

Design and Development of a Mounted Corn Picker

A Final Year Project Report

Presented to

SCHOOL OF MECHANICAL & MANUFACTURING ENGINEERING

Department of Mechanical Engineering

NUST

ISLAMABAD, PAKISTAN

In Partial Fulfillment

of the Requirements for the Degree of

Bachelor of Mechanical Engineering

by

Sajjad Ali

Muhammad Ali

Mehmood Ayaz Khan

June 2022

EXAMINATION COMMITTEE

We hereby recommend that the final year project report prepared under our supervision by:

Sajjad Ali	243789
Muhammad Ali	264412
Mehmood Ayaz Khan	256097

Titled: *DESIGN and DEVELOPMENT of MOUNTED CORN PICKER* be accepted in partial fulfillment of the requirements for the award of B.S. Mechanical Engineering degree with grade ____

Supervisor: Dr. Rehan Zahid, Associate Professor, SMME, NUST	
	Dated: _____
Committee Member:	
	Dated: _____
Committee Member:	
	Dated: _____

(Head of Department)

(Date)

COUNTERSIGNED

Dated: _____

(Dean / Principal)

Contents

ABSTRACT	5
ACKNOWLEDGEMENTS	6
ORIGINALITY REPORT	7
CHAPTER 1: INTRODUCTION	9
Motivation of work	9
Problem statement	11
Objectives	12
CHAPTER 2: LITERATURE REVIEW	13
Pull type corn forage harvester	Error! Bookmark not defined.
Development trend of corn harvester.....	Error! Bookmark not defined.
Corn Harvester:.....	13
Corn Head:.....	13
Snapping Unit:	13
Spiral-lugged snapping rolls	14
Straight-fluted rolls	14
CHAPTER 3: METHODOLOGY	22
Corn Field Parameters:	22
Tractor Parameters:.....	23
New Holland Fiat Tractor Dimensions	23
Massey Ferguson Tractor Dimensions.....	23
Mechanism and dimensions of design:	24
Calculations:	24
Design parameters:.....	25
3D Modelling:.....	27
Prototype and material selection:	30
Chapter 4: Results and Discussion	32
Operating Speed:.....	38
Effect of rotational speed:.....	39
Effect of the clearance between picking plates:	39
Chapter 5: Conclusion	41
References	44

Table of Figures:

Figure 1 corn production	9
Figure 2 yield gaps	10
Figure 3-model of a corn harvester	Error! Bookmark not defined.
Figure 4-Different types of snapping rolls and their features	Error! Bookmark not defined.
Figure 5 - Three contact point test	15
Figure 6corn harvesting conditions	16
Figure 7-side view and front view of the rollers employed for corn picking	18
Figure 8-corn picker virtual assembly	19
Figure 9-force calculation scheme	20
Figure 10-deformation at the end of cob	21
Figure 11 - Roller 3D model	28
Figure 12 - Stripper Plate 3D model.....	28
Figure 13 - Roller Assembly 3D Model.....	29
Figure 14 - Corn Picker 3D Model	29
Figure 15-prototype	31
Figure 16-total deformation on the main body.....	32
Figure 17-equivalent stress.....	33
Figure 18- Von Mises Stress in Roller.....	34
Figure 19-comparison of double hook belt drive and single hook belt drive.....	35
Figure 20-open belt drive.....	Error! Bookmark not defined.
Figure 21-Total deformation in meshing gears.....	36
Figure 22-von mises stress in gears	37
Figure 23-total deformation	38
Figure 24-von mises stress representation.....	38
Figure 25-final model of the machinery	41
Figure 26 - Roller Stress Analysis	42

ABSTRACT

This report aptly presents the work done on the Design and Development of the mounted Corn picker. Corn production is one of Pakistan's major businesses which is very widespread. Owing to lack of technological advancements, automation has not been done in this field and it still stands on manual labor. To start with the project, an extensive literature review is done to comb all the resources and the previous work done in the pursuit of creating an efficient design for a corn picker. Although both corn picker and harvester are used in the industry our epitome of attention has been the corn picker because it is convenient to make and manage. It provides a relatively simpler design. The literature review contributes to the pre-design created. The resources combed to get to the design are research papers, books, and product catalogues. The principle in the working of corn picker is to hold the stem of the plant in the design part that only allow to pass stem through it but does not allow corn or ear of the plant to pass through it. Sufficient pulling force is applied by the specific mechanism that separate the corn from the stem and stored it in specific container. The design of the assembly is created in SolidWorks and relevant calculations are done to validate the model. The prototype is created using Manufacturing principles and processes.

ACKNOWLEDGEMENTS

We cannot express enough thanks to our Supervisor, Dr. Rehan Zahid, Associate Professor, SMME, NUST for guiding us in our project and making it possible for us. His expertise and insights have proved to be an asset for us during our project. Extending our gratitude to Dr. Niaz Bahadur, he has been at and arm's length for most of the times.

A special thanks to our school SMME for the provision of resources and guidance that has helped us in achieving our goal. We are humbled and grateful to all the instructors at SMME whom we have contacted in need of hour along with our FYP coordinator Mr. Ali Hassan for clearing all the ambiguities for us.

On the list of the people who have been helpful we are thankful to our seniors who have extended their help unconditionally, their experience has come in handy in our pursuit of making our FYP.

ORIGINALITY REPORT

Final

ORIGINALITY REPORT

9 %	3 %	4 %	4 %
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Xiao Rong Lü, Xiao Lian Lü. "Design of Maize Picker Device", Advanced Materials Research, 2014 Publication	4 %
2	Submitted to Bahcesehir University Student Paper	2 %
3	Submitted to Higher Education Commission Pakistan Student Paper	1 %
4	Submitted to Pittsford Sutherland High School Student Paper	1 %
5	Submitted to Bahrain Training Institute Student Paper	1 %
6	ijabe.org Internet Source	1 %
7	Frank Serpas. "Forward-dynamics Simulation of Anterior Cruciate Ligament Forces Developed During Isokinetic Dynamometry", Computer Methods in Biomechanics & Biomedical Engineering, 1/1/2002	<1 %

Publication

-
- | | | |
|----|--|------|
| 8 | Joseph Irudayaraj. "II. APPLICATION TO GRAIN KERNELS", <i>Drying Technology</i> , 1993
Publication | <1 % |
| 9 | Submitted to Institute of Technology, Nirma University
Student Paper | <1 % |
| 10 | krishikosh.egranth.ac.in
Internet Source | <1 % |
| 11 | library.unisel.edu.my
Internet Source | <1 % |
| 12 | Rupinder Chandel, Surinder Singh Thakur. "Optimizing Field Performance of Axial Flow Rotary Combine With Single Rotor and Snap Roll Header for Maize Harvesting", <i>Journal of Agricultural Science</i> , 2022
Publication | <1 % |
-

Exclude quotes On

Exclude matches Off

Exclude bibliography On