International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1092-1097 www.ijaem.net ISSN: 2395-5252

Experimental Investigation on the Properties of Molding Sand exploitation Industrial Waste (Wet Ash)

S.Karthikeyan[*1], N.S.Mohan [*2], A.Balakumaran [*3], K. Sowmiyan[*4], M. Sudhersan[*5], R. Surya prakash[*6], M. Vasantha kumar[*7]

[*1]*Asst. Professor, Mechanical Engineering, Erode Sengunthar Engineering College, Tamilnadu, India*
[*2] *Asst. Professor, Mechanical Engineering, Erode Sengunthar Engineering College, Tamilnadu, India*
[*3]*Asst. Professor, Mechanical Engineering, Erode Sengunthar Engineering College, Tamilnadu, India*
[*4]*Student, Mechanical Department, Erode Sengunthar Engineering College, Tamilnadu, India*
[*5]*Student, Mechanical Department, Erode Sengunthar Engineering College, Tamilnadu, India*
[*6]*Student, Mechanical Department, Erode Sengunthar Engineering College, Tamilnadu, India*
[*7]*Student, Mechanical Department, Erode Sengunthar Engineering College, Tamilnadu, India*

Submitted: 10-03-2021 Revised: 30-03-2021 Accepted: 01-04-2021

ABSTRACT: Green sand molding method is ancient and customary in apply of producing castings. Here, the main target is formed on disposal of wet ash waste powder created in industry. The economical price reduction obtained in metalwork's by substitution an acceptable quantity of industry waste powder mixed with silicon oxide sand in numerous compositions. Variety of samples in numerous compositions of silicon oxide sand, waste powder and clay were ready and tested. The necessary technological properties like permeableness, inexperienced and dry compression strengths were measured for checking the suitableness of the waste powder and square measure analyzed. The moulds ready with varied compositions of waste powder with silicon oxide sand were poured by liquefied atomic number 13. The castings obtained were inspected and also the results shows that the addition of waste powder with silicon oxide sand will increase the surface quality and reduces the value of production.

Keywords: Wet ash powder, Bentonite, Green sand, Natural Silica sand, Copper, Aluminium, Brass, and Casting.

