Case study Swedish NH90 (HKP 14)
Decision support and cost savings through optimization, modelling and simulation

Johan Elfvik, MSc
2016-10-11
AGENDA

• Life Cycle Management and Opus Suite
• Background NH90/HKP14
• Case 1 - Reduction in yearly flight hours due to cost reductions
• Case 2 - Evaluation of supplier spare parts proposal (ICS buyout)
• Case 3 - Adaption of spare parts optimization based on vendor quotations
• Questions
AGENDA

• Life Cycle Management and Opus Suite
• Background NH90/HKP14
• Case 1 - Reduction in yearly flight hours due to cost reductions
• Case 2 - Evaluation of supplier spare parts proposal (ICS buyout)
• Case 3 - Adaption of spare parts optimization based on vendor quotations
• Questions
LIFE CYCLE MANAGEMENT

OVERALL OBJECTIVE

cost-effectiveness

MAXIMUM SYSTEM EFFECTIVENESS AT MINIMUM COST

TECHNICAL SYSTEM

SUPPORT SYSTEM

OPERATIONAL CONCEPTS
OPUS SUITE – THREE INTEGRERATED TOOLS
Background – NH90

- NHIndustries (NHI) NH90 is a medium-sized, twin-engine, multi-role helicopter

- **Placed orders:** Australia, Belgium, Finland, France, Germany, Greece, Italy, Netherlands, New Zealand, Norway, Oman, Spain, Sweden

- **Cancelled orders:** Portugal, Saudi Arabia

- **Total deliveries:** 274

- **Total order book:** approx. 500 helicopters
SWEDISH NH90/HKP14 TIME SCHEDULE

MAIN EVENTS

1999
- RFI
- RFQ
- tender

2000
- contract award

2001
- first flight SWE

2002 – 2007
- first delivery SWE

2008 – 2015
- Planned full delivery, 18 helicopters

2020
- Spare parts acquisition
- Repair & Overhaul Contracts

Case Studies
- Opus 10, Simlox

Systecon support to FMV – LCM and Opus Suite support

FMV = Swedish Defence Material Administration

© 2016 Systecon AB
AGENDA

• Life Cycle Management and Opus Suite
• Background NH90/HKP14
• **Case 1** - Reduction in yearly flight hours due to cost reductions
• **Case 2** - Evaluation of supplier spare parts proposal (ICS buyout)
• **Case 3** - Adaption of spare parts optimization based on vendor quotations
• Questions
Case 1 - Background

• Reduction in spare part acquisition budget
  => not possible to reach required $y$ FH/year

• Opus Suite was used to analyze the maximum yearly flight hours
  ($x$ FH/year) possible with regard to reduction in spare parts
  investment
OPUS SUITE INPUT DATA MODEL – HKP14

**USER DATA**
- user “constants”
  - man-hour rates
  - admin costs
  - efficiency factors
- operations
  - number of helicopters
  - FH/year
- availability requirement
- 85% mission success

**TECHNICAL DATA**
- acquisition costs
  - helicopters
- logistics resources
  - GSE
  - initial training
  - documentation
- system/item data
  - PM data
  - CM data
  - item prices

**LCC**
- LCC calculation

**Simulation & spares optimization**
- Opus Suite model

**Existing stock**
- NBO
- Cost
Analysis with OPUS10 and SIMLOX

Opus Suite Model – update of input data:
- x FH/year
- Iterative analysis to find the ”x-value” that fulfills 85% Mission success rate

Output:
- Recommended x FH/year

Result - OPUS10

Result - SIMLOX

© 2016 Systecon AB
Case 1 - Summary

• The "x-value" was found

Swedish Air Force operational planning for HKP 14 adjusted to x FH/year
AGENDA

- Life Cycle Management and Opus Suite
- Background NH90/HKP14
- **Case 1** - Reduction in yearly flight hours due to cost reductions
- **Case 2** - Evaluation of supplier spare parts proposal (ICS buyout)
- **Case 3** - Adaption of spare parts optimization based on vendor quotations
- Questions
Case 2 - Background

