Review on Equipment Performance Enhancement of Sugar Plant.

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Abstract: Equipment Performance Enhancement is an aggressive strategy focuses on actually improving the function of the equipment. Equipment is like the goose that lays the eggs. If you want to keep the getting golden eggs, you need to take care the goose. Equipment Performance Enhancement perform same thing in company’s business. Equipment Performance Enhancement aims to increase the availability effectiveness of existing equipment’s in a given situation through the effect of minimizing input and the investment in human resources, which result in better hardware utilization to make business more profitable. This work is related to take advantage of this concept by implementing it in Industry.

Keyword: Equipment Performance Enhancement, maintenance.

1. Introduction

Mechanical industries have gone through the significant changes in last decade. Competition, cost, and equipment complexity have increased while budgets, operating margins, and maintenance staffs have decreased. So, maintenance department must be able to show a positive effect on the “bottom line”. Customers focus on product quality, product delivery time and cost of product. Because of these, a company has to develop or introduce quality and maintenance system.

The survey of Sugar industries has been carried out and the outcome of the same gives good opportunities to improve the present maintenance techniques used by them. For medium scale sugar industry annual maintenance cost is 4 to 5 crore. If equipments are not maintained properly then breakdown occurs which results in different losses as production loss, loss due to accidents, parts replacement loss etc. Cost of these losses is more than 5 crore. Select the appropriate maintenance strategy as condition monitoring, Inspection task, preventive maintenance task or re-Design etc. that detects indications of change in equipment performance well in advance and carryout remedial measures for safer operation. The maintenance organization now has a role in making the business more profitable and the manufacturing system more competitive by continuously improving the capability of equipment as well as making the practice of maintenance more efficient.

Equipment Performance Enhancement is an aggressive strategy focuses on actually improving the function of the equipment. Equipment is like the goose that lays the eggs. If you want to keep the getting golden eggs, you need to take care the goose. Equipment Performance Enhancement perform same thing in company’s business. Equipment Performance Enhancement aims to increase the availability effectiveness of existing equipments in a given situation through the effect of minimizing input and the investment in human resources, which result in better hardware utilization to make business more profitable. This work is related to take advantage of this concept by implementing it in Industry.

2. Background

The sugar industry in Maharashtra is highly popular in the co-operative sector, as farmers own shares in the sugar factories. These co-operative sugar factories are backbone of the sugar industry of Maharashtra. The Maharashtra sugar industry has been a spectacular growth owing to the different conductive in the state. One of the chief crops manufactured in Maharashtra is sugarcane with most of sugar industries been setup over the years. History of Sugar Industry in Maharashtra: British government started first sugar factory in 1919 at Haregaon in Ahmednagar district of Maharashtra. Then R.N.Hiremath and G.N. Sahsatrabudhe introduced concept of establishment of co-operative sugar factories in 1912. First sugar factory in cooperative Sector is established in 1918 in the name of ‘The Neera Valley Co-operative Sugar Factory’ at Baramati in Pune district. But it closed nearly. During the period of 1933 to 1934 six new factories are established. Untill 1941, 12 sugar factories were in existence in Maharashtra. In 1950, Dr. Vithalrao Vikhe Patil started Pravara Co-operative Sugar Factory at Loni in Ahmednagar district. It is a milestone of development of
Cooperative sugar industry in Maharashtra. There are 199 installed sugar factories (2009-2010) in the state but out of them 142 factories are in operation with production of sugar 7.066MTs.

Prognostic is nowadays recognized as a key feature in maintenance strategies as it should reduce maintenance cost. Real prognostic systems are however scarce in industry. The general purpose of the paper is to choosing an efficient technology: many approaches to support the prognostic process exist, whose applicability is highly dependent on industrial constraints.. The prognostic process is defined and an overview of prognostic metrics is given. Following that, the “prognostic approaches” are described. The whole aims at giving an overview of the prognostic area, both from the academic and industrial points of views. 'Review of Prognostic Problem in Condition-Based Maintenance' Otilia Elena DRAGOMIR, Rafael GOURIVEAU, Florin DRAGOMIR, Eugenia MINCA, Noureddine ZERHOUNIEuropean Control Conference, ECC'09. Aug 2009, Budapest, Hungary. sur CD ROM, pp.1585-1592.