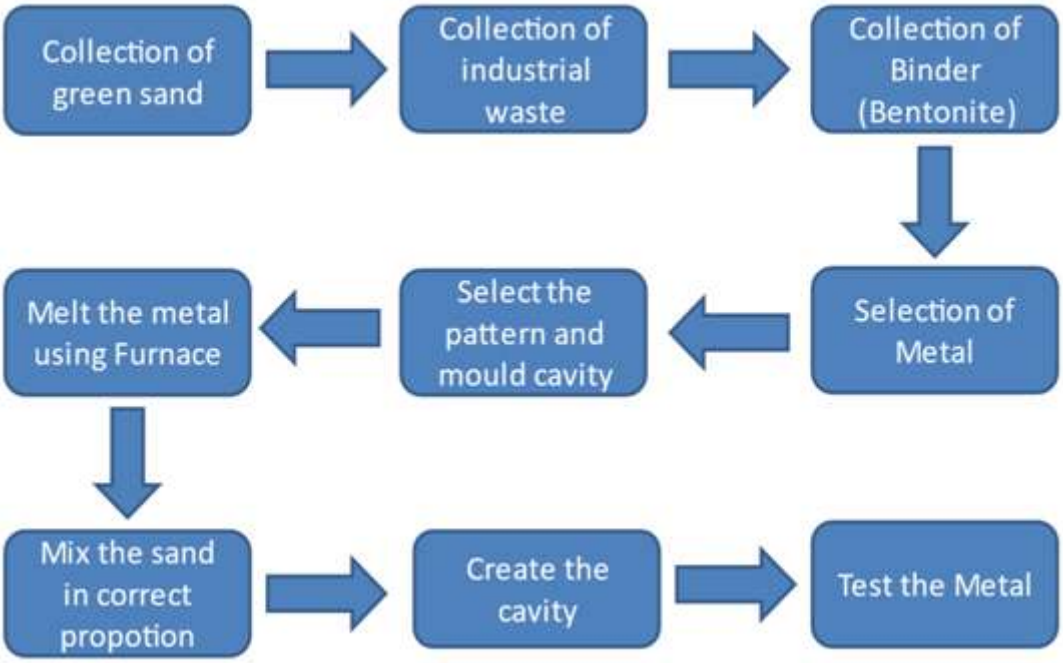
I. INTRODUCTION

Casting technique one in every of the oldest and customary processes used in manufacturing. It selection of pattern correct, composition of mould sand preparation, preparation of mould cavity and selection of runner and raiser and surface finishing. Most of the industries uses mould die and injection molding technique so as that usage of mould sand and mould cavity preparation is decrease because of its complication in final product. so as that many analysis below study for higher mould solid, higher surface finishing and minimize the matter faced in solid half.

So, that we have a tendency to tend to face live here to investigate molding sand composition by addition of clay as a binder and silicon dioxide sand and Wet Ash as a base in molding sand. The mould cavity prepared by use of our mould sand and solid component is made to see the last word outcome and cavity with standing capability. The characteristic of the prepared mould sand is analysis and tested. Material like atomic number 13, copper and brass area unit liquefied and casted at intervals the mould prepared by the experimental mould sand to verify whether or not the mould cavity is stabled. By analyzing the mildew sand ready most the impurities area unit neglected and correct solid element is obtained and additional machined.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1092-1097 www.ijaem.net ISSN: 2395-5252

II. METHODOLOGY



1.1 Natural Silica Sand

Most inexperienced sand moulds contain oxide sands secured with a clay water mixture (The term inexperienced implies that the mould, that's tempered with water, isn't dried or baked). The composition, size, size distribution, purity and sort of the sand are necessary to the success of the mould creating operation. manufactory sand consists primarily of pure, uniformly sized, high-quality oxide sand or lake sand that's secured to make molds for ferric (iron and steel) and nonferrous(copper, aluminum, brass)metal castings. Although these sands are cleaned before use, throughout casting it's going to contain ferric (iron and steel) parts. These ninety fifth of mill sand is used for castings. The automotive business and its parts suppliers are the foremost very important generators of mill sand. The foremost common casting technique used among the mill business is that the mould system.

1.2 Bentonite

There unit of measurement differing kinds of clay, every named once the individual dominant component, like K (K), metal (Na). Metal (Ca), and metal (Al). Clay usually forms from weathering of volcanic ash. Most frequently among the presence of water. However, the term clay, likewise as similar clay known as ton stein, has been accustomed describe clay beds of unsure origin. For industrial functions, a try of main categories of clay exist those are metal and metal clay. Kaolinite-dominated clays unit of measurement usually noted as ton steins and are usually related to coal. clay might even be a comparatively soft stone, fashioned over time by the natural alteration of volcanic tuffs thanks to acid or basic rain.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1092-1097 www.ijaem.net ISSN: 2395-5252

III. III FIGURES

Figure1: GREEN SAND AND WET ASH

Figure 2: WET ASH

Figure 3: MOLD CAVITY

Figure 4: MOULD CAVITY FILLED WITH MOLTEN METAL

Figure 5: FINAL PRODUCT

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1092-1097 www.ijaem.net ISSN: 2395-5252

FIGURE 6: MACHINING PRODUCT

IV. RESULTS

The results and discussion sections gift the analysis findings and analysis of these finding. I additionally contain conclusion section, that focuses on usage or provides a outline of the analysis.

1.3 SIEVE ANALYSIS TEST FOR NATURAL SILICA SAND

Sieve analysis test is help for find the grain size of the sand and weight of sand in each micron.

S.NO	Sieve size (in microns)	Weight of the Natural Silica sand (in grams)	Weight of the Natural Silica Sand in %
1	2057	80	0.039
2	1680	40	0.025
3	1003	130	0.130
4	710	110	0.152
5	520	320	0.62
6	355	20	0.053
7	150	280	1.867

The sieve size of the silicon oxide sand plays important a big a major role in prepared preparing getting ready the mould as a results of the size decides that the porosity where it is a significant offer in casting that is throughout the time of casting the gases designed as a result of its hot nature of liquefied metal reacted with the mould that we've got an inclination to ready. The size offers sensible smart the nice the good mildew and porosity put together having good strength of mildew once examination with varied molds with fully completely different grain size of the natural silicon oxide sand.

1.4 PERMEABILITY TEST

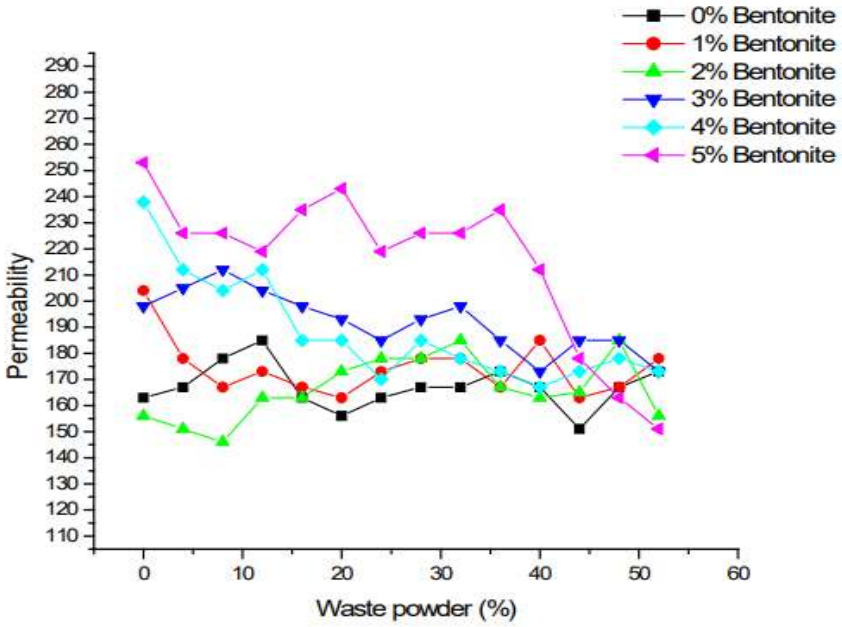
Permeability of the sand specimen ready determined by passing a given volume of air through the sand. This check was taken within the consistence meter. What proportion air passing through the specimen was to be showed by gauge reading? The consistence choices have to be compelled to neither low nor high. The overall tests choose four-dimensional water that is optimum value permanently binding.

4.2.1PERMEABILITY TEST OF SILICA SAND MIXING WITH BENTONITE BINDER

Specimen Number	Bentonite binder in%	Manometer reading	Permeability (gm/cm^2)
1	5	3.6	220
2	10	4	195
3	15	4.3	180
4	20	5.4	123

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 3 Mar. 2021, pp: 1092-1097 www.ijaem.net ISSN: 2395-5252

5	25	6	95

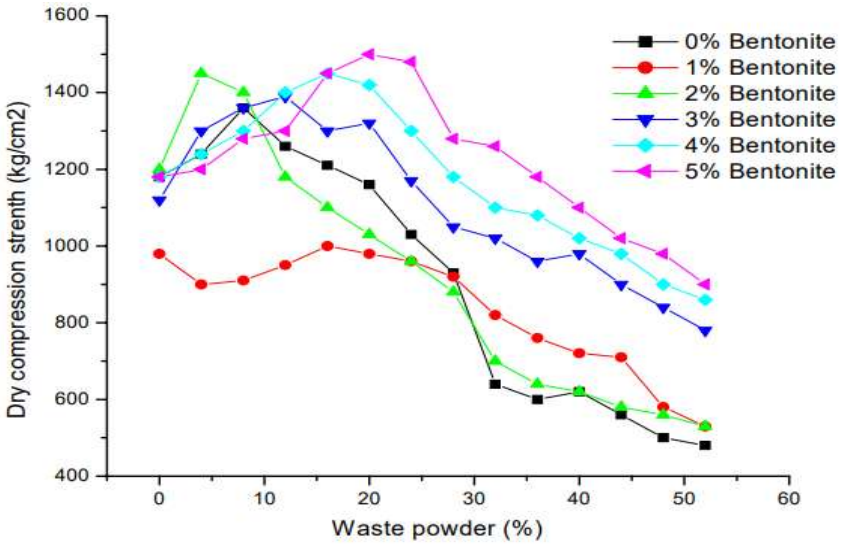


4.3 DRY COMPRESSION STRENGTH TEST (DCS)

This check was command once inexperienced Compression Strength checks. An analogous specimen was naturally dried in forty eight hours and takes the sign on sand strength machine and calculates the dry compression strength.

