OMDEC

OPTIMAL MAINTENANCE DECISIONS INC

SMS - Spares Management System – Sales Brief

OMDEC's Spares Management Profile

1.Improve the management of ordering, receiving, issuing, restocking and disposing of inventory à OMDEC's 12 step approach - two or three days practical workshops

2.Optimize the on-hand inventory – implement the management processes - set goals and KPI's, training, monitor results. Two to four weeks on-site consulting.

3.On hand forecasting of expensive parts so as to balance cost and system reliability requires SMS software. Inventory cost reductions of 50+% are typical using this approach.

4.On-going analytical approach to monitor on-line existing inventory levels, recommend buy quantities and dates, plus surplus-for-disposal amounts -- automatically via a secure website à Xtivity - OMDEC Business Partner.

5.Very in-depth analysis of the reliability and logistics of components (more usually appropriate to military situations), à Pennant - OMDEC Business Partner

Purpose of the SMS Software

1. A decision support tool for setting the right inventory levels for ***critical, slow moving and high cost parts***
2. Matches cost and reliability – ***reduces stock costs, increases production reliability***
3. Combines science and economics to set inventory levels according to operations and reliability needs, not just budgets
4. Forecasts stock levels for in-house repair, sub-contract repair and new purchases based on
    a. the required reliability
    b. cost
    c. equipment availability
5. Provides the basis for:
    a. selling surplus inventory
    b. buying needed spares in the right quantity at the right time
    c. delaying the buy until the spares are needed
    d. forecasting cash requirements for critical and expensive spares based on real need.
6. Aligns spare parts replacement decisions with the Equipment Reliability process and the current business situation (risk and cost)
7. Facilitates placement of final orders for discontinued parts

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Target markets

Any organization which:

1. uses critical high cost spares
2. needs to maintain production volumes when reliability and potential failures are an issue
3. needs to justify a spares buy to Finance
4. questions how many high cost spares to maintain in stock
5. requires to optimize cash flow against spares purchases

Examples – mining, oil & gas, power generation, cement, metals and minerals processing, transportation, food processing, chemicals and plastics, heating and cooling, pharmaceuticals, automotive, batch manufacturing.

Case Studies

1. Steel Manufacturer had the following questions:

- How many spares do I need to achieve X% Reliability
- What is the right spares level to minimize cost?
- Will my current level of spares give me the required reliability during my planning period?
- What lead time should we buy for to provide the required reliability during this lead time?
- What level of reliability will I expect in the period before the new stock arrives?
- What is the cost if I run short?
- What should my order quantity be?

Sample results:

1. recommended buy was 2 units for $204,000; reducing the buy to 1 @ $102,000 saves $102,000 and decreases Reliability by only 0.7% to 99.25%
2. recommended buy was 4 units for $156,000; reducing the buy to 3 units saves $39,000 and decreases Reliability by only 1.3% to 98.4%
3. recommended buy was 2 units for $52,000; reducing the buy to $26,000 saves $26,000 and decreases Reliability by 10% to 87.4%

Conclusions:

1. Company easily focused on high value, capital spares – both repairable and non-repairable
2. SMS brought decision logic to the Finance versus Operations debate (zero stock) versus infinite stock)
3. Clearly showed the increased risk of saving cash and reducing inventory
4. Introduced Required availability + Required reliability + Unavailability Cost + Equipment Management requirements into the procurement process
5. Aligned sparing/procurement decision with the Equipment Reliability Business Process

2. Military Organization wanted to better manage spares for obsolete equipment no longer supported by the manufacturer. Questions asked:

1. based on 95% reliability and experienced MTBF, how many in stock compared with SMS recommended levels?
2. what is the cost impact?
3. with the current stock levels, how long will they last?

Sample results:

1. Item 1 – 51 in stock for a 9 year planning period; SMS recommended 26. Unit cost was $3,000 for an overbuy of $78,000
2. Item 2 - 68 in stock for a 15 year planning period; SMS recommended 166. Unit cost was $10,000 for an underbuy of $98,000
3. Item 3 - 22 in stock for a 44 year planning period; SMS recommended 68. Unit cost was $4,000 for an underbuy of $184,000
4. Item 4 - 35 in stock for a 14 year planning period; SMS recommended 17. Unit cost was $4,000 for an overbuy of $72,000
5. Item 5 - 98 in stock for a 24 year planning period; SMS recommended 207. Unit cost was $3,000 for an underbuy of $327,000

Conclusions:

1. Rapid refinement of preliminary data
2. Cursory and early detection of errors: systemic errors, extreme values, operator input, intuitive misalignment
3. Minimization of spares allocation for given Reliability level (95%)
4. Not easily duplicated by standard office automation tools

3. Power Transmission Company: given the reliability of the transformers, what is the relationship between the number of spares a and the resulting reliability?

