Asset Management Control for the Chilean Navy

Realized in cooperation of:

ARMADA DE CHILE
AMC Centre
Marinebedrijf
Study Focus

'Cost Effective Management Control for the Assets (Ships) of the Chilean Navy'

This study focuses on the realization the Asset Management Control (AMC) approach into the CN to improve the cost-effectiveness of her ships seen as physical assets.

It is recognized that the CN has at her disposal a huge amount of technical and logistic expertise and besides that also a well organized logistic information system ‘SALINO’.
Based on these essentials, the introduction of AMC is aiming for:
- the formulation of unambiguous requirements and objectives, to obtain improving insight and understanding of the systems, throughout the life cycle, for all actors involved;
- the availability of reliable performance- and cost indicators to enable a structured way of improving the cost-effectiveness.

To achieve these aims the following questions should be answered. Is there:
1. a view on realistic objectives?
2. a reliable set of cost and performance figures?
3. knowledge about the effects of control measures?
4. knowledge about the environmental/operational influences on the system?
5. knowledge about the actual state of the system?
6. a clear view on the future lifecycle periods?
7. sufficient data-processing capacity to process the required information?

To achieve an organization that is able to deal with this questions the following tangible results are aimed for:
- an AMC Policy & Support Centre within the CN;
- an AMC Training Program tailored for and integrated in, the CN;
- an AMC for Frigates (AMC 4F) Pilot Study, resulting in:
  o an (international) LCM team for the M Frigates (in cooperation with the RNLN);
  o an LCM team for the L Frigates.
Introduction

‘Asset Management’ is a term used in the fields of finance, estate management, automation and logistics. For this study Asset Management is defined as an approach to manage the sequential logistic processes, i.e. specify, design, produce, maintain and dispose over the life time of a physical asset. By adding ‘Control’ to this term, it focuses also to ensure that capital assets (e.g. ships, offshore platforms, aircrafts, etc.) meet the operational needs of the customer/user in the most cost-effective way.

Challenges to meet are:

- the fact that operational needs of the customer/user are either insufficiently defined, or subject to permanent changes, possibly due to changing operational requirements;
- often logistic results not clearly related are to the operational needs and therefore difficult to measure;
- a lack of asset management information to control the logistics processes.

These challenges cover technical, economical and organizational/social aspects with regard to the logistic processes involved. When the complexity of technical systems is increasing, which is visible in the multitude of different installations (subsystems) tracking and tracing changes and their effect on the system performances can be improved by an integrated management support system based on legacy information systems already in service (e.g. SALINO).

The AMC benefits should be a Return on Investment (ROI) achieved directly by cost reduction of the material logistics and improved performances so that operations can be obtained with less effort and time, which is illustrated in the figure below.

For example to exploit a modern frigate (e.g. the M Frigate) the estimated budget for maintenance and spare part supply, can be easily reached up to 4 or 5 M€ a year. This ‘risk’ or ‘reality’ on expensive repairs can be caused by wrong or none spare parts available or, on the other hand, far too much spare parts in stock, which courses much administrative effort and
purchase costs. Also incompetent maintenance or improper usages of the installations can forces up the cost. This kind of failures are not only unwanted because of the cost, but also because of the uncertainly when these repairs occur and the unplanned downtime it will take. When a navigation RADAR or the lubrication system of the propeller shaft, fails in foreign waters extensively operational cost will be occur for external support, port dues, flying in spare parts and even also specialists to get the job done. Besides this the ship crew is during all this time out of duty, which means that missions will take more operational time and cost than budgeted. On this point recent studies have demonstrate that savings of 20% or more are attainable. On the other hand AMC requires also some investments in man-power (staff), knowledge and tools (out of pocket money). On the long term (app. 10 year) this will be not more than a fifth of the overall benefits. This means a Profitability Factor of more than 5 is attainable. The Return on Investment and the Pay Back Period are subject to the way how AMC will be implemented.

To put this figures in a most economically way, the CN is recommended to start with the realization of an AMC Policy and Support Centre with minimum consultancy assistance but based on a long-term partnership with the AMC Centre. Besides that AMC training programs and some specific AMC web-tools are necessary to realize AMC throughout the whole organization. For the knowledge transfer it is proposed to set up a ‘train the trainer’ program based on teaching material, developed by the AMC Learning Centre in close cooperation with the CN Naval Academy. An AMC e-learning environment will be also a part of the web-tools which has to be developed or purchased in close cooperation with the AMC Centre.

To put AMC in practice it is recommended to start study wise. A context analysis should point out which asset/system will be the most profitable to start with.

