

Modification of Planetary Mixer with Strainer Arrangement

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ABSTRACT

The stirrer of conventional machine rotates in one direction only which creates a specific flow pattern within the fluids hence the particles tend to stay to the walls of container owing to the force instead of mixing thoroughly in mixture of paint, ultimately results into poor quality mixture of paints there by poor quality output of paint . In order to possess a through mixing of metal oxide powder it might be appropriate to possess a stirrer that rotates such rotates about own axis also revolves about another fixed axis which helps it reach all parts of the container. This ensures that turbulence required for thorough mixing is provided all over the container. It would be advantageous to vary pattern of flow, which avoids vortex formation, i.e. motion of particles in a spiral path. Also if a wiper is added that brings the particles adhering to walls of container back to main flow or mixing area, good quality mixture are going to be ensured. The planetary mixer with strainer may be a perfect solution that has all the above mentioned features. This machine involves a rotating stirrer that revolves about the fixed container axis also as incorporates an strainer that changes the flow pattern and also acts as a wiper. Machine has variable mixing speed feature at an equivalent time delivers heavy torque to the stirrer for proper mixing.

Keywords: sun gear, Planetary gear, stirrer, mixer.worm and wom wheel.

1 Introduction

In case of process industries, process of blending and stirring forms and integral and therefore the important a part of the entire manufacturing process. Mixing is that the process which determines uniformity and overall quality of product. Process industries like chemical plants, food processing plants, paint industry etc, largely employ mechanical mixers to hold out mixing of powders , semisolid jelly fluids etc. Mixing may be a process where powder or jellies are mixed together through within the sort of uniform mixture where stirring is that the process to combine the fluid and powder to dissolve the powder thoroughly in given mixture and form a consistent product or output. In either of above cases thorough mixing of fabric is desirable to offer and good and uniform quality output. Mixing of powders of various material so as to make a consistent product or a powder mix is quiet easy but when it's desirable to mix powder during a fluid matter specially when the density of powder is high the matter occurs thanks to heavy weight of particles of powder features a tendency to settle down., financial aspects, labour costs etc. So, it's important of all the tasks in construction.

2 Theory

Let us study the subsequent example 'Preparation of Ionic Paints'. In this case it's required to combine the heavy density metal powder within the fluid mixture and pigment base together called as in vehicles. Vehicle may be a rarity evaporative fluid which when mixed with metal oxide powder thoroughly is applied by



painting on to automobiles silencer to make an anticorrosion particle layer. In order to possess good quality and uniform layer of paint on the work it's necessary that the oxide powder is thoroughly mixed with vehicles

3 Conventional Method

In conventional method of mixing the metal oxide powder and vehicle mixing is administered on 'Unidirectional Stirring machine' In this machine the motor is driven on gearing box through coupling the output shaft of drugs box is coupled to stirrer shaft to which the blades are connected , when the motor rotates output shaft of medicine box rotates at slow speed. There by driving the stirrer. The stirrer rotates in one direction to agitate the mixture to organize paint.

4 Construction and working

4.1 Construction

It consists of the following parts:

1. Motor - The motor is a single phase AC motor, with power 01 HP and the speed is 2880 rpm. The motor is mounted on the base plate and is connected to the worm shaft of the worm gear box by using an open belt drive system.
2. Main Pulley - The main pulley is V- groove pulley and it is mounted on the input worm shaft and locked by a grub screw.
3. Worm gear box - The worm gear box having 1:80 ratio. The input worm may be a right single start worm held in ball bearings at either ends, and carries the reduction pulley at one end. Worm gear having 1.5 module 80 teeth gear mounted on gear shaft held in ball bearings at either ends, and carries the muff coupling at one end by which it's coupled to the input shaft of machine.
4. Input shaft & stirrer bracket - The input shaft is held in ball bearing mounted in bearing housing which holds the fixed spur gear from the spur gear pair used for planetary motion of stirrer. Stirrer bracket was mounted at the lower end of input shaft which carries the stirrer shaft at one end and therefore the strainer at other.
5. Spur gear pair - For obtaining planetary motion a pair of spur gears having 1.5 mm module and 44 teeth were used. One gear is fixed and is mounted on the input shaft of bearing housing where because the other is mounted on the stirrer shaft.
6. Stirrer - The stirrer arrangement consist of blades mounted on stirrer shaft that hold blades for stirring purpose on their periphery.
7. Strainer - The strainer arrangement consist of a sheet which having holes at equal distance and mounted on the strainer shaft and a wiper sheet bolted on this sheet.
8. Base plate - The base plate is the supporting member that supports or holds the bearing housing.
9. Container - The container is in the form of a cylindrical drum mounted below the base plate and in between angle frame.
10. Frame - Frame is a fabricated structure that supports the entire mixer assembly.

4.2 Working

When motor is started the motor pulley rotates the most pulleys via the V-belt drive. The most pulleys rotate the worm shaft which rotates and switch gives 1:80 ratio reduced speed at output shaft which is connected to the input shaft of the machine. The input shaft carries stirrer bracket which carries the spur gear-1 which is constant mesh with spur gear-2 mounted on the bearing housing. When the stirrer bracket rotates it makes the spur gear-1 to revolve around the input shaft also because it rotates about its own axis.

The spur gear-1 carries the mixer blade sets at its lower end. The other end of the stirrer bracket carries a strainer arrangement which helps break the raisins.

5 Methodology

5.1 Design of Mixer

In our attempt to design a special purpose machine we have adopted a very a very careful approach, the total design work has been divided into two parts mainly; Mechanical design System design mainly concerns with the varied physical constraints and ergonomics, space requirements, arrangement of varied components on the most frame of machine no of controls position of those controls simple maintenance scope of further improvement; height of m/c from ground etc. In Mechanical design the components are categories in following parts.

For design parts detail design is completed and dimensions thus obtained are compared to next highest dimension which are readily available in market this simplifies the assembly also as post production servicing work. The varied tolerances on work pieces are laid out in the manufacturing drawings. The method charts are prepared & passed on to the manufacturing stage. The parts are to be purchased directly are specified & selected from standard catalogues.

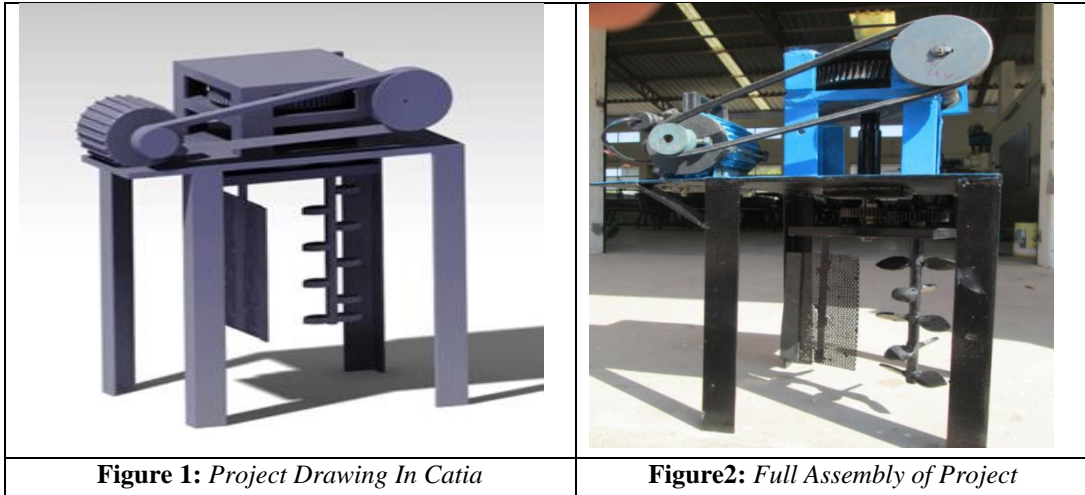
- System Design-In system design we mainly concentrate on the following parameter System selection based on physical constraints: While selecting any m/c it must be checked whether it's getting to be used in large scale or small scale industry. In our case it is based in small scale industry. So space is a major constrain. The system is to be very compact. The mechanical design has direct norms with the system design hence the fore most job is to regulate the physical parameters.
- Arrangement of various components- Keeping into view the space restriction the components should be laid such that their easy removal or servicing is possible moreover every component should be easily seen & none should be hidden every possible space is utilized in component arrangement
- Components of system - As already stated system should be compact enough so that it can be accommodate data corner of a room. All the moving parts should be well closed & compact A

Following are some examples of this section

- Design of machine height
- Energy expenditure in hand operation
- Lighting condition of m/c

Chances of failure - The losses incurred by owner in case of failure of a component are important criteria of design. Factor of safety while doing the mechanical design is kept high so that there are less chances of failure. Periodic maintenance is required to keep the m/c trouble free

- Servicing facility - The components servicing is possible especially those components which required frequent servicing can be easily dismantled.
- Height of m/c from ground- Fore ease and comfort of operator the height of m/c should be properly decided so that he may not get tired during operation . The m/c should be slightly higher than that the level also enough clearance be provided from ground for cleaning purpose.
- Weight of machine - The total wt of m/c depends upon the selection of material components as well as dimension of components. A higher weighted m/c is difficult for transportation & in case of major break down it becomes difficult to repair.



4 Conclusion

Mixing may be a process where powder or jellies are mixed together through in the form of uniform mixture where stirring is that the process to combine the fluid and powder to dissolve the powder thoroughly in given mixture and form a consistent product or output. In either of above cases thorough mixing of fabric is desirable to offer and good and uniform quality output. Planetary mixer brings out both the results which makes it most advantageous mixing machine for the process industries, paint industries, pharmaceutical industries & dairy applications. It makes it valuable due to top quality of blending, low cost of production & in no time production rate.

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