Data Centre Maintenance

EUROPEAN DATA CENTRE ASSOCIATION

SUMMARY

Why is maintenance so important for Data Centres?

How are maintenance and operations linked?

What is the proper maintenance strategy for a Data Centre and what should be the objectives of this strategy?

Should we insource or outsource maintenance activities?

Which are the steps to be followed for building a successful maintenance strategy?

This current paper aims to answer the above questions and to give a generic approach as to what Data Centre maintenance means.

Why is maintenance so important for Data Centres?

Data Centres are one of the most critical industries of the modern digital era. It is a "factory" with a demand of continuous, uninterruptible and smooth operation. The "products" that are "manufactured" are several and critical to business and government operations as well as personal activities. For example, a vast amount of third parties who are hosted and operate in a Data Centre collocation environment, provide services through applications, platforms, telecom services, etc. Any malfunction that might affect Data Centre operation, has an impact in an extended number of companies and users that receive services through the Data Centre's provider. The impact of a failure is huge and difficult to be quantified. There have been many high profile service outages which were due to operation and maintenance issues.

The only way to eliminate the risk of a failure is to consider this in the design and to then implement a suitable operations and maintenance strategy. Properly maintained equipment has an extended life span, and can lower by up to 90% or more the corrective maintenance needs. This leads to a massive reduction of a company's unplanned expenses, the potential to optimize a company's resources and to reduce the total cost of ownership.

From an operational point of view, data centres consume massive amounts of energy and it is well known that well maintained systems consume less. This could reduce significantly the operation cost of a corporate Data Centre. On the other hand, less consumption could give competitive advantage to a collocation provider and place him in a better position in today's competitive market.

Maintenance versus Operations

Maintenance should be considered as a fundamental part of a modern Data Centre's operations. The first level of maintenance activities (technical rounds, visual inspections, basic measurements, monitoring of infrastructure data – alarms, etc.) are typically executed by the operations team. This gives the best results, leads to better utilization of available resources and to direct cost reduction.

Maintenance and operations are interrelated. Maintenance aims to improve operations, eliminate disruptions and contribute to the achievement of SLAs. On the other hand, in a Data Centre environment, maintenance cannot be performed if the operational continuity is not guaranteed during the execution of maintenance activities. Determining SCPs (Site Configuration Procedures), SOPs (Standard Operating Procedures), MOPs (Methods of Procedures) and EOPs (Emergency Operating Procedures) is a prerequisite for any maintenance activity. Any preventive maintenance activity should be linked with the proper SCPs and SOPs. Any corrective maintenance activity should follow the EOP designed to cope with the specific potential failure scenario.

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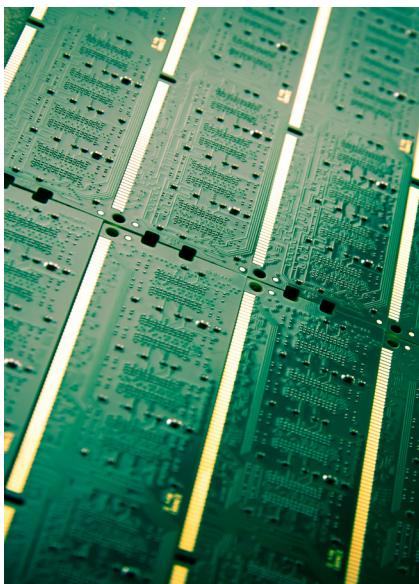
What is the Maintenance Strategy for a Data Centre?

