



DETAILED ANALYSIS OF SLURRY POT TESTER

Elamathi.E.¹, Parthipan.U.², Naina Mohamed.S.³, Dinesh Kumar.S.⁴, Vignesh Durai.S.⁵

^{1,2,3,4,5}UG Scholars, Department of Mechanical Engineering,

PSN College of Engineering and Technology (Autonomous), Tirunelveli, India

Abstract- *The slurry disintegration wear is the real issue in the liquid apparatuses and the hydro turbines where the erodent particles are conveyed with the liquid and these particles are affected on the objective surface and because of effect volume loss of material happens. There are a few strategies are accessible to control the slurry disintegration; however the surface covering utilizing the warm showering is for the most part utilized. In the present review, the WC-CO covering is utilized to decrease the disintegration wear and used to enhance the life expectancy of the chose material (Gun Metal Bronze). The covering is connected in the substrate material with the assistance of the high speed oxy fuel covering (HVOF). The experimentation on the slurry pot analyzer has been completed to test the disintegration wear. It is watched that the most extreme disintegration wear is at 15° effect edge and the base disintegration wear is at 90° effect point.*

Keywords- Cutting Wear, WC-CO Coating, Slurry Pot Tester.

1. INTRODUCTION

The wear is only dynamic loss volume of material from target material. Slurry disintegration wear is happening because of the effect of the hard rough particles conveyed by the water. The slurry disintegration is hard to comprehend on the grounds that it relies on upon many components, which act at the same time. Fig - 1 demonstrates these components which incorporate stream field parameters, properties of target material and erodent molecule qualities. Among these parameters, the introduction point and the microstructure assumes pivotal part on the material evacuation handle. The turbine edges, needles and spouts in the pressure driven apparatuses, have endured the rapid water with or without the strong molecule impingement, and subsequently they should have the astounding quality, sturdiness, and disintegration wear resistance. Due to the erodent particles which are streaming with the water will strike on the edge surface and the surface gets disintegrated, and because of which the turbine effectiveness diminishes and the life expectancy of the turbine additionally decreases.

In the present review, The Pump introduced at "Dapora Pumping Station" at Village Dapora was disassembled and the impeller of the pump was inspected with necked eyes to distinguish the reasonable justification of wear Fig - 2. From the preparatory examination, it was watched that the impeller and packaging of the pump was worn out because of effect of

the strong particles. It was watched that the material from edges of the diffuser vanes of the impeller was exhausted and disfigured because of strong particles stacking.



Fig.1. Experimental Setup

The warm spaying system is superior to alternate methods. Which is most sparing, attractive and valuable. Henceforth it regards settle on a decision of most reasonable process. The disintegration resistance of the impeller edge is utilized to improve with the assistance of the High speed oxy-fuel covering (HVOF). As indicated by the different scientists it is seen that the hardness, quality and the wear resistance of WC-CO cermets is increments essentially by decreasing the extent of the carbide grains to nanometre scale. These days, for different mechanical applications, high speed oxy fuel (HVOF) splash is in effect generally utilized is because of its capacity to deliver fantastic covering with required hardness and low oxide content because of its high speed affect characteristic all the while. The porosity and hardness are the two imperative properties for wear and consumption application .The WC-12CO cermet covering was more