In the last few decades, manufacturing organizations were forced to shift their business models from closed system-orientations, to more open system-orientations. This shift was brought about by drastic competitive forces, which made the costumer the focus of organizational, operational and strategic practices. Today’s manufacturing organizations are required to operate as open operational systems. In such systems, advanced operational manufacturing technologies are blended with modern information and communication technologies to integrate and coordinate operational resources, processes, and activities in order to generate a stream of value-added operations aimed at capturing and sustaining a competitive advantage. With the increasing complexity, scope, and organisational role of operational advanced manufacturing technologies, the maintenance of these technologies is becoming very critical to the ability of the organization to compete. In this context, operations management, especially maintenance management, is taking on a broader organizational strategic role. J.M. Simões, C.F. Gomes, M.M. Yasin, (2011) "A literature review of maintenance performance measurement: A conceptual framework and directions for future research". Journal of Quality in Maintenance Engineering, Vol. 17 Iss: 2, pp.116 –137.

There are many models, techniques, systems and approaches available to facilitate and support maintenance management of activities, resources, and decisions (Garg and Deshmukh, 2006). In this context, several new approaches and strategies/tactics/technologies can be utilized. These include among others, self-maintenance, integration of product and maintenance design, total productive maintenance (TPM), Preventive Maintenance (PM), Condition Based Maintenance (CBM), and Continuous Maintenance (CM) (Takata et al., 2004). Therefore, approaching maintenance management strategically and systematically has become essential to make the right choices, especially in capital intensive industries.

Advances in networking technologies are opening integration opportunities for Condition Based Monitoring (CBM) systems, presenting further possibilities for increasing CBM system functionality. This paper presents the results of a CBM Survey designed to determine present applications of CBM systems within industry. Understanding how industry applies practices such as CBM in the work place offers valuable research results for CBM system providers, consultants and business users alike.

The survey acts as a CBM application indicator for 2004. It targets 6 key areas: 1) Respondents’ company information, 2) The type of CBM technique/s applied by the respondents’ company, 3) Incentives that led the respondents’ company to implement their CBM system, 4) Technological and integration issues associated with respondents’ application of CBM, 5) Implementation issues associated with the respondents’ CBM system, and 6) Reliability and consequential maintenance awareness issues following implementation.

An international response shows CBM to be a globally accepted maintenance practice. In addition to the survey results, the paper discusses developments in remote CBM systems using the Internet, with particular regard for developing suitable user interface designs. Philip A. Higgs/Lead Author, Rob Parkin/Co Author ‘A SURVEY ON CONDITION MONITORING SYSTEMS IN INDUSTRY’. Proceedings of: ESDA 2004: 7th Biennial ASME Conference Engineering Systems Design and Analysis July 19-22, 2004 Manchester, UK (N).

Lubrication monitoring is the application of scientific principles to reduce the friction between two surfaces in relative motion. Lubricant monitoring is potentially a versatile method of conditioning monitoring for most internal combustion engines, particularly automobile engines, with dynamic parts, especially in developing countries like Nigeria. The paper discusses the current, widely utilized measurements and analysis techniques for lubricant monitoring. The Ferrographic Oil Analysis method is discussed. This technique, if properly applied, will not only

It is estimated that problems due to corrosion-erosion of boiler system cost industries billions of dollars per year. Method of corrosion-erosion control varies depending upon the type of problem encountered. This study is focused on the optimization of the boiler blowdown frequency and its effect on the chemical values of the water-steam cycle. Parameters such as conductivity, iron and silica concentrations were closely monitored via on-line monitoring devices. The conductivity in the boiler water and steam cycle was between 0.3 to 0.6 us/cm and 0.1 to 0.15 us/cm, respectively. The average iron concentration in the water cycle was less than 0.01 ppm and in the steam cycle the average reading was less than 0.005 ppm and the average of silica concentration in the boiler fluctuated between 0.02 to 0.08 ppm. Corrosion-erosion on waste heat recovery boiler system via blowdown optimization Zainal Zakaria* and Nor Ismail Hashim Journal of Petroleum and Gas Engineering Vol. 3(3), pp. 41-50, March 2012 Available online at http://www.academicjournals.org/JPGE DOI: 10.5897/JPGE11.032 ISSN 2141-2677 ©2012 Academic Journals

