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Creation of a Computerized Maintenance Management System (CMMS) with Features and Planning Requirements

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ABSTRACT

The article covers the output of the system and all forms of maintenance that must be executed. The study provides a methodology on the implementation of CMMS. First, the equipment list is selected, and then the project phases from engineering to implementation will be implemented. Software features are described in detail, as well as report types.

Overview

The subject research will examine the practices and approaches used in oil and gas facilities to apply a computer maintenance management system (CMMS).

The Principal Equipment is as follows:

1. Examine separators
2. Units of dehydration
3. Dehydration of condensate coalescer
4. Unit for treating oily water
5. gasoline-fueled fuel unit
6. Pork Terminal
7. Drum with HP vent knockout
8. Generators of power (gas, diesel, and gas turbine)
9. air compressors with the necessary package accessories
10. Unit for distilling water
11. Gas and water storage tanks
12. Cranes on pedestals
13. Pumps that catch fire
14. Boats for escape
15. Unit for treating sewage
16. Receivers for Pigs
17. Separators primary and slug cutters
18. Two Separation Units at Low Temperature
19. Unit for Condensate Stabilization

20. Package for Overhead Dehydration Stabilizer
21. Package for Mono Ethylene Glycol Reconcentration
22. Gasoline Fuel Unit
23. The Flare System
24. Molecular Sieve Packages for Dehydration
25. Utilizing Turbo Expanders for Cooling Trains.
26. Unit of fractionation (Tunnels for depropanizer and debutanizer)
27. Oil heating system
28. Three Gas Compressors with Tails
29. Compressor for intermediate input gas
30. System for injecting methanol
31. System of open and closed drains
32. Gasoline fuel unit
33. The Flare System
34. Gas turbine-powered centrifugal compressors
35. Gasoline Fuel Package
36. Tanks for storing condensate on floating roofs
37. Tanks for LPG cigarettes
38. LPG Round Containers
39. Pump Station for Loading Condensate
40. Pump station for loading LPG
41. Diesel and Gas Engines
42. Institut. & air compressors for utilities
43. Unit for Treating Waste
44. Package for Nitrogen Generation
45. Units for Water Filtration
46. fueling station for aircraft

The Principal Approach

To achieve the targeted production targets, every equipment must operate in a safe, economical, and continuous manner, necessitating the following:

Apart from the onshore facilities, operating and managing all stationary and rotating equipment that is dispersed across the four offshore sites.

arranging and carrying out all necessary maintenance and repair work on the rotating and stationary equipment in the A/Q district.

supplying the materials and spare parts required for upkeep and operation.

preparing for the overhaul or replacement of major equipment.

routine inspections of every facility in the A/Q District.

Effective inventory control of spare parts based on real consumption rates implementing modern condition monitoring and control systems for large machinery

Human resource management.

optimum production rates can only be achieved through effective departmental cooperation.

preparing the required reports for each piece of equipment, including those on maintenance, overhauls, operational parameters, equipment history, etc.

Goals

The computerized management system for integrated maintenance and inspection has the following objectives:

- Develop a preventive and predictive maintenance management system with contractor assistance to enhance maintenance and inspection functions toward excellence. This system must meet a number of strict requirements; awards will be given out on a regular basis based on staff members' efforts to implement the system.

- Create official written schedules and task execution protocols for every activity that is done in the field.

- Create a system for overseeing, controlling, and modifying employee actions to guarantee that the plan is followed.

- Preserve and preserve the data and records of the actions to support training in the future and act as a reference database for system expansion or maintenance enhancements.

- Estimating the amount of work that can be planned and completed with the greatest efficiency and benefit to the facility's objectives.

- Create an integration and strive for the best possible state about the availability of labor and materials, the cost, the state of every facility, and all field maintenance and inspection operations.

- Give management the most flexibility when deciding between production and cost

- Extend the intervals between overhauls. Boost dependability and availability. Preserve optimal throughput efficiency. Reduce the expense of each overhaul. Maximize the stock of replacement parts. Minimize the possibility of human error.

