International Journal of Advance Research in Science and Engineering
Vol. No.6, Issue No. 04, April 2017
www.ijarse.com
IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

CRITICAL REVIEW ON FABRICATING AN EXPERIMENTAL SET-UP TO INVESTIGATED THE DEVELOPMENT AND DIAGNOSTIC STUDIES ON JET TESTER SOURCES AND GENERATION

Vikas Patyal[1], Shubham Sharma[2]

[1,2]P. G. Research scholar, Mechanical Engineering Department

Chandigarh University[1], D.A.V University[2] (India)

ABSTRACT

Fundamentally a jet tester is used to innovate the erosion wear performance at high impact angle of solid liquid mixture at distinct concentration. The slurry particle partition of jet tester is distinct at various level because it builds upon the velocity and impact angle of the material. A conical type /rectangular type/ circular type slurry pot is installed at the top of the cylinder and which is fixed by the propeller and propeller rotates at distinct speed. With the help of the electric motor the uniform speed of distribution can be needed. The workpiece is held on the top of the cylinder which is fixed on a test fixture at distinct angle . The work specimen has distinct angular positions to check out the wear rates and angle of impingement. High velocity slurry particles impinge on the surface of the workpiece which causes erosion wear that occur loss of mass on the material. The nozzle of the jet tester is used to design that purpose which can enhance the performance of erosion wear particles and abrasive rate. Different experiments work have performed at distinct angles, distinct particle size and speed distribution. Therefore the result shows ductile materials are better with the literature point of view.

Keywords: Abrassive rate, Erosion wear, Impact angle, Jet tester

I. INTRODUCTION

In this era the hydraulic transportation system can be conceited by the slurry particles. Erosion wear is an exact phenomenon that result shows the loss of material particles from the surface. The distinct chemical reaction has been applied to ensure the erosion wear when the high velocities of slurry particles impinge on the specimen that causes the loss of electrons in the materials which enhance the erosion wear. The diverse parameters such as impact angle, velocity of solid particles, hardness, and solid concentration are responsible for the erosion wear deformation. In turbines, pipelines, and slurry pumps these types of wear can be formed. The increase in kinetic energy of particles enhancing the loss of materials due to erosion striking the target surface.

II. LITERATURE REVIEW

A.N.J Stevenson and I.M Hutchings (1995) [1] first examined the steady state performance of influencing the nozzle length. Stevenson was found that plume was more divergent at higher velocities. And low velocities effect was produced. The nozzle length is a fixed velocity particle which is significantly diverge the particle size distribution. The result shows nozzle length/diameter ratios >20. Therefore nozzle length is not a major parameter for designing a test rig.

IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

Wood and D.W (1997) [2] Wheeler studied the performance of high velocity air jet sand impingement. Wood designs the aid of computational fluid dynamics to simulate the erosion conditions. They experienced by subsea choke valves used in the offshore oil industries. They used CVD diamond coatings at sonic velocity to evaluate the erosion performance. The experimental setup is in gas blast design. After experimentation the result shows pressure, velocity and sand flux are described.

Y.Xiea and H.Mcl Clark (1999) [3] examined the study of modeling slurry particle dynamics in the coriolis tester. The test rig has low impact angle. The characteristics parameter's such as particle size, particle density, impact angle, impact velocity, solid concentrations are predicted by the models and the parameter's which observed wear patterns. The properties such as plastic deformation, fracture are depends upon the erosion resistance.

BK Gandhi and S.N Singh (1999) [4] investigated the studied about parametric dependence of erosion wear for parallel flow. In this design the special fixture and design modifications in slurry pot tester. The parallel flow of the mixture is due to primarily in work piece an erosion wear. The large numbers of experiments were performed at different particle size, distribution.as the result shows the parametric dependence on velocity is comparatively much stronger as compared to solid concentration.

Manabu Wakuder and Yukihike (2003) [5] examined the studied of material response to particle during AJM. Manabu identify the material response of alumina ceramics to the abrasives particles impact in AJM processes. The sintered alumina particles are the different kinds of abrasives particles were utilized.

H.Meng and Neville (2006) [6] investigated the corrosion study of stainless steel in marine conditions. The examine check the performance of two stainless steel UNSS32760 and UNSS31603 for marine applications. The experimental design method has two level factorial. The loss of material process shows the effect of velocity and sand. The temperature of the fluid has a smallest effect on the specimen. The result shows SS32670 has better corrosion resistance than SS31603.

Wai and T.Miyajima (2006) [7] investigated the study of erosion wear resistance. The author has investigated the new type solid impact test to know the properties of wear. The properties of wear are single layered and multi layered coatings. In PVD coatings, the 1.2 micrometer alumina parts are impacted at high velocity at different angles, different speed and different substrate temperature. And the result shows the coated materials has good wear properties than substrate materials.

Girish R. Desale and B.K Gandhi(2009) [8] investigated on erosion wear behavior of laser clad surfaces . they studied about the colmonoy-6 and inconal 625 are cladded on AISI 316L steel and AISI 304L steel. The author were optimized the laser processing parametres. They obtained scanning speed and power feed of a sound clad. They found that the minimum cracks porosity and distortion were found at scanning speedof 0.1m/min. and powder rate 12g/min. as the result shows the maximum hardness is obtained by colmonoy-6 clad on AISI316L steel and is 352VHN in case of other steel.

HS Grewal and Anupam Agrwal (2012) [9] examined the studied of high velocity slurry corrosion test rig. The author designed a new type of slurry erosion test rig with various types of construction and working condition. They eliminate the some limitations such as velocity concentration, acceleration; distance, etc. the results ductile and brittle materials erosion wear behaviors being observed.

IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

Satish and Bhushan(2014) [10] investigated on development of jet tester .They used stainless steel SS304l at uniform speed distribution. They studied about the different types of material which is used slurry pot tester. The various parameter's such as velocity, particle size and impact angle affect the material of the slurry pot tester. The result obtained ductile material ductile material is good material.

Promod A. Thakur and Hitesh (2015) [11] investigated about the development of jet erosion tester. They found that high velocity particle strike with specimen through the nozzle that causes the erosion wear. The author conducted experiments for repeatability test for fix parameter's such as 45° and particle size does not more than 615 micron, angle and 10% solid concentration for 60 minutes. As the results were obtained the ductile materials are in good arrangement.

III. FEW AMENDMENTS & CHANGES IN JET EROSION TESTER

A jet erosion tester was developed to check the erosion wear rate. Jet tester has a nozzle which has diameter 1.14mm at inlet angle 60°. The distinct types stresses applied at the starting position of nozzle and test head to the soil sample. Even if whole duration of test the test head is selected it is usually held constant. During performing the experiment the specimen has a different angle such as 15°,30°,45°,60° to check the impact angle. The experiments are fulfilled for repeatability tests for fix parameters such 55, particle size 655 micron and angle & 10% solid concentration for 60 minutes and another one for attestation.

IV. SCHEMATIC DIAGRAM OF JET TESTER

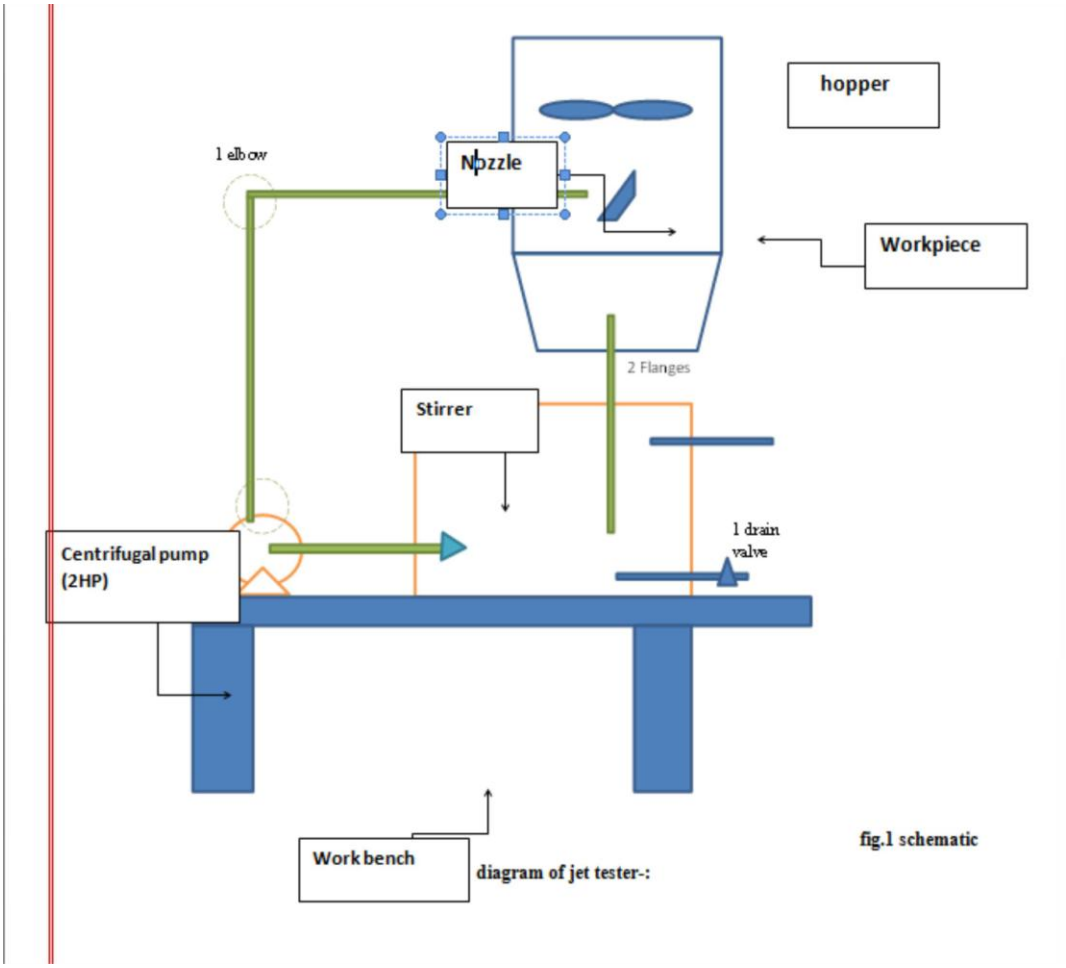

fig.1 schematic diagram of jet tester-:

IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

VI. PARAMETRIC VALUE OF NOZZLE TESTING

Parameter	Value Tested
Nozzle length	50.8mm
Inlet angle	60º
Nozzle diameter	1.14mm
Orifice diameter	0.38mm
Water pressure	310 Mpa
Abrasive flow rate	3.8g/s

V. IMPACT ANGLE OF NOZZLE AND WORKPIECE

β degree	α degree
0.0	15º
0.0	30º
0.0	45º
0.0	60º

VI. FUTURE OUTLOOK & SCOPE OF JET TESTER

The high temperature jet erosion testing machine is used to test the erosion resistance of solid materials to a stream of gas containing abrasive particles. With the help of jet tester we check the material loss, of the test specimen with distinct parameters such as temperature, angle of incidence of the jet stream. The abrasive particle speed and flux density can be varied to simulate the actual conditions. Various applications and abrasion rate can be measured.

VII.CONCLUSIONS

Although distinct test rig has been designed to check the performance of erosion wear. Different experimental approaches were performed to improve the life cycle of the material. All researchers regarding the performance of erosion wear, when applying the proper parameter's in the system. Increase the erosion wear of the work piece there is decrease in the volume of the mass of the material.

REFERENCES

[1.] A.N.J Stevenson and I.M.Hutching. The influence of nozzle length on the divergence of the erodent particle stream in a gas- blast erosion rig (1995).

[2.] R.J.K Wood and D.W Wheeler. Design and performance of a high velocity air-sand jet impingement erosion facility (1997).

[3.] Y.Xie, H.Mcl.Clark. Modeling slurry particles dynamics in the coriolis erosion tester (1999).

[4.] B.K Gandhi and S.N Singh. Study the performance of parametric dependence of erosion wear for the parallel flow of solid liquid mixtures (1999).

[5.] Monabu Wakuder and Yukihiho. Material response to particle impact during abrasive jet machining of alumina ceramics (2003).

IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

[6.] H.Meng and Neville. Investigated the corrosion study of stainless steel in marine conditions (2006).

[7.] H.Mg and X.Hu. Systematic erosion –corrosion study of two and SS in marine condition via experimental design (2007).

[8.] Girish and Desale and B.K Gandhi. Erosion wear behavior of laser clad surfaces of low carbon austenitic steel (2009).

[9.] HS Grewal and Anupam Agrwal. Design and Development of high velocity slurry erosion test rig using CFD(2012).

[10.] Satish and Bhushan. Development of pot tester to simulate the erosion wear due to solid- liquid Mixture (2014).

[11.] Pramod and Hitiesh. Development slurry erosion jet tester to simulate the erosion wear due solid-liquid mixture (2015).