helpless to disintegration consumption harm than the watery slurry testing than was the WC-10Co-4Cr. The test comes about demonstrates that the NiCrBSi showered covering displays a greatly improved slurry disintegration resistance than the SUS 304 stainless steel. With the assistance of the preparatory examinations the NiCrBSi can enhance the administration life of the needle and spouts 3-4 times. The Cr3C2-NiCr and the WC-Ni are broadly utilized as a part of the wear applications. It is noticed that, Cr3C2-NiCr will give the preferred disintegration consumption resistance over the WC-Ni. Christo Ananth et al. [2] proposed a system about Efficient Sensor Network for Vehicle Security. Today vehicle theft rate is very high, greater challenges are coming from thieves thus tracking/ alarming systems are being deployed with an increasingly popularity. As per as security is concerned today most of the vehicles are running on the LPG so it is necessary to monitor any leakage or level of LPG in order to provide safety to passenger. Also in this fast running world everybody is in hurry so it is required to provide fully automated maintenance system to make the journey of the passenger safe, comfortable and economical. To make the system more intelligent and advanced it is required to introduce some important developments that can help to promote not only the luxurious but also safety drive to the owner. The system "Efficient Sensor Network for Vehicle Security", introduces a new trend in automobile industry. Christo Ananth et al. [3] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry. It is an interfacing of the advanced technologies like Embedded Systems and the Automobile world. This "Intelligent Sensor Network for Vehicle Maintenance System" is best suitable for vehicle security as well as for vehicle's maintenance. Further it also supports advanced feature of GSM module interfacing. Through this concept in case of any emergency or accident the system will automatically sense and records the different parameters like LPG gas level, Engine Temperature, present speed and etc. so that at the time of investigation this parameters may play important role to find out the possible reasons of the accident. Further, in case of accident & in case of stealing of vehicle GSM module will send SMS to the Police, insurance company as well as to the family members.

II. EXPERIMENTAL SET UP

The slurry pot analyzer utilized as a part of the present work, was produced by the Desale (2005), the schematic chart of slurry pot analyzer with dimensional subtle elements is introduced in Fig-3. The pot of size [240 mm measurement

and 155 mm height]made from AISI SS304 material. The vortex movement created because of the revolution of the propeller is break with the assistance of 25 mm x 155 mm divider round and hollow pot. The gap of 20 mm distance across is given at the base side of the pot with a specific end goal to deplete the slurry after each examination. The acrylic sheet of 12 mm thickness is utilized for the visual perceptions. The AC engine shaft is combined with the fundamental shaft with the assistance of the affection jaw coupling. The oil-seal of 10 mm measurement is given at the base to the revolution of the propeller shaft. The 4 cutting edge propeller is settled on the pole at the separation of 24 mm over the base and turned with the assistance of DC engine. The wear examples are turned at craved speeds by AC engine. At the base end of the pole the 30 mm x 25 mm metal sleeve is accommodated settling the two level arms to hold the two content apparatuses at oppositely inverse closures. In the present study, Worthington 5 Hp Vertical turbine impeller made of the gun metal bronze is used as a substrate material. The WC-CO powder is used for HVOF coating on the substrate. The erosion wear experiments were conducted using the solid-liquid mixture of Quartz (IS Sand) with tap water. In the present study, Worthington 5 Hp Vertical turbine impeller made of the gun metal bronze is used as a substrate material. The chemical composition of the material has been determined by using the optical emission spectrometer. Christo Ananth et al. [4] discussed about an eye blinking sensor. Nowadays heart attack patients are increasing day by day."Though it is tough to save the heart attack patients, we can increase the statistics of saving the life of patients & the life of others whom they are responsible for. The main design of this project is to track the heart attack of patients who are suffering from any attacks during driving and send them a medical need & thereby to stop the vehicle to ensure that the persons along them are safe from accident. Here, an eye blinking sensor is used to sense the blinking of the eye. spO2 sensor checks the pulse rate of the patient. Both are connected to micro controller. If eye blinking gets stopped then the signal is sent to the controller to make an alarm through the buffer. If spO2 sensor senses a variation in pulse or low oxygen content in blood, it may results in heart failure and therefore the controller stops the motor of the vehicle. Then Tarang F4 transmitter is used to send the vehicle number & the mobile number of the patient to a nearest medical station within 25 km for medical aid. The pulse rate monitored via LCD. The Tarang F4 receiver receives the signal and passes through controller and the number gets displayed in the LCD screen and an alarm is produced through a buzzer as soon the signal is received. Christo Ananth et al. [5] discussed about a system, GSM based AMR has low infrastructure cost and it reduces man power. The system is fully automatic, hence the probability of error is reduced. The data is highly secured and it not only solve the problem of traditional meter reading system but also provides additional features such as power disconnection, reconnection and the concept of power management. The database stores the current month and also



