Journal of Engineering Sciences
Vol 10, Issue 11, Nov /2019
ISSN NO:0377-9254

DESIGN AND ANALYSIS OF AGRICULTURE PLOUGHING CRANK SHAFT BY DIFFERENT ALUMINUM ALLOYS

[1]MADALA ANVESH BABU, [2]Dr. Y. SESHA RAO
[1]M.Tech Student, [2]Professor
[1,2]Department Of MECHANICAL
[1,2]QIS college of engineering technology ongole AP india.

ABSTRACT: In recent years, technologies around the world are growing at exponential speeds in many fields like manufacturing, automobiles, computers, electronics, etc. The field of agriculture is not an exception. In the field of agricultural also we had seen remarkable development, big farmers are now a day's using cultivator, harvester, tractor, advance machine tools and advance farm equipment's, but in the country like India, 70% of farmers are small and marginal and they are still doing farming by traditional method. Thus they are in need of improved agricultural tools that may be hand driven or bullock driven. In this paper similar advanced type of crank shaft tool is designed. A crankshaft is used to convert reciprocating motion of the ploughing blades into rotary motion or vice versa. The crankshaft consists of the shaft parts which revolve in the main bearings, the crankpins to the big ends of the connecting rod are connected, the crank arms or webs which connects the crankpins and the shaft parts. The crankshafts are subjected to shock and fatigue loads. Thus material of the crankshaft should be tough and fatigue resistant. The common materials used for crankshaft are Carbon Steel or Nickel-Chrome alloy steel or Nickel-Chrome or special cast iron. The main work was to model the crank shaft with dimensions and then simulate the crank shaft for static structural and modal analysis. The modelling software used is Pro-e/creo-2 for modelling the crank shaft. The analysis software ANSYS will be used for structural and modal analysis of crank shaft for future work. The material for crank shaft is Cast Iron and other alternate materials on which analysis will be done are SAE 1045, SAE 1137,and EN9. The objectives involve modelling and analysis of crank shaft, so as to identify the effect of stresses on crank shaft, to compare various materials and to provide possible solution.

Keywords: structural and modal ANSYS, CREO, crank shaft, 3D model with different materials.

I. INTRODUCTION

For the present growing population, the development in the agricultural engineering mainly focuses on modernization in tillage, development in latest fertilizers and harvesting technologies. This study deals with changing the design of the existing tillage machine, which is used for small size gardens and farms. Tillage which is deeper is known as primary tillage and the shallower is known as secondary tillage. The primary tillage produces rough surface whereas the secondary produces smoother surface [2, 8]. Methods for the measurement and the mathematical representation of road and terrain profiles were described. Observations on the interactions of the load, inflation pressure and dimensions of conventional pneumatic tyres running on different soil surfaces in the context of recent experimental and theoretical research on soil compaction were discussed

Introduction to ploughing

India is agricultural country so, India's economy is mainly depends upon agriculture and agriculture based product. India's 50 - 60% population depends over agriculture and agriculture based industries. More than 65% farmers of India still using traditional agricultural tools. These tools are not that much efficient and well designed. They increase cost of the productivity of farm and farmer. India has been known as an agricultural country. Indian people are considered 'as a race of farmers,' and Indian life as 'essentially a country life'. Agriculture in India had developed in a remote antiquity, and down to the eighteen century India ranked among the few developed countries in globe. During the eighteen and nineteen

centuries agriculture was really a vital industry of the people and with it were most closely linked all other local industries. It was on its development that the hope of raising the status of people depended. Compared with it other industries took 'a lower room'. Indian husbandman in the eighteen century had a rich stock of an agricultural techniques and implements.

