

»»» Maintenance Management Systems (MMS)



Source: KfW Bankengruppe/Dawin Mickel

Two technicians discussing maintenance issues

Relevance of this Tool Type within the Project Cycle



Definition

MMS is an integrated software to manage a project’s or operator’s maintenance operations and optimize the utilization and availability of equipment, infrastructure and/or maintenance staff. It is used by permanent infrastructure projects (such as schools, clinics, roads, power plants, etc.), financing a considerable number of assets with inventory, including equipment such as vehicles, machinery, and spare parts). It can be categorized in two types: highly sector-specific and proprietary or standard and simple asset management systems. Setting up an MMS is an ownership incentive for the Project Executing Agency (PEA) or long-term operator to operate and maintain assets during and/or after the end of the project in a sustainable manner.

MMS offers many advantages, such as safety improvement, uptime reliability, downtime, and paperwork reduction.

How to select an MMS?

Step 1: Check the Digital Principles

Before designing/selecting any MMS, the nine Principles for Digital Development should be considered: <https://digitalprinciples.org/>

Step 2: Which Types of Data to Consider?

MMS software gathers data giving a better sense of the project’s operational and maintenance needs. The type and volume of data to be inserted into the MMS are based on the project’s complexity and can range from a small farm (tractors, plows, tills, seeds, fertilizer, etc.) to a hospital complex (beds, wheel-chairs, meals, light bulbs, drugs, masks, thermostats, blood bags, etc.).

Some MMS ready-to-use solutions are configured with all the necessary base files, processes, reports, and data visualization dashboards, work orders, inventory requisition, contracts, vendors, roles and responsibilities, technical restrictions, textual data and georeferences, external systems to interact, and so on. One important information need lies in the regular upkeep of data collection and the careful weighing of dis-/advantages between decentralized (by each technician) vs. centralized (by an administrative assistant) data entry.

The different components of an MMS include, but are not limited to:

- ✓ **Equipment data management:** equipment model number, serial number, equipment ID, purchase date, installation date, warranty, and spare parts information, such as part number, description, location, and pictures

- ✓ **Preventive maintenance:** cyclical maintenance scheduled on a regular basis to save on corrective maintenance, prolong the shelf-life of the device, and so on
- ✓ **Predictive maintenance:** occasional maintenance scheduled before a device is likely to fail, requiring a connection to sensors and increasingly using artificial intelligence (AI) to analyze the information. AI can also track deviations early on, which is particularly handy in case of remote monitoring, to send technicians timely information and avoid downtime.
- ✓ **Labor:** technician name, visits, date of repairs, and so on
- ✓ **Work order system:** required repairs are described and located for mobile teams to be sent out (e.g., scheduling/planning, vendor management, inventory control, purchasing, budgeting, and asset tracking)

In many cases, an MMS has touchpoints or even interlinkages with other key hard/software technologies of the project. For example, an MMS could be connected via an intranet to an infrastructure smart sensor that measures whether external conditions allow operations and alerts in case material degrades, or maintenance data can flow into **asset investment planning and management (AIPM)** solutions, which help asset-intensive organizations' management decide where and when to invest in their businesses to optimize performance and manage risk.

Step 3: What Information Do I Need?

Maintenance workers, quality engineers, customer service, manufacturers, and system administrators specifically rely on MMS to make inventory, effectively plan breakdown/preventive repairs, organize spare part storage management, support management's decision-making in cost allocation, and verify and keep track of regulatory compliance. Various sectors use MMS (manufacturing, fleet/facilities/utilities/properties management, hospitality, healthcare, agriculture, food service, municipalities, energy, national parks, warehouses, mobility, etc.).

MMS uses in the building sector

- Computer-Aided Facility Management (CAFM) systems for maintaining buildings such as hospitals or vocational training facilities

MMS uses in the water sector

- **Water supply/wastewater disposal:** Maintenance of treatment plants (drinking water treatment, desalination, wastewater treatment plants) via computer-based systems
- **Drinking water networks:** leakage repairs are made based on an MMS informing the repair teams via handheld systems (location of the repair, network details, etc.), data collection of all repairs to generate statistics and to generate the basis of rehabilitation measures in the network (time/type of maintenance, for example for valves, pipelines, and pumps).

