **COSTS**
  - LCC analyses
  - Cost related to any KPP
  - Profit/cost analyses
  - Budget & forecasts
  - Comparing solutions
  - Cost control

**Opus Suite’s Unique Capabilities**

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**Opus Suite**

- SIMLOX
- OPUS10
- CATLOC
Defense Customers & Software Users

*More than 600 licenses installed at over 150 customer sites in 30 countries on 5 continents*

<table>
<thead>
<tr>
<th>Government Agencies</th>
<th>Contractors</th>
<th>International Users</th>
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<tbody>
<tr>
<td>• US Air Force</td>
<td>• Lockheed Martin</td>
<td>• Bundeswehr</td>
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<tr>
<td>• US Navy</td>
<td>• Boeing</td>
<td>• OCCAR</td>
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<td>• UK Ministry of Def</td>
<td>• Raytheon</td>
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<td>• French Air Force</td>
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<td>• MTU Aero Engines</td>
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<td>• Spanish Air Force</td>
<td>• BAE Systems</td>
<td>• Rheinmetall Landsysteme</td>
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<td>• Heli-One</td>
<td>• Blohm+Voss</td>
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<td>• Mitsubishi</td>
<td>• ThyssenKrupp Marine</td>
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<td>• Eurocopter</td>
<td>• Airbus Military</td>
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<td>• OCCAR</td>
<td>• CAE</td>
<td>• IAI</td>
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*...and more*
# Programs Supported

*Experience on more than 100 programs including complex PBLs*

- CH-47
- H-60
- F-16
- F-15
- F-35
- Apache
- Merlin
- NH-90
- Typhoon
- F-18
- Aegis
- Puma
- S-92
- S-76
- Sentry
- KC-135
- KC-46
- C-130
- C-17
- A400M
- Leopard
- T-6
- King Air
- THAAD
- Lynx
- Trident
- Multiple Ship Programs
Potential Reasons for Unavailability

Use Opus Suite to Identify the Constraint and Optimize Outcomes to Get the Most “Bang for the Buck”

- Reliability
- Maintenance activities
- Spare parts
- Tools
- Documentation
- Other resources
Opus Suite for Decision Support

System Operations, Readiness & LCC Analysis

The Benefits

- Optimize Life Cycle Costs as a function of readiness objectives.
- Lower Costs by more than 15%.
- Optimize manpower, material, resources, and availability in a single model.

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Opus Suite for Decision Support

*Manpower Optimization and Level of Repair Analysis (LORA)*

**The Benefits**

- Lower manpower costs by more than 20%.
- Optimize manpower and repair strategy location by location.
- Simulate outcomes to identify solution robustness and perform “what-if” analysis to see impact of investment in things like Reliability Growth

![LORA XT](image1)

![Spare Parts List](image2)

![Repair Strategy](image3)

![LORA and Repair/Discard Analysis](image4)
Opus Suite for Decision Support

*Spare Parts Optimization and Inventory Analysis*

The Benefits

- Lower spare parts inventory by 40% over other methods.
- Optimize over time (ramp up/down).
- Full V&V for defensible, trusted results.
Opus Suite for Decision Support

*Holistic LCC Modeling for True Optimization*

**The Benefits**

- Holistically consider all system aspects to include test and support equipment, as well as, personnel and training requirements analysis.
- Proven on more than 100 programs in 30 countries.
- Lower LCC by 20% or more.
- Identify performance against key performance parameters including sortie generation, logistics footprint, cost per flight hour, and more.
Preliminary Model Inputs (80% Solution)

Only a basic set of inputs is required to begin modeling that can be refined and incrementally expanded over time.

• Preliminary Model Development will provide the 80% solution estimate
  – Additional fidelity can be added incrementally (about 300 potential input variables) to continue to lower O&S costs and optimize performance.

• Input examples are:
  – Item ID
  – Item Failure Rate (or a metric that may be used to derive failure modes/rates)
  – Item Acquisition Costs
  – Item Repair Costs
  – System Configuration
  – System Duty Cycle
  – System Repair Turnaround Time
  – Item Repair Turnaround Time
  – Transportation Time Between Locations
  – Quantity of Systems per Site
Logistics Support & Spares Optimization
OPUS10

**Optimization of Logistics Solutions**

**The Benefits**

- Strategic and tactical optimization that facilitates maximum availability at minimum cost across all locations.
- Readiness Based Optimization of spares, repair resources & support organization and the ability to compare alternatives, and conduct trade studies and BCAs.
OPUS10 key features

Optimization of Logistics Solutions

The Benefits

• Flexible modeling of different technical systems & support organizations (multi-indenture and multi-echelon)
• Repairable, discernable & partly repairable
• Preventive & Corrective maintenance
• Item or Task based maintenance structure
• Lateral support & Backorder priority
• Time Phased Optimization (phase up/ramp down)
• Customer proven results: Increased system efficiency while reducing investment by 20-40%
SIMLOX

Simulation of Operations and Logistics Support
SIMLOX Key Features

Robust Simulation and Detailed Analysis

The Benefits

• Analyze complicated enterprise scenarios
• Dimension resources, system types, manpower and material
• Evaluate the ability of technical systems and their support solution to meet operational objectives such as sortie generation and CPFH
• Simulate the impact of time dependent variables
• Verify and extend the OPUS10 model and results
• Introduce efficiency measures more closely related to operational data, e.g.
  – start & success fraction
  – operational time accomplished
  – 95% confidence limit of accomplished op time

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SIMLOX

*Mission Simulation and Sortie Generation*

- Event based Monte Carlo Simulation
  May use the same input data as OPUS10 plus time dependent variables such as operational profiles, resource availability, to simulate mission capability and demonstrate readiness in war gaming scenarios.

- Game mode – Graphical visualization of simulation
  - PLAY, STEP, FORWARD & REWIND -
LCC & Cost Analysis

CATLOC
CATLOC

Life Cycle Cost and Cost Analysis

The Benefits

• Flexible approach to LCC and cost analysis.
• LCC structure is 100% user defined (or based on templates).
• Analysis view with unlimited possibilities to break down and distribute costs over different dimensions.
• Summaries of costs/revenues on aggregate level, as well as detailed drill-down for cost drivers.
CATLOC

Life Cycle Cost and Cost Analysis

Key Features

• Comparing different suppliers.
• Evaluate different technical solutions.
• Comparing different support solutions.
• Evaluate new contracts, conduct BCAs, and breakdown cost elements.
• Identify cost drivers.
• Forecast cost/revenue review.
• Model economical impact of changes to design and support solution.
• Decision support for replacement of aging equipment.
• Budgeting and cost control.
Analysis Example
Analysis Example

- Technical System
- Support Solution
- Operation

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Example: Operational Capability
Example: **Systems In Operation**
Example: Reasons for Unavailability
Example: **Improvement 1 - Add Repair Resources**
Example: **Improvement 2 – Spares Optimization**
Example: **Improvement 2 – Spares Optimization**

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Example: **Results after Improvements**
Example: Results after Improvements

![Graph showing accumulated mission time over time after improvements.](chart.png)
Example: Comparing Life Cycle Costs

Note: In the improved solution we lowered our spares investment considerably but invested in an additional resource and flew more. Increased mission hours by 15% while only increasing costs by 5%
Example:  Cost analysis over time