Optimization of Logistics in complex realistic systems

Synopsis of the Invited Lecture – Thursday, April 23rd , Library Hall

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Consider the following logistic scenario:

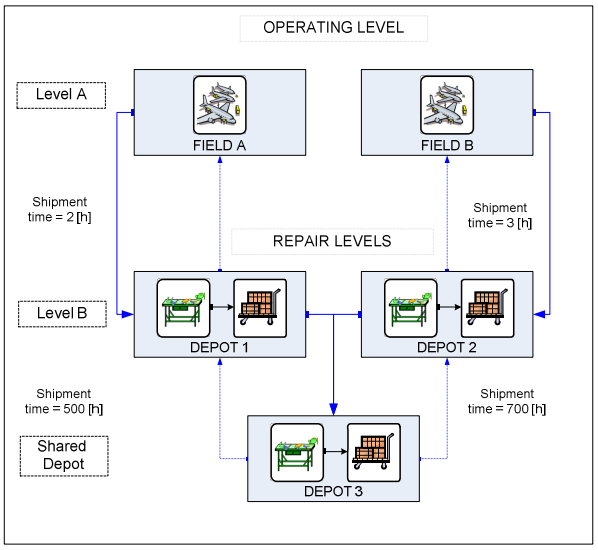

Figure 1 *The logistic layout of the systems in a given area*

In this scenario there are two fields containing any number of systems each. Upon a failure of a component a complete logistic cycle takes place. The failed component is sent for repair (Recycled) and at the same time a spare is searched to introduce in place of the failed unit. Higher level storages and depots may be involved if repair can not be commenced at a lower repair level. At every repair level there are specific specialized repair teams and equipment. On top of this maintenance operations are taking place in the fields based on many different criteria's such as age, operational hours and/or inspected condition. Redundant components may have latent failures and thus inspection operations are also commenced periodically.

The systems in the field have a complex structure. They contain many interacting component i.e an event (Failure) in one component has an impact on other components. Components are aging and require maintenance and inspection. Redundant components may have undetected failures requiring inspection and many contingency rules may exist that link the availability of components to that of the system and to production.

Here are some of the questions one may wish to ask about such a systems scenario:

1. How many spare parts should be allocated at each site, for each type?
2. How often should maintenance be executed (There may be optimally different maintenance periods for different LRU types?).
3. How often should the inspections be executed and on which components?
4. How many specialized repair teams should be allocated at each repair site ?
5. How should the above resources be allocated at a minimal cost to provide maximum performance?
6. What would be the performance (Availability? Production?) of the system as function of time?

All the above are critical questions essential in providing optimal design.

The lecture will address these questions on a realistic practical basis. It will be shown that relevant optimal answers exist and can be obtained using new and novel methods. A certain amount of mathematical analysis will be presented but only with the aim of explaining the newly suggested practical methods. Actual industrial cases will be presented to demonstrate the validity of the methods.