A comprehensive maintenance strategy for a Data Centre should include:

- Monitoring and analyzing critical infrastructure operation, through monitoring (BMS, SCADA) and/or specialized management systems (DCIM). This should be performed by a specialised team, having the ownership of Data Centre operations.
- Use of CMMS (Computerized Maintenance Management Software) as the central interface to manage all maintenance activities. Produce work orders, record and analysing all historical data.
- Regular and thorough inspections. Performed by the Data Centre operations team and including daily visual inspections. Should be based on a check list.
- Predictive maintenance. Measuring specific data and analysing them in order to predict changes, trends, abnormal conditions.
- Preventive maintenance. Periodic actions including systematic measurements, adjustments, parts replacement and cleaning performed in order to ensure the optimum operation and the maximum reliability of the equipment.
- Corrective maintenance. Parts replacement carried out after failure detection and is aimed at restoring an asset to a condition in which it can perform its intended function.
- Re-engineering. Modifications on the initial design or equipment in order to achieve the expected operation.

The maintenance strategy is dynamic. Plan, execute, measure, review and improve are the key factors which drive success.

What are the objectives of the Maintenance Strategy?

There are two main targets: infrastructure availability and operational cost optimisation. The objectives could be summarised as follows:

- Ensuring maximum infrastructure reliability
- Extend the life cycle of critical installations – positive impact to CAPEX
- Mitigate risks and reduce the impact of a failure
- Achieve smooth operation and eliminate unpredictable events
- Improve the energy efficiency and reduce the OPEX
- Mitigate the impact to environment
- Comply to local and/or national regulations (MCP directive etc.)
- Guarantee SLAs defined in customers' agreements
- Ensure certification compliance (e.g. ISO 50001, ISO 14001…)

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In-house versus Outsource

This is not a simple issue. Both approaches have pros and cons. Every organisation that is trying to set up its maintenance approach regarding insourcing vs outsourcing, must answer the following questions:

- Are there qualified persons in the organization that could take over a significant part of the maintenance activities?
- Are there qualified technicians in the market?
- Are there qualified local vendors to maintain equipment and comply to the response times required?
- Are there operating companies available in the local market?

The answers to these questions will define the maintenance approach to be followed. Proper balancing of insourcing versus outsourcing should be based on the business needs. In all cases, vendors of all critical equipment (UPS, generators, chillers, CRACs, BMS, etc.) should be a part of the maintenance approach.
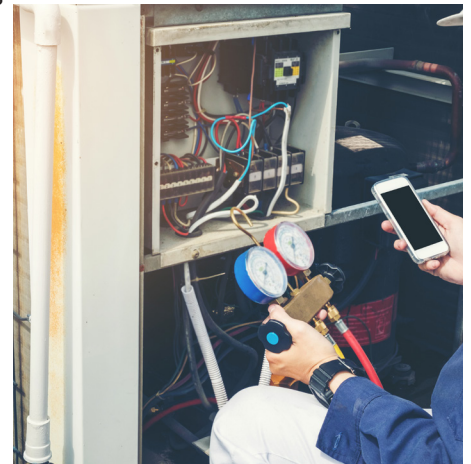
What are the steps to be followed for building a successful maintenance strategy?

The Data Centre owner should consider execution of its maintenance strategy based on size, SLO's&SLAs, infrastructure, local market resources and subcontractors' availability. While there is not a standard fixed approach that can be adopted, there are some general directives in order to perform an efficient and cost effective maintenance strategy.

- Map critical and non-critical infrastructures linked to Service Level Objectives
- Define and communicate to the clients the planning of annual preventive maintenance with risks and impacts
- Define the activities that should be performed by operations staff
- Draw a detailed plan and make clear the requirements based on the maintenance strategy
- Design and create detailed maintenance procedures.
- Link maintenance activities with operational requirements during execution. Determine SCPs, SOPs, MOPs and EOPs before implementation of any maintenance activity
- Obtain vendors' support. Build detailed contract agreements and include SLAs based on business requirements
- Build a continuous training process (Internal staff and third-parties)
- Use a CMMS (Computerized Maintenance Management Software) and analyze historical data
- Define a well calculated stock of spare parts
- Define KPIs and review on regular basis vendors' and technical staff performance and infrastructure efficiency, reliability and availability. Review the maintenance cost
- Improve the energy efficiency
- Create a continuous improvement culture
- Evaluate and adjust if necessary the maintenance strategy