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**THE MAINTENANCE SYSTEM
A NEW CHALLENGE FOR THE MILITARY
ENVIRONMENT**

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Abstract :

This approaching has as a main purpose a brief overview about the importance and close links between the maintenance system and military environment and also it describes the evolution of maintenance starting with individual activities in this field until the most developed maintenance system.

Key words: maintenance, system, military environment, network, challenge

1. Introduction

The maintenance, like an activity, has followed the mankind during the times. The ancient human beings performed a lot of activities to find out and improve their means used for fishing and hunting, in order to assure the food needed and to avoid the mass extinction of the species. Also those means were adapted to be used for self-defense against animals and, later, for enforcement domination of some groups over the others.

Even if the ancient human being didn't realized what is the maintenance, this concept was used and developed through all ages. Perhaps the starting point of the maintenance's concept was the carving of the stones. This action was based on the thinking process and it assured a superior level of the effectiveness and, of course, a higher level of power, military speaking.

During the time, the military leaders were concerned about the improvement of their equipments and also about the possibility to spend less amount of money for replacement of the damaged or worn military means. I think that this point represented the turn point through the modern concept of maintenance.

Nowadays, the maintenance's concept is strongly defined and it's a way for assuring the military superiority.

2. Some considerations about maintenance system related to the military environment

For a realistic analysis of the interactions and connections between maintenance system and military environment there is a helpful way to analyze the main features of the military environment during the development of the human society.

Taking in account the previous considerations, we can identify some basic maintenance activities in the early ages of the mankind. At that time, the main features of human social's organization was the family. For this reason, the maintenance activities had

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like the main purpose assuring and keeping in operation the common tools and ancient weapons. Those activities were performed by the family's members. Also, they were farmers and warriors in the same times.

In the Middle Ages the weapons continued to be developed and from that moment some kinds of workshops occurred. The maintenance activities started to be crystallized into a system split in some specific branches with their specific tasks like sharpening of swords, shoeing of the horses and so on. Also, it can be seen that the maintenance personnel was discharged by the fighting duties. The warriors performed the wars and the maintenance personnel had to assure the weapons needed. This division of labor was more obviously once the gun powder was used and the first gun was built up.

The first concepts about maintenance system could arise once the industrial revolution occurred. The oldest maintenance's definitions comprised only few domains of activities like maintenance, adjustments and repair of the machine tools which there were designed and made using a low level of technology. Accordingly, the reliability of those machines was the poorest possible and involved a large amount of manual labor and a lot of qualified personnel.

During the 1st World War, because of the stationary character of the war, the maintenance system wasn't changed so much; it was adapted at the new kinds of weapons that were more complex. For this reason related with the higher price of those equipments, a new element of the maintenance system occurred, the recovery mission. The damaged military equipments were recovered and sent to back of the battlefield where there were disposed some specific workshops. Of course, those workshops were also stationary.

The major changes in the maintenance system's concept occurred starting with the IInd World War when the military environment was different; the military actions became more rapidly and engaged a large quantity of complex equipment made by the newest technologies. So, it was compulsory to set up a new concept of the maintenance system in order to assure the technical status imposed by the military actions.

The main idea was that each echelon to have a specialized unit for maintenance. These units had to have all capabilities to repair all kinds of equipments depends on the maintenance level for that specific echelon.

Obviously, because the war concept was usually set up on two lines, troops in contact for the 1st line and reserves for the 2nd line, the maintenance system was set up on four levels.

First level of the maintenance system was named ARTM (in Romanian) – workshop for repairing the military equipment - and it consisted in a workshop specialized in checking of the military equipment before and after missions. Those workshops performed the lowest level of the maintenance, the current repairs. Also, there were parts of the combat units designated for tactical level. Simultaneous, these units had the recovering missions in their areas of responsibility and gathering in some specific places.

Second level of the maintenance system was named SRTM – section for repairing military equipment – which was assigned with some specific objectives, many and more complex than ARTM. First of all, I want to emphasize that these SRTM were specialized units coordinated by operative echelons – the oldest divisions. The maintenance level of repairs usually was medium because of the higher technological level than ARTM. Also, these SRTM were equipped with specialized wheeled or armored vehicle designated for recovery missions. Starting with this echelon, there were usually organized 2 itineraries for evacuation of the damaged equipment gathered by the ARTM. Other characteristics of this kind of maintenance unit were flexibility and mobility assured by the mobile workshops.

The Maintenance System

A new challenge for the Military Environment

SRTM were able to be moved quickly on these mobile workshops and to follow the fighting echelons.

The third level of the maintenance was covered by the other types of the maintenance unit, BRTM – repairing base of the military technique. This type was more complex than SRTM because of the maintenance level performed. BRTM had to fix all kinds of the military equipment with severe damages. This philosophy was used in order to renew the equipments' level needed in the war time. Also, this type of unit could provide the capabilities needed for improving the technical characteristics of the major equipments and in addition it had more developed means for recovery & evacuation facilities.

The last level was represented by the Central Base – BC in Romanian – which was one more specialized maintenance unit. They were focused only for some specific kinds of equipments but theirs main task was the highest maintenance level – remanufacturing. This type of unit didn't have a less level of mobility.

In conclusion, the former type of the maintenance system was focused on the main characteristics of the military environment after the WW IInd.

Unfortunately, a few years ago, between 2000 and 2007, the military leaders started to cut numbers of maintenance units based only on the structure and operational requirements of the old maintenance system without any realistic analysis (including figures, scenarios, simulations and so on) based of the new challenges of the military environment and the results were dramatic because a large amount of equipments were not be able to operate properly or not at all, but the worst thing was losing of the qualified personnel. The estimated time to full regeneration of the Maintenance System is about 5...7 years for a normal economical environment and perhaps 10 years in the crisis situation. This situation was encouraged by the economical environment which created a false opinion. The representatives of this environment claimed that they could perform all maintenance activities for the Armed Forces at any time and any condition, and in this way the full externalization of the maintenance idea occurred. The truth is that just some auxiliary activities needed to be performed outside of the military environment because of the economical reason; the others activities are cheaper to be perform inside the military organization (the calculated values varied between 6 to 30 times cheaper).

The modern warfare involves the most developed technologies and for this the new equipments have to achieve some major requirements imposed by the actual military environment, like:

- the possibility to operate in different kinds of terrain or weather conditions;
- the accuracy needed in operation which is claimed by the military and political leaders in order to avoid the undesired collateral casualties and damages;
- versatility in order to assuring the possibility to switch easily the mission in accordance with the military course of actions;
- because the speed of the military actions, the equipments must be reliable;
- also, these equipments have to be adaptable to the different kinds of threatening because the modern war is an asymmetric one;
- For military environment it's vital to assure the coverage of actions which requires stealth technologies. This technology needs a lot of maintenance because in the most cases the equipments must be controlled by the computers all the time otherwise they can not work properly because theirs usual functional regimes are unstable, and so on.

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For all those requirements the maintenance system has or has to have one or more answers. This system is very tighten with the research & development stage because is the main provider of the feed-back regarding to the technical data.

Taking in account all these facts, between 2009 and 2010 it was a large debate which involved some experts in the maintenance domain from all echelons concerning to development of a new maintenance system which could fulfill the requirements of the military environment simultaneous with the optimization in using the resources having the lowest levels of the military budget. This analyze started from the main requirements of the modern military environment, from the actual all kinds of resources left on our hand and from the existed infrastructure or the infrastructure liable to be used. After the evaluation of some options it was obviously that a network system is the most suitable pattern for the maintenance domain.

Therewith, this new system doesn't take in account just a restrictive model designed for a short period of time – casualty system. It was designed using some assumptions which assure the rapid development of the maintenance system in order to achieve the needed standards required by the military environment for a medium period of time. Consequently, it were elaborated some plans regarding to the development of some parts of the maintenance system in the next four years. These parts refer mainly to the improvement of the infrastructure, endowment with the specialized equipment and, not at the end, to the generation of the schooling figures for engineers and technical personnel.

But, the new system has a crucial advantage. It was designed as one main part of the Integrated Logistics System. Thus, I think that the Maintenance System is one of the important stages in LCC (Life Cycle Cost) which can save a lot of financial resources simultaneous with increasing of military capabilities and, for this reason, the military leaders must be more concerned about it. The expected savings of money are justified.

Some important steps were made in a short period of time, almost one year. In this period there were performed the compulsory activities for auditing and certification of the system by the National Authorities in order to provide maintenance services following the EU rules for security, quality of activities and protection of the natural environment.

In the same time, there was started the evaluation and certification process by the vendors for taking-over the rights for maintenance of the main military equipments which are operated by our Armed Forces.

All these facts validate the viability of this concept about maintenance system.

3. Conclusions

Some conclusion could be arising. Among these, I emphasize just some of them, like:

- The military environment is the major actor in order to define the main requirements which represent the bricks for the maintenance system's design;
- Partial/total remission or applying of a wrong formulas of the maintenance system leads unavoidable to some severe limitation of the action capabilities of the military environment simultaneous with a higher increasing of the budgetary effort;
- There is compulsory a constant changing and reshaping of the maintenance system in order to fulfill the optimum ratio between the requests of the military environment / capabilities of the maintenance system. A good ratio and a performing and flexible maintenance system could preserve a lot of resources and provide the possibility of development for the military environment.