Objectives

To observe and study the current conditions of the farmers by conducting a survey. b. To detect and asses the severity of faults in the current ploughing tool. c. To provide farmers with a ploughing tool this is durable and affordable and can be used in all kinds of geographical regions

Problem Statement

1) Breakage of the ploughing tool due to sudden encounter of rocks and roots present in the soil.
2) Reduction in sharpness of the ploughing tool.
3) Scope for reduction in cost of the ploughing tool.
4) Scope for increase in the life of the ploughing tool.
5) Using materials of optimum weight to increase efficiency of tool

II.CRANKSHAFT

The crankshaft, sometimes casually abbreviated to crank, is the part of an engine which translates reciprocating linear piston motion into rotation. To convert the reciprocating motion into rotation, the crankshaft has "crank throws" or "crankpins", additional bearing surfaces whose axis is offset from that of the crank, to which the "big ends" . It typically connects to a flywheel, to reduce the pulsation characteristic of the four-stroke cycle, and sometimes a torsional or vibrational damper at the opposite end, to reduce the torsion vibrations often caused along the length of the crankshaft by the cylinders farthest from the output end acting on the torsional elasticity of the metal

FORCES IMPOSED ON A CRANKSHAFT

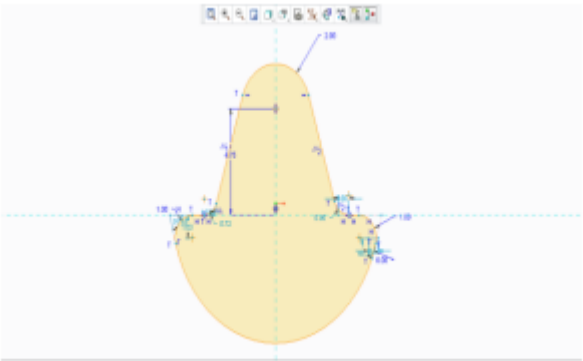
The obvious source of forces applied to a crankshaft is the product of combustion chamber pressure acting on the top of the piston. High-performance, normallyaspirated Spark-ignition (SI) engines can have combustion pressures in the 100-bar neighborhood (1450 psi), while contemporary high-performance Compression-Ignition (CI) engines can see combustion pressures in excess of 200 bar (2900 psi). A pressure of 100 bar acting on a 4.00 inch diameter piston will produce a force of 18,221 pounds. A pressure of 200 bar acting on a 4.00 inch diameter piston produces a force of 36,442 pounds. That level of force exerted onto a crankshaft rod journal produces substantial bending and torsional moments and the resulting tensile, compressive and shear stresses.

III. DESIGN AND METHODOLOGY:

CAD is an essential industrial art considerably used in plenty of packages, together with automotive, shipbuilding, and aerospace industries, commercial and architectural format, prosthetics, and plenty of extra. CAD is also extensively used to supply pc animation for computer graphics in films, advertising, and technical manuals. The modern-day ubiquity and strength of computers suggest that even fragrance bottles and shampoo dispensers are designed the use of techniques terrific via engineers of the Nineteen Sixties. Because of its big monetary importance, CAD has been a fantastic driving strain for research in computational geometry, computer snap shots (each hardware and software), and discrete differential geometry. PTC CREO, previously known as Pro/ENGINEER, is three-D modeling software program applied in mechanical engineering, layout, production, and in CAD drafting provider businesses. It changed into one of the first three-D CAD modeling programs that used a rule-based totally absolutely parametric

gadget. Using parameters, dimensions, and features to seize the conduct of the product, it can optimize the development product in addition to the layout itself. The call has become modified in 2010 from Pro/ENGINEER Wildfire to CREO. It modified into introduced thru the organization that developed it, Parametric Technology Company (PTC), at a few degree within the release of its suite of layout products that embody packages which incorporates assembly modeling.

