Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 12 Issue 11, November-2023

Design and Development of Cloth Feeding and Cutting Mechanism for Medical Field

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***Abstract*— Today, many industries rely on machines to operate, which has drastically reduced the need for manual labor. India's leading manufacturers of industrial tools and equipment make high-quality goods. Cutting machines are also in high demand, and this sector requires new technology and modernization. In this project, we focused on an automatic cloth cutting mechanism for a variety of applications, such as cutting fabric and making masks.**

INTRODUCTION

For improved immobilization of broken limbs, the FractoAid is an embedded composite wrap with integrated hook-and-loop closing straps. It is kept in a unique liner. The hybrid material has a good strength to weight ratio, a short 3-minute set time, and stiffness. The resistance is useful after five minutes. Water can easily enter the studs through the unique liner. The skin-contact layer protects the patient and is porous and biocompatible

Problem Statement and Background

TEN PERCENT OF HOSPITALIZATIONS IN INDIA ARE DUE TO TRAFFIC ACCIDENTS, AND THE MAJORITY OF THESE PATIENTS FREQUENTLY HAVE A DISABILITY OF SOME KIND. EVEN THOUGH ACCIDENT VICTIMS MIGHT ONLY HAVE BROKEN BONES, IMPROPER CARE GIVEN TO THEM WHILE BEING TRANSPORTED TO A HOSPITAL COULD HAVE MADE THINGS WORSE. AN UNCOMPLICATED SPLINT CAN AVERT THINGS FROM GETTING ABOMINABLE. THE BUSINESS NOW CUTS THE UNPROCESSED PRODUCT BY HAND TO THE REQUIRED LENGTH.

In order to improve performance and minimize human participation, the sponsoring company looked for automated cutting and feeding equipment.

OBJECTIVE

1. Necessary forms and suggested dies for cutting the raw material
2. To increase precision.
3. Utilize the Mechatronics Technology to shorten the time needed.

Literature survey:-
Literature Summary:-
Literature Gap:-
Proposed Work for the Project :-

1.Function: Using careful cutting and feeding, the fabric is given the proper stretch and form.
2. Parameters:
i) Type: cutting and feeding of cloth material.
ii) One operator is needed in terms of manpower.
iii) Capacity: Based on the width and length of the fabric.
iv) The approximate all-inclusive dimensions are 1230 x 1250x 835 mm. Using a cutting blade or dies, cut fabric.
v) General Details
vi) Selected size: In accordance with the manufacturer's chart.
vii)AC or DC power.
3. Evaluation of Various Key Mechanisms' Components.
i).Guiding roller shaft innovation and design.
ii).Fabric grip technique development and design.
iii).Spring construction.
iv).The Die Design.
v). Lateral reciprocating blades and die cutting operation

DESIGN.

4. Selecting the appropriate components, bearings, couplings, motors, and travels for an automated system.
5. Analysis of critical components
   a. A guide roller evaluation.
   b. An examination of the fabric-cutting machinery's mechanical linkages.
   c. A drive shaft analysis.

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The project will go via the following seven phases.
Phase I: Literature Survey
In the relevant field, a thorough bibliographic analysis will be conducted. The chosen projects are mostly related to the business world, thus at this point we will be doing small business visits to gather feedback on the problems suppliers are currently facing.

Phase II: Concept Generation
In order to complete our project, we will now create a schematic design and a drawing of the key components. We create diagrams at this step based on the problem statement as well as feedback and recommendations from vendors and end users.

Phase III: Design calculations
For design calculations at this point, we will consult standards, catalogues, and reference materials. We will complete the components' dimensions and design during this process. Additionally, we choose materials based on the component's purpose and the loads it must withstand. We will now choose the components' dimensions, shapes, and locations within the assembly. Additionally, we'll choose the machining techniques required to produce the components, as well as their boundaries and tolerances.

Phase IV: Preparation of Drawings
We will prepare the design at this time. The creation of appropriate component and assembly drawings will aid in the visualization of the actual project configuration. We create drawings in accordance with industrial formats at this stage.

Phase V: Critical Components Structural Analysis
In this stage, we examine a component under extreme load circumstances. We can determine component materials and final dimensions through analysis.

Phase VI: Manufacturing
• The production of the various parts and assemblies will be done using the proper
• The pieces will be put together in accordance with the designs.
• To check and test the parameters (time and speed) that we will use to achieve the
highest product quality, the project will be put through a functional trial.

Phase VII: Experiential Studies (Real-World Field Trial)
The adequacy of the produced mechanisms for the desired application will be evaluated. The machine will be tested in a real field as part of this experimental test.

DESIGN OF SHAFT :-

Selection of material
Any physical object's design process includes a step called material selection. The main objective of material selection in the design of a product is to keep costs as low as possible while yet achieving desired product performance. The qualities and price of the candidate materials serve as the starting point for the methodical selection of the optimal material for a certain application. Most failures are the result of poor material choice. The shaft is made of C40, a through-hardened alloy steel that is preferred for its superior machinability. Its hardness is in the range of 248/302 HB and is suitable for gears, shafts, brackets, bolts, etc. Induction/nitriding can be used to case harden C40 to provide components with increased wear resistance. The following is C40's chemical make-up:

Grade	Carbon (C)	Manganese (Mn)	Silicon (Si)	Nickel (Ni)	Chromium (Cr)	Sulphur (S) Phosphorous (P)	Molybdenum (Mo)
Min (%)	0.35	0.45	0.10	1.3	0.90	--	0.20
Max (%)	0.45	0.70	0.35	1.8	1.40	0.05	0.35

Driving shaft loading condition

As a result, our guiding mechanism uses rollers.
We have taken into account a 5 kg load on the roller to help us grip and guide.
We took into account our own weight as well as a 20 kg load per roller for design purposes.

Total load on roller thus = 20 kg or 200 N.
Roller Diameter (a) = 50 mm
Torque on shaft = 200 × a
A planned load of 20 kg (or 200 N) per roller is put into consideration.
T= Maximum torque produced to a revolving crank is σ = 145 N/mm2, or total torque on the crank is 200 x 25 = 5000 N-m
Considering the safety factor at 4

A shaft's torsion-resistant design includes:
Carbon steel C40 shaft composition is chosen in accordance with the Design Data Handbook.

$$C_{40} \rightarrow S_{ut} = 580\ N/mm^2$$
$$Yeild = 435\ N/mm^2$$

σ = 145 N/ mm^2
As per ASME code
Yield Strength 0.18 N/ mm^3
Ultimate Strength 0.18 N/ mm^2
0.3 x 330 = 99 N/ mm^2 …………………… (1)
0.18 x 580 = 104 N/ mm^2 ………………… (2)
From equation (1) & (2)
The permissible stress value is 99 N/mm2.
Due to the keyway provided in the shaft.
τ = 99 x 0.75 = 74.25 N/mm^2

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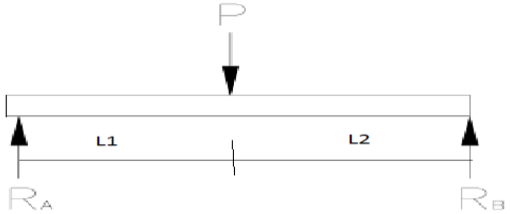
We are aware that the maximum torsional moment equation is provided by.

$$T_e = \frac{\pi}{16} d^3 \tau$$

Where T = 5000 N- mm

By using above equation drive shaft diameter, d = 7 mm

Design against bending: -



Driving shaft loading condition.

100 kg of static load is thought to be on the shaft. Taking into account project manufacturing and aligning flaws

Centre distance taken into consideration: 200 mm.

P = 1000 N

$$\sum F_Y = 0$$

$$R_A + R_B = 1000$$

The overall weight on the wheel is taken into account depending on the load and agricultural conditions.

R_A = 500 N, R_B = 500 N

The bending moment at the loading point P,

BM at M = 500 x 100 = 50000 N-mm

That much is obvious.

$$M = \frac{\pi}{32} d^3 \sigma$$

σ = 145 N/mm^{2}consider factor of safety = 4

Drive shaft dia. d = 15.49mm applying the aforementioned equation

We chose the diameter of the shaft to be 20 mm from equations A and B in order to account for extra jerk and for safe design.

According to maximum shear stress theory

We Know,

$$T_e = \frac{\pi}{16} d^3 \tau$$

We Know,

$$M = \frac{\pi}{32} d^3 \sigma$$

$$\xi = 34.40 < 74\ N/mm^2$$

$$\sigma = 66.07 < 145\ N/mm^2$$

The permitted shear stress and permitted bending stress were checked using the equation above, and we can see that both of these values are within permissible ranges, demonstrating the security of the construction.

Selection of bearing: -

Systems with bearing axle boxes include more than just bearings. The complete system includes ancillary parts like shafts and housings. A crucial function is also played by lubricants and sealing components. The right amount of the right lubricant should be used to minimize bearing friction and shield it from corrosion in order to maximize bearing performance. Sealing components are crucial because they keep lubrication in the bearing cavity and keep outside contaminants out. This is crucial since the bearing's service life is significantly impacted by cleanliness.

F_a / F_r = 0 ≤ e

So, x = 1 & y = 0

Equivalent dynamic load

P = X F_r + Y F_q

Fa= Axial load

Fr= Radial Load

P = RB = 500 N

Life in hrs. = 10000 hrs.

Life in million

$$L = \frac{60\, n\, L_h}{10^6}$$

L = 36 millions of rev

dynamic load capacity

$$L = \left(\frac{C}{P}\right)^a$$

a = 3 for ball bearing.

We choose the static bearing capacity for shaft dia 20mm = Co = 2.32 KN from the SKF bearing catalogue.

From the previous equation, C=201 N.

Thus, dynamic capacity C was determined as follows: bearing catalogue dynamic capacity C = 4.32KN.

As a result, from the catalogue (V. B. Bhandari table 15.5), the selected bearing is 61804.

The Springs' Design

Materials for springs:

High fatigue strength, resilience and creep resistance should all be present in the spring material.

Springs frequently include a carbon content of 0.9% to 1.0%.

• 0.3% to 0.4% carbon and 0.85% to 0.95% carbon in steel

3. Manganese, which helps longer nib sizes.

• High-quality springs are made from alloy steels like silicon-manganese and chrome-vanadium steels.

• For improved corrosion and temperature resistance, there are also customised casings available for chrome steel, phosphor bronze, and Monel (nickel alloys).

Parameters and Geometric Dimensions of a Cylindrical Spring

D_1 = Inside Diameter

D_2 = Outside Diameter

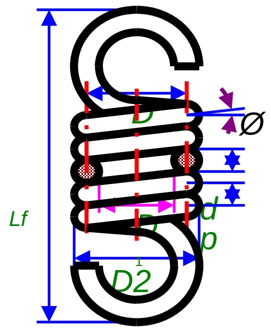
D = Mean Diameter

d = Wire Diameter

p = Pitch

f = Pith angle

L_f = Free Length



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Stress in springs:

Think about a coil spring made of a circular wire with a "d" mm diameter. The spring has a relatively tiny height. The "W" load's motion tends to twist the yarn there, putting the yarn under torsional shear stress. This spring has a torsion design.

Ignoring the effects of plain and bending shear.

Where, W = axial load, R = mean radius of coil, d = diameter of coil wire

Torsion equation can be used to compute stress,

$$\frac{T}{J} = \frac{f_s}{R}$$

$$F_s = \frac{TR}{J} = \frac{T}{Z_p}$$

Where,

Z_p = Section modulus = π /16 x d

T = Torque transmitted by the spring = W x R

f_s = Shear stress induced = 16 WR/ nd^3

Design of spring wire

The load on spring considered 25kg = 250N

$$\text{Wahl's Factor } K = \frac{4C\text{-}1}{4C\text{-}4} \times \frac{0.615}{C} = 1.31$$

We know that

$$\tau = K \times \frac{8wc}{\pi D^2}$$

$$D^2 = \frac{1.06 \times 8 \times 0.25 \times 10^3 \times 5}{\pi \times 450}$$

$$D^2 = 7.49$$

$$D = 2.43 \text{ mm} \cong 2.5 \text{ mm}$$

$$\text{Mean diameter } d = c \times D = 5 \times 2.5 = 12.5\text{mm}$$

Let us presume number of turns n = 5

For square and ground ends $n^1 = n+2 = 5+2 = 7$

Deflection of spring

The load o spring considered 25 kg = 250 N

$$\delta = \frac{8Wd^3 n}{Gd^4} = \frac{8 \times 0.25 \times 10^3 \times 12.5^3 \times 5}{8 \times 10^4 \times (2.5)^4} = 6.25 \text{ mm}$$

Free length of the spring

$$l_f = (n^1 \times d) + \delta + (0.15\delta) = (5 \times 2.5) + 6.25 + (0.15 \times 6.25) = 19.68 \text{ mm}$$

Pitch of the coil

$$p = \frac{\text{free length}}{n^1\text{-}1} = \frac{19.68}{5\text{-}1} \approx 4.92\text{mm}$$

FINITE ELEMENT METHOD (FEM)

The space around it, which is frequently an actual structure, represents the area of interest. The variables of interest that require the solution to the differential equation are the field factors. The values of the field variables (or associated parameters, like derivatives), as recorded on the area's edges, are the conditions of the boundary. whichever is the kind of physical issue being addressed, field adaptable could involve things like fluid velocity, temperature, heat flow, and physical deformation. Every part is connected to other components by an outer node. The field variable is described in a collection of finite element equations so that it has an identical value at every nodal connection for every linked element

CAD MODEL

Computer-aided design and drawing (CADD) is the use of science and technology, such as computers, in the design and documentation processes. The method of using a computer to create drawings is known as computer-aided drafting. Users are given access to input-tools for designing, documenting, and producing designs more quickly using CADD software or surroundings, However, it is also employed throughout every stage of engineering, from conceptual product design and layout through the development of production-related constituent procedures to the strength and dynamic analysis of installations. The primary application of CAD is the precision engineering of 3D models and/or 2D drawings of actual parts. It is also applicable to the design of objects.

ANALYSIS OF SUPPORT ROLLER SHAFT (STATIC CONDITION)

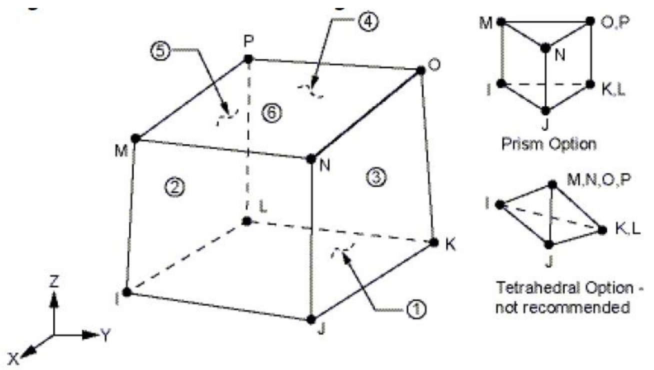
Static analysis addresses the equilibrium of bodies that are exposed to forces. Static analysis can be performed linearly or nonlinearly. Huge deformations, plasticity, creep, stress stiffening, contact elements, and other nonlinearities are not restricted. Static analyses compute the effects of constant loading conditions on a structure while disregarding inertia and damping effects time-varying loads are to blame. A static analysis is employed to calculate the displacement, stresses, strains, and forces produced by loads that don't affect the inertia and damping of structures or parts.

In contrast, a static analysis can take into consideration constant inertia loads like gravity and spinning as well as time-dependent stresses. Static analysis makes the assumption that loading, and response conditions exist, which means that loads and structural responses are thought to fluctuate gradually over time. Static analysis allows for the use of the following loading types:

1.Tensions, moments, and forces that are applied Externally.
2.Stable inertial forces like spinning and gravity.
3.Non-zero displacements that are imposed.

ELEMENT GEOMETRY AND FEATURES

Figure shows SOLID 185 element.



Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
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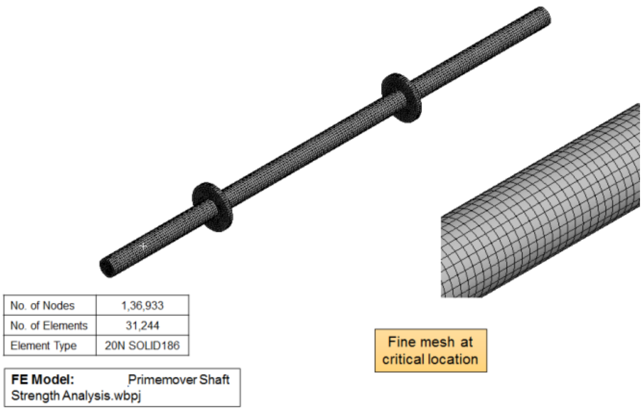
A 3-D modelling tool for solid structures is called SOLID185. Translations in the nodal x, y, and z dimensions are feasible with three degrees of freedom in each of its eight nodes. It's possible that the substance is plastic, incredibly elastic, creeping, significantly deflected, and under a lot of stress. Applying combined formulations that are it also provides the capacity to mimic deformations of fully incompressible hyper elastic materials and almost incompressible elastoplastic materials. SOLID185 Structural Solid is the greatest tool for modelling common three-dimensional solid structures. If employed in strange places, it allows prism and tetrahedral degenerations.

A few examples of element technology are the B-bar, Element Reference, and uniformly falling integration. Page: 2 Confidential information that only belongs to ANSYS, Inc. and its affiliates Some of the element technologies that are available are B-bar, continuously decreasing integration, and improved stresses.

Detailed meshing of support roller shaft



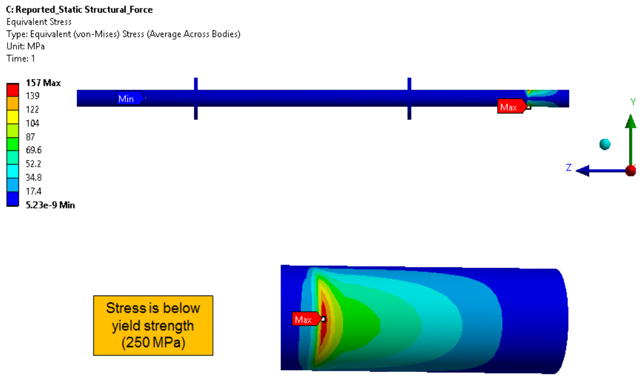
Material Properties

S r. N o.	Component	Material Name	Young's Modulus (Mpa)	Poisson's Ratio	Yield Strength (MPa)	Ultimate Tensile Strength (Mpa)
1	Shaft	Structural Steel	205000	0.3	250	460

FEA analysis has been carried out to calculate total deformation, von-mises stresses, deformation for existing support roller shaft.

Total Deformation plot of support roller shaft
Total Deformation of Shaft in Static condition
Figure displays the overall deformation value for the support roller shaft's applied constraints. The principal area of deformation is indicated by the red zone. The color patterns of the deformation plot show that the total deformation value decreases as one moves away from the maximum point of distortion. Around the roller's center, deformation is happening. The deformation values, which are listed next to the deformation image, are reflected differently by distinct color profiles. As the color profile transitions from red to blue, the value of total deformation decreases.
From a FEA study, a shaft deformation value of 0.045mm was determined.

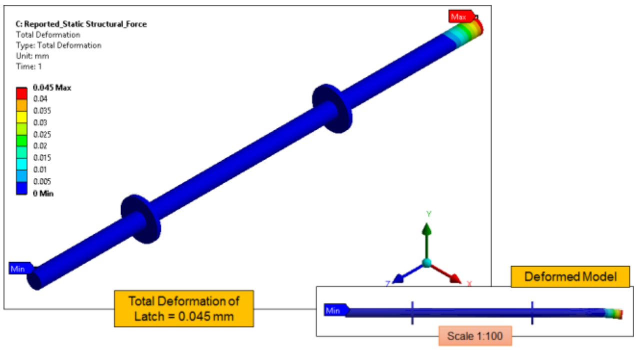
Stress Plots of support roller shaft



Von Misses Stresses in Shaft in Static condition

The maximum stress, as shown in Figure 6.6, is 157 MPa. Although the deformation is too slight in reality, the map is only taken at an inflated size for visualization. The area with the highest concentration of stress is indicated by the red zone.

Maximum Principal Stress in Shaft in Static condition



From the above plot it is found that maximum principal stress is 160 MPa.

1.CONCLUSION :-

1.The Equivalent von-Misses stress in shaft is below the yield strength (250 MPa).
2.The Maximum Principal Stress in shaft is below the yield strength (250 MPa).

2.RECOMMENDATION:-

1.The diameter of shaft can be reduced for optimization of weight and cost.

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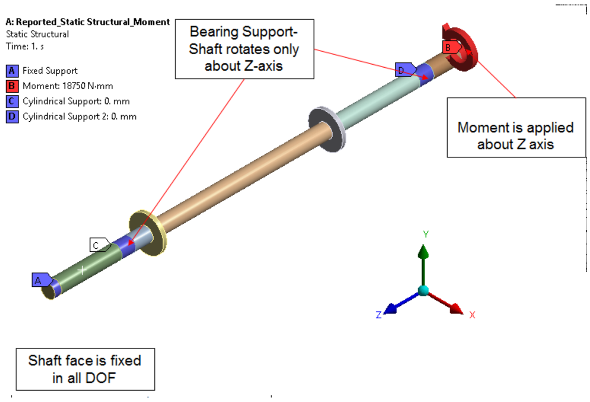
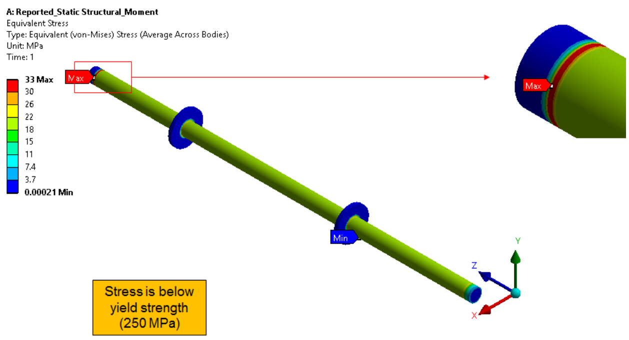
Total Deformation plot of support roller shaft



Loading and boundary conditions for dynamic analysis



Stress plots of support roller shaft

Fig: Von Misses Stress in Shaft in Dynamic condition

The red zone shows the area of stress concentration. From plot it is found that the maximum stress is 33 MPa.

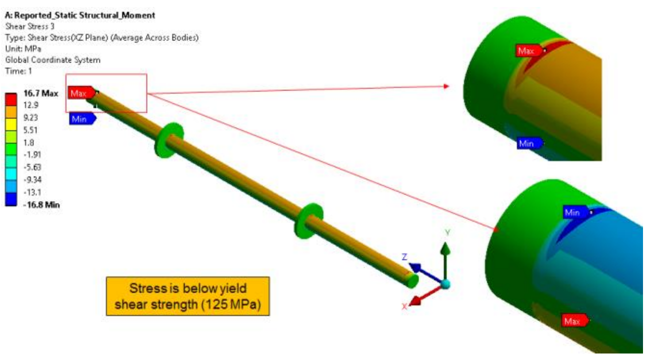


Fig: Maximum Principle Stress in Shaft in Dynamic condition

Exaggerated detail is used to depict the area of greatest principal stress. The highest possible principal stress is 16.7 MPa. The red band (which may be seen in a distorted image next to it) indicates the stress concentration zone. The location of the stress concentration is where the cross section changes quickly. The stresses in various locations are symbolized by various colors.

1.CONCLUSION

1.The Equivalent von Mises stress in shaft is below the yield strength (250 MPa).

2.The shear stress in shaft is below the shear yield strength (125 MPa).

2.RECOMMENDATION

1.The diameter of shaft can be reduced for optimization of weight and cost.

Optimization of Critical Components

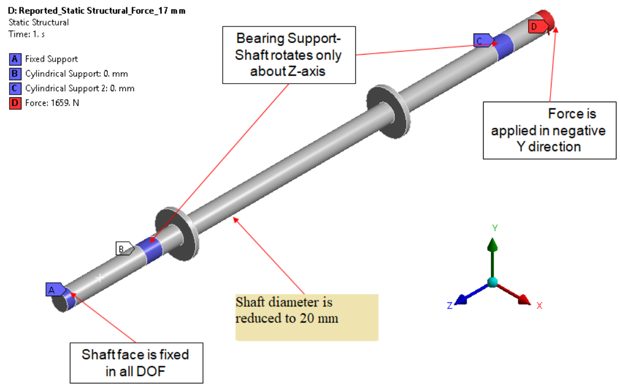


Fig. Loading & Boundary Conditions.

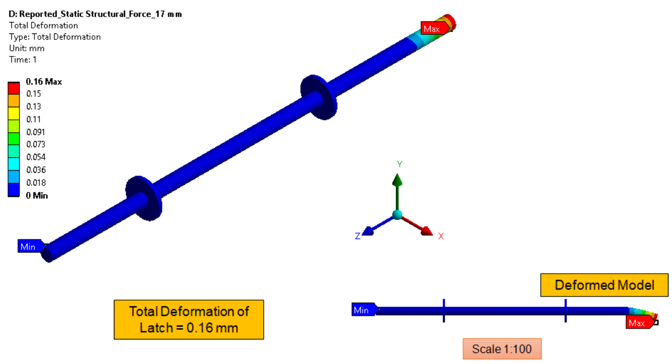


Fig. Total Deformation Plot

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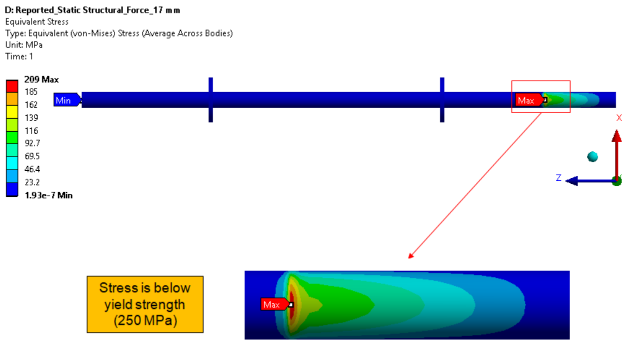


Fig. Equivalent von-Misses Stress Plot

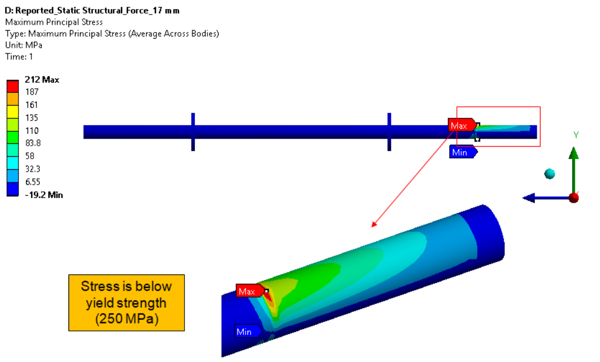


Fig. Maximum Principal Stress Plot

1.The Equivalent von Mises stress in shaft is below the yield strength (250 MPa).
2.The Maximum Principal Stress in shaft is below the yield strength (250 MPa).
If we reduce the shaft size by 20% using the optimization result, the component's maximum stresses will still be within the permitted range in both circumstances:
1.Equivalent von Mises stress.
2.Maximum Principal Stress

The shaft of 20 mm diameter instead of 25 mm diameter might be used as a result of the aforementioned optimization procedure. When the results are compared with the number of rollers, the effect of optimization is maximized because reducing the diameter of the roller reduces its weight and the cost necessary for only one roller.

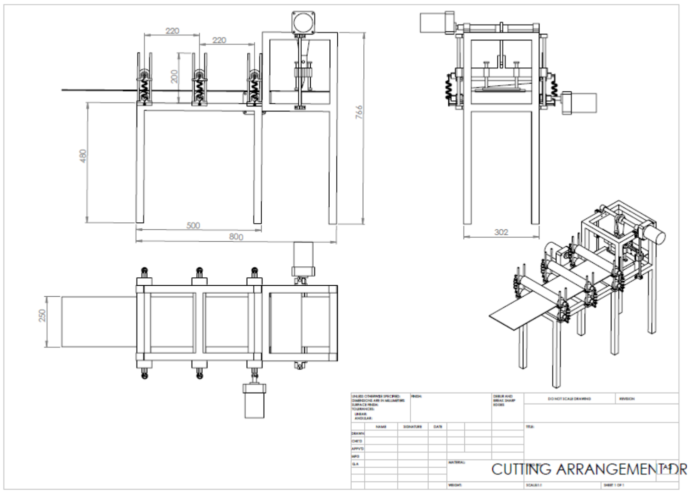
RESULT AND CONCLUSION

The electrical parts of the conveyor are examined and checked to see if they fall within the permitted ranges. The place of application experiences the greatest stress, as shown in the accompanying figure. The weight loss is also within the safe range, according to the optimization results. We accept the optimized findings because the stresses generated in the component are acceptable.
The roller shaft is mostly affected by load; hence it was examined. As seen in fig. 6.7, the highest stress that may be created is 160 MPa, and once the material has been reduced, the stress that can be developed is 212 MPa, which is below the permitted stress limit. Figures 6.7 and 6.14 depict how the stress develops at the shaft's upper surface.

	Shaft diameter 25 mm	**Shaft diameter 20 mm**	**Allowable stress (MPa)**
Equivalent von-Misses (MPa)	157	209	250
Max. principle stress (MPa)	160	212	250
Total deformation	0.045	0.16	

We deduced from the discussion above that the component's created stresses are within permissible limits.

A Thorough Depiction of The Suggested Technique:



DESIGN OF MAIN FRAME

Machine parts are prepared by using C channels.

- SQ frame
- Material Selection
- For the creation of sq pipe, various materials are employed. We have chosen structural steel for the main frame's design. An isotropic material that is frequently used in manufacturing machines is structural steel. The structural steel's material characteristics are as follows. Table No.

Sr. No.	Property	values
1	Density	7850 Kg/m^3
2	Modulus of elasticity	200 x 10^9 Pa
3	Poisson's ratio	0.3

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ISSN: 2278-0181
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Table No. Material properties

Main frame is a fundamental part of our machine. Sq pipe is used to build the main frame. Four spherical wheels attached to the bottom of the Main Frame allow it to be moved.

- Drive Shaft Wheel

The driving shaft wheel's specifications state that the shaft is composed of mild steel. The dimensions are 140 mm on the outside and 16 mm on the inside. The drive shaft wheel is 25 mm thick. Six 20 mm-diameter holes have been drilled into the wheel to reduce its weight.

- Rollers/Pulleys

As the belt is being coated, rollers spin and hold it in place. The mild steel rollers utilized in this project has the following dimensions. 50 mm on the outside. To prevent the bar from slipping from the rollers during feeding, a 20 mm inner diameter is provided.

- Pillow block Bearing

Cast iron enclosure that is greyish. The bearing is made up of a ball bearing. bearing for a pillow block UCP204. The seal is made of rubber NBR, and the housing face is painted.

- Electronic Element:

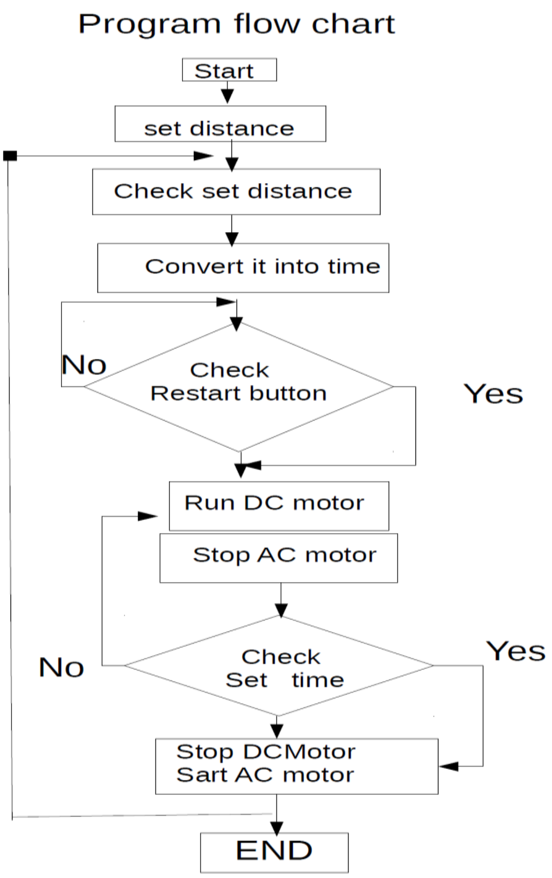
- DC motor
- Power Supply
- DC Motors
- Magnetic sensor
- Micro-controller unit
- Relay Drive Circuit
- LCD Display
- Keypad
-

POWER SOURCE:

- Microcontroller at89s52
- 7805 Voltage regulator
- Keypad

16X2 LCD Display:

- LCD-Liquid Crystal Display



List of Operation Sheet

Sr. No.	Name of Operation Sheet
1	Structural Frame
2	Shaft
3	Guide Roller
4	Fitment of all parts

Testing of Machine

To verify and examine the operation of the intended plasma coating equipment, we conducted a live demonstration at the vendor. In addition, we gathered comments and suggestions on the created model.