**The Chilean Navy related to AMC**

Chile is part of a community of nations, a fact that generates simultaneously a series of benefits and highly demanding obligations. Peace, together with national and international security, is the key to Chile’s development and progress.

The Chilean Navy’s most important asset is the 22,000 men and women that develop, maintain and operate the naval and maritime systems and land-based support installations.

A good second one is the fleet of the CN. The Chilean Navy is currently purchasing new vessels so as to safeguard its deterrent and defense power, whilst preserving its international presence. In 2004, the Navy acquired from the Royal Navy the frigate “Almirante Williams” (former HMS “Sheffield”), which replaced the destroyer “Almirante Blanco Encalada”. Between 2005 and 2007, the Navy is due to receive two anti-air frigates and two multi-purpose frigates from the RNLN, which will replace existing vessels that have served their life with the Institution.

The table below, from the presentation ‘Aims to the next Maintenance Cycles concerning the New Acquisitions’ [Niemann, 2006], gives an idea in what situation the CN will be in a few years. Modern high sophisticated materiel is acquired to strengthened the CN capability. From this point of view the implementation of AMC, to improve System Management for operating the systems more cost-effective, is well-advised.
Intensively cooperation with ASMAR

ASMAR- The Navy Shipbuilding and Ship Repair Company is an autonomous state-owned corporation that mainly provides maintenance, repair, modernization and construction services to the Chilean Navy, and to the Chilean and international shipping community as a whole. Since it first began, ASMAR has constantly kept up-to-date to ensure that at all times it meets the requirements of the Navy, the Merchant and Fishing fleets, both Chilean and foreign, which seek to upgrade their ships with larger vessels using modern technologies.

Since 1895, ASMAR has carried out the maintenance, repair, refit, modernization and conversion activities to the naval units of the Chilean Navy, developing important structural studies and in the weapon, navigation and propulsion systems of destroyers, frigates, submarines, and auxiliary ships. Its experience allowed to formalize in 1994, a strategic alliance with the German Naval Group, formed by H.D.W., Blohm + Voss and Thyssen Nordseeverske and their trading companies of Ferrostaal and Thyssen Rheinstal, for the delivery of these services to ships of South American Navies.

Based on the experiences as stated above ASMAR can be a full partner in the AMC approach. In line of this also other contractors and subcontractors, should be involved, e.g. De Schelde Logistic Services or Thales Hengelo.

**Marinebedrijf, the RNLN Maintenance Establishment**

The Marinebedrijf is located at the base of the RNLN in Den Helder, which is in the northern part of The Netherlands. The objective of the RNLN is to provide international security and fighting strength at sea. In peacetime, this objective implies that the RNLN has to cooperate in missions, both individually as well as in cooperation with other countries (e.g. NATO allies). Schedules for these missions are made a few years in advance by the Dutch Commander of the Naval Forces. These schedules indicate when each ship/system is requested in an operational condition. Consequently, the objective of the Marinebedrijf is to provide the required system effectiveness (capability, reliability and availability) of the (technical) systems against...
minimal cost, in order to bring (or keep) the operational availability of the RNLN into conformity with the demands in compliance with the demands on quality, occupational health and environment.

Within the Marinebedrijf AMC is based on:
- the Planning and Control of the Ministry of Defense;
- the system approach which identifies the operational environment, the technical system (the asset as object of interest for systems management) and the logistic processes;
- the integral maintenance and support management process model which identifies the following three sub domains:
  - Systems Management: view on performances and costs of systems (i.e. ship/ship’s class): Cost-Effectiveness;
  - Installation Management: view on performances and costs of subsystems/installations: Installation Performances;
  - Portfolio Management: view on products and services of the product units and materiel divisions: Quality and Service Performances;
- the AMC management model, which shows the interrelations of Systems Management with other actors internal as well external the RNLN maintenance establishment;

The way in which AMC is executed within the RNLN maintenance establishment is based on the following management principles:
1. a professional attitude and mindset;
2. self steering teams;
3. organizational learning.

The Process Management Model on the right illustrates the way how the AMC management domains are implemented within the Marinebedrijf.

The Management Relation Model on the left shows the way how the AMC management functions are arranged within the Marinebedrijf.
**AMC Centre**

The AMC Centre is the knowledge and study network for enhancing Asset Management Control hosted by the AMC Research Foundation [www.amc-rf.com](http://www.amc-rf.com). The objective of the AMC Centre is advising and supporting organizations who want to incorporate AMC to improve their day-to-day business.

**The philosophy regarding implementing AMC**

The AMC credo is ‘It's all about people, teams and systems’. Therefore the basic philosophy as driving force behind the implementation of AMC in an organization is that the knowledge and skills of professionals (workforce and management) within the organization are based on the principles of the Learning Organization [Peter Senge]. In a directed development process the organization transforms itself into an AMC way of working to suit the customer's needs.

![Diagram of AMC process]

**Incorporation phase**

Within the incorporation phase the objective is to make sure that the implementation of AMC is updated and continuously fits the needs of the customer.

Added value of the AMC Centre is that all necessary expertise is available, such as:
- specific AMC/ship maintenance knowledge from the RNLN;
- analysis and support tools from the AMICO Service Centre;
- training/workshops/education from the AMC Learning Centre;
- consultancy in the field of systems support engineering, process management and team management.

**Get Organized**

**AMC Steering Group**

For coordination and strategic issues a steering group should be established.

**AMC Policy & Support Centre**

This centre will be the strategic kernel of AMC in the CN. For that it will formulate the AMC policy and will take care for the implementation. Besides that it should be the helpdesk for the whole organization to answer all kind of questions and to coordinate all kind of actions to solve AMC related problems.
AMC Training Program Team
The AMC Training Program will be one of the solutions offered by the Policy & Support Centre. Because setting up the training program is considered as work for professionals a dedicated team is foreseen. This team should be manned by specialists of Materiel Logistic education (Naval Academy) and supported by the AMC Learning Centre.

AMC Information Management Team
The Information Management Team will focus on the AMC Web Portal Structure needed within the CN. Therefore the existing information plan will be updated or modified in close cooperation with all stakeholders. It will also provided the tools needed to analyze the systems and to set up Life Cycle Management Models.

AMC 4F Project Team
- The AMC 4F Project Team will be resulted in two LCM teams which will coordinate all logistic and maintenance activities related to the L & M Frigates on an integrated way to achieve the best cost-effectiveness attainable. Because of the integrated focus it is necessary that actors with different roles in the organization will be represented in this project team.

During the exploitation phase the LCM team members should match with the following function profiles:
- System Manager, which is overall responsible for the cost-effectiveness of the system and capable to initiate and/or coordinate all activities in order to tackle Performance Killers and Cost Drivers.
- Program Manager, which is capable to coordinate all (logistic) activities which has to be done for a most cost-effective system.
- Maintenance Engineer, which is responsible for an adequate (technical) approach to meet the Installation performances and to tackle Performance Killers and Cost Drivers on Installation level.

From the directorates as shown above at least one representative should be within the study team. The idea is to start with two LCM teams (IPT’s according to the RN), one for the M Frigates and one for the L Frigates.

AMC Support Team
The AMC Support Team will be operated from the AMC Centre in Den Helder, The Netherlands and when necessary it supports the CN on location also. This team is formed by experienced partners in AMC.
This team takes care about issues like:
- setting up an AMC MSc Course in Chile based on e-learning;
• delivering practical training modules to the AMC Training Program Team;
• setting up an e-learning training environment;
• working out the study plan;
• study support; coordination, advising, risk analysis, etc.;
• AMC implementation support on location;
• helpdesk support based on Internet connection;
• setting up/modify the information plan;
• helping setting up the web portal environment.

**ACM Implementation**

According to the general approach, applicable in all (maritime) organizations involved in capital assets, the implementation is structured according to the following demands:
- get organized;
- get oriented;
- get practiced;
- get real;
- get across;
- get grip.

These demands are explained below, based on the AMC Base Book [Stavenuiter, 2002].

**Get organized**

The following specifications are assessed:
- the need for a method to provide a transparent technical system breakdown structure, capable of supporting the management control and logistic processes;
- the need for a method to provide a transparent logistics process structure, capable of supporting management control in a cost effective way;
- the need for a method to provide a structured and applicable information & communication system.

Beside these methods, actors (logisticians) are necessary to operate the system. An LCM-team is foreseen to manage and control the system throughout the life cycle. This team should consist of primarily-involved managers and engineers and it starts to operate at the conception of an asset and ends with its phase-out. It is evident that team members will change over the life cycle phases because the LCM-team provides AMC over several decades.

**Get oriented**

To meet this demand a system analysis should be made to provide well-specified objectives. Based on these objectives the logistic actors should then be able to set up a detailed orientation of the system requirements. These requirements should make it possible to define detailed specifications of all logistic products and services needed throughout the life cycle.