Results

1. for 90% reliability – 1 spare unit
2. for 98% reliability – 2 spare units
3. for 100% reliability – 3 spare units

4. Metal Manufacturer: how does the reliability vary and the number of spares vary with changes in MTBF? Note, cost of failure is extremely high, and lead times are about 6 months.

Results

1. with MTBF = 15 years, 1 spare unit will provide 99.9% reliability
2. … and zero spares provides 97% reliability
3. as MTBF increases to 40 years, so reliability increases to 99% for zero spares.

5. Military Organization: 5 critical components, each with different current stock levels. Given the history of MTBF, what is the supportable period for the parent equipment at various reliability levels?

Results

1. The supportable period is determined by the minimum level for any of the critical spares
2. At current stock levels and 90% reliability, the supportable period is 1.1 years, but the other critical spares supportable periods vary up to 5.8 years
3. At 95% reliability, the supportable period is 0.9 years, with other parts varying up to 4.9 years.
4. and at 99% reliability, the supportable period is 0.7 years, with other parts varying up to 3.5 years.
5. If the stock levels had been equalized at the minimum supportable levels, then the total stock could have been reduced from 60 to 26 units for a savings of approx $170,000.
6. To raise the supportability by a factor of 3, an increase in stock level of 16 units would have been required at a cost of about $80,000

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Benefits

- Improved decision making → reduced cost of spares, higher reliability
- • Integrates risk and cost calculations
- • Forecasts timing of replacements for current spares
- • Sets the Spares levels needed for multiple replacement conditions and % reliability:
  - instant reliability (spare is available when called for)
  - interval reliability (spare is available during the period being planned)
  - cost minimization
  - availability of the process or production unit
  - given a stock size, the availability during the period being planned
- Accommodates variable failure intervals, variable lead times, variable repair times
- • Provides cost calculations for repairable and non-repairable spares
- • Multiple Availability and Reliability Parameters
- Based on proven algorithms, designed and developed by the University of Toronto
- Complementary to RCM
- • Easy to use data entry screens requires little training
- • Easy to read graphical output shows results at a glance
- Sales and Support by OMDEC and Partners worldwide; comprehensive User manual
- Web Training included
- Uses commonly available data
- Runs on Windows laptop/desktop

Inputs

Inputs can readily be made from a spreadsheet, with the input data being drawn from the following:

1. Asset ID and Description
2. Adjusted cost / Purchase Price $
3. Repairable? Y/N
4. # of Parts in Use
5. Planning Horizon - months
6. Constant Rate of Replacement (MTBR) - months
7. If Non-Constant, the standard deviation for replacements
8. Number of Spares in Stock
9. Emergency cost of Spare Part $
10. Downtime cost of Spare Part $
11. Expected Annual Loss of Value of Spare Part in Stock - %
12. Holding Cost of Spare Part - $ per month
13. Capital cost per month %

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Outputs

A variety of reports is available – two are attached showing the Reliability curve (% Reliability based on a given number of spares in stock), and the Cost curve (cost per month based on the number of spares in stock)

Training and Support

The software is easy to use and little training is required. OMDEC also has a 2 hour web seminar available.

Upgrades will be available from time to time as new features and capabilities are added.

Training and Support is provided by OMDEC or certified partners. Technical support is provided by OMDEC.

Software and Support Pricing

OMDEC price list. Special offers available from time to time.

Demo Systems

OMDEC website: http://www.omdec.com/sw-sms/SMS14Demo.zip
Contact your regional manager for the password. Contact **daming@omdec.com** if you have problems with the download.

How to Order a Full Copy

Just send us an email or call, we will do the rest.

Further Documents Available

1. User manual (available with the software download)
2. SMS Brochure (available on the website)
3. Case Studies (a text version of the above summaries)
4. PowerPoint Presentation
5. XLS Data input form
6. Summary of OMDEC Stores Consulting
7. Step by step of OMDEC's Stores Upgrade process

Contact your regional manager for copies.

OMDEC July 2009

SMS - Spares Management System – Sales Brief

C-MORE Laboratory at University of Toronto

Report Date: Tuesday, July 07, 2009 (16:22:14)

Project Name:	Gen station
Spare Part:	Turbines
Description:	Pressure tubes

Basic Data:

Non-Repairable Selected — Time Unit: months

Parts In Use: 10

Mean Time Between Replacements: 48 months(s) — Replacement Rate: 0.02083/months

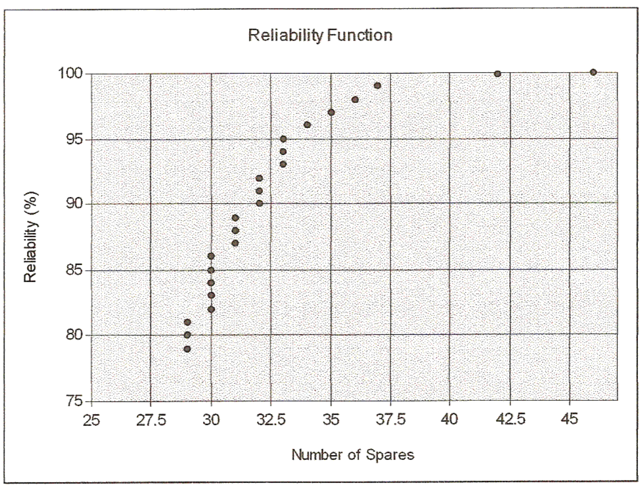
Rate Selection: Constant Rate

Calculation Method: Risk Calculation - Interval Reliability

Reliability Required: 99% — Planning Horizon: 120 months(s)

Calculation Output:

Total Parts Utilization	1200 months(s)
Expected Number Of Replacements	25
Recommended Number Of Spares (up)	37
Reliability (up)	99.08%
Recommended Number Of Spares (down)	36
Reliability (down)	98.54%



C-MORE Laboratory at University of Toronto

Report Date: Tuesday, July 07, 2009 (16:27:09)

Project Name:	Gen station
Spare Part:	Turbines
Description:	Pressure tubes

Basic Data:

Non-Repairable Selected	Time Unit: months
Parts In Use: 10	Planning Horizon: 120 months(s)
Mean Time Between Replacements: 48 months(s)	Replacement Rate: 0.02083/months

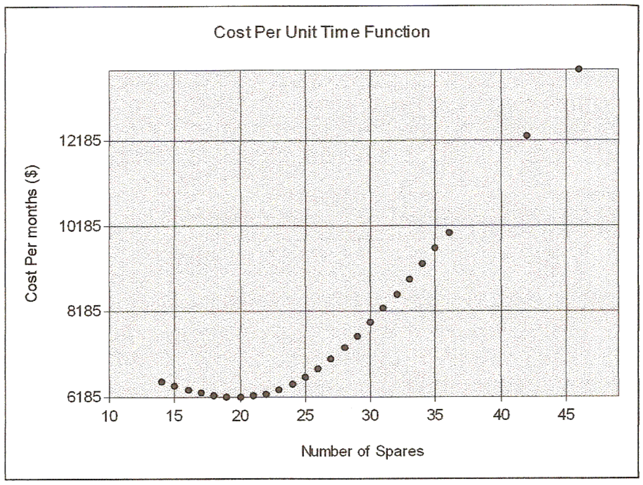
Rate Selection: Constant Rate

Calculation Method: Cost Calculation
Minimal Total Cost Required
Cost Specification (All Costs Are In Present Day Dollars ($)):

Regular Cost Of Spare Part	10000
Emergency Cost Of Spare Part	45000
Holding Cost Of One Spare Per months	300
Cost Of Capital Per months (%)	3%
Future Value Of Unused Spare At The End Of The Planning Horizon	258.6

Calculation Output:

Total Parts Utilization	1200 months(s)
Expected Number Of Replacements	25
Recommended Number Of Spares (up)	20
Reliability Of Initial Stock (up)	18.55%
Recommended Number Of Spares (down)	19
Reliability Of Initial Stock (down)	13.36%
Total Cost (up)	742638.21
Cost Per months (up)	6188.6517
Total Cost (down)	743395.36
Cost Per months (down)	6194.9614


Cost Per Unit Time Function
Cost Per months ($)
12185
10185
8185
6185
10
15
20
25
30
35
40
45
Number of Spares