all the previous month data for the future use. Hence the system saves a lot amount of time and energy. Due to the power fluctuations, there might be a damage in the home appliances. Hence to avoid such damages and to protect the appliances, the voltage controlling method can be implemented. Christo Ananth et al. [6] discussed about a project, in this project an automatic meter reading system is designed using GSM Technology. The embedded micro controller is interfaced with the GSM Module. This setup is fitted in home. The energy meter is attached to the micro controller. This controller reads the data from the meter output and transfers that data to GSM Module through the serial port. The embedded micro controller has the knowledge of sending message to the system through the GSM module. Another system is placed in EB office, which is the authority office. When they send "unit request" to the microcontroller which is placed in home. Then the unit value is sent to the EB office PC through GSM module. According to the readings, the authority officer will send the information about the bill to the customer. If the customer doesn't pay bill on-time, the power supply to the corresponding home power unit is cut, by sending the command through to the microcontroller. Once the payment of bill is done the power supply is given to the customer. Power management concept is introduced, in which during the restriction mode only limited amount of power supply can be used by the customer. Christo Ananth et al. [7] discussed about Positioning Of a Vehicle in a Combined Indoor-Outdoor Scenario, The development in technology has given us all sophistications but equal amounts of threats too. This has brought us an urge to bring a complete security system that monitors an object continuously. Consider a situation where a cargo vehicle carrying valuable material is moving in an area using GPS (an outdoor sensor) we can monitor it but the actual problem arises when its movement involves both indoor (within the industry) and outdoor because GPS has its limitations in indoor environment. Hence it is essential to have an additional sensor that would enable us a continuous monitoring /tracking without cutoff of the signal. In this paper we bring out a solution by combining Ultra wide band (UWB) with GPS sensory information which eliminates the limitations of conventional tracking methods in mixed scenario(indoor and outdoor) The same method finds application in mobile robots, monitoring a person on grounds of security, etc. Christo Ananth et al. [8] discussed about Nanorobots Control Activation For Stenosed Coronary Occlusion, this paper presents the study of nanorobots control activation for stenosed coronary occlusion, with the practical use of chemical and thermal gradients for biomedical problems. The recent developments on nanotechnology new materials allied with electronics device miniaturization may enable nanorobots for the next few years. New possibilities for medicine are expected with the development of nanorobots. It may help to advance the treatment of a wide number of diseases: cardiovascular problems, neurosurgery, cancer, diabetes and new cell therapies. The implementation of new methodologies to help on manufacturing analyses and

system design for the development of nanoscale molecular machine is one of the most important fields for research. The use of 3D physically based simulation in conjunction with clinical data may provide ways to design practical approaches for control and transducers development. Christo Ananth et al. [9] proposed a system, this fully automatic vehicle is equipped by micro controller, motor driving mechanism and battery. The power stored in the battery is used to drive the DC motor that causes the movement to AGV. The speed of rotation of DC motor i.e., velocity of AGV is controlled by the microprocessor controller. This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

Table -1: Target Material Elemental Composition

Target Material	Elemental composition (wt. %)							
	Cu	Sn	Pb	Zn	Al	Ni	Sb	Fe
Bronze IS 318	85.5	5.2	4.2	4.2	0.03	0.4	0.1	0.1