**Get practiced**

Within this demand a fitting training program must be specified and developed. The following design specifications are assessed:
- provide knowledge and skills of systems (support) engineering;
- provide knowledge and skills of logistics process management;
- provide knowledge and skills of management control.

"Arturo Prat" Naval Academy, based in Valparaiso, educates future Navy Officers in moral,
intellectual and physical fitness, and cultural awareness, to enable them to exercise the important function of commanding and directing personnel and to efficiently manage the Institution’s resources.

On completion of their training, the Officers receive a professional and academic qualification that is equivalent to a university degree. A certain number of Officers will subsequently further their studies as Joint Chiefs of Staff at the Naval War Academy. The Naval Polytechnic Academy is responsible for providing specialized naval education. Graduates from the Seaman Training School complete their professional training. They will graduate as middle or high-level technicians. Likewise, Line Officers may study for degrees in Naval Systems or Marine Engineering, Electrical Engineering, Hydrography and Oceanography. Both academies will be asked to facilitate also the AMC Learning Program. In this line the MSc course in Asset Management Control is a unique course for both officers managers and engineers who are dealing with the complex environment of capital assets (ships – airplanes – buildings – etc.) The program will guide delegates towards the essential framework of information they need for working with optimum cost-effectiveness of capital assets. It will develop both their abilities to acquire information by themselves and apply it effectively.

Get real
To meet this demand there is a need for methods to set up realistic business plans and directives for all involved actors (designers, contractors, operators, maintainers, etc.). To meet the system requirements these methods should be well-structured and capable of delivering a baseline program for the required products and services, with a view to the whole life cycle. Besides qualitative information this method should also provide quantitative information.

Get across
In relation to large-scale business engineering studies 'get across' is recognized as one of the most important demands. It includes all management communication activities with the actors involved concerning (sub) objectives, plans, conditions, etc.. In large organizations with complex processes it is becoming increasingly common to support these management activities with system models such as the LCM models provided by the AMICO application.

Get grip
Getting and keeping a grip on the logistic processes and by that on the technical system (asset) is considered the primary objective of Asset Management Control. To meet the related problems the following needs will be provided:

- clear procedures and guidelines;
- availability of reliable data;
- consensus about the used methods and techniques;
- accessibility of all relevant information for all actors involved.

Results

Two permanent appointed LCM-teams
The aim is to have two LCM-teams accepted by all actors and to create logistics processes based on teamwork.

Availability of relevant and reliable logistic product data
The fact that solid system and installation performance requirements are not available and the difficulty to persuade engineers to establish norms is taken into account here. Group sessions
have to determine essential baseline information, frequently based on 'expert opinions'. Organized as shown in the figure below.

Setting up the Web Portal Environment
This starting point is actually a conceptual specification of the ILS data set defined in the Logistics Support Analysis Record (LSAR) according to the Military Standard 1388-2B.

The Web Portal approach is primarily based on standard Internet applications. On the basis of these applications an RNLN environment known as the RNLN Intranet has been constructed.

In a so called ‘Technical Data Center (TDC)’ all logistic data is collected, classified and edited in the correct layouts. Typical functions of the TDC are the web (site) editor and the web (site) master. The TDC can be seen as a support department for the systems and maintenance engineers enabling them to provide reliable and relevant information which is easily retrievable by the users (logistics actors).

In order to meet the logistic data specifications, answers had to be found for the following specific technical problems:
- how to handle the various information carriers e.g. data base records, text files, graphic files, screen files, multimedia files, etc.;
- how to display the information for the end user;
- how to set up a data storage and retrieval system which has adequate capability with maximum flexibility at an acceptable cost and risk.

To solve these problems a software interface has been developed based on .NET or ASP. With this interface, called the Data Base Interface (DBi) Engine, it is possible to connect data from different sources to an Intranet page in a dynamic way. This makes configuration management much easier for the logistic engineers. When they change something in 'their' database it will be directly visible on all related web pages without human intervention. The DBi Engine also makes it possible to separate the logistics-engineering environment (with its complex database structures and various information carriers) from the web-technology-based user environment. An additional advantage is the ability to undertake maintenance, extension or overhaul of the
data base systems in the engineering environment, without disturbing the user environment.

**Presence of skilled and experienced actors**
Adequate skilled and experienced actors should be available for the performance of logistic activities needed.

**A Logistic Program which is accepted by all those concerned**
It is anticipated that much effort will be required to achieve consensus on the final set up of the Activity Diagrams on which the Service Level Agreements are based.

**An operational LCM-model**
The LCM-model developed in the RNLN will be used as starting point. Actors involved should be authorized to use the navy network, with access to the LCM-model and related product data.