3D

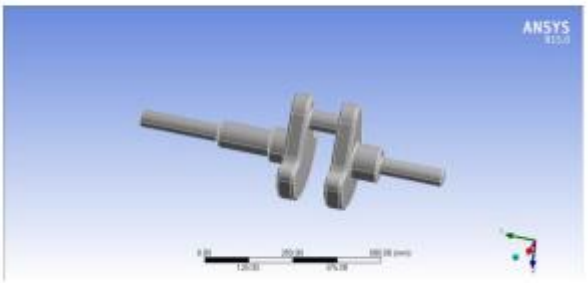


2D

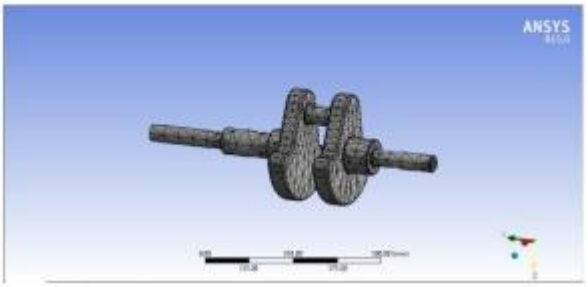
IV.ANALYSIS RESULTS

Finite detail assessment is a way of solving, commonly about, positive troubles in engineering and era. It is used mainly for troubles for which no unique solution, expressible in some mathematical shape, is available. As such, it's miles a numerical as opposed to an analytical method. Methods of this kind are wished due to the truth analytical techniques can't deal with the real, complex troubles which may be met internal engineering. For example, engineering energy of substances or the mathematical theory of elasticity may be used to calculate analytically the stresses and traces in a bent beam, but neither may be very a hit in finding out what's occurring in part of a vehicle suspension system for the duration of cornering. ANSYS Mechanical is a finite element evaluation device for structural evaluation, which includes linear, nonlinear and dynamic studies. This computer simulation product affords finite elements to model conduct and helps fabric models and equation solvers for an in depth variety of mechanical layout troubles.

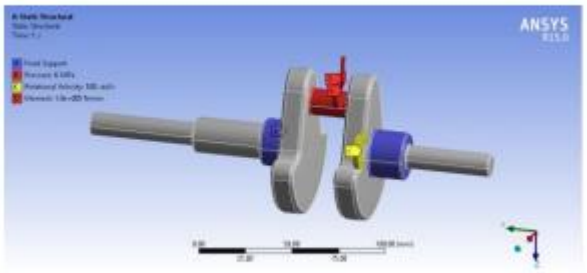
IMPORT GEOMETRY



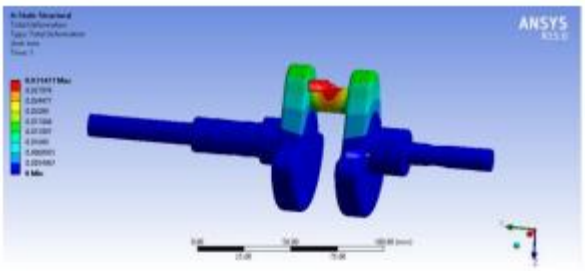
MESHED MODEL



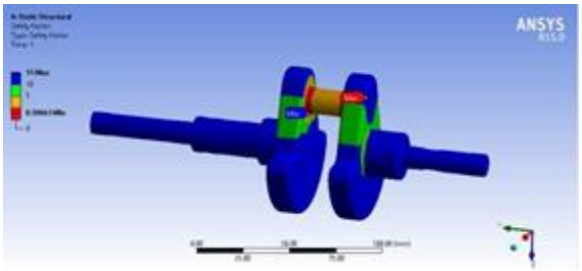
SPECIFYING BOUNDARIES FOR



Cast iron
Deformation

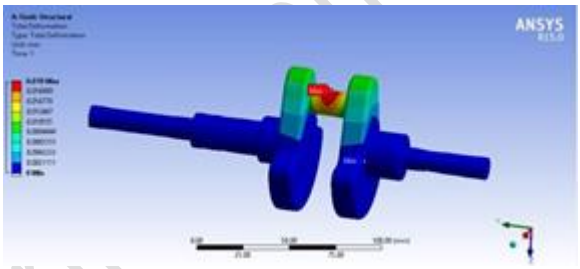


Stress