• The Interim Contractor Support (ICS) contract was a performance based contract where the spare parts stock was owned by supplier
• Sweden and Norway
  – one common pool of spares
• The ICS contract was terminated during 2015
• The supplier offered SWE to buy the existing SWE stock items used during the ICS-contract period (“ICS buyout”)
Questions asked

• Would it be cost effective to accept the buyout offer “as is”?  
• Did the offer include items not contributing to system availability?  
• Would it be more cost effective to pick individual items from the offer?  
• Which items should be picked?
OPUS SUITE INPUT DATA MODEL – HKP14

**USER DATA**
- user "constants"
  - man-hour rates
  - admin costs
  - efficiency factors
- operations
  - number of helicopters
  - FH/year
- availability requirement
  - 85% mission success
- support organization
  - bases
  - support lines
  - transport times
  - turn-around times
  - lead times

**LCC**
- LCC calculation
- NBO
- Cost

**TECHNICAL DATA**
- acquisition costs
  - helicopters
- logistics resources
  - GSE
  - initial training
  - documentation
- system/item data
  - PM data
  - CM data
  - item prices

**Existing stock**

**Simulation & spares optimization**
- Opus Suite model
Analysis with OPUS10 and SIMLOX

Opus Suite Model – update of input data:

Alt.1: Existing stock “as is”
Alt.2: Existing stock based on “free picking”

Output
- OPUS10 recommended stock to reach x FH/year

Result - OPUS10

Result - SIMLOX

© 2016 Systecon AB
Case 2 – Analysis results (1/2)

• Total spare investment to reach x FH/year
  – Alt. 1 (Existing stock "as is"): $C_1$ MEUR
  – Alt. 2 (Existing stock based on "free picking"): $C_1 - 6$ MEUR
Case 2 – Analysis results (2/2)

Conclusions
• 6 MEUR saving if ”free picking” is allowed
• The recommendation is to not accept the existing stock ”as is”

Input to the negotiation team
• The goal should be a ”free picking” alternative
• If free picking is not allowed, there should be a discount of approx. 6 MEUR
Case 2 - Summary

• The “Free picking” alternative was accepted by supplier

Total saving: 6 MEUR
AGENDA

• Life Cycle Management and Opus Suite
• Background NH90/HKP14
• Case 1 - Reduction in yearly flight hours due to cost reductions
• Case 2 - Evaluation of supplier spare parts proposal (ICS buyout)
• Case 3 - Adaption of spare parts optimization based on vendor quotations
• Questions
Case 3 - Background

- There is a need to Purchase spare parts
  - Alt. A: Purchase directly from the supplier, acc. to existing price list
  - Alt. B: Competitive tendering
- Alt. B was chosen
- During 2015 the Swedish Defence Material administration (FMV) released a Request For Quotation (RFQ) regarding spare parts acquisition
Enquiry – spare parts acquisition

- Approx. 600 components (LRU/DU)
- Item by item approach

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Denomination</th>
<th>Category (LRU/DU/C1C)</th>
<th>Indicative quantity needed</th>
<th>Quoted Part Number</th>
<th>Life Limit (months) (For offered P/N)</th>
<th>Remaining Life (months) (For offered S/N)</th>
<th>Price/unit (EUR)</th>
<th>Delivery Time PLT (months)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>115340</td>
<td>SPRING</td>
<td>LRU</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12086000002</td>
<td>ACTUATOR CTIL COMP.</td>
<td>LRU</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-0003P24</td>
<td>SHRT TUNED VVH ANT</td>
<td>LRU</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>132CE02Y10</td>
<td>ALT/EPU PROT PCB</td>
<td>LRU</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>142CE02Y03</td>
<td>AC I/O LOGIC PCB</td>
<td>LRU</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>152CE02Y06</td>
<td>BITE PCB</td>
<td>LRU</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tender evaluation