4.3.1 Dry compression strength of silica sand mixing with Bentonite binder.

S.No	Sand mixing with Bentonite binder in %	Dry Compression Strength (gm/cm^2)
1	**5**	**690**
2	**10**	**800**
3	**15**	**900**
4	**20**	**1060**
5	**25**	**1200**



V. FUTURE SCOPE

Molding sand area unit reused effectively by the utilization of oxide, molding technique victimization granite powder area unit progressing to get replaced for natural matter sand. Completely different non-ferrous metals area unit casted and its properties area unit progressing to be discovered. Comparison of the recent sand mould properties and used sand mould properties. Environmental safety is achieved by not disposing waste we tend to ash the atmosphere to the setting The molding sand we tend tonight area unit progressing to be reduced in CO2; molding technique as a results of it eliminates the complete standing content with within the sand after we compared to the sand molding technique.

VI. CONCLUSION

The experimental results show that dry return strength of the inexperienced sand with wet ash powder has exaggerated up to certain level then decrease. The body will increase at first and attenuated bit by bit. No made variation is determined. Aluminum, Brass, Copper castings boughten from hour wet ash powder and 400th inexperienced sand was inspected. As a result of it, there's risk of fantastic surface end and minimum defects. By commutation some share of molding sand with wet ash powder; succeeding might even be taken into thought for utility.

- Wet ash powder might even be used effectively.
- Minimizing the assembly price of castings.
- Sensible surface end might even be obtained.

Finally this project concludes that by pattern the Wet ash powder, the molding sand price might even be reduced by60% of molding sand.

REFERENCES

[1] Shuaib-Babata YL, Ibrahim HK, Ajao KS, Ambali IO, Bello MO (2019) Evaluation of the foundry properties of Oyunriver moulding sand. Adeleke Univ J EngTechnol 2:12–24

[2] Ugwuoke JC (2018) Investigation on the suitability of Adada river sand and Nkpologwu clay deposit as foundry moulding sand and binder. Int J Sci Res Eng 3(1):19–27

[3] Murthy IN, Rao JB (2016) Investigations on physical and chemical properties of high silica sand, Fe-Cr slag and blast furnace slag for foundry applications. Procedia Environ Sci 35:583–596

[4] Fo E, Ju O, EE N (2015) Effect of Ukpor clay content on the properties of synthetic moulding sand produced from River Niger sand. Int J Res Adv EngTechnol 1(3):12–16

[5] Kausarian H, Choanji T, Karya D, Willyati R (2015) Distribution of silica sand on the Muda Island and Ketam Island in the Estuary of Kampar river, Pelalawan Regency, Indonesia. Int J Adv Sci EngTechnol 5:37–40

[6] Nuhu A. Ademoh, Evaluation of the Mechanical Properties of Expendable Foundry Sand Cores Bonded with Composites Made of Kaolin Clay and Grades 1 and 4 Gum Arabic, American-Eurasian Journal of Scientific Research, Vol.4 (3), 2009, pp. 117–123.

[7] O. S. I. Fayomi, O. O. Ajayi and A. P. I. Popoola, Suitability of local binder compositional variation on silica sand for foundry core-making International Journal of the Physical Sciences, Vol. 6(8), 2011, pp.1940–1946.

[8] Nuhu A. Ademoh and A.T. Abdullahi, Assessment of foundry properties of steel casting sand moulds bonded with the grade 4 Nigerian acacia species (gum arabic), International Journal of Physical Sciences Vol. 4 (4), 2009, pp. 238–241