This paper describes the modern boilers in the South African sugar industry. A new equation for the calculation of the net calorific value (NCV) of bagasse is suggested and a distinction is made between boiler design efficiency and boiler operation efficiency. Methods to calculate fuel calorific values and boiler efficiencies from first principles are presented. BOILERS, BOILER FUEL AND BOILER EFFICIENCYA WIENESE Proc S Afr Sug Technol Ass (2001) 75 EQUIPMENT EFFICIENCY METRICS IN PRODUCTION SYSTEMS

A LITERATURE REVIEW AND SURVEY Markus Gram International May Conference on Strategic Management - IMKSM2013, 24-26. May 2013, Bor, Serbia. This paper shows a literature review of efficiency ratios for equipment in production systems. The literature analysis uses the approach of Scientometrics. This methodology gives a good general view of the suggested metrics in the scientific field. The most common used metric for equipment effectiveness is the Overall Equipment Effectiveness OEE ratio. The searching in the scientific databases like Scopus based on this metric. The main focus of the study is to find new developed metrics to measure the efficiency of the whole production system. Several scientometrics methods are used to show and find hot spots in the science map. Some of these visualization and analyzing methods are illustrated like author-paper, Paper citation and keyword network. Additional the results of a survey over the practical use of equipment metrics are stated like OEE, TEEP, first pass yield.

Mike DiLeo, Charles Manker [3], Condition based maintenance- this Paper reviews the classical approaches to maintenance and then compares and contrasts them with CBM. A variety of factors which affects the selection and performance of various maintenance alternatives are presented followed by an overview of the concepts and procedures involved in CBM.

Over a period of 50 years, Sugar Industry has invested substantially to create the modern and sophisticated infrastructure. While running titanic equipment setups, organization faces some problems with conventional maintenance program. Some problems are listed below. At present overall equipment effectiveness is comparatively less, due to improper utilization of machine resources. Production cost of sugar is high, due to longer cycle time. Sugar industry is suffering from number of equipment breakdown trouble due to poor maintenance strategy which results in unnecessary wastage of man, machine and money. The self involvement of operators is very less, due to the lack of maintenance knowledge. Hence operator has to depend on service department’s persons. In current environment; there is deficiency of advanced tools and techniques as FFT analyzer, microscopic study etc. The present strategy of industry is not sufficient to motivate the employees to use such tools and techniques

Objectives:

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<td>study maintenance Practices followed</td>
<td>Maintenance Process</td>
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<td>2</td>
<td>develop methodology for inline and offline performance</td>
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<td>Reduction in labour an maintenance cost</td>
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There is large scope to improve the overall plant efficiency by finding effective solutions on above mentioned problems. In today’s industrial world, Equipment Effectiveness has been recognized as one of the significant operation strategy to regain the production losses due to equipment inefficiency. Many organizations have used the system of Equipment Effectiveness to improve their equipment efficiency and to obtain the competitive advantage in the global market in terms of cost and quality. This will be the most excellent way to eradicate the maintenance troubles. My research work is aimed at optimizing the maintenance costs by reducing the number of breakdowns through Equipment Effectiveness and other techniques.

3. Methods

The new generation of condition monitoring and diagnostics systems differs by the detailed solution of diagnostic problems that allows making a step from machine vibration state monitoring to the monitoring of the machine technical condition. Most rotating machine defects can be detected by such a system much before dangerous situations occur. It allows the efficient use of stationary online continuous monitoring systems for condition monitoring and diagnostics as well. A real-time system for condition monitoring of Gearbox can reduce expenses of maintenance of it used in industry. It is based on vibration signature analysis concept using the vibration information as acquired from the various bearing locations of a Gearbox. The aim of vibration monitoring is the detection of changes in the vibration condition of the object under investigation during its operation. The cause of such changes is mainly the appearance of a defect. The vibration measurements can be conducted without any change in the operation mode of the object the objective of this paper is to detect the fault in Gearbox by the interpretation of vibration data and spectrums. The spectrums shows the fault in Gearbox when Gearbox is operated at different Gears on full loads. ‘Detection of Gear fault using vibration analysis’ G Diwakar1, Dr. M R S Satyanarayana2, P. Ravi Kumar3 International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, Volume 2, Issue 9, September 2012)