- **Evaluated price** = Offered price + Surplus value

*Surplus value*: Price addition in the evaluation set to 5% of the price per month for a delivery time (PLT) later than November 2015

<table>
<thead>
<tr>
<th>FMV Enquiry</th>
<th>Category</th>
<th>Rank Evaluated Price</th>
<th>Lowest Evaluated Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A  B  C  D  E  F</td>
<td>Unit Price  PLT  Company</td>
</tr>
<tr>
<td>ACTUATOR CTRL COMP.</td>
<td>LRU</td>
<td>4 1 3 2</td>
<td>700 000 10 B</td>
</tr>
<tr>
<td>SHRT TUNED VHF ANT</td>
<td>LRU</td>
<td>2 1</td>
<td>20 000 8 C</td>
</tr>
<tr>
<td>ALT/EPU PROT PCB</td>
<td>LRU</td>
<td>4 1 3 2</td>
<td>25 000 6 B</td>
</tr>
<tr>
<td>AC I/O LOGIC PCB</td>
<td>LRU</td>
<td>4 1 3 2</td>
<td>30 000 6 B</td>
</tr>
<tr>
<td>RITE PCB</td>
<td>LRU</td>
<td>4 1 3 2</td>
<td>25 000 6 B</td>
</tr>
<tr>
<td>CONDEN. ELEC. FAN</td>
<td>LRU</td>
<td>2 1</td>
<td>80 000 14 C</td>
</tr>
<tr>
<td>EVAP ELEC FAN</td>
<td>LRU</td>
<td>2 1</td>
<td>15 000 13 C</td>
</tr>
<tr>
<td>BATTERY LOGIC PCB</td>
<td>LRU</td>
<td>4 1 3 2</td>
<td>500 000 13 B</td>
</tr>
<tr>
<td>RIGHT AC-DC EMB</td>
<td>LRU</td>
<td>4 1 3 2</td>
<td>100 000 7 B</td>
</tr>
<tr>
<td>LEFT AC-DC EMB</td>
<td>LRU</td>
<td>4 1 3 2</td>
<td>100 000 7 B</td>
</tr>
</tbody>
</table>
OPUS SUITE INPUT DATA MODEL – HKP14

USER DATA
- user "constants"
  - man-hour rates
  - admin costs
  - efficiency factors
- operations
  - number of helicopters
  - FH/year
  - availability requirement
  - 85% mission success
- support organization
  - bases
  - support lines
  - transport times
  - turn-around times
  - lead times

LCC
- LCC calculation
- Simulation & spares optimization
  - Opus Suite model
- Existing stock

TECHNICAL DATA
- acquisition costs
  - helicopters
- logistics resources
  - GSE
  - initial training
  - documentation
- system/item data
  - PM data
  - CM data
  - item prices

© 2016 Systecon AB
Analysis with OPUS10 and SIMLOX

Opus Suite Model – update of input data:
- Updated item prices
- Updated Lead times

Output:
- OPUS10 recommended stock

Result - OPUS10

Result - SIMLOX

© 2016 Systecon AB
Case 3 - Summary

• Investment in spare parts according to OPUS10 recommendation
• Savings compared to supplier’s existing price list:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-2 000 000</td>
<td>-1 500 000</td>
<td>-1 000 000</td>
<td>-300 000</td>
<td>-200 000</td>
<td></td>
</tr>
</tbody>
</table>

Total saving: 5 MEUR
SWEDISH NH90/HKP14 TIME SCHEDULE

MAIN EVENTS

1999 – 2007
- RFI
- RFQ
- Tender
- Contract award
- First flight SWE
- First delivery SWE

2008 – 2015
- Interim Contractor Support (ICS)
- Planned full delivery, 18 helicopters

2020
- Spare parts acquisition
- Repair & Overhaul Contracts

Savings
- Case 2: 6 MEUR
- Case 3: 5 MEUR
- 11 MEUR

Systecon – LCM and Opus Suite support

© 2016 Systecon AB
THE END

Questions?

Source: Swedish Armed Forces