Methodology statement

In general:

Contractor shall furnish the company with software supporting the preventive maintenance program, link the various instruments used in predictive maintenance and condition monitoring to the relevant software, provide onsite training to company-assigned staff, and implement the aforementioned programs in accordance with the scope specified in the following sections of this Annex, in addition to the engineering services required for setting up the information system.

Phases:

Phase I: Engineering and data collection Phase

This Phase consists of:

a) Project definition; b) Site survey; c) Data collection; and d) Equipment classification and listing.

b) Creating a thorough maintenance and inspection schedule.

c) Adjusting the Maintenance Management software package's primary features to the current maintenance conditions.

d) Establish the final layout for the necessary Local Area Network.

The creation of the technical volumes that are unified.

Phase II Site implementation

This phase consists of the L's establishment. A. N. as well as the completion of the first running and software installation. includes completing the preventative maintenance reference manuals and executing the necessary integrations to demonstrate how the system operates.

Phase III: On-site system implementation.

This Phase will comprise: -

loading all of the gathered information into the database program

the CMMS software's full implementation.

System protection, performance testing, and debugging

Employee training for the company during the implementation phase.

A group of skilled professional contractors' engineers will carry out each of the previously listed stages. They will constantly oversee the various tasks during the contract's execution.

Phase I: The stage of engineering and data collection

Overview:

To create the maintenance management system, the contractor team will analyze and review all maintenance engineering data and information resources in cooperation with the support of the various department representatives. This will involve, but not be limited to, the following specific tasks:

The scope of work under this stage will include the following tasks:-The equipment listing and classification, as well as the preventive maintenance plan, will encompass stationary, machinery, and electrical and instrumentation equipment.

- Data Collection

To gather the information that is currently available, the contractor will need to:

a. Engineering records, P&I.D.s, design drawings, and manuals.

C. Books of vendors' data

d. catalogs from manufacturers

e. historical maintenance records currently in existence

- A list and classification of equipment

a. Arrange and arrange gathered data, including compilations and reprints, according to each piece of equipment.

b. Specify the parameters of each equipment's design.

C. Describe each piece of equipment's functioning status.

d. Create a master data file for every piece of equipment.

e. Create a pyramid structure for your equipment that explains the hierarchical relationships between various systems.

f. Sort and label every piece of equipment (everything will have a special code).

- Configuring the system's settings

In carrying out the previous data collection plan, the contractor will specifically review engineering documents pertaining to operating philosophy in order to:

Decide on the maintenance/inspection management system's philosophy based on factors that are most relevant to process, geography, and logic.

To specify the primary features that must be included in the package while taking into account the requirements of COMPANY's numerous maintenance departments as well as the specifications stated in this Annex.

to specify the criticality of the units and the priority levels.

Technical coding includes codes for resources, failures, maintenance, etc.

- Creating a thorough maintenance and inspection schedule

This will consist of:

a. All the tasks related to maintenance and inspections for every kind of equipment.

b. Design check lists for every kind of apparatus.

C. Decide on the task's duration and frequency.

d. Create test records for every assignment.

e. Make history cards for every piece of equipment.

It is important to note that while determining the description and frequency of equipment maintenance duties, international norms and standards, company maintenance strategy, and operation instructions from the equipment manufacturer should all be consulted in addition to the contractor's knowledge.

Phase II: Creation of hardware and software for computerized maintenance inspection management.

The primary purpose of the maintenance inspection computerized management software is to assist maintenance personnel in the following areas by providing information and decision support:

recording the inventory of equipment.

organizing the maintenance that is preventive.

Organizing the preventive maintenance.

Management of Materials and Spare Parts

History and maintenance follow-up.

It should give users with varying degrees of technical and managerial expertise access to a sufficient quantity of information presented in a variety of formats.

The following features will be available in the system:

RESOURCES:

The module will have the ability to establish labor codes and data, trades, material for spare parts needed for each task, and contractors along with the necessary charges.

