



“A CASE STUDY OF MANUFACTURED SAND (M-SAND/ROBO-SAND/P-SAND/ARTIFICIAL- SAND),,

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ABSTRACT--The manufactured sand (M-sand) is obtained by the crushing the stone and hence the properties may be vary based on the type of rock from which is manufactured, a huge amount of sand is consumed by the construction industry because sand and aggregate are basic need for the constructions. Sand has several function in concrete Hence there is a need to find the new alternative material to replace the river sand, such that excess river erosion and harm to environment is prevented. Now a days the construction industry in the India is facing one of the big problems about natural fine and coarse sand and NGT objecting on excavation of sand from river beds because they effect badly on environment (Flora and fauna) and changing the river flow directions & considering the erosion of river and environmental issues. The shortage and non-availability of river sand will affect the construction. This study will also explain the requirement, properties, uses, quality-quantity of the manufactured sand, difference between river and manufactured sand, advantage and disadvantage of the manufactured sand.

KEY WORDS—M-sand, Artificial sand, p-sand ,concrete strength, quality of concrete, workability River sand , production cost , sand stone.

INTRODUCTION—M-sand is substitute of river sand for construction & m-sand is produced hard granite stone by crushing hard rock into the fine particles, the cursed sand is of cubical shape with rounded edges, washed and graded to as a construction material.

Production--- M-sand is made in factories using advanced machinery like jaw and cone crusher the resulting particles are then washed and sieved to remove impurities and fine particles.

Properties--- M-sand has similar chemical characteristics to river sand, but it has enhanced compressive strength, permeability, and setting. However it has low water retention and workability, and it tends to crack more often.

Benefits--- M-sand is a popular choice for construction projects because its available in a large quantities, has a uniform size and shape, and has minimal impurities.

Sand crisis--- Sand is the third most consumed natural resource after air and water, and population growth is increasing the demand .M-sand is an economic and ecological alternative to river sand.

Polygorskite--- polygorskite is a material that can be used to increase the percentage of manufactured sand in concrete mixes.it has thixotropic properties that improve the flow and workability of the concrete mixture.

This topic present the result of practically and theoretical investigation of partial and full replacement of natural sand by artificial / manufactured sand. The object of this topic to compare the compressive strength and workability of concrete with m-sand and natural sand in varying proportions the result show that concrete with m-sand shows higher compressive strength whereas workability decreased with increasing proportion of manufactured sand.

REASONS FOR THE USE OF M-SAND

Internal cohesion and bonding—the shape and texture of sand particles create contact point for cement paste, which allows for solid adhesion and interlocking.

Shrinkage control and dimensional stability---properly graded sand can help reduce volume change by prevention excessive shrinkage and minimizing cracks.

Aesthetic considerations--- the selection of sand can affect the aesthetics of the concrete.

1-M-sand is an alternative for river sand due to causing deficiency of suitable river sand in the world.

2-Due to depletion of good quality river sand.

3-The cost of construction can be controlled by the use of m-sand.

PROPERTIES OF M-SAND

Now a day the construction industry required good quality and strength of concrete depending on the structure & quality of concrete depends on the quality on ingredients.so artificial sand also play an important role in the concrete production. Some of the basic guideline of concrete quality stand in need of-

Material quality— quality of sand can be controlled because it's by manufacturing process.

Impurities--- This sand does not contain silt or any other type of impurity.

Quality of concrete—Due to monolithic bonding less bleeding and segregation.

Strength--This sand has smooth surface texture and free from flaky and elongated particle & its cubicle shape provide greater durability, higher strength and long life span of the concrete. A good quality of manufacturing sand helps the filling voids between the coarse aggregates and makes concrete more dense and compact.

Workability--Due to cubical shape and proper gradation provide good plasticity & workability. Workability is a vital property of concrete and related with the compaction as well as strength also size, shape, texture play an important role in workability of concrete. W/c ratio help us in increasing the strength of concrete.

Reduction of construction defects & concrete quality—Due to high quality of fineness and optimum initial and final setting time it reduce the segregation , bleeding ,honeycombs , voids in concrete at the time of pouring.

ADVANTAGES OF M-SAND

1-its Free from silt, clay, organic, soluble or any other impurities, higher unit weight & low permeability.

2-Less environmental impact & no any harm to river beds.

3-Perfect grading and cubical shape gives high strength and durability.

4-Avalibility all seasons not effected by flood or rainy seasons.

5- Good workability compare to river sand.



Photo of m-sand

6-M-sand is the economical product can drastically reduce the cost since, Like River sand, it does not contain impurities and wastage is nil. In international construction scenario, no river sand is used at All, only sand is manufactured and used, which gives superior strength and its cubical shape ensure a significant reduction in the cement used in the concrete.

7-No harm to flora and fauna

8-it is well graded.

9-M- sand is the eco-friendly & only alternative to river sand dredging of river beds to get river sand will lead to environmental disaster like ground water depletion , water scarcity ,a threat of safety of bridges , dams etc.

DISADVANTAGES—Initial plant establishment, land & quarry cost is high.

PLASTERING SAND (P-SAND)

Plastering manufactured sand also called P-sand with the granule size 0 to 2.36 mm is suitable for the all kind of plastering requirement and is used across all segments such as independents houses, Apartments and other residential & commercial projects plastering sand does not require to be filtered again all the constructions site and can be used directly to prepare the mortar which save labour, time and money .course aggregate is not required for plastering, sand to be mixed

In the cement ratio 1:4 (internal work) 1:6 (External work)

SL.NO		RIVER SAND	M-SAND
1	Marine Product	2 – 4.1%	Nil
2	Oversize Material	6 – 10%	Nil
3	Clay & Silt	5 – 19.5%	Nil

SPEFECAATION OF PLASTERING P-SAND are

Better workability

Higher compressive strength

Higher Flexure bond strength

Higher water receptivity

0 % wastage

The sand shall consist of natural sand, cursed stone sand or cursed gravel sand or a combination of any of these. The sand will be hard, durable, clean and free from adherent coatings and organic matter shall not contain clay, silt and dust more than specified.

Comparison of Impurity-River Sand Vs M & P-Sand

Sr.No		M-Sand	P-Sand	River Sand
1	Economy	No Sieve loss; save labour, 100% material utilization	No sieve loss; save labour, 100% material utilization	Up to 20% wastage contains silt, dust and deleterious and un-uniformed mater indirect cost lose 20%
2	Over Sized Materials	0% Since it is artificially manufactured.	0% Since it is artificially manufactured.	1-6% of minimum oversized material can be expected.
3	Quality	Better quality control.	Better quality control.	No control over quality.
4	Marine Product	0%	0%	1-2% like sea shells, tree bark etc.
5	Eco-Friendly	It cause less damage to the environment as compare to river sand.	It cause less damage to the environment as compare to river sand.	Harmful to the environment. Eco imbalance, reduce groundwater level and river water gets dried up.
6	Adulteration	The probability of adulteration is less	The probability of adulteration is less	High probability of adulteration since filtered and (a type of pre-washed sand which contains high silt contents) are mixed together. As a rule, supply shortage always bring adulterer products to the market
7	Price	Price range from Rs.35-Rs.45 per cubic feet.	Price range from Rs.50-Rs.55 per cubic feet.	Price range from Rs.60-80 per cubic feet.
8	Water Content	Minimum Water content	Minimum Water content	More than 60% of water Content resulting in excess weight
9	Application	Highly recommended for RCC purposes and brick/block works.	Used for wall plastering and brickwork purposes	Recommended for RCC, plastering and brick/block work.

SIEVE ANALYSIS RIVER SAND VS M-SAND

TEST FOR M-SAND

Cube-Test/sieve-Test/water-absorption/specific-gravity/organic-impurities/deleterious-material/soundness-Test/bulk density/silt test etc.

QUALITY REQUIREMENTS AND MANUFACTURING PROCESS OF M-SAND

Use of m-sand in concrete production its properties is based on quality controlling .the quality and property requirements are specified in IS 383:2016.the good quality of m-sand depends on the raw material quality and its processors.

S No	IS SIEVE	RIVER SAND (% Age Passing)	M-SAND (% Age Passing)	% Age passing for single sized aggregates of Normal Sand (IS 383-1970)Zone-II
1	4.75 mm	99.20	99.70	90 to 100
2	2.26 mm	93.45	78.30	75 to 100
3	1.18 mm	48.10	52.10	55 to 90
4	600 Microns	21.15	38.10	35 to 59
5	300 Microns	04.00	21.00	08 to 30
6	150 Microns	0.05	5.10	0 to 10

CONCLUSION

To save environment and natural flow of rivers without any harm to flora and fauna we can replace river sand to m-sand .The construction industry shall start using the M-sand to full largeness as alternate of river sand. Hence M-sand is economical, Eco-friendly and low price product except initial cost.

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