MMS uses in the energy sector

- SCADA power monitoring and control systems

MMS uses in the mobility sector

- Road management systems
- Bus stop maintenance systems
- E-Mobility power charging systems

Step 4: Acquisition Options

Sector- and/or infrastructure-type specific software is usually proprietary. It is in the PEA's interest to plan MMS from the onset of the project and include its purchase and expertise to use it in the project suppliers' terms of reference.

What do I need to consider before acquiring MMS software?

- ✓ the **internal capacity** to channel and use the many data sources that may feed the MMS (sensors, spatial data, etc.)
- ✓ the **user adoption rate** (percentage of users sticking with an MMS app, number of work orders per technician, degree of autonomy between technician and supervisors).
- ✓ **cross-border dimension** with adaptations with regards to language, measurements, and time zone setup, among others.

Interoperability Requirements

MMS software is usually used in connection with Building Information Modeling (BIM) software, R/MIS and/or Geospatial Information Systems (GIS) > [other Tool Types Fact Sheets](#). Thus, interoperability requirements are critical for smooth-running implementation. **Construction Operations Building information exchange (COBie)** is an international standard developed to improve the handover of facility data (BIM) and to support facility management systems.

Legal Aspects

Data Security: If a desktop software system is used, data security should be warranted by ensuring:

- ✓ that the data are protected against unauthorized or accidental destruction, accidental loss, technical defects, falsification, theft, unlawful use, unauthorized modification or duplication, and other forms of unauthorized access and use by appropriate technical means
- ✓ regular backup of data
- ✓ appropriate security of hardware

If the software is provided as a web-based service (SaaS), the provider should be contractually obliged to take appropriate organizational and technical precautions to prevent disruptions to the availability, integrity, authenticity and confidentiality of their information technology systems, components, and processes that are essential to the functioning of the critical infrastructures they operate. The provider should implement data backup concepts, thereby ensuring the protection of data against loss due to system-related faults.

Data protection: Wherever possible, the collection of personal data should be avoided. If this is impossible, the main principles of data protection must be adhered to, that is, personal data shall:

- ✓ be processed lawfully, fairly, and in a transparent manner
- ✓ only be used for a legitimate purpose in relation to the project
- ✓ be limited to what is necessary in relation to the purposes for the project
- ✓ be accurate and, where necessary, kept up-to-date
- ✓ not be kept longer than is necessary for the purposes of the project
- ✓ be securely stored, including protection against unauthorized or unlawful processing and against accidental loss

If KfW (or persons acting on behalf of it) are (also) processing personal data, the privacy check in

> [RMMV Guidebook Section 2.3.1](#) must be followed.

Since MMS tools allow **tracking of employees**, legal restrictions on the use of such tools may arise from applicable local laws. Some privacy laws will give discretion to employers as to how far they can go with their employee monitoring programs. In other cases, employers will have to inform employees who are likely to be monitored or even require employees to consent.

Project Examples/Use Cases

- In the [Greening Public Infrastructure Program in Montenegro \(PN: 42455\)](#), an energy monitoring system for public buildings was set up to increase energy efficiency by remotely collecting, analyzing and managing energy and water consumption data.
- In the [Water and Waste Water Program PAAC in Central America \(PAAC; PN: 39602\)](#), a Water-MMS was created to monitor the maintenance of the newly built infrastructure
- In the infrastructure [project PAPR in Togo \(PAPR; PN: 35999\)](#), a Road Maintenance System was established to collect, store and utilize the data on the condition of rural roads for maintenance

Links to Further Sources

- List of Open Source MMS software: <https://www.goodfirms.co/blog/the-7-best-free-and-open-source-cmms-software>
- Interoperability Framework for BIM and MMS (pdf): https://www.researchgate.net/publication/326266381_Developing_an_Interoperability_Framework_for_Building_Information_Models_and_Facilities_Management_Systems



Further information on how to use this tool type in an RMMV context can be found here:

