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Design of Automatic Seed Feeding Machine

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Abstract: *The present review provides brief information about automatic seed feeding machine. The basic objective of seed feeding machine is to inseminate seeds at a required depth with certain spacing and covering the seeds with the soil with the help of closing jaw which is fixed at the rear side of the machine and simultaneously gushing water on the seeded part of the ground. Therefore a wide area can be seeded with low input cost and the time required for this process is comparatively less.*

Keywords: *Inseminate, Gushing, transmission belt, Seed Sowing, Ploughing, Hopper, Camshaft and Triangular Side Plates.*

I. INTRODUCTION

Agriculture has a significant role in the socio-economic fabrics of India. As per the world ranking for population India ranks second. So, there is a greater need for multiple cropping in the farms and these in turn efficient and time saving machine. Thus this automatic seed feeding machine fulfills the above cited requirements. As Agriculture is the back bone of Indian economy. In India around 70% of the population earns its livelihood from agriculture.

It is an important source of raw material for many agro based industries. India's geographical condition is unique for agriculture because it provides many favorable conditions such as plane areas, fertile soil, long growing season etc. The Indian agriculture is going through a constant process of learning aimed at conquering nature. The Indian agricultural scientist and farmer are telescoping into a few brief year's achievements which have taken decades or even centuries to accomplish in the agriculturally advanced countries.

So this project helps to minimize the human efforts involved in plantation and save the time. This will give perfect plantation with less effort.

II. PRESENT SITUATION

A. Present Methodology

To get a good crop farmers have to follow a number of steps like ploughing, sowing, watering, harvesting, and storing the crop. Ploughing is the digging up of soil to prepare it for growing crops.

It is done with the help of the plough which is pulled either by animals or by tractors. Nursery is the part of agriculture. So as in farm the feeding of all parts of seeds are not feasible because in the farm proper environment will not present, the wastage of seeds are possible. Also the chances of falling of unnecessary seeds during sowing are possible. Hence in the nursery by maintaining proper environment required for growing of plants care is taken. After growing of plants those plants are taken and then they are used to plant in farm. For this the plants are produced by using a tray which has number of holes as per the requirements in those whole the coco-peat powder is used to fill half of the hole and is followed by the seeds in those holes. Again the powder is filled. As per requirements of customers the nursery produces different kinds of plants. Now a days in Nursery seed feeding is done manually which affects on productivity of the Nursery.

The seed feeding activity takes more time which results in less plantations of the seeds. Then the weeds are removed with the help of a rake. the soil is broken down into lumps and smoothened with a help of a harrow. Once the soil is ready different crops are grown. Healthy and ripe seeds of the best variety are selected and sown. crops grow well if they get the right amount of water at right time. watering can be done by several ways. The soil is made more fertile by adding manure or fertilizer to it. Manure is obtained from animal and plant waste. Protecting the growing crops from diseases and harmful insects is done by spraying insecticides and pesticides. it is very important to store the harvested crops properly. Now a day's seed feeding in Nursery and on the agriculture field is done almost manually which effects productivity of the crop. As this manual method requires more time which Inturns reduces plantation of seed. Therefore, agriculture rate increases then economy of the country rises as agriculture activity is the backbone to the Indian economy.

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III. AUTOMATIC SEED FEEDING MACHINE

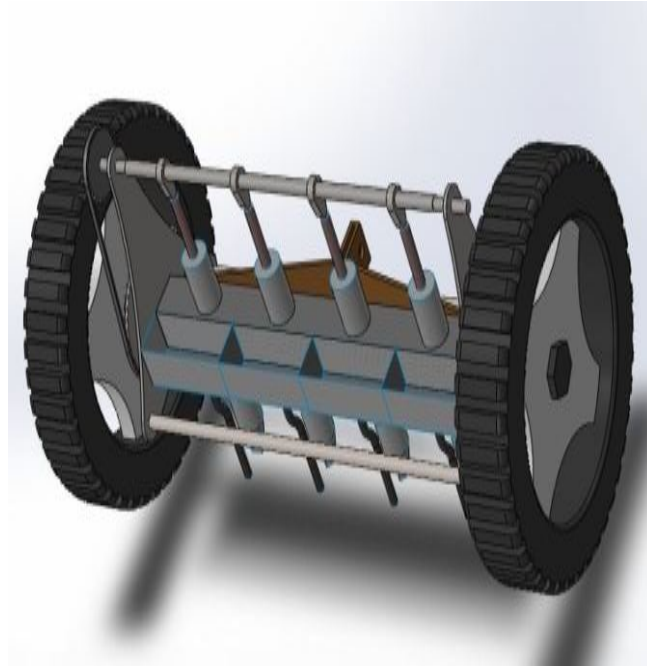


Fig.4. Automatic Seed Feeding Machine

As the whole assembly is mounted on the frame hence it should be rigid and having more strength to withstand forces. The materials suitable for automatic seed feeding machine are mild steel and galvanized iron. The frame consists of two triangular side plates which is mounted adjacent to the wheels as shown in figure 5.

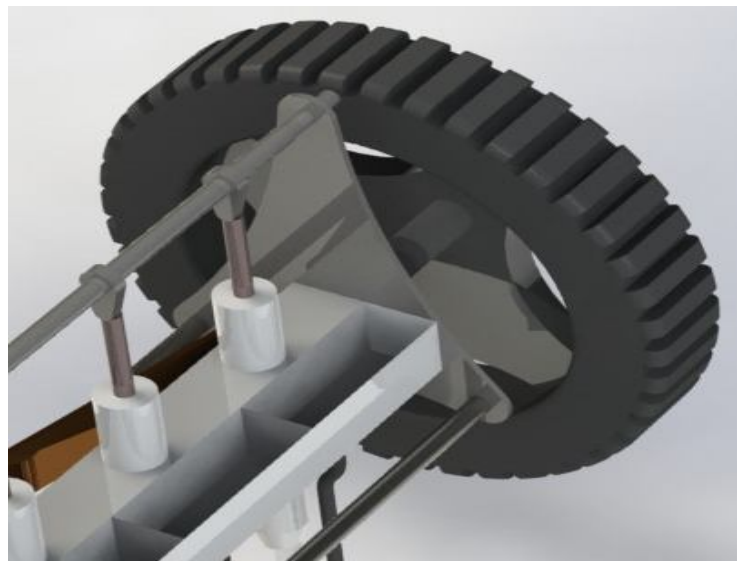


Fig.5. Arrangement of Side Triangular Plates and Wheel

In between the two triangular side plates placed oppositely at a certain distance, four hoppers are arranged with equal spacing connected to the camshaft which is operated by the rotation of wheel for sowing the seeds. Separate opening is provided at the top of each hopper for the storage of seeds. A water storage tank is installed at the rear end of the machine which is operated after sowing the seeds. Plough is connected to the bottom end of the hopper which is used to retain back the soil. A tow hinge assembly is provided to link up with other vehicle or animals etc.

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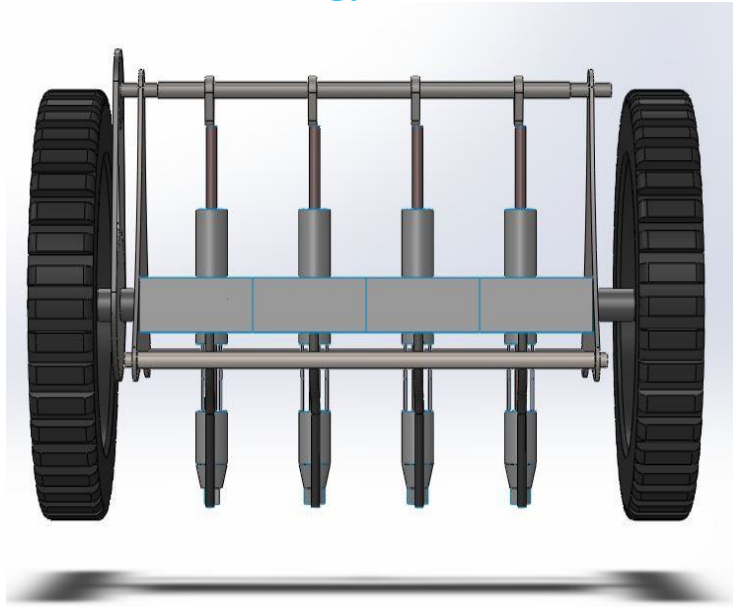


Fig.6. hopper arrangement(rear side view)

IV. SPECIFICATION

The complete dimensioning of Automatic seed feeding machine is shown in the figure below:-

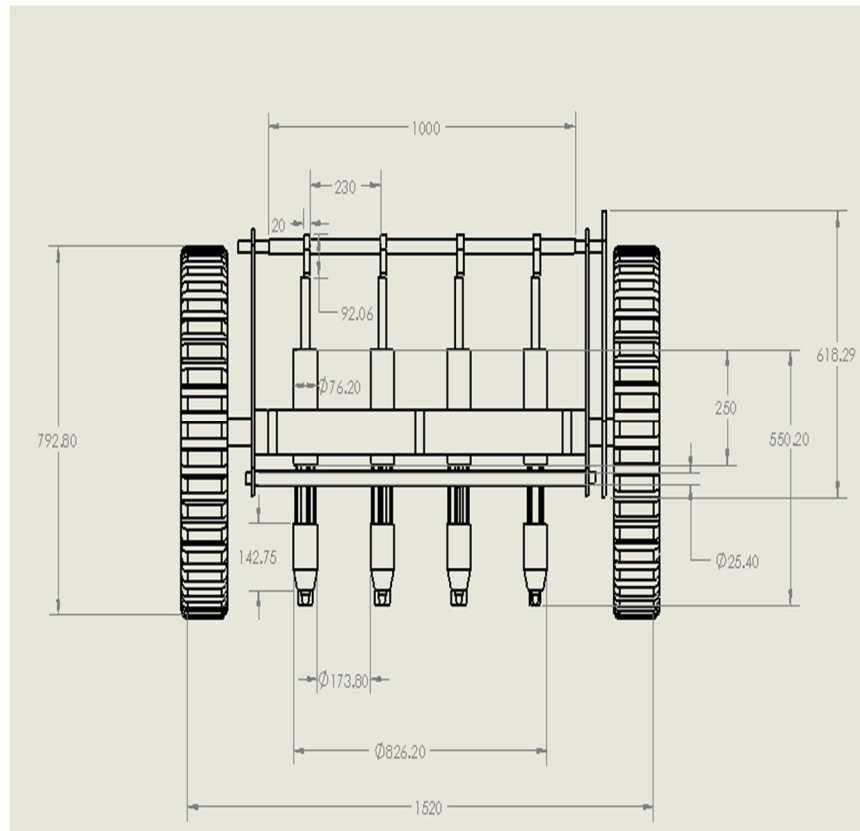


Fig.7.Dimensions of Automatic seed feeding machine

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PART NAME	QUANTITY	MATERIAL	DIMENSIONS (mm)
WHEEL	2	MILD STEEL	Ø799
TRIANGULAR SIDE PLATE	2	MILD STEEL	THICKNESS=10
HOPPER	4	MILD STEEL	DIA=173 LENGTH=250
CAM	4	CAST IRON	THICKNASS=20
TRANSMISSION BELT	1	RUBBER	THICKNESS =10
DISTANCE BETWEEN TWO HOPPER	-	-	250
WATER TANK	1	STEEL	180*100*100
CAM SHAFT	1	CAST IRON	Ø92,L=100

Table 1.description of machine

V. CONCLUSION

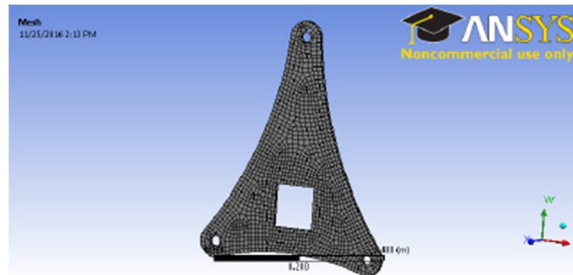


Fig.8.Side plate

Object name = Side plate

Bonding box:

Length X = 0.47588m

Length Y = 0.57616m

Length Z = 1.e-002m

Properties:

Volume = 1.1355e-003m³

Mass = 8.914kg

Centroid X = -1.9368e-017m

Centroid Y = 7.2079e-002m

Centroid Z = 5.e-003m

Moment of inertia Ip1 = 0.1987kg-m²

Moment of inertia Ip2 = 9.0129e-002kg-m²

Moment of inertia Ip3 = 0.27985 kg-m²

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Nodes = 15074
 Elements = 2566

Static Structural:
 Physical type = Structural
 Analysis type = Static Structural
 Environmental temperature = 22.c

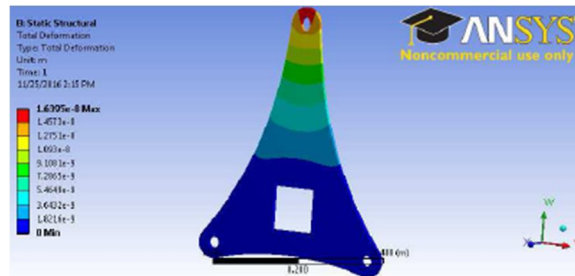


Fig.8.1.Side Plate Mesh

A. Static structural Result

Table 2.Static Structural Result

Type	Total deformation(m)	Equivalent stress(pa)
minimum	0.3	0.28727
maximum	1.6395e-008	34969

Density = 7850kgm⁻³
 Coefficient of thermal expansion = 1.2e-005c⁻¹
 Specific heat = 434jkg⁻¹c-1
 Resistivity = 1.7e-007ohm m
 Compressive yield strength pa = 2.5e+008
 Tensile yield strength pa = 2.5e+008+tensile ultimate strength pa = 54.6e+008

B. Isometric Elasticity

Table 3.Isometric Elasticity

Young modules (pa)	Poisson's ratio	Shear modules (pa)	Bulk modules (pa)
2.e+011	0.3	1.6607e+011	7.6923e+010

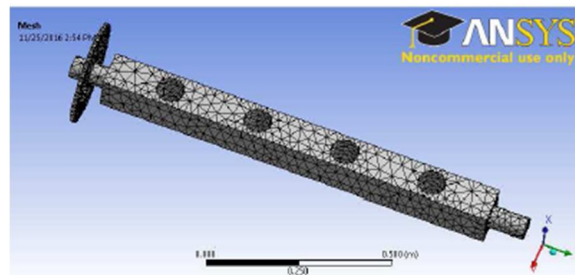


Fig.9.Centre square rod

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Object name = Centre square rod

C. Bonding box

Length X = 0.27843m
 Length Y = 1.3m
 Length Z = 0.27843m

D. Properties

Volume = 1.0271e-002m³
 Mass = 8.624kg
 Centroid X = -2.0896e-017m
 Centroid Y = -3.0931e-002m
 Centroid Z = -3837e-018m
 Moment of inertia Ip1 = 10.681kg-m²
 Moment of inertia Ip2 = 0.16787kg-m²
 Moment of inertia Ip3 = 10.688kg-m²
 Nodes = 9490
 Elements = 4675

E. Static Structural

Physical type = Structural
 Analysis type = Static Structural
 Environmental temperature = 22.c

