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ONION LIFE ENHANCEMENT THROUGH AUTOMATED VENTILATION STORAGE SYSTEM USING EXTERNAL SOURCE

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ABSTRACT

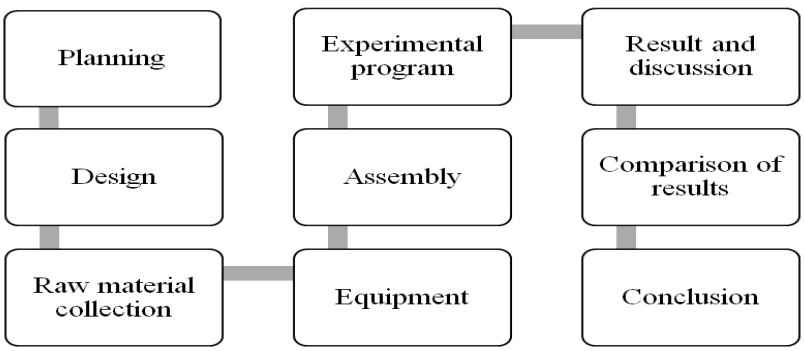
Onion is considered to be one of the world's most important vegetable crops. India is the second largest producer of onion in the world. A large quantity of onion is stored to fulfill domestic and export demand at ambient atmospheric conditions. These stored onions in onion sheds or onion storage are exposed to hot, cold & humid air. The continuous change in climate shows adverse effect on stored onions. The storage losses in these ambient atmospheric stores are high. To minimized storage losses and develop efficient onion storage structure we proposed a storage unit model where we tried to enhance the storage life of onions by providing controlled external forced air and additional movement to the stored onions, so that proper ventilation air is been provided to each onion evenly.

Keywords: Onions, Storage Losses, Forced Air Ventilation, Additional Movement.

I. INTRODUCTION

Onion is one of the most widely cultivated vegetable in the world. India is the second largest producer of onion in the world . In India, it is grown on 1.20 million hectares with production of 4.30 million tonnes of bulbs per annum (FAO, 1995). It is one of the most important vegetable crop of our country and forms a part of daily diet in almost all households. Most of the onion produced in India comes from the state of Maharashtra, Gujarat, Uttar Pradesh, Orissa, Karnataka, Tamil Nadu, Madhya Pradesh, Andhra Pradesh and Bihar. Maharashtra is the leading producer accounting for 20% of the area and 25% of the production. By considering the survey we observed that around 50-60% of onions out of total production got wasted. This is a big loss of our farmers and nation. Among this majority of losses are during the onion storage for longer period. The storability of onion is influenced by several factors such as varieties, cultural practices, pre-harvest practices and post-harvest practices. Most loss of the onion occurs after post harvesting which includes physiological loss in weight (30-40 %), sprouting (8-10%), rotting (10-12%), root growth and other disorders. Since onion is stored at ambient temperature in our country, the storage structures are designed to achieve 25- 30^0c temperatures and 65-70% humidity. To overcome this post-harvest loss of onion after its storage we come up with the solution where we tried to build a new structured storage unit for onion storage. Our storage unit comprises an external forced air ventilation to the onions over a period of time depending upon the different weather i.e hot or cold. And an additional periodic movement to the onions from base to top which will cause good ventilated air flow over the onions.

II. METHODOLOGY



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Design Of Components

Design Of Cylindrical Drum

Load on Frame (W) = 65 Kg ,

= 65* 9.81

= 637.65 N

Ultimate tensile stress for Mild Steel (σ_{ut}) = 475 N/mm^2

Length of frame (L) = 914.4 mm

Outer Diameter (D_0) = 457.2 mm

Inner Diameter (D_i) = 453.2 mm

Bending Moment (M) = WL/4

= (637.65 * 914.4)/4

= 1.4576*10^6 N-mm

Moment of Inertia (I) = $\pi/64$ [$(D_o)^2$-$(D_i)^4$]