TASK:

The following should be defined and covered by the task coding in addition to the equipment/task relationship:

Task occurrence rate.

kind of maintenance.

primary category.

work Number

Start of work permit

status of work permit

Principal attributes:

The following are the features that this module must have:

Choice to change how much data is saved on each piece of equipment.

Possibility of printing every static piece of equipment data.

History of Assets, including Creation and Upgrades

Connecting all necessary and accessible data to an asset, including free text, drawings, and video files

Relationships with assets (parent and subsidiary equipment)

All required data should be copied and pasted by the software, along with the opportunity to modify the code field to fit various classes, devices, and categories.

Keep an accurate inventory of all the resources in the company and document their usage and relationships with one another.

Monitor the asset and the serialized portion of asset's failure.

Make hierarchies that show where operations are located within various systems.

Create failure code hierarchies and asset hierarchies (site, unit, section, category, asset, sub & tag) to document asset issues for analysis.

Establish benchmarks, carry out trend analysis, and analyze defects.

To enable careful monitoring, permit the aggregation of any linked work orders that are divided among various Maintenance Responsibility Centers (MRCs).

Module for Work Order Planning and Transactions.

This module is the most basic component of the necessary software; it can virtually communicate with all of the other primary modules and should enable the user to specify a forward plan for resources needed and assets to be maintained.

In addition, this module ought to enable monitoring of ongoing tasks in the event of modifications.

This module raises and manages all work orders, prints planning (processing), and other work in progress. It includes all jobs that are scheduled to begin, are underway, have been interrupted, or have just been completed. It should also generate an electronic or print work order that may contain the job to be done, tools, supplies, labor, and other pertinent data, as well as feedback on hours worked, comments, etc. to other modules.

Capacity to oversee and manage all work orders, including unplanned, predictive, and preventive ones. This management begins with the issuance, printing, and feedback. In order to account for failures or one-time jobs like upgrades or installations, the program must essentially distinguish between two categories of work: scheduled preventative maintenance (PPM) and unscheduled maintenance tasks (USMT), which are established on a "as need basis."

These are additional crucial components that such a module might have in addition to the ones mentioned above:

Target date and completion date (including necessary labor, material, and spares) for the PPM tasks are scheduled.

Outlining the technical specifications and directions for the task.

Prior to the task execution, the necessary permits (for production, safety, and other concerned departments) must be obtained via the CMMS network.

Return work orders that have been completed along with the actual resources used.

the option to remove work orders that have been issued for various reasons.

totality of work orders that have been completed.

Rescheduling of the uncompleted tasks is possible.

Capacity to initiate and coordinate "USMT" (unscheduled break down maintenance tasks) in order to avoid having two work orders for the same piece of equipment, one scheduled and one unscheduled.

In addition to standard work solutions—i.e., jobs with known requirements but no set schedule or time limit—all equipment should have access to a library for problem diagnosis and solutions instruction against fault symptoms.

the capacity to carry out PPM tasks on a calendar or meter basis.

Capacity to Handle Tasks Initiated by the Temperature, Pressure, and Vibration Conditions Monitor Parameters.

The ability to organize tasks into work packages, where a collection of tasks are bundled and assigned on a specific date (Maintenance project).

Capacity to pass a small job if the following big job date falls between 20 and 30 percent of the minor job interval.

Prior to task execution, necessary permits from the related departments (production, safety, and others) must be obtained via the CMMS network.

The ability to modify the provided work plan by adding or removing tasks, equipment, etc., and rescheduling it appropriately.

the ability to create and publish work order schedules for various time periods (weekly, monthly, annual, etc.)

Capacity to reconcile the maintenance schedule with the resources at hand

Use the work order tracking page to view comprehensive planning details, a work plan, a timeline, an asset list, a failure analysis, and related documents.

Issue a comprehensive plan for maintenance and inspection.

Keep track of work orders that are awaiting execution because of previously reported outstanding causes.