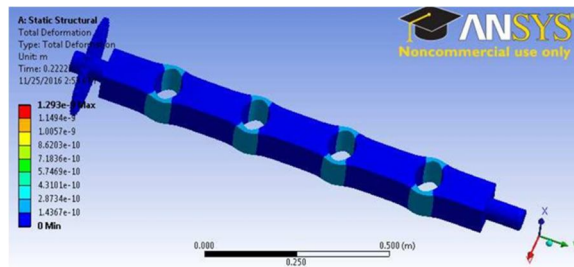


Fig.9.1.Centre square rod Mesh

F. Static structural Result

Table 4.Static Structural Result

Type	Total deformation(m)	Equivalent stress(pa)
Minimum	0	0.2696
Maximum	1.293e-009	4611.5

Density = 7850kgm⁻³
 Coefficient of thermal expansion = 1.2e-005c⁻¹
 Specific heat = 434jkg⁻¹c-1
 Resistivity = 1.7e-007ohm m
 Compressive yield strength pa = 2.5e+008
 Tensile yield strength pa = 2.5e+008+tensil ultimate strength pa = 54.6e+008

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G. Isometric Elasticity

Table 5. Isometric Elasticity

Young modulus (pa)	Poisson's ratio	Shear modulus (pa)	Bulk modulus (pa)
2.e+011	0.3	1.6607e+011	7.6923e+010

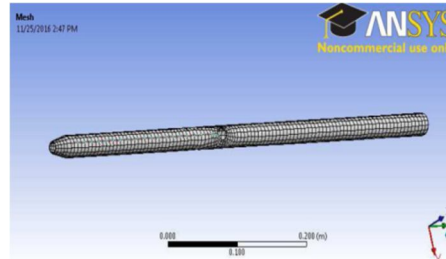


Fig.10. Seed Feeding Rod

Object name = seed feeding rod

H. Bonding box

Length X = 2.56e-002m

Length Y = 0.70565m

Length Z = 2.56e-002m

I. Properties

Volume = 5.6675e-005m³

Mass = 0.4449kg

Centroid X = 3.5418e-008m

Centroid Y = 5.9352e-002m

Centroid Z = -3.7262e-005m

Moment of inertia Ip1 = 1.854e-002kg-m²

Moment of inertia Ip2 = 7.1091e-005kg-m²

Moment of inertia Ip3 = 1.858e-002kg-m²

Nodes = 1551

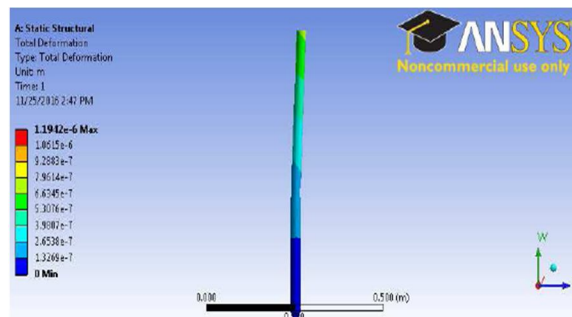
Elements = 1539

J. Static Structural

Physical type = Structural

Analysis type = Static Structural

Environmental temperature = 22.c



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K. Static structural Result

Table 6. Static Structural Result

Type	Total deformation(m)	Equivalent stress(pa)
Minimum	0	17374
Maximum	1.1942e-006	2.0351e+006

Density = 7850kgm⁻³
 Coefficient of thermal expansion=1.2e-005c⁻¹
 Specific heat = 434jkg⁻¹c⁻¹
 Resistivity = 1.7e-007ohm m
 Compressive yield strength pa = 2.5e+008
 Tensile yield strength pa = 2.5e+008+tensile ultimate strength pa = 54.6e+008

L. Isometric Elasticity

Table 7. Isometric Elasticity

Young modules (pa)	Poisson's ratio	Shear modules (pa)	Bulk modules (pa)
2.e+011	0.3	1.6607e+011	7.6923e+010