= $\pi/64$ [$(457.2)^2$-$(453.2)^4$]

= 74.08*10^6 mm^4

Perpendicular Distance to Neutral Axis (I) = D/2

= 457.2/2

= 228.6 mm

Now,

Bending Stress (σ_b) = My/I

= (1.4576*10^6 (228.6))/(74.08*10^6)

= 4.4979 N/mm^2

For Mild Steel,

σ_{ut} = 475 N/mm^2

Factor of Safety = 2

$\sigma_{work} = \sigma_{yeild}$/F.S

σ_b = 4.4979 N/mm^2

According to Stress Theory,

$\sigma_b <= \sigma_{yeild}$/F.S

$\therefore \sigma_b$ = 8.99 ≅ 9 N/mm^2

$\therefore \sigma_b <= \sigma_{ut}$

∴ Design is safe.

Specification of Blower

Size of blower (Diameter) = 6 – inches (150 mm)

Power input = 220/240 V AC ~50/60 Hz 0.12/0.14 A 23 W

III. MODELING

Model & Material:

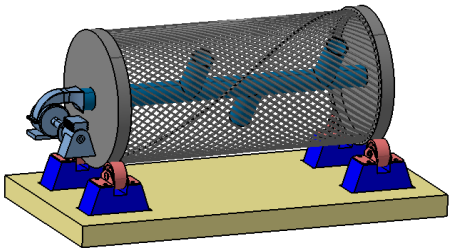

Figure 1: 3D view of building.

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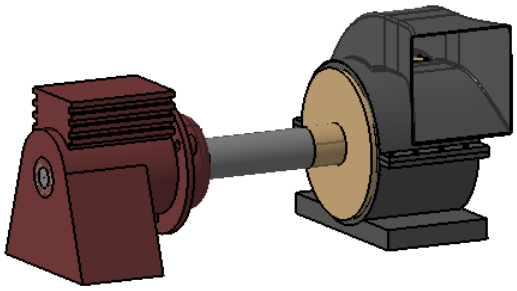

Figure 2: 3D view of motor & blower

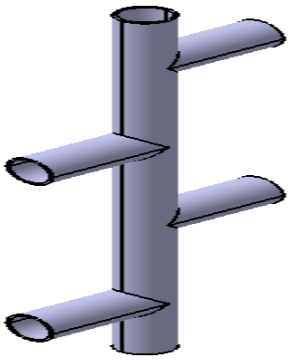

Figure 3: 3D view of internal pipe structure

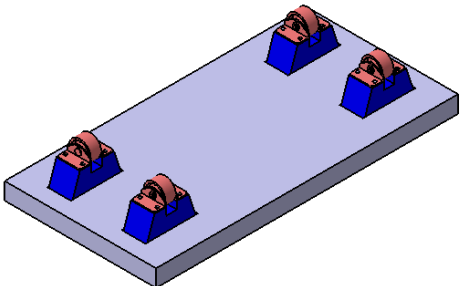

Figure 4: 3D view of base support with rollers

Material List & Specifications:

SN.	Material Type	Length	Width	Thickness	Diameter
1	MS-Angles	56 Feets (Approx)	1 x ½ inch	5 mm	_
2	MS Mesh	20 Feets	4-6 Feets	_	_
3	MS Flat Bar	20 Feets	1 inch	5 mm	_
4	PVC Pipe	6 Feets 6 Feets	_	_	4 inch 1 * ½ inch

IV. RESULTS AND DISCUSSION

The results and discussion may be combined into a common section or obtainable separately. They may also be broken into subsets with short, revealing captions. An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it. This section should be typed in character size 10pt Times New Roman.

V. CONCLUSION

From the study, it may be conclude that the shelf and storage life of onions system should be increased by using automated ventilation storage system compared to conventional storage.

Also the quality of the onion after using this technique should not be changed or decreased.

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