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FABRICATION AND ANALYSIS OF DOUBLE CONE BLENDER MACHINE FOR PHARMA BASED FOOD PROCESSING

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Abstract

- Fabrication of Double Cone Blender is an major operation carried in various industries as the Double Cone Blender is an efficient & versatile machine for mixing dry powder and granules homogeneously for Pharmaceutical, Ayurvedic, Food, Chemical and Cosmetic products etc.Thus the fabrication process of Double Cone Blender has been acknowledged dealing all the parameters regarding the all the parameters in this modern world. And a case study has been done regarding the role of Double Cone Blender in our modern industries for blending which is an easy subject for the homogeneous mixing of components

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1. Introduction

Blending is the method of thoroughly combining extraordinary substances to supply a homogenous product. The mixture, is normally a combination of distinct substances, e.g. Coal ash and cement are combined in a precise ratio to produce Pozzocrete cement. In other cases, a chemically homogeneous material may be mixed to provide a uniform lot of a favored weight/volume with steady particle length distribution, shade, texture, and different required attributes, e.g. Steel powders produced in 1 ton batch size are mixed to a homologous lot size of four heaps (or pre-distinctive amount).The terms "mixing" and "mixing" are regularly used interchangeably, but technically they are slightly unique.Mixing is a system of combining substances; however mixing is a extraordinarily gentle method as compared to blending.In terms of the segment of fabric, mixing is the method of solid-stable blending or blending of bulk solids with small amount of liquid.The terminology mixing is greater intently related to liquid-liquid, gas-liquid, and viscous substances. For the scope of this text and people to comply with, we are able to use the phrases "blending" and "mixing" interchangeably.mixing and mixing are the most traumatic unit operations in the chemical technique industries.Industries which include pharmaceutical and ingredients also rely closely on mixing and mixing technology.

1.1Importance of Mixing Technology

Blending is a important procedure due to the fact the quality of the final product and its attributes are derived by the first-rate of the mixture. mistaken mixing results in a non-homogenous product that lacks consistency with recognize to desired attributes like chemical composition, shade, texture, taste, reactivity, and particle length.The extensive variety and ever growing complexity of blending processes encountered in business programs requires careful selection, layout, and scale as much as make certain effective and green blending. Stepped forward blending performance ends in shorter batch cycle instances and operational expenses. Present day aggressive manufacturing strains necessitate strong gadget that are able to fast combination times, lower electricity intake, device flexibility, ease of cleansing, and a gamut of customized features. Similarly to mixing additives, many cutting-edge mixers are designed to mix exclusive technique steps in a single system, e.g. coating, granulation, heat switch, drying, and many others.

1.2 BLENDER:

A blender (occasionally known as a liquidiser in British English) is a kitchen and laboratory equipment used to mix, purée, or emulsify meals and other substances. A stationary blender consists of a blender jar with a rotating metallic blade at the lowest, powered by way of an electric powered motor within the base. a few powerful fashions also can overwhelm ice. The newer immersion blender configuration has a motor on pinnacle connected by a shaft to a rotating blade at the lowest, which may be used with any container.In 1949 the business enterprise Vitamix advertised their blender in one of the first television infomercials. The sales pitch lasted for 25 minutes, suggesting that the blender be used to make bread crumbs, potato pancakes, laxative spinach liquids, and a dessert beverage providing complete uncooked eggs and their shells, which the host announced would be loved like Malted milk stable dose and powder dose pharma merchandise include more than one ingredients. these encompass an active Pharmaceutical element (API) and severa excipients which consist of fillers, binders, lubricants or disintegrants to name a few. mixing is a process which mixes the API and excipients to make certain there's a homogeneous combination of the all substances for every production technique. mixing is a process that can be carried out severa instances within a manufacturing system when new excipients need to be delivered to the combo.The mixing system critical manner parameters are recognized as blender velocity and mix time. To ensure a homogeneous aggregate from a mixing method the incorporation of method analytical technologies which include the Multieye, a multi-factor NIR system, that could display combination uniformity may be vital as excessive blending can cause electrostatic build-up, attrition and over lubrication.

1.6 TYPES OF BLENDERS:

1. V Shape blender,
2. Octagonal Blender,
3. Ribbon Blender,
4. Mass mixer
5. Polygon blender
6. Double cone blender.

Figure 1.0 Double cone blender

The Double Cone Blender is an efficient and versatile machine for mixing dry powder and granulates uniformly. -thirds of the quantity of the cone blender is filled to make sure proper mixing. Double Cone Blender is used for pharmaceutical, meals, chemical and cosmetic products, etc. these machines are significantly used within the pharmaceutical enterprise to granulate and blend medicated powders. it's also the nice way to mix very heavy and abrasive merchandise for general discharge of product with minimal retention. Blender features multi shear deflector plates for the stepped forward mixing efficiency of free flowing powders and granules.

2. Research Method

Procedure of mixing the usage of DCB:

1. Ensure that Line clearance is duly checked and signed with the aid of QA private as consistent with SOP No: P/P/048
2. Take a look at and make certain that Double cone blender has been autoclaved.
3. Regulate the perspective of the blender with the assist of a moving wheel to a required role for convenience in loading the substances.
4. Load the materials from the container to the blender as in line with the collection designated within the person Batch Manufacture record (BMR).
5. After loading the materials, close the lid of the blender.
6. Positioned the safety pin at the lid and match it properly inside its groove. Lock the blender lid by moving the wheel in clockwise route.
7. Earlier than beginning the operation, ensure that the lid and the safety pin lock has been assembled properly.
8. Put the safety guard earlier than graduation of the operation.
9. Activate the device and notice down the beginning time.
10. Combo the material as in step with the time particular inside the man or woman BMR.
11. To dump the fabric, ensure that the gadget is cast off.
12. Put off the safety shield.
13. Modify the placement of the blender at the specified angle for convenience in unloading the materials.
14. Release the safety pin and put off the lid from the blender.
15. Dump the combined substances.

3.Fabrication of Double Cone Blender:

Fabrication of Double Cone Blender includes operations such as:

Sheet Cutting
Rolling
Pressing
Welding
Grinding
Buffing

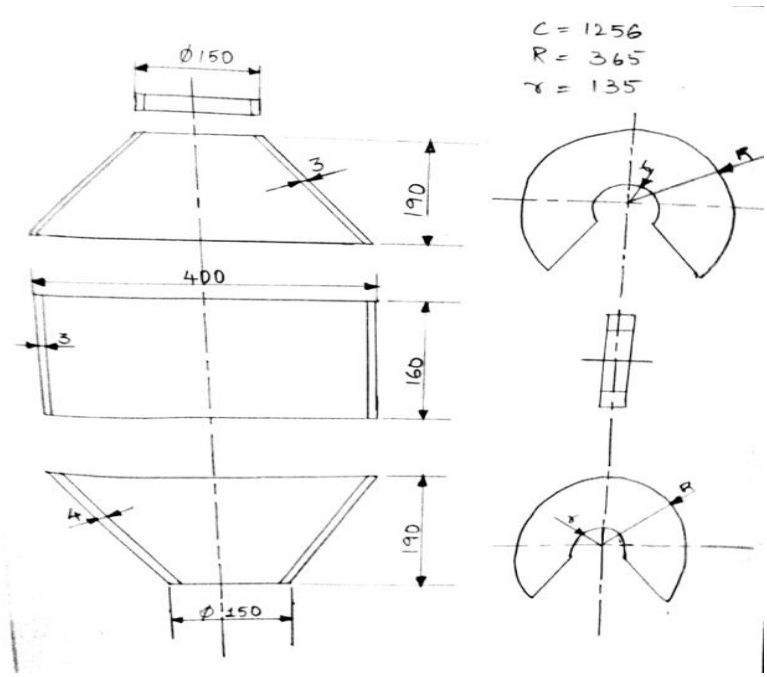
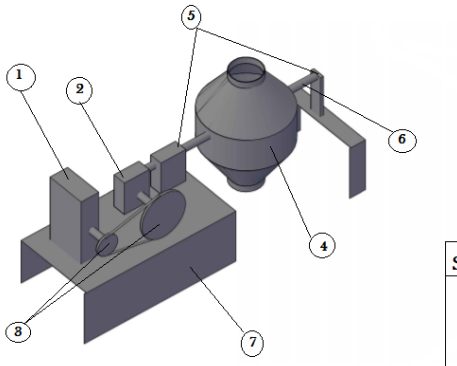


Figure 2.0 Conceptual Layout of Double cone blender



S.no	Components
1	Motor
2	Gearbox
3	Pulleys
4	DCB ball
5	Bearings
6	Shaft with Couplings
7	Table (Stand)

Figure 3.0 Cad model of Double cone blender

4. Results and Analysis

Theoretical Calculations:

Power developed (P) = V × I × P.F
= 230×1.2×0.8
P = 220.8
Torque (T) = 60×P/ 2πN
= 60 × 220.8 / 2 × π × 1440
= 13248/9043.2
= 1.46 Nm
T = 1465 Nmm
Torsional Shear For Solid Shaft Of Uniform Cross section:(s)
S (shear) = 16π / π(d)3
= 16 ×1645/π(d)3
= 23440/84780
= 0.276 N/mm2
S = 0.276 Mpa
Bending Stress for solid shaft of uniform cross section:(b)
B = 32M/π(d)3
M /I = b /y = E/R
M/π(d)4 /64 = s/30/2
M = 0.27/π(30)4 × 2 / 64×30
M = 715.6Nmm
S =32M/π(d)3
= 32×715.6/π× (30)3
= 0.26N/mm ^{2}
S = 0.26Mpa

To find the output rpm of DCB, we placed a 30:1 ratio gearbox & placing 2" &3" pulleys and initiating the motor with an rpm of 1440

Input (rpm) = 1440
Output (rpm)=?
Gearbox (ratio)=30:1, when
Dia of Input pulley connected to gearbox =d1=2"
Dia of output pulley connected to gearbox =d2=8"
Then wkt (1/N2 = d1/d2
1440/N2 = 8"×30:1 / 2"
(Since gearbox is connected to 8"pulley.pulley is connected to gearbox ratio. Gearbox ratio is multiplied with it.)
N2 =1440×2/8×30
N2= 2880/240
N2=12rpm

5. Conclusion

- The conical shape at both ends enables uniform mixing andeasy discharge.
- All contact parts are made out of stainless steel of 304 or316 quality materials, asrequired by customer.
- Maximum care has been taken to ensure safe operation ofthe unit.
- Cone will be mirror polished from the inside & outside &structure will Matt polished.
- Safety guards made from SS304 pipes provided in front ofthe m/c with limit switch.
- Safety guards provided with limit switch to not start the machine when safety guards are not in proper position

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