Performance Evaluation Of Multilevel Sand Screening Machine

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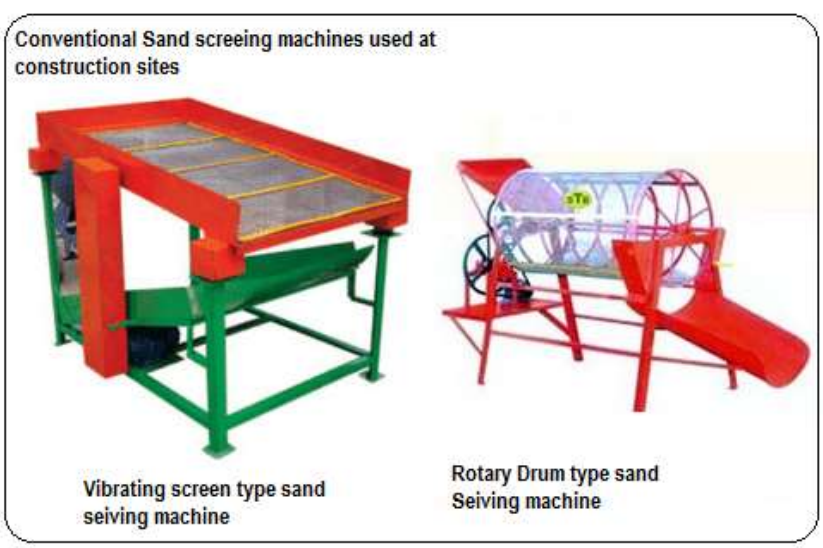
ABSTRACT

Sand is an important ingredient in construction and civil work , sand needs to be screened properly for various stages in construction , ie size of sand for construction work is slightly coarse where as that used for plaster work is fine . The screening is normally done manually using fixed screens or machines shown below. This is time consuming and laborious work which takes a lot of time and cost. The conventional machine also proves of lesser help as the sand needs to be manually transported and material handling takes place twice to get different sizes of sand. The project aims to develop a working prototype of fully automatic multi-level screening machine where in the sand will be vertically transported with help of vertical screw conveyor mechanism and then screened using two different screens vibrating at two different levels thereby dividing the sand in three parts namely sand for plaster (fine) / sand for construction (medium to coarse) / wastage (very coarse).The Sand sieving machine was fabricated and testing was done in two parameters as output , namely quantity of sand delivered by the conveyor mechanism (kg/min) and the quantity of sand delivered by the screening machine (kg/min)

Keyword : - *Sand screening, Multi-level, and Vertical Conveyor*

1. Introduction:

Fig :1 Conventional machines available in market for sand screening



In case of conventional machines handling of sand is done manually, moreover only one size is separated at a time hence double handling makes it un-economical and time consuming

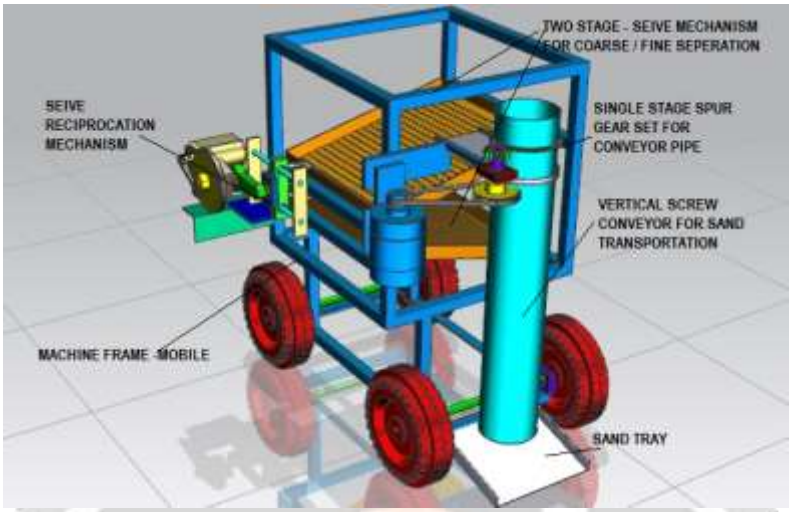


Fig :2 Multi level sand screening machine

The multi-level screening machine is unique in the sense that it has bot conveyance as well as screening facility. The screening is done at three different levels and thus three different sizes of sand are separated.

2. Principle of Working

The basic principle of working is to reduce the labor required to lift the sand by use of vertical screw conveyor where in the Pshute screw (conveyor screw) is fixed and the conveyor pipe or casing is rotated about to lift the sand from the bottom to the top and thereby automatically transport it from the bottom to the vibrating screens. Secondly two sets of vibrating screens with different set of holes is used to seperate three sizes of sand namely sand for construction, sand for plaster and waste sand all at one time and all three sizes are collected at three different locations thereby maximum productivity is achieved.

3. TEST & TRIAL ON SAND SEIVING MACHINE :

The testing of the machine was done with two considerations, namely the two parts of the project ie, the vertical screw conveyor and the multilevel screening machine were tested.

Objectives of Test :

1.Determine the sand handling capacity of the vertical screw conveyor at various speeds.

2. Determine the overall screening ability (kg/ min) of the screening machine at various speeds

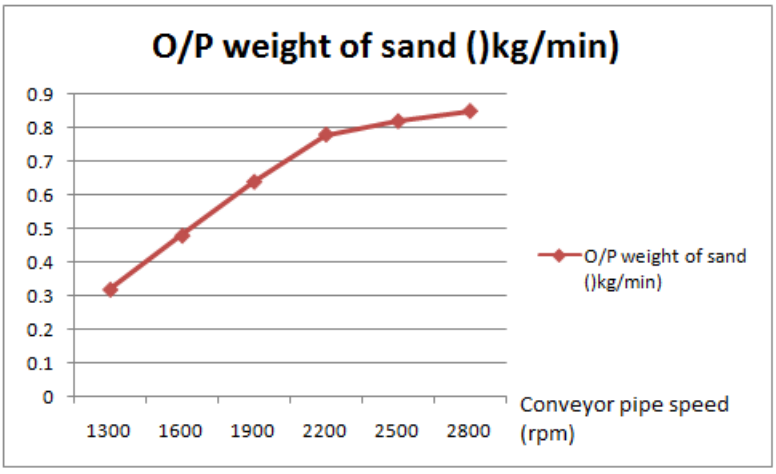
Test-1 : Determination of the sand handling ability of the vertical screw conveyor :

Result table :

Sr.	Speed of the Conveyor pipe	Weight of Sand transported kg/

No	(rpm)	min
01	2800	0.85
02	2500	0.82
03	2200	0.78
04	1900	0.64
05	1600	0.48
06	1300	0.32

Graph of Output Weight of Sand (kg/min) Vs Speed of Conveyor pipe



From the graph it is clear that the output weight of the sand increases with the increase in the speed of the conveyor pipe.

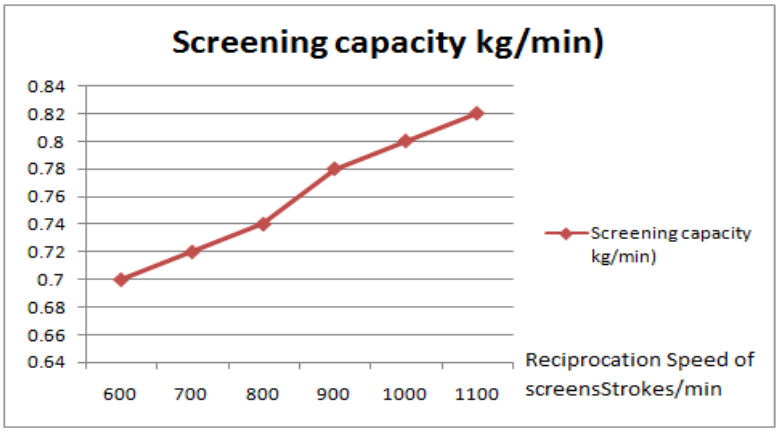
Test- 2 : Determination of the screening ability of the screening machine :

Result table :

Sr. No	Reciprocation Speed of screens Strokes/min	Screening capacity kg/ min
01	1100	0.82
02	1000	0.8
03	900	0.78

04	800	0.74
05	700	0.72
06	600	0.7

Graph of Screening Capacity of Sand (kg/min) Vs Speed of Reciprocation of Screens



From the graph it is clear that the screening capacity of the seiving machine increases with the increase in the speed of reciprocation of the machine.

4. CONCLUSIONS

The sand seiving machine was designed and developed and the testing was done for the said parameters of output quantity of sand by either mechanism. It was found that the speed of the conveyor pipe if increased the quantity of sand delivered by the mechanism increases. Similarly the if the speed of the reciprocations of the screens if increased the quantity of sand sieved increased.

Thus an innovative method of lifting was developed and also the multi level screening operation ensured that the time and effort required to screen three different sizes was considerably reudced.

5. ACKNOWLEDGEMENT

In the due course of project with the valuable guidance of Guide. Prof. Swapnil Bandgar. the project was completed as per schedule and desirable results were achieved.

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