III. PROPOSED SYSTEM

In the present study commercially accessible WC-CO powder was contemplated concerning its slurry disintegration resistance. The covering powder was stored on the firearm metal bronze example at RMS Engineering Pune, India. Utilizing a business HVOF warm shower framework. The compacted air planes is utilized to coolspecimens amid and in the wake of showering, before covering testimony; the examples were sand impacted to upgrade the surface unpleasantness in order to acquire a decent covering attachment. It is seen that the powder has the round fit as a fiddle. In the present review, quartz is utilized as the erodent molecule, and this will be utilized with the water to wind up slurry. The mean molecule size is 256 μm which is held between the two sifters of 300 μm and 212 μm sizes. Christo Ananth et al.[10] discussed about E-plane and H-plane patterns which forms the basis of Microwave Engineering principles. The theory proposed by the Bitter was suggested that, the striking particle velocity components (Perpendicular and parallel) are responsible for cutting and deformation wear. Thus the deformation wear is calculated with the help of following relationship.

$$ED(\alpha) = ED90(\sin\alpha)^3 \quad (1)$$



Where, $ED(\omega)$ is the deformation wear at any impact angle and the ED_{90} is the deformation wear at the 90° impact angle at the similar experimental conditions. The cutting wear is nothing but the difference between the total wear and the deformation wear and this is presented in equation 2,

$$E_c = E_w - ED \quad (2)$$

The variation of the deformation and the cutting wear due to the erodent particles is represented graphically in Fig -7. We generally assumed that the zero degree impact angles no wear is takes place. But the researcher Gandhi B.K is explain that at zero degree impact angle some wear takes place due to the random impact of the particles. It is seen that cutting wear is decreases with the increase in orientation angle at reaching zero at 90° impact angle and the deformation wear is increases with increasing the orientation angle. Christo Ananth et al.[11] presented a brief outline on Electronic Devices and Circuits which forms the basis of the Clampers and Diodes.

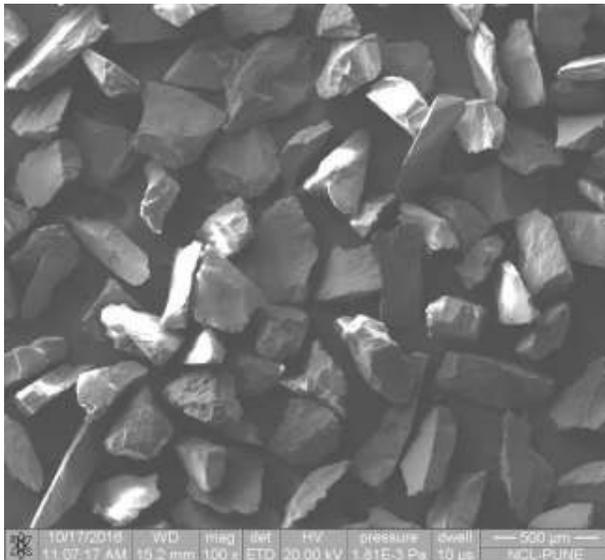


Fig.2. SEM micrograph of the erodent particle

IV. RESULTS AND DISCUSSION

In the present study commercially accessible WC-CO powder was contemplated concerning its slurry disintegration resistance. The covering powder was stored on the firearm metal bronze example at RMS Engineering Pune, India. Utilizing a business HVOF warm shower framework. The compacted air planes is utilized to cool specimens amid and in the wake of showering, before covering testimony; the examples were sand impacted to upgrade the surface unpleasantness in order to acquire a decent covering attachment. It is seen that the powder has the round fit as a fiddle.

In the present review, quartz is utilized as the erodent molecule, and this will be utilized with the water to wind up slurry. The mean molecule size is $256\mu\text{m}$ which is held between the two sifters of $300\mu\text{m}$ and $212\mu\text{m}$ sizes and weight concentration(10%). It is observed that, the erosion rate is maximum at the 15° orientation angle and goes decreasing as the impact angle decreases till 90° .

IV. CONCLUSION

The slurry disintegration wear is the real issue in the liquid apparatuses and the hydro turbines where the erodent particles are conveyed with the liquid and these particles are affected on the objective surface and because of effect volume loss of material happens. There are a few strategies are accessible to control the slurry disintegration; however the surface covering utilizing the warm showering is for the most part utilized. In the present review, the WC-CO covering is utilized to decrease the disintegration wear and used to enhance the life expectancy of the chose material (Gun Metal Bronze). The covering is connected in the substrate material with the assistance of the high speed oxy fuel covering (HVOF). The experimentation on the slurry pot analyzer has been completed to test the disintegration wear. It is watched that the most extreme disintegration wear is at 15° effect edge and the base disintegration wear is at 90° effect point.