Work orders should be scheduled according to urgency or real-time updates.

PM displayed graphically by asset.

"Pick and put" data entry to increase accuracy and speed up the process.

the capacity to produce assets "on the fly" in response to work requests.

Possibility of scheduling a PM according to several parameters, such as location, supervisor, department, craft, and calendar/meter based times.

Keep track of the amount of missed PM jobs.

Ability to modify PM schedule in case of emergencies or seasonal changes.

the ability to alter the data and formatting of work orders and work reports.

Permit work to be added to the schedule based only on work order comments.

Work orders are automatically time stamped to identify peak and off-peak hours.

The planning engineer could benefit from receiving a set of planning and follow-up reports to aid in monitoring work orders and get insight into the future master plan, which includes tasks, resources, and costs.

Outline the task in terms of fundamental job processes.

Establish the framework for management's monthly reporting that explains the work

The following will be included in the printed work order, minimum:

Number of work order

Task precedence

Description of the equipment

Type of Maintenance

The date of the rise

Department of Execution

Requirements for shutdown and permits

Name of work approval

Resources needed

Step-by-step Work Request

Trades Necessary

hours for each transaction

Date of completion

The following should be included at the very least in the work order feedback:

Actual man-hours spent on the task

The length of time the work actually took

Task completed

Used spare components

The craft number and the supervisor

Acceptance

Equipment History ought to

This module should make it possible to compile an extensive database of work done on machinery and plants. It should also enable analysis of expenses, downtime, reported problems, job type and class, labor usage, and relative frequency. It may also offer a planned versus emergency method and make suggestions for potential enhancements.

The following are the primary characteristics that, at the very least, such a module ought to have:

Transfer of completed work automatically from the work-in-progress module.

Provide the capability to access historical and trending performance records.

The ability to change how much information is saved in the past.

the ability to perform word searches among other combinations of historical data.

Analysis of occurrences into a report that includes various work kinds and classes as well as relative frequencies.

analysis of the average interval between errors.

Department/cost center analysis.

The report's output will consist of.

This module is the result of the CMMS since it has to display the data in a way that makes sense, provide the necessary information fast and flexibly so that it can be used to take the appropriate action, and utilize judgment and expertise to determine the causes of problems and their solutions.

A fundamental prerequisite for accomplishing the aforementioned goals is that the software must include a custom report writing capability that enables the creation of any kind of report without the need for complex or specialized programming.

given a comprehensive collection of standard reports to create work orders and other important details regarding the operation of the inspection and maintenance process and related materials.

Make new reports or modify any of the basic reports to generate bespoke reports.

Make independent tables, screens, and notes that may be accessed from any program module.

Make more texts and tables to go along with particular apps.

Report Types Produced by Standardization:

These are some examples of standard reports that may come with this module by default. As was previously said, custom report writing tools should be able to alter these kinds of reports.

Typical reports should include the following:

1. reports that are static.

list of geographic areas.

Enumeration of all sections, types, skids, equipment/type, and equipment/service.

Equipment details.

lists of tasks, manageable units of work.

List of Manpower.

For any defined technical codes, report.

a list of the supporting equipment.

2. reports from the past.

Work history and type of maintenance.

History of equipment failure.

Task forces for work reports.

consumption of materials.

History of equipment run.

reports on availability.

W. O. was removed.

W. O. both concise and thorough reports.

3. Reports with Graphics

adherence to the schedule.

Equipment dependability and availability.

Distribution of work burden.

Trending graphs of equipment failure.

Analyzing costs.

hours worked.

4. reports on measurements

Measurements of vibration.

Measurements of thickness.

points of testing.

5. Reports on Status

Wok orders are open.

Unfinished work orders.

Human resources accessible.