BENEFITS AND DRAWBACKS OF THE PAYBACK METHOD:

Advantages:

A project with a quick repayment period can start making money right away. Therefore, it supports the creation of efficient capital budgets for enterprises with constrained resources.

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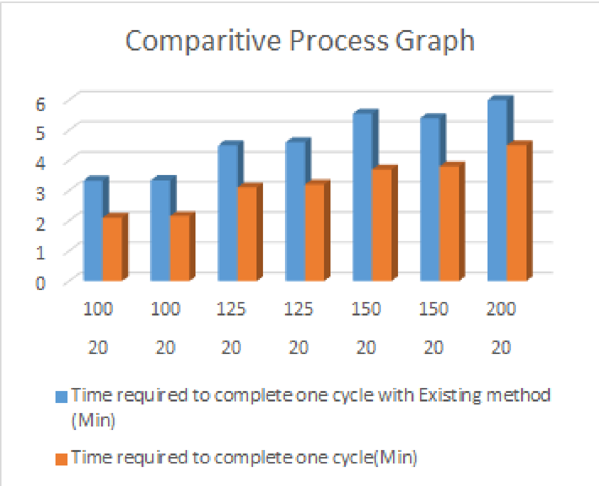
1. In just a few days, a venture with a rapid return on investment could significantly increase the company's cash flow. The payback period is important for organizations that depend heavily on liquidity.
2. A project can be funded as soon as possible when an investment has a short return period.
3. The danger of loss from unforeseen circumstances, such as economic fluctuations, is reduced by a short payback period.
4. It is simple to determine the payback period.

DISADVANTAGES:

1. The payback schedule disregards the amount of money's escalating value.
2. It does not take into account the asset's useful life, or the cash flow generated after the payback period.

The production task and supplies total $27,500 in the initial cost.
Maintenance expenses: - 10% of the purchase price multiplied by 0.10% is 2750 each year.

Observation of test samples:



International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 12 Issue 11, November-2023

Lot size fabric Cloth type 1.

Sr No	Cloth type	Cutting length (mm)	Time required for one cycle with Existing method (Min) A	Time required for one cycle(Min) B	% of time saving = B/A X 100	Accuracy	Remarks
1	Type-1	100	1.5	30 sec	52.17	+/- 0.5mm	Ok, acceptable
2	Type-1	100	1.5	30 sec	50.00	+/- 0.5mm	Ok, acceptable
3	Type-1	125	1.5	30 sec	51.72	+/- 0.5mm	Ok, acceptable
4	Type-1	125	1.5	30 sec	52.63	+/- 0.5mm	Ok, acceptable
5	Type-1	150	1.5	30 sec	71.88	+/- 0.5mm	Ok, acceptable
6	Type-1	150	1.5	30 sec	65.71	+/- 0.5mm	Ok, acceptable
7	Type-1	200	1.5	30 sec	69.05	+/- 0.5mm	Ok, acceptable
8	Type-1	200	1.5	30 sec	62.22	+/- 0.5mm	Ok, acceptable
	Total avg time:-		**3.24375**	**1.96875**	**59.4**		

RESULT CONCLUSION :-

It may be concluded from the aforementioned results that the recommended method is efficient and lowers costs in the form of employment expenses. Within six months, the payback time estimate will have paid for the machine's recovery expenses, making it potentially useful for small-scale medical businesses. The quantitative evaluation shows that the machine is efficient at analyzing time as well; the amount of time required for each cycle is less than that of the present manual technique. On average, the present traditional approach saves 59% of the overall time required.

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In this project, we developed the conventional test setup for applications involving feeding and cutting cloth in accordance with the manufacturer's specifications. The planned system is functioning in line with the requirements of the owners. The following are the project's findings: -

1. The tests and results for the suggested machine are good; they are acceptable.
2. An average timesaving's of 59% is made in comparison to the present manual approach.
3. It is determined that the repeatability and precision are adequate.
4. The payback time cost will be borne by the maker in less than six months when taking into account both the existing and newly constructed mechanisms.

FUTURE SCOPE:

Based on conversations and producer demands, additional work for the proposed mechanism is feasible.

1. The use of a PLC operating system to improve precision.
2. Constructing a test rig for a big, uneven bar.

PHOTO GALLARY:

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