OPERATION, MAINTENANCE AND MANAGEMENT OF ENGINEERING EQUIPMENT FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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MATRIC NO: 17/ENG03/010

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SUBMITTED TO: CIVIL ENGINEERING DEPARTMENT OF THE COLLEGE OF ENGINEERING, ABUAD, IN PARTIAL FUFLIMENT TO ENG384, ENGINEERING LAW AND MANAGERIAL ECONOMICS

DATE: 13TH APRIL, 2020

ABSTRACT

Sustainability is a critically important goal for human activity and development. Sustainability in the area of engineering is of great importance to any plans for overall sustainability given 1) the pervasiveness of engineering activities in societies, 2) their importance in economic development and living standards, and 3) the significant impacts that engineering processes and systems have had, and continue to have, on the environment or country.

DEDICATION

I dedicate this project to my mother and father for all the support they have been giving to me.

INTRODUCTION

The present state of engineering affairs in the country today gives rises for the review for the maintenance , operation and management of engineering equipment to develop our country.

Nowadays we use unqualified personnel to handle the job of maintenance of engineering equipments in the country and it will obviously have a bad effect on the equipments . This is a situation that needs to be resolved in the country so that we can use the engineering equipment for sustainable development in the country.

Why Engineering for Sustainable

Development?

It is increasingly recognised, in public discussion and political discourse, that many of

the practices and lifestyles of modern society – particularly but not exclusively

industrialised society – simply cannot be sustained indefinitely. We are exceeding the

capacity of the planet to provide many of the resources we use and to accommodate

our emissions, while many of the planet’s inhabitants cannot meet even their most

basic needs.

This problem, of recognising the need to live within constraints and to ensure more

fairness in access to limited resources, lies at the heart of the concepts of sustainability

and sustainable development. It is something new in human history – the planet is full

and we have no new geographical horizons to move to. This Guide is intended to

provide an introduction to how sustainability and sustainable development affect the

way in which engineering must in future be practised.

Sustainable development is the process of moving human activities to a pattern that can

be sustained in perpetuity. It is an approach to environmental and development issues

that seeks to reconcile human needs with the capacity of the planet to cope with the

consequences of human activities. It is useful to represent the constraints that make

sustainable development an imperative in the form of a simple Venn diagram

‘Techno-centric concerns’, which encompass techno-economic systems, represent

human skills and ingenuity – the skills that engineers must continue to deploy – and

the economic system within which we deploy them. ‘Eco-centric concerns’ represent

the ability of the planet to sustain us – both by providing material and energy resour.

LITERATURE REVIEW:

**Engineering Equipment**

Engineering is the application of economic, social, scientific, and practical principles to invent, build, design, maintain, and otherwise improve machines, devices, materials, systems, and processes. Engineering is an important field of work, especially in our company, so we can keep ahead of the design and machining curve.

The engineering department at Phoenix Specialty Manufacturing is small, but powerful. We have a three-person team with a combined work experience of over 80 years. Our engineers use a variety of controls, software, and concepts to effectively install new equipment, as well as enhance our manufacturing processes.

**MAINTENANCE ENGINEERING**

**Maintenance Engineering** is the discipline and profession of applying **engineering** concepts for the optimization of equipment, procedures, and departmental budgets to achieve better maintainability, reliability, and availability of equipment. ... A person practicing **maintenance engineering** is known as a **maintenance engineer**.

## Maintenance engineer's description

A maintenance engineer should possess significant knowledge of statistics, probability and logistics, and additionally in the fundamentals of the operation of the equipment and machinery he or she is responsible for. A maintenance engineer should also possess high interpersonal, communication, and management skills, as well as the ability to make decisions quickly.

Typical responsibilities include:

* Assure optimization of the Maintenance Organization structure
* Analysis of repetitive equipment failures
* Estimation of maintenance costs and evaluation of alternatives
* Forecasting of spare parts
* Assessing the needs for equipment replacements and establish replacement programs when due
* Application of scheduling and project management principles to replacement programs
* Assessing required maintenance tools and skills required for efficient maintenance of equipment
* Assessing required skills for maintenance personnel
* Reviewing personnel transfers to and from maintenance organizations
* Assessing and reporting safety hazards associated with maintenance of equipment

# Maintenance Tips to Extend Equipment Life

Heavy machinery, especially Mining, Industrial or Farming Equipment, requires constant maintenance to keep it in good working order. Conversely, poorly maintained large machinery equipment runs inefficiently. Breakdowns are costly and safety is also an important consideration.

Here are five top tips for large machinery maintenance:

## 1. Stay on top of large machinery operator training

Many types of large machinery have multiple operators. One of the ongoing inspections on any checklist should be overseeing the correct operation of the equipment.

Large machinery should be inspected as soon as it is purchased. Operator training is usually done at that point, but training needs to be kept up. Employees come and go, skills become rusty and poor operation leads to breakdowns.

Operator manuals can be revised for the specific work situation. They can be rewritten in simpler language. A short manual can be provided to each operator for easy reference. And, if you operate in a paperless environment, you can rest assured operators use the most current version of each manual.

One other note is to identify best practices, which can then be applied to other facilities or geographic locations. The knowledge you learn about how to maintain your equipment can become quite valuable – be sure to best leverage this important knowledge and use it at every applicable location.

## 2. Add and test lubricants frequently

Lubricants reduce friction around any moving part. A schedule of good lubrication maintenance extends the life of large machinery equipment and parts.

Lubrication is one of the first and most important of maintenance checks. Look for signs of excess oil or grease build-up on pistons. Check for leaks around oil seals.

Be sure to use the right lubricant. There are specific kinds of oil and grease for every component. Check the manufacturer’s recommendations.

Getting the lubricants checked is a good way to diagnose problems with large machinery. Experts analyze particles in the used oil. The makeup of any contaminants will indicate which part may be suffering from wear or breakdown.

## 3. Check for signs of wear

Vibration, shock, high temperatures, friction and age all contribute to the breakdown of parts in heavy machinery.

* Vibration can come from gears and belts that are out of alignment
* Shock can come from accidents and from poor operator technique
* High temperatures can come from extended use, friction, poor lubrication and worn parts, among other reasons
* Age affects many key components. Over time, belts will warp. Seals will dry and crack. Bolts will loosen and stretch out of shape. Age is a factor to monitor in equipment.

Should you discover wear and tear on any moving parts within your heavy equipment, be sure to quickly perform the necessary replacement of any worn parts.

## 4. Keep large machinery clean, and maintain a clean environment

There are many seals and filters in place on heavy machinery to keep working parts clean and free of contamination. Seals should be inspected regularly to make sure they’re in good condition. Filters should be inspected and changed regularly. Breathers should be kept clean to avoid creating a vacuum in the cab which will suck contaminants into the cab. The electronics in the cab are susceptible to breakdown if contaminated. This impacts the clutch, for example.

Large machinery should be stored in a shed or other building if at all possible. Exposure to wind and weather can lead to rust and rot. The machinery should be run periodically if it is not in use.

## 5. Have a maintenance and repair schedule, and keep good records

Fluids, tires, tracks and electrical systems are among the components that have to be checked regularly for preventive maintenance. Know what needs to be inspected and when. Here are some examples.

* Power transmissions have many moving parts that need to be maintained in top condition. Gearboxes need to be checked for lubrication, vibration and damage to parts.
* Friction materials, seals, gaskets and bearings all need to be inspected for wear and replaced. Gears and shafts usually last a long time and don’t need to be replaced often, if at all.
* Drive train components need constant monitoring. Check pulleys and v-belts on CVT transmissions for alignment and wear. Check sprockets for correct meshing with chains and for breaks.
* Test the oil to diagnose problems. Change filters frequently.
* Bearings keep great amounts of force running smoothly and are vital to large machinery performance. Check bearing lubrication often. Maintaining bearings well extends their life.
* Lubricate gears frequently.
* Do a seal check to prevent bearing raceway contamination.
* Run torque checks on the bolts. Bolts can elongate and creep over time.

To conclude, following the above 5 steps can significantly extend the useful life of heavy machinery, improving the Return on Investment from these important purchases. In today’s global manufacturing world, even greater value can be extracted if you have a global knowledge capture and distribution system such that this knowledge of machinery maintenance can be effectively shared across your organization – letting you reap even greater benefits on a much wider scale.

6. we should also read the safety manuals of this engineering equipments .lets make reference a tractor …….



Using tractors safely

A step-by-step guide



Before starting

Before you start a tractor, you must know the basic safety procedures. These are safety checks and safe stop Safety checks .

Am I wearing suitable clothig and footwear?

■

Have I read and understood the instruction manual?

■

How am I going to do this work?

■

Have I carried out pre-start checks of the machinery?

■

Do I know enough to work safely?

■

Safe stop

Make sure the handbrake is fully applied.

■

Make sure all controls and equipment are left safe.

■

Stop the engine.

■

Remove the key.

■

Always use

safe stop

:

before leaving your seat; or

■

when anyone else approaches; or

■

when anyone else is working on the machine.

■

You need to take extra precautions when

safe stop

is not possible, for example

when using power take-off (PTO)-driven stationary machinery such as slurry tankers

or operating external controls.

LIST OF SOME EQUIPMENTS THAT NEED TO BE MAINTAINED IN THE COUNTRY

I would be making reference to the course I study which is civil engineering.

### 1.Earth Moving Equipment

[Excavators](http://basiccivilengineering.com/2015/04/use-of-excavator-in-construction.html)  
[Graders](http://basiccivilengineering.com/2015/05/use-of-grader-in-construction-advantage.html)  
[Loaders](http://basiccivilengineering.com/2015/04/use-of-loaders-in-construction.html)  
[Skid loader](http://www.basiccivilengineering.com/2015/05/use-of-skid-steer-loaders-in.html)  
[Crawler loaders](http://www.basiccivilengineering.com/2015/05/use-of-crawler-loader-in-construction.html)  
[Backhoe](http://www.basiccivilengineering.com/2015/05/a-backhoe-also-known-rear-actor-or-back.html)  
[Bulldozers](http://www.basiccivilengineering.com/2015/05/use-of-bulldozer-in-construction.html)  
[Trenchers](http://www.basiccivilengineering.com/2015/05/use-of-trenchers-in-construction.html)  
[Scrapers](http://www.basiccivilengineering.com/2015/05/use-of-scrapers-in-construction.html)  
[Wheeled loading shovels](http://www.basiccivilengineering.com/2015/05/use-of-wheeled-loading-shovels-in.html)

### 2. Construction Vehicle

[Tippers](http://www.basiccivilengineering.com/2015/05/use-of-tippers-in-construction.html)

[Dumbers](http://www.basiccivilengineering.com/2015/05/use-of-dumpers-in-construction.html)

[Trailers](http://www.basiccivilengineering.com/2015/05/use-of-trailer-construction-vehicle.html)

[Tankers](http://www.basiccivilengineering.com/2015/05/use-of-tanker-tank-truck-used-in.html)

### 3. Material Handling Equipment

[Crane](http://www.basiccivilengineering.com/2015/05/use-of-crane-in-construction-advantage.html)  
[Conveyors](http://www.basiccivilengineering.com/2015/05/use-of-conveyors-material.html)  
[Hoists](http://basiccivilengineering.com/2015/05/use-of-hoist-in-construction.html)  
[ForkLifts](http://www.basiccivilengineering.com/2015/05/use-of-forklift-in-construction.html)

### 4.Construction Equipment

[Concrete Mixture](http://www.basiccivilengineering.com/2015/05/use-of-concrete-mixture-cement-mixture.html)

[Compactors](http://www.basiccivilengineering.com/2015/05/use-of-compactor-in-construction.html)

[Pavers](http://www.basiccivilengineering.com/2015/05/use-of-paver-in-construction.html)

[Road Rollers](http://www.basiccivilengineering.com/2015/05/use-of-road-rollers-in-construction.html)

### 5. Tunneling Equipment

5.1  [Road Headers](http://www.basiccivilengineering.com/2015/10/road-header-machine-in-construction.html)  
5.2 [Tunnel Boring Machines (TBM)](http://www.basiccivilengineering.com/2015/10/tunnel-boring-machine-tbm.html)

### 6. Other Construction Equipment



Equipment use in construction industry

HOW TO MANAGE ENGINEERING EQUIPMENT FOR SUSTAINABLE DEVELOPMENT IN THE COUNTRY

1. The government should employ educated and qualified people to operate and take charge of the engineering equipment.
2. The engineering equipment should be changed or replaced when old.
3. The engineering equipment should undergo servicing regularly.

1. Amateurs should not be allowed to operate ant engineering equipment except gone for proper training.
2. Always read manuals for things we do not understand.

CONCLUSION:

1. Based on the previous findings above on how to operate, maintain and manage the engineering equipment for sustainable development in the country it has improved the strength of the equipment, facilities and machines over a long run.
2. I also believe that engineering equipment that have served for long should be change.

ACKNOWLEDGMENT:I thank God that this research was a success

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