6. Reports on maintenance:

Equipment operation hours

Actual maintenance tasks carried out each week

reports that detail the monthly labor requirements

reports with a breakdown of costs and real labor working hours

reports with a breakdown of costs and a list of spares used by equipment

Monthly reports that list the necessary work orders

reports that list finished and unfinished work

reports that track key performance metrics

Reports on preventive maintenance that include completed work. work hours for the equipment during maintenance, as well as the final equipment W. hours-date

Redesigns reports

Reports on failure analysis

Every Part. jobs requiring type identification for specific equipment within a time frame

All of the materials utilized to create an apparatus over time

7. Important Reports

Code number for spare parts, part number, amount available, maximum and minimum consumption rates.

Monitoring of material requisitions

Purchase order monitoring

8. reports from administration

Recent employment

Employee History (awards, promotions, yearly evaluations, etc.)

Employee Pay

The following Madules are required in order to track data:

Configuration of an Integrated Workflow

Permit several layers of approval for job orders.

Streamlined task routing

sending messages and assignment alerts via email

Examination and Analysis of Failures:

Establish the inspection schedules and plan for each new asset that is added.

Document inspection data so that legislative requirements can be audited.

In order to forecast preventative maintenance, analyze inspection data.

Possibility of recording the

malfunctioning parts

Causes of failure and corrective measures

Average amount of time between errors

In the interim, make repairs.

Material and Stock Management:

The Capability to Classify Spare Parts in Various Ways

Items Pin location within the store

Number of components installed in the apparatus

Analysis of Material Consumption

Tracking of Cost Centers

Able to provide the following information for inventory items

Purchase date and most recent price

Minimum/Maximum level, consumption rate, and stock-adjustability

Able to create Material Requisitions based on Minimum Level, Consumption Rate, Delivery Time, and New Item Addition

Ability to provide a list of the materials and spare parts needed for a specific time frame (weekly, monthly, yearly, etc.); these products must be described according to manufacturer, price, etc.

Monitoring the status of the material received and the M.R. & P.O.

Budgeting and costing:

Centers of Cost

Estimating the budget for (manpower, cost centers, and equipment)

Realistic cost estimates broken down by equipment and cost centers.

Calculations of actual costs for each task

Measuring and improving performance

calculating and presenting the utilization, reliability, and availability performance indicators graphically.

Monitoring S/D Causes and Records for Every Piece of Equipment.

Stage Three: On-site system implementation.

There are three different activities at this stage:

I implemented maintenance management software on the site.

II Detailed instruction for assigned personnel regarding:

Implementation of CMMS Site.

In general:

The scope of the contractor's maintenance should be understood. System site implementation will be restricted to all software-related operations and data manipulation tasks, including those involving computerized or documentary data. COMPANY personnel will be in charge of completing all work order-described preventive maintenance tasks and filling out work report forms.

Contractor will provide additional inspection services at the man-day rates listed in the pricing lists, should the company need them beyond the scope of this project or after contract responsibilities have been fulfilled.

System deployment

Edit data output and entry forms, enter data into the computer, monitor system performance, and prepare sections of system manuals pertinent to this project stage.

Issue and monitor work orders, both scheduled and unscheduled.

Report on work received is fed back.

A data analysis plan that includes:

Send out work orders and follow up on them, whether they are planned or not.

Send the work report back.

data analysis that includes

* Cost, budget, manpower, and material are all affected by failure.

* Personnel and equipment performance.

* A compliance summary.

-final adjustments to the work plan to guarantee a smooth system

-Customization as needed to satisfy particular requests made during full load transactions

-Completion and submission of evaluation reports and maintenance manuals.

Notes The following are the primary characteristics of the necessary predictive maintenance software:

able to track each data point's unique vibration peak values

As per the application, include the standard alarm and S/D values for vibration levels.

Add the defect frequencies related to m/c component failure.

The capacity to forecast a machine malfunction based on the vibration data gathered by the CSI Ultraspec Analyzer

Capable of uploading or downloading the alignment work or vibration measurement point to and from the Ultra Spec analyzer.

In summary

The study's conclusion about the CMMS stages' implementation was that the system offers a thorough engineering strategy for carrying out this kind of maintenance management model, which would be extremely beneficial to every business.

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