REFERENCES

- [1] M.C. Lin, L.S. Chang, H.C. Lin, C.H. Yang, K.M. Lin (2006). A study of high-speed slurry erosion of NiCrBSi thermal-sprayed coating. *Surface and coating Technology*, 201, pp. 3193-3198.
- [2] Christo Ananth, I.Uma Sankari, A.Vidhya, M.Vickneshwari, P.Karthiga, "Efficient Sensor Network for Vehicle Security", *International Journal of Advanced Scientific and Technical Research (IJST)*, Volume 2, Issue 4, March-April 2014, pp – 871-877
- [3] Christo Ananth, C.Sudalai@UtchiMahali, N.Ebenesar Jebadurai, S.Sankari@Saranya, T.Archana, "Intelligent sensor Network for Vehicle Maintenance system", *International Journal of Emerging Trends in Engineering and Development (IJETED)*, Vol.3, Issue 4, May 2014, pp-361-369
- [4] Christo Ananth, S.Shafiq Shalaysha, M.Vaishnavi, J.Sasi Rabiyyathul Sabena, A.P.L.Sangeetha, M.Santhi, "Realtime Monitoring Of Cardiac Patients At Distance Using Tarang Communication", *International Journal of Innovative Research in Engineering & Science (IJIRES)*, Volume 9, Issue 3, September 2014, pp-15-20
- [5] Christo Ananth, G.Poncelina, M.Poolammal, S.Priyanka, M.Rakshana, Praghash.K., "GSM Based AMR", *International Journal of Advanced Research in Biology, Ecology, Science and Technology (IJARBEST)*, Volume 1, Issue 4, July 2015, pp:26-28



- [6] Christo Ananth, Kanthimathi, Krishnammal, Jeyabala, Jothi Monika, Muthu Veni, "GSM Based Automatic Electricity Billing System", International Journal Of Advanced Research Trends In Engineering And Technology (IJARTET), Volume 2, Issue 7, July 2015, pp:16-21
- [7] Christo Ananth, S.Silvia Rachel, E.Edinda Christy, K.Mala, "Probabilistic Framework for the Positioning Of a Vehicle in a Combined Indoor-Outdoor Scenario", International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE), Volume 2, Special Issue 13, March 2016, pp: 46-59
- [8] Christo Ananth, R.K. Shunmuga Priya, T.Rashmi Anns, S.Kadhirunnisa, "NANOROBOTS CONTROL ACTIVATION FOR STENOSED CORONARY OCCLUSION", International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE), Volume 2, Special Issue 13, March 2016, pp: 60-76
- [9] Christo Ananth, M.A.Fathima, M.Gnana Soundarya, M.L.Jothi Alphonsa Sundari, B.Gayathri, Praghash.K, "Fully Automatic Vehicle for Multipurpose Applications", International Journal Of Advanced Research in Biology, Engineering, Science and Technology (IJARBEST), Volume 1, Special Issue 2 - November 2015, pp.8-12.
- [10] Christo Ananth, S.Esakki Rajavel, S.Allwin Devaraj, M.Suresh Chinnathampy. "RF and Microwave Engineering (Microwave Engineering).", ACES Publishers, Tirunelveli, India, ISBN: 978-81-910-747-5-8, Volume 1, June 2014, pp:1-300.
- [11] Christo Ananth, W.Stalin Jacob, P.Jenifer Darling Rosita. "A Brief Outline On ELECTRONIC DEVICES & CIRCUITS.", ACES Publishers, Tirunelveli, India, ISBN: 978-81-910-747-7-2, Volume 3, April 2016, pp:1-300.