DESIGN AND ANALYSIS OF SAND SIEVING MACHINE

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***Abstract*— Sand is an important element in the construction of buildings. Sand is utilized in building at many phases, from the foundation to the finishing work. Sieving is a method of separating particles from a mixture based on particle size differences. It uses sieve machine for separation of coarse particles from finer particles. Sieve machine have meshed or perforated bottoms which allow only particles of a specific size to pass through it. In our project is "Design & Analysis of Sand Sieving Machine", it's useful to the construction field, but major problem in helical spring vibration. The design created in Creo parametric software and analysis using Ansys software. By using two different heights of the spring, the vibration is improved. To check the natural frequency based on modal analysis Ansys software is used. Finally, it's compared to the existing model.**

I. INTRODUCTION (*HEADING 1*)

The purpose of a sieving machine is to remove big grains by passing them through a sieve. Separation occurs when sand is put on top of a filter with holes of varied diameters. The first sieving is done to remove sand with a size larger than that of a standard withholding sand filter, and the second sieving is done to remove sand with a size smaller than that of a typical withholding sand filter. small to ignore the sand filter. A sieve is a device that uses a woven screen such as mesh, net, or metal to separate desired elements from undesired material or to characterize the particle size distribution of a sample.

A machine member, excited by some external source, repeats its motion by itself after a certain interval of time. this motion is called vibration. vibrations can be grouped in to two categories based on the load applied. if a member is blown once with an impact load and allowed to vibrate freely, then it is called as free vibration. if the excitation continues repeatedly, then it is forced vibration. damping the vibrating member is one among the important aspect in vibration control.

The concept of vibration shaker takes the concept of gravity, where the material will tend to go down when there is an empty place. Because the large material will generate a larger gap that can be easily introduced by small material, it will be easier for a little material to reach the lower point of the large

material.

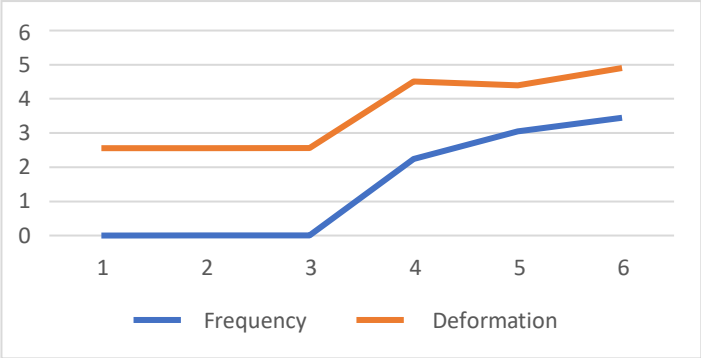
Fig. 1.1 Vibrating Sand Siever

a) CAD/CAM is time because of this CAD & CAM technology worried about using virtual computers to perform sure functions in design & production. This technology is shifting within the route of more integration of layout & manufacturing, activities that have traditionally been dealt with as district & separate capabilities in a manufacturing company. In the long run, CAD/CAM will provide the generation base for the computer-incorporated manufacturing facility of the future.

The CAD will be defined as utilize of systems to make possible the creation, modify, evaluation, or optimization of a design. The computer structures include the hardware & software program to perform the specialized design functions required utilizing the user firm. The CAD hardware usually includes the computer, one or greater graphic put on show terminals, keyboards, & an additional peripheral system. The CAD software program consists of the computer programs to enforce pc photos at the device plus software programs to facilitate the engineering capabilities company. Examples of those application packages encompass strain-stress evaluation of components, the dynamic reaction of mechanisms, warmness-transfer calculations, & numerical manage component programming. CAM can be defined as the utilize of the computer system to the plan, manage, & organize the operations of the industrialized plant via both direct or not direct computer interface with the undergrowth manufacturing assets.

b) Now day's people always prefer the most suitable way to cut their cost and time. However, in certain large companies, there are high-tech machines that can sieve any sub-stand or mixture. Construction area required a highly efficient sieve machine that is comfortable and easy to use, and vibration should be increased at the time machine runs. So, identify the natural frequency in both existing & proposed models of sand sieving machine.

COMPARATIVE NATURAL FREQUENCY IN EXISTING MODEL



FREQUENCY IN EXISTING MODEL SPRING

The sand sieving at each corner helical spring is used. The high vibration is obtained in the spring. To predict the six different mode frequency range at 0 to 3.4456 Hz, similarly deformation range is 2.5565 to 4.9007 mm.

Modal Analysis Result of Proposed Model

Any analysis performed in FEM aids in the validation of the component's design. Designers do not go straight to prototype/product manufacture during the design phase of a component or when dealing with a completely new design concept. In

addition to this, the component design has to satisfy various guidelines in terms of structural behaviour, life and dynamic behaviour.

MODAL ANALYSIS

The most common type of analysis is quasi-static analysis, in which the load is delivered slowly enough to avoid significant acceleration (or almost zero). The effects of acceleration cannot be neglected in dynamic analysis. Both create a one-to-one link between a specific input (such as a force given to a system) and the system response (for example, a displacement of the system due to its load).

Modal analysis, in contrast to quasi-static and dynamic analysis, provides an overview of a system's response limits. What are the limitations of the system's response, for example, for a specific input (such as an applied load of a specified amplitude and frequency)

NECESSITY OF MODAL ANALYSIS

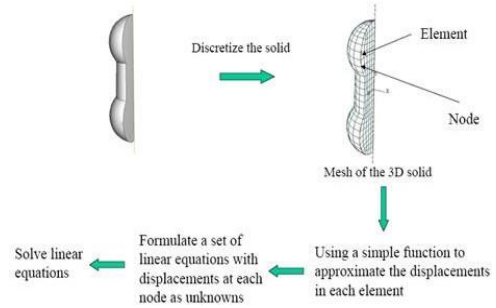
Any analysis performed in FEM aids in the validation of the component's design. Designers do not go straight to prototype/product manufacture during the design phase of a component or when dealing with a whole new design concept. In addition to this, the component design has to satisfy various guidelines in terms of structural behaviour, life and dynamic behaviour.

FEM gives a fast method for ascertaining those behaviours. Modal analysis in FEM can provide you with information on all of a component's nodal diameters/modes. The resulting frequencies are then compared to the frequencies of the excitation sources for a certain piece of hardware.In this manner, through FEM you can know if those frequencies lie within that hardware's operational range (testing for resonance) or not, which could lead to component deformation/failure (resonance) at a later time.

The precision of such results is also determined by the level of detail entered into the FEA software.You can tweak the boundary conditions quickly to simulate the real-life condition and focus on designing for certain level of performance without waiting for test results (to a large extent).

PRODUCT DESIGN

Designing a product is not simple to do. While businesses may come up with a plethora of new product ideas, not all of them will be unique, profitable, or effective, all of which are important considerations to consider when producing a new product. Product design is the process of creating a new product that is intended to be sold to customers. Developing an idea, determining product feasibility, testing the product, and finally releasing the product for sale to customers are all processes in the product design process. Let us take a closer look at each of these steps.



Idea Creation

The idea creation stage of the product design process is the process of developing fresh concepts in order to produce a product. You should focus on developing a product that is both valuable to clients and a good match for the firm. Because you want customers to have a clear image of your brand, creating products that correspond with the company's goal is critical.

To come up with a fresh concept, a group of employees should collaborate and brainstorm suggestions for what product should

be made. Assume you're at a table, having a chat with yourself about product development. Assume you're at a table, having a chat with yourself about product development. You may have a wonderful concept, but when a group of individuals gets together, the idea might become much better. Combining ideas can help a good idea become a great idea by allowing others to contribute to the development of functionalities that will benefit the product Feasibility

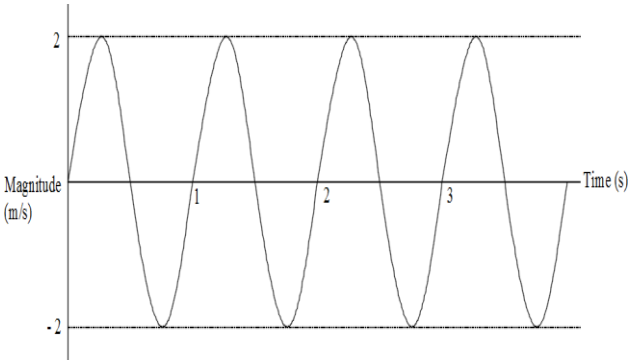
Once all of the ideas have been created, the company has to determine the product feasibility, which involves determining whether the product can actually be manufactured as well as whether or not it can be made profitably. The research and development team is in charge of analyzing the concepts and determining which goods can be developed and manufactured. The R&D team will then build a prototype to show the corporation how the product will look and work. The prototype should resemble the final product, and once it does, it's ready to go on to the next step.

FEA WORKS

FEA might be a machine tool for engineering analysis in the performing arts, just as it is in engineering. It entails the use of mesh construction techniques to divide a tough problem into small sections, as well as the usage of a software package programme coded according to the FEM rule.

Existing Material (Mild Steel)

Mild steel, commonly known as "low carbon steel," is a form of carbon steel having a low carbon content. Although ranges differ based on the situation source, the amount of carbon typically found in mild steel is 0.05% to



0.25% by weight, whereas higher carbon steels are typically described as having a carbon content from 0.30% to 2.0%. If any more carbon was added to the steel, it would be categorised as cast iron.

Analysis of Sand Sieving Machine Model

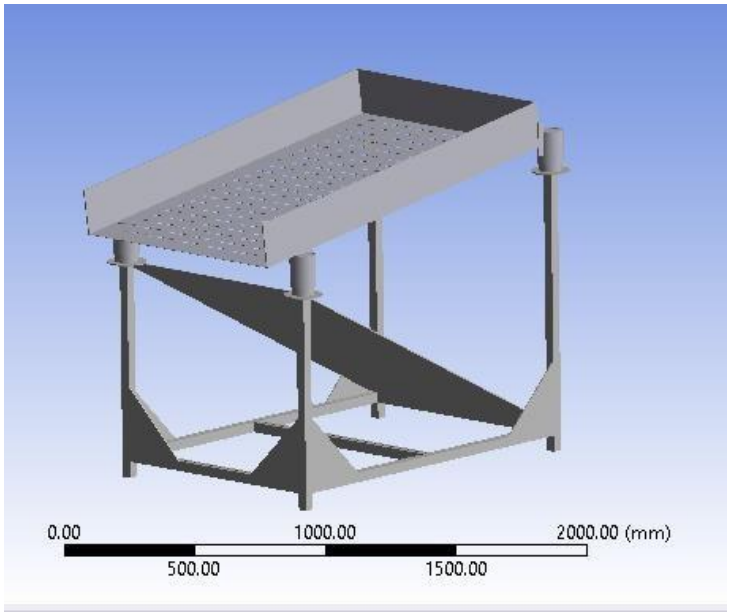


Fig. 1.3 Sand Sieving Model

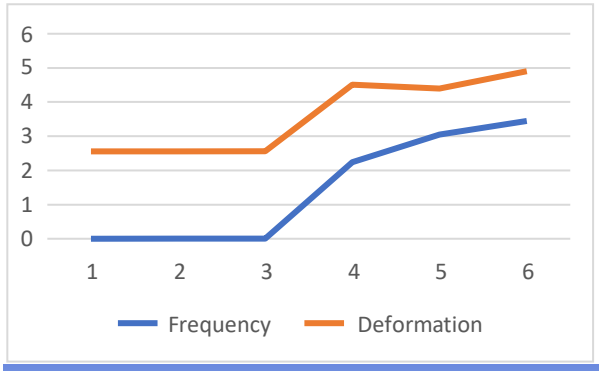
II. COMPARATIVE NATURAL FREQUENCY IN EXISTING MODEL

Comparative Natural Frequency in Existing Model

Modes	Frequency (Hz)	Deformation (mm)
1	0	2.5565
2	0.00005	2.5565
3	0.00052	2.5567
4	2.246	4.5054

5	3.0494	4.3953
6	3.4454	4.9007
7	3.9462	5.4321
8	4.4053	5.8630
9	5.1235	6.3780
10	5.7231	6.9732
11	6.2710	7.3264
12	6.8110	7.9183
13	7.4321	8.4180
14	7.9181	8.8912

FIG. FREQUENCY IN EXISTING MODEL SPRING



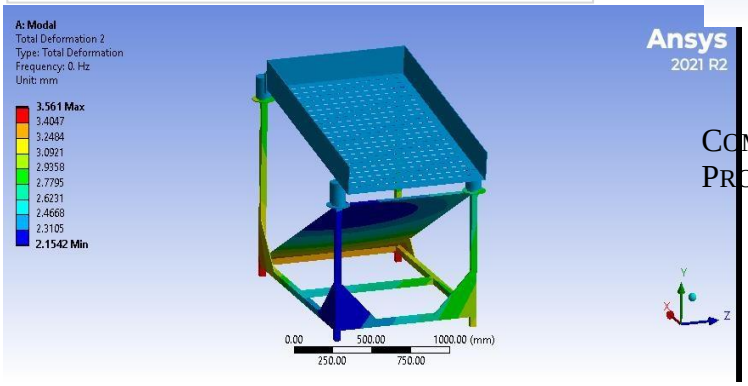


Fig. 1.4 Mode in Proposed Model

The sand sieving at each corner helical spring is used. The high vibration is obtained in the spring. To predict the six different mode

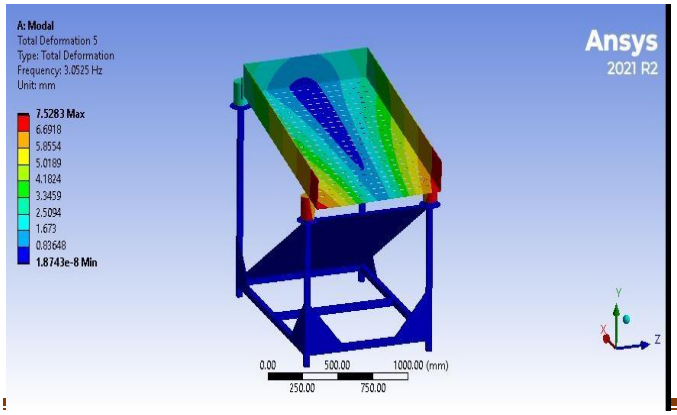
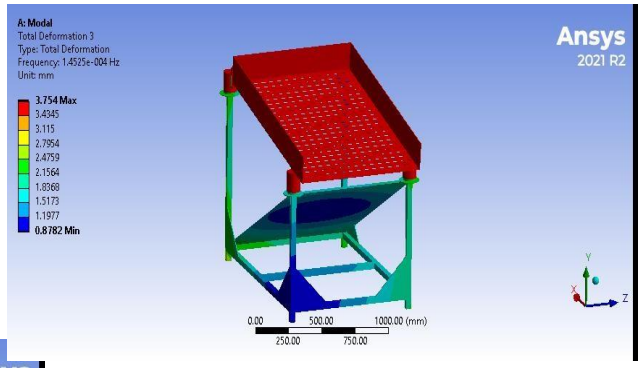


Fig. 1. 5Mode in Proposed Model

frequency range at 0 to 3.4456 Hz, similarly deformation range is 2.5565 to 4.9007 mm.

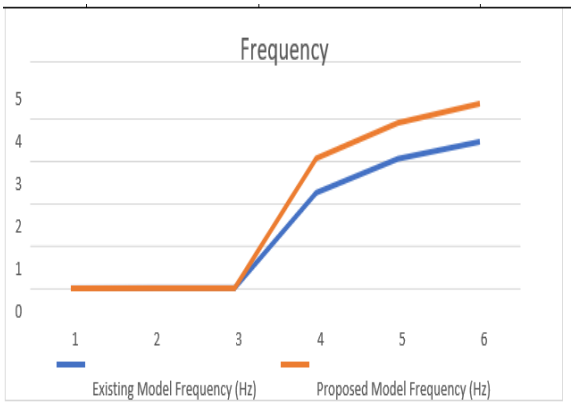
MODE NATURAL FREQUENCY IN PROPOSED MODEL

Fig. 1.6 Mode in Proposed Model



Maximum Frequency obtained in 10.282 Hz

COMPARATIVE NATURAL FREQUENCY IN PROPOSED MODEL



Modes	Existing Model	Proposed Model
1	0	0
2	0.00005	0.000014
3	0.00052	0.000034
4	2.246	3.0525
5	3.0494	3.886
6	3.4454	4.3387

CONCLUSION

The Modal Analysis for different Models we can conclude the mode shapes of sand sieving machine while in motion. Where the different mode shapes according to the frequency are obtained. Following the model analysis, all deformations are summarized in Table according to their frequency. Where we found Proposed model has better performance than Existing model.

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