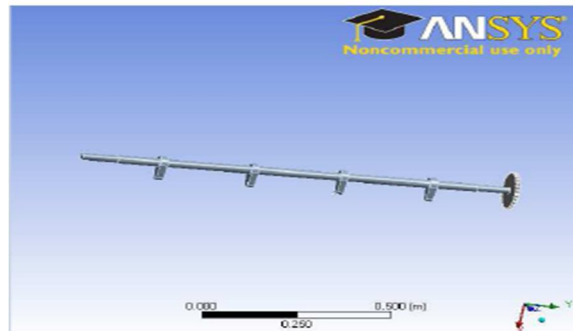


Fig.11. Cam Shaft

Object name = Cam shaft

M. Bonding box

Length X = 0.14406m
 Length Y = 1.2m
 Length Z = 0.14482m

N. Properties

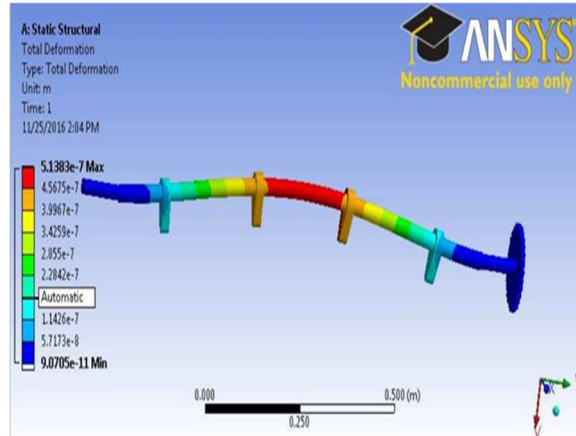
Volume = 1.1582e-003m³
 Mass = 9.022kg
 Centroid X = 3.857e-003m
 Centroid Y = 7.2139e-002m
 Centroid Z = 6.2773e-018m
 Moment of inertia Ip1 = 1.1689kg-m²
 Moment of inertia Ip2 = 5.1617e-003kg-m²
 Moment of inertia Ip3 = 1.1702 kg-m²

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Nodes = 11332
 Elements = 2931

O. Static Structural

Physical type = Structural
 Analysis type = Static Structural
 Environmental temperature = 22.c



P. Static structural Result

Table 8. Static Structural Result

Type	Total deformation(m)	Equivalent stress(pa)
Minimum	3.17×10^{-13} m/m	9.0705×10^{-11} m
Maximum	2.9525×10^{-7} m/m	5.1383×10^{-7} m

Density = 7850 kgm^{-3}
 Coefficient of thermal expansion = $1.2 \times 10^{-5} \text{ c}^{-1}$
 Specific heat = $434 \text{ jkg}^{-1} \text{ c}^{-1}$
 Resistivity = $1.7 \times 10^{-7} \text{ ohm m}$
 Compressive yield strength pa = 2.5×10^8
 Tensile yield strength pa = 2.5×10^8 + tensile ultimate strength pa = 54.6×10^8

Q. Isometric Elasticity

Table 9. isometric Elasticity

Young modules (pa)	Poisson's ratio	Shear modules (pa)	Bulk modules (pa)
2×10^{11}	0.3	1.6607×10^{11}	7.6923×10^{10}

Hence the method of seed feeding fulfills the existing limitation it includes: -
 To reduce seed sowing time
 To give equal depth to all the seeds
 Equal spacing between the corresponding seeds.

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To bring down manual efforts.
Less cost of feeding as compared to manual seed feeding cost
To increase productivity
increase efficiency
No separate irrigation method is required

V. ACKNOWLEDGEMENT

It gives us immense pleasure to present our research paper titled “DESIGN of AUTOMATIC SEED FEEDING MACHINE”. We are thankful to our honorable Research and development Director Dr Mohammed Masood and HOD Dr Syed Azam Pasha quadri Department of Mechanical engineering LORDS institute of engineering & technology Hyderabad for his support and encouragement.

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