Condition monitoring of Antifriction bearings find widespread domestic and industrial application. It offers the advantages of reducing down time and improving maintenance efficiency. The machine need not be stopped for diagnosis. Bearing failure is a major factor in failure of rotating machinery. As a fatal defect is detected, it is common to shut down the machinery as soon as possible to avoid catastrophic damages. Performing such an action, which usually occurs at inconvenient times, typically results in substantial time and economical losses. It is, therefore, important to monitor the condition of antifriction bearings and to know the details of severity of defects before they cause serious catastrophic consequences. The vibration monitoring technique is suitable to analyze various defects in bearing. The Shock Pulse Method is used for the monitoring and analysis of high frequency compression (shock) waves generated by a bearing while rotating. The way these signals are separated is really what makes this technology unique. Unlike vibration analysis that monitors a broad vibration band and then tries to isolate unique frequencies; SPM has developed a means to only look at the high frequency signals of antifriction bearings. ‘CONDITION MONITORING FOR FAULT DIAGNOSIS OF BEARINGS ‘Sanjay Rukhande1, Shamim Pathan2, Pratik Lahane3, Vijay Patil4, Devendra Mhatre5, Ashish Gosavi6 Proceedings of the NCNTE-2012, Third Biennial National Conference on Nascent Technologies Fr. C. Rodrigues Institute of Technology, Vashi, Navi Mumbai, Feb 24-25, 2012.

The Ferrographic Oil Analysis System method of measurement is used. It focuses on ferrous metallic wear debris and it consists of a special magnet situated in a housing below a clean inclined slide (as shown in Figure 1) on which debris adhere as the oil is pumped and directed by a pump along the slope of the slide. The magnet is then removed and the metallic debris is measured and recorded. The Gallant Model of a Lancer motor car engine with Super Oleum SAE 40 oil was used. The vehicle tolled from Osogbo to Esa- Oke, Osun State, Nigeria. The oil was drained and passed through the ferrographic method as shown above. The process was performed five times and the quantity of metallic debris was measured each time. The mass of metallic debris was determined and used to calculate rate of wear in the vehicle engine. Ferrographic Oil Analysis Technique for Lubricant Monitoring and Analysis in Internal Combustion

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Failure of boiler tubes by corrosion attack has been a familiar phenomenon in power plants resulting in unscheduled plant shut down; in consequence, there are heavy losses in industrial production and disruptions to civil amenities. The failure of boiler tubes appears in the form of bending, bulging, cracking, wearing or rupture, causing leakage of the tubes. The failure can be caused by one or more modes such as overheating, stress corrosion cracking (SCC), hydrogen embrittlement, creep, flame impingement, sulfide attack, weld attack, dew point corrosion, etc. In this presentation, information related to boiler tube failures are given in the form of some case studies. The case studies are comprised of failures occurred due to SCC, overheating, flame impingement and creep. The description of the failure, possible causes and mechanism(s) will be presented followed by conclusions and recommendations. CORROSION OF BOILER TUBES SOME CASE STUDIES Anees U. Malik, Ismail Andijani, Mohammad Mobin, Fahd Al-Mualil and Mohammad Al-Hajri Published in the Proceeding of 4th SWCC Acquired Experience Symposium held at Jeddah in 2005, pp. 739-763.

If one considers the importance that steam plays in the production of sugar, the boilers should be considered one of the highest priorities in a sugar factory. In fact, some have said that a sugar factory boiler is the heart of the factory. But, do sugar factory personnel place a high priority on the condition of the boiler? To answer this question, a study was conducted on 43 sugar factory boilers in Louisiana at the end of the 2003 crop. Video borescope equipment was used to examine the internal condition of 222 different tubes and to document their condition. Additional data from analyzing boiler water and feedwater during the crop was evaluated to show the impact of boiler conditions and operating practices on the operating efficiencies of the factories. Based on the severity of conditions found, in terms of deposition and scaling, calculations were made to demonstrate how this impacts factory profits when supplemental fuels are required to achieve firing rates required for efficient factory operation. A discussion of how these adverse conditions occur and why the water treatment program is of utmost importance is also presented.

Boiler Water Treatment and Related Costs of Boiler Operation: An Evaluation of Boilers in the Louisiana Sugar Industry’

James A. Cuddihy, Jr., Walter J. Simoneaux, Robert N. Falgout, and James S. Rauh Journal American Society Sugar Cane Technologists, Vol. 25, 2005

Boilers, Boiler Fuel and Boiler Efficiency: Wienerse Proc S Afr Sug Technol Ass (2001) 75: The efficiency of a boiler is the energy imparted to the boiler feed water in its conversion to superheated steam as a percentage of the energy in the fuel. One of the standards for determining boiler efficiencies is BS 845 (Anon 1987) but there are other methods being practiced, often with different results. Whichever way it is done it is based either on the ‘direct method’ or the ‘indirect or loss method’. In the direct method, the boiler efficiency is defined as the difference between the energy in steam and the energy in boiler feed water as a percentage of the energy in fuel.

The greatest advantage of the direct method is that it is easy. In addition, it can cover any period of time. It takes into account any losses occurring during the period under consideration and reflects the actual steam generation and fuel consumption for that period. The mass of steam is usually taken at the crown Valve which means that auxiliary steam such as deaerator steam, steam used for boiler fans and feed water pumps or any other steam related to the boiler operation is included. The boiler feed water may or may not exclude boiler blow down. Indirect or loss method. The definition of boiler efficiency is the same irrespective of the method being used. The definition is in the approach. While the direct method concentrates on the energy made, the ‘loss method’ focuses on the energy lost.

John Cadick, P.E. [4], Condition based maintenance- focused on step-by-step method which may be used to implement condition based maintenance program. Starting with equipment oriented predictive maintenance the paper moves on to the more comprehensive and cost effective concept of CBM.

International Atomic Energy Agency [2], Implementation Strategies and tools for condition based maintenance at nuclear power plant.-have discussed different tools such as vibration analysis, thermography etc. of condition based maintenance.

4. Result

It must be noted here that boiler water control in a sugar factory can be, at best, difficult due to the constantly changing operational conditions of the milling operation. But, at the same time, it must be recognized that boiler water chemistry can be controlled within desired control ranges most of the time. This can be achieved with dedicated and a properly trained operator supported by a knowledgeable water treatment supplier.

Proper boiler blowdown consists of regular bottom blowdown and continuous blowdown from the steam drum surface. Manual blowdown of the mud drums is essential to remove precipitated solids and to prevent them from contributing to recirculating suspended solids. A continuous blowdown system effectively removes water from the boiler on a continuous basis under controlled conditions.

Water is removed from the boiler at the point of the highest dissolved solids concentration in the boiler water so that maximum dissolved solids may be removed with minimal loss of water and heat from the boiler. Any possible reduction in the amount of blowdown contributes to water and fuel savings (see example in Table 6) as well as keeping the water treatment chemical residuals within their desired control ranges. Scale control in a boiler is achieved with a combination of chemicals and conductivity control. Manual blowdown removes these precipitated solids from the mud drum and lowers the total solids in the boiler. This is an important operational control that must be performed by operators on a regular schedule. Automated blowdown control will remove dissolved solids and reduce carryover due to high conductivity, reduce chemical usage by decreasing unnecessary manual blowdown, and lower fuel costs by reducing the requirement for makeup addition to the boiler.

BOILER WATER TREATMENT AND RELATED COSTS OF BOILER OPERATION: AN EVALUATION OF BOILERS IN THE LOUISIANA SUGAR INDUSTRY

James A. Cuddihy, Jr., Walter J. Simoneaux, Robert N. Falgout, and James S. Rauh

Journal American Society Sugar Cane Industry, Vol. 25, 2005

The laboratory tests established: the optimum conditions for the calcium and magnesium hardness precipitation (reactive agents and their doses, operating temperature, settling time); the optimum physical-chemical indices of the treated wastewater (pH, "p" alkalinity, total hardness and carbonic hardness), necessary for the re-utilization of the treated water for the subsequent regeneration of the Na-cationic filters. The insurance of these indices prevents the diminishing of the useful capacities of ionic exchanges, under the conditions of the treated water reutilization, the corrosion speed of the steal made tubes in experimental environments. the iron concentration in the experimental substances. In every testing period there were analyzed both the test tubes and the remaining substances from the test tubes. There were determinate the following chemical parameters: conductivity, pH, p & m, alkalinity. The results were inserted in the table and will be graphically presented. as a regenerative solution; the technology for the wastewater treatment in order to reuse it as a regenerative agent. full reutilization of the treated wastewater in the process of backwashing and as a regeneration solution in the Na-cationic filters.

A great diminishing in the volume of the waste water discharged from a of power plant that produces softened water for the district heating networks environmental pollution diminishing through the reduction of the discharged waters with a high salt content; diminishing of corrosion in the wastewater transport pipes, by reducing the waste waters chloride content. ‘Technology for the treatment of the used waters resulting from the softening process’ Stanca, P. Budulan, A. Serbanescu, A. Raducanu, L. Amza, V. Brinzoi and G. Stanca ,IEEE bogolaPower Tech. Conference,Bogola Italy June 23,2003.

B.Raghukumar, K. V. Ramana and K. mallikarjun [1], condition Monitoring and fault diagnosis of boiler feed pump unit.-have explained condition monitoring is carried out by vibration measurement and signature analysis to ensure safer operation of unit.

Mike DiLeo, Charles Manker [3], Condition based maintenance- this Paper reviews the classical approaches to maintenance and then compares and contrasts them with CBM. A variety of factors which affects the selection and performance of various maintenance alternatives are presented followed by an overview of the concepts and procedures involved in CBM.

John Cadick, P.E. [4], Condition based maintenance- focused on step-by-step method which may be used to implement condition based maintenance program. Starting with equipment oriented predictive maintenance the paper moves on to the more comprehensive and cost effective concept of CBM.

5. Conclusion

Durable development involves the integration of economical strategies beside social and environmental ones for the optimization of processes. This major provocation of triple performance outlined an interesting development
area in industrial world: concepts like statically corrective or preventive maintenance were completed by predictive and proactive maintenance. In a word “prognostic” is nowadays recognized as a key feature in maintenance strategies. Obviously, considering the benefits that a “prognostic system” may bring to the security, economics and resource management fields, the industrial interest in prognostic is also perceptible in the scientific community for which it represents an exciting research area, with applicative perspectives. Thereby, although prognostic is still a novel axes of development (a few decades); many works have been performed and develop accurate tools for that purpose. The variety of potential prognostic tools as well as the diversity of published works is of good omen for industrials that may be interested in using such technologies. However, knowing that techniques are suited to the prediction problem is not sufficient to make a choice: one must have a closer look on implementation requirements and constraints.


It is observed that vibrational analysis is better compared to other monitoring techniques. To reduce costs and facilitate diagnosis, vibrational analysis is a very popular technique. It provides a highly sensitive, selective, and coeffective means for online monitoring of a wide variety of heavy industrial machinery. This paper has investigated the detection of Gear fault using vibration monitoring. An experimental study has been conducted on motor with Gearbox, measured quantities such as frequency and amplitudes. The peaks are present at sub-harmonics and multiples of frequencies. The cause of presenting the subharmonics & multiples of frequencies is due to the presence of fault in the Gearbox. ‘Detection of Gear fault using vibration analysis’ G Diwakar1, Dr. M R S Satyanarayana2, P. Ravi Kumar3 International Journal of Emerging Technology and Advanced Engineering Website: www.ijeetae.com (ISSN 2250-2459, Volume 2, Issue 9, September 2012)

The root cause of blower high vibration and abnormal sound problem has been pinpointed. Hence it can be diagnosed that blower vibration problem was due to blower bearing’s low load carrying capacity. Hence blower bearing type modification (i.e to increase load carrying capacity of existing bearing) from self aligning ball bearing to spherical roller bearings having the same self aligning property was recommended to use. After blower bearing modification, blower vibration and sound have been reduced to normal. Thus blower high vibration problem has been solved. This has lead to an increased blower reliability and life. Operational confidence level as well as blower running safetyhas been tremendously improved. Proceedings of the NCNTE-2012, Third Biennial National Conference on Nascent Technologies Fr. C. Rodrigues Institute of Technology, Vashi, Navi Mumbai, Feb 24-25, 2012.

Measurement and analysis techniques for lubrication monitoring in metal-metal contact resulting in gradual wear and consequently leading to material failure, have been appraised for most automotive engines with dynamic parts. The ferrographic method is one of the techniques for monitoring lubricants in the automotive industry. It helps in showing the rate at which engine components are wearing away. It also indicates the level at which the lubricant contamination occurs or has been reached, thereby enabling the automotive engine or mechanic to know when to change the lubricant as well as changing engine parts to avert break down of the vehicle or obstruction of work. The ferrographic method, therefore, if properly employed, will give adequate monitoring of automotive engine lubrication Ferrographic Oil Analysis Technique for Lubricant Monitoring and Analysis in Internal Combustion Engines. I.A. Lateef, B.Tech., PGD*, M.O. Arowolo, M.Tech., and O.A. Akintaro, COREN The Pacific Journal of Science and Technology – 107– http://www.akamaiuniversity.us/PJST.htm Volume 10. Number 1. May 2009.

The study was conducted in order to understand the behavior of the chemical condition for the water-steam cycle by reducing the normal boiler blowdown frequency of once per day. Several conclusions that can be made are: The chemical condition of the water-steam cycle can still be maintained even though the frequency of the blowdown is reduced. Boiler blowdown must be carried out if one of the chemical parameters in the water and steam cycle is trending upwards and reaching the limit value. After a boiler startup, blowdown shall be carried out for approximately 3 h or until the feed water line indicates stable and low concentration of Iron (Fe) and Silica (SO4), and the conductivity is within the specified range.

With the implementation of the new blowdown procedures, saving on the gas, water and chemicals would be achieved for the whole water and steam cycle. The failure of the blowdown valves can be minimized and this again can save a lot of money and down time for the necessary repair work. Corrosion-erosion on waste heat recovery boiler system via blowdown optimization Zainal Zakaria*
A LITERATURE REVIEW AND SURVEY
Markus Gram International May Conference on Strategic Management - IMKSM2013, 24-26. May 2013, Bor, Serbia
The overall equipment effectiveness is a good metric to measure losses of equipment. OEE measures the efficiency of a single machine. The proposed method for literature research shows how to find enhancements of the OEE value in bibliographic sources. The development of this key figure aim to measure the performance of the whole production system. Some of them comprise economic and quality parts for assessment. A lot of these approaches are theoretical and should be tested in practice. The empirical part of this paper shows that companies do not use the OEE metrics. Equipment-intensive industries calculate their machines performance with simple metrics such as system availability and downtime. Easy to use holistic metric is required to measure the equipment performance of those companies.

The Sugar factory set up has extensive use of sophisticated production equipments. Hence need of this factory is to execute this set up properly and improve the production system in minimum cost. The suggested model of Equipment Effectiveness will help them to reduce product manufacturing costs. Equipment Effectiveness System helps to predict the machine breakdowns by using tool such as lubricant analysis, vibration analysis, control of corrosion etc. one can check the condition of the equipments by carefully observing the parameters such as vibrations, PH, current ratings, oil debris etc. Execution of Equipment Effectiveness concept in Sugar factory will positively contribute in the different parameters such as variation in manufacturing system, productivity, maintenance cost, inventory control, environment safety, employee’s morale. The practical aspect within and beyond the basic Equipment Effectiveness theory will be studied by attempting the data collection of present situation of boiler section. Difficulties for adoption of Equipment Effectiveness and the problems encountered during the implementation will be considered for its analysis during this research work. The Results of investigation will be used to establish the effective approach for system of Equipment Effectiveness.

The following benefits will be accomplished through this research work

- Increase the amount of time that the production equipment is available for use.
- Reduce the number of accidents in the workplace.
- Involve people in all level of organization and create an enthusiastic work environment.
- Enhance reliability, performance and safety.
- Reduce the manufacturing cost by maintaining good quality.

6. References


20. BOILERS, BOILER FUEL AND BOILER EFFICIENCYA WIENESE Proc S Afr Sug Technol Ass (2001) 75 EQUIPMENT EFFICIENCY METRICS IN PRODUCTION SYSTEMS


27. BOILERS, BOILER FUEL AND BOILER EFFICIENCY. A WIENERSE Proc S Afr Sug Technol Ass (2001) 75


