Computer Application for Maintenance Planning and Scheduling

of Industrial Plant

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Abstract

Plant maintenance involves all activities carried out on a machine to ensure a zero downtime of operation. Maintenance activities vary from one industry to the other but the basic maintenance activities are mainly to ensure continuous operations of equipment, plant and machineries.

Over the past few decades, the various industrial work activities and maintenance operations are performed without a concrete plan (schedule) or are performed via manual paper work. Industrial operations are usually complex and recurrent activities. Analysis has shown that lack or insufficient maintenance coordination, has accounted for the poor performances and inefficiencies of many industries. Thus, it is pertinent to deduce a planned maintenance organizer or a computer aided design for the planning and scheduling of industrial work activities. This becomes important as computer has revolutionalized industrial activities with the development of modern high level computer programming languages such as visual basic by Microsoft among others.

1. Introduction

1.1

Plant maintenance involves all activities carried out on a machine to ensure a zero downtime of operation. It involves all activities carried out to prevent operation stoppages or downtimes in industries due to equipments and facilities failure or to minimize downtimes as much as possible.

Maintenance planning and scheduling is often viewed as the centre of industrial maintenance management, since other processes such as preventive maintenance, root cause analysis (RCA), inventories record management, and other processes are dependent on the planning and scheduling process to work.

- Reasons for Planning and Scheduling Maintenance Operations:
- It enhances work efficiency since operations can be easily delegated among employees.
- It assures the optimum availability of installed equipment for production or service.
- It ensures operational readiness of all equipment required for emergency use at all times such as standby units, fire fighting, rescue units etc.
- It enhances maximum possible return on investment.
- It ensures the safety of personnel.

2. Design Analysis

The Program is design with the compiler, Microsoft Visual Studio 2008, version 9.0.21022.8 RTM © 2007, Microsoft Corporation. It is sectioned into modules. Each of the modules provides specific functions and features that when combined together, becomes an outstanding maintenance management system.

3. Function of Each Program Module

• THE LOGIN WINDOW

It controls the relative access of the engineer and other staffs as the engineer can access all the modules unlike the

other staffs that have no access to the scheduler and the work permit.

🖳 Login			
Staff ID			
Password			
	Login	Cancel	

Figure 1: Login Interface

• HOME PAGE

The home page has buttons associated with the modules. It also has four separate data grid tables, showing a summary of the day's planned scheduled, equipments history, inventory records and work permit records. This is aimed at presenting a first hand view of activities to be performed and stock levels at the first look of the program.

Maintainance			Toda	y's Sched	ule			Equipments Records					
Planner		Task ID	Task Type	Task Priority	Personnel 1	Personnel 2			Equipment ID	Description	Manufacturer	Model	Serial Numb
ork Request	► *	201074-1722846	Strainers Cleaning	1	Wasiu	HamzaT	F	*					
Parts and Inventory							20						
Equipments Record													
Nork Permits		m.]			8		Þ	٠ [m				
Safety Management			Inve	ntory Reco	brd	0	10.0	Work Permits				Mar.d.	
		Part ID	Description	Manufacturer	Stock	Location			Permit ID	Date	Location	Floor/Department	perfromed
Record	*												
enta Record							4						
sonal Organizer													

Figure 2: Home Page Interface

• MAINTENANCE PLANNER MODULE

This is used to create planned maintenance type tasks. The Engineer is able to schedule maintenance operations to be performed on plants through this module. Also, the personnel to carryout the maintenance operations and can likewise give appropriate safety instructions for successful performance through this module.



Maintainance Planner				
	Look Up View Detailed View			
Maintainance	Save Changes			
New Schedule	Task Task ID	Work Requested By	Task Instructions	
Maintenance Report	Task Details	Estimated Down Time	^	
	Task Priority -			
	Scheduling Date 17 March 2010	Machine Assignment Machine Name	-	
	Scheduled Start 17 March 2010	Client Name	Other Instructions	
	Scheduled End			
	Start Time 12:00 AM -	Safety Instructions		
	Personnel Assignments	•	-	
	-	Classification		
		Classification Assignments	Completion Details	
	-		17 March 2010	
	Page and Labor Assignments		Completion Approved By	
Cancel	Parts Assignments	Labour Assignments		

Figure 3: Maintenance Planner Module

Similarly, parts and labour required to carryout the task can be assigned through the parts and labour assignment button as shown above.

🖳 part Search		
Task ID	201094-460443	
Part ID	1	-
Description		~
Quantity Needed	0	
	Add	Done

Figure 4: Add Part Interface

• WORK REQUEST MODULE

🖳 Work Request					
WORK ORDERS AN	D REQUESTS				
	Look Up View Detailed View Scheduling and Str	atus			
Maintainance	Work Request ID		Estimated Down Time Needed		
New Work Order	Brief Description of Work to Perform				
Print Entire Work Order					-
	Work Requested By	•	Request Data	00 4-4 2010	
			Hequest Date	08 April 2010	•
	Classification Production Equipment	•	Safety Instructions		-
	Equipment	.			
	Work Type				
	Imminent Danger	 Safety Hazard 	 Safety Concern 	Standard Work Order	
	Work To Be Performed and Why it Should Be	Performed			
Cancel					

The work request often include elements that help the management to know exactly what the staffs wishes to order, including what work to embark upon, equipment required, scheduling and completion information among others. Figure 5: Work Orders and Report Module

Details of completed work order will automatically save to the data grid table and can be printed when required.

(v) PARTS AND INVENTORY RECORDS MODULE

Here, part information such as description, manufacturer, part number, etc are recorded. It is also possible to setup stock levels for the inventory items as well as storage locations.

Lookup View Detail	s View					
Apply Changes						
Part ID	1225			Length 210		
T GIT ID	1200		Specifications	Heigh 50 Weth 70		
Description	Washers	*		Appearance 3D		
		-				
					-	
Manufacturer	CATS EQUIPMENTS	-				
		_				
Part Number	222	_	Quantity in Stock	< E ()		
Primary Vendor	CATS	-	Minimum Level	10		
Storage Location	WARE HOUSE	-	Maximum Level	100		
Classification	CRUCIAL	-	Reorder Qty	50		
			Unit Tune		_	
			onit type			
Equipment	Strainer Cleaning Machine	-	Unit Price	N30.000		
	Lookap, Mew Devail Acety Changes Part ID Description Manufacturer Part Namber Primary Vendor Storage Location Classification Equipment	Lookup, Vew Details Vew Activy Changes Port ID 1225 Description Wathers Manufacturer CATS EQUIPMENTS Part Number 222 Premary Vender CATS Storage Location VARE HOUSE Classification CRUCIAL Equipment Straner Classing Machine	Lookup Vew Petells Vew Apply Changes Part ID 1235 Description Warbers Menufacturer CATS EQUIPMENTS Part Number 222 Phinary Vendar CATS Storage Location WARE HOUSE Gassification CRUCIAL Equipment Straner Clearing Machine	Lookup Keyr Details Vew Apply Changes Part ID Part ID 1235 Description Warkers Menufacturer CATS EQUIPMENTS Part Number 222 Ouwritig in Stock Primary Vendor CATS Storage Location WARE HOUSE Classification CRUCIAL Unit Type Equipment Straner Clearing Machine Unit Price	Lookug, Mew Description Part ID 1225 Description Wathers Menufacturer CATS EQUIPMENTS Part Number 222 Quartity in Stock Estimation Primary Vender CATS Storage Location WARE HOUSE Storage Location CRUCIAL Classification CRUCIAL Unit Type Location Equipment Straner Classing Machine Vial Price N30.000	Lobicup, Mew Details Vew Pest ID 1225 Description Wathers Wathers Specification Menufacturer CATS EQUIPMENTS Pest Number 222 Quarkty in Stock Primary Vender CATS Storage Location WARE HOUSE Storage Location CRUCIAL Equipment Straner/Deaning Machine Unit Type v Equipment Straner/Deaning Machine

Figure 6: Parts and Inventory Module

• EQUIPMENTS RECORD MODULE



The Equipments Record Module is where information on equipments and other assets are recorded. Information such as asset numbers, warranty information, leasing information, etc, can be maintained.

equipment					× 1
	Look-up View Detailed View Equipme	nt Log			
Equipments					
Add Equipment	Reference ID	123a	Building	Workshop	
P. (5.)	Description	MILLING MACHINE	Room	2	
Piet Countries					
FILL EQUIPMENT NOTES	Manufacturer	CAT GERMANY	Account		
	Model Number	243158NCAG			
			Classification	Major Works	
	Serial Number	5674235689F			
	Assigned to	Heavy Duty Work	Vendor	Lubcon	
	Location	Warehouse	Meter Reading	1	
	Safety Instruction	Weekly Lubrication	Meter Type		
					H
Cancel					

Figure 7: Equipments Record Module

• WORK PERMIT MODULE

The permit contains such information as permit identification, date issued, building where work is to the performed, permit expiration date and a column for management approval among others.

🖳 Work Permit (form)								
Permit ID	123					Work to do	Refil of Air-Conditioner gases	
Date Issued	09	April	2010		-			
Building	Main E	Building	1			-		
-		-						
Floor and Department	2nd flo	or and	Adminnitratio	'n				
G	00	0	2010	(*****)				
Start Date	09 .	Abui	2010		÷			
					_			
Permit Expiration Date	09 .	April	2010		÷			
Approval								
Permit Requested By	Hamz	at A/C	la		-			
Safety Officer	ATTA	AH / S/	AFETYOFFIC	ER	-			
			-		_			
Print				Cancel				

Figure 8: Work Permit Module

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Accident Report	
	ACCIDENT REPORT
	File Accidents
Reports	General Medical Details Causes Action-Review Investigation
Accident Report	
	Report ID
	Name Age
Witness Report	Sex Hire Date 09 April 2010
	Postion/Job Title
	Incident Detaile
	Type of Accudent max Adv • Date of Incudent U3 April 2010 • Name of Walkess
	Work Status Returned Time of Incident Nature of Injuries
	Nature of Damage Personal Date Reported 00 Peril 2010 C Estimated Cost of Damage
	Equipment Damage Specific Location of Damage
	Where any specific job procedures involved?
	Who made the job assignment?
	What loads relies did the experiment period before at union used ?
	The installers do the enproper learned briefs again grows (
Cancel	

Figure 9: Accident Report

HotPermitViewer		
		Find Next
	GENERAL WORK PERMIT	<mark></mark>
DATE	09 April 2010	
MORE NO	Main Building	
EPSRAMENT	2nd floor and Administration	
VORK TO PERFORM	M	
Refil of Air-Condition	ter gases	
TART TIME 05	3 April 2010	
ERMIT EXPIRES	09 April 2010	
he precautions listen his work:	d below have been completed. Permission is therefore granted for	
ermit Requested By		
NAME	Hamzat A/Ca	
BIGNATURE		
SIGNATURE		
	AFFRE	
afety Supervisor		
AME	ATTAH / BAFETY OFFICER	
IGNATURE		
	DO THIS JOB IN THE MAINTENANCE SHOP?	
STREET WELD	, OR USE OTHER OPEN FLAME OR SPARK PRODUCING	
All Personal Protect	THE FOLLOWING PRECAUTIONS HAVE BEEN CHECKED.	
Flame or spark pro	iducing equipment to be used has been inspected and found in good	
There are no comb	ustible fibers, dusts, vapors, gases or liquids in the area. Tanks and	
nd vapors has been	containing such materials have been purged. The absence of gases	
ontinuously monitore	eveloping in nearby piping, equipment, or tanks, this area is being .d.	
The work will be co Surrounding floors	infined to the area or equipment specified in the permit. Have been swept clean and, if combustible, wet down.	
. Ample portable ext rovided.	inguishing equipmnt such as hand hose or extinguisher has been	
All combustibles h rotected with metal All floor and wall o Strict adherence to	ave been relocated 35 feet from the operation and the remainder guards or flame proofed curtine or covers (not ordinary tarpaulins). penings within 35 feet of the operations have been tighly covered. I all neccessary regulations must be observed	

Figure 10: General Work Permit Report

• EMPLOYEES RECORD MODULE

Efficient maintenance planning also involves keeping an appropriate employee record. This information is properly documented in the database.



- Add New Con	tact								
Staff ID	2010215-48	301491				Upload Pict	ture		
Name									
Position	_			-					
Address				~		Browse	Cancel		
, daress				_					
					E-Mail			_	
State				_	Job Security	_			
City									
					Pay Rate				
Phone	_			_					
					Hire Date	31 May	2010	(iii	
Marital Status	Single	-							
Sex	Male	-			Next of Kin				
					Name				
Date Of Birth	31 May	2010	-						
				~	Relationship				
Notes									
					Phone Number			_	
				-					
	Submit C	Ther Docur	nents			Next		Reset	

Figure 11: Employees' Contact Module

4. Conclusion

Effectively planning for future actions help in achieving goals in the most efficient and effective manner. It minimizes costs and reduces risk and missing opportunities. It can also increase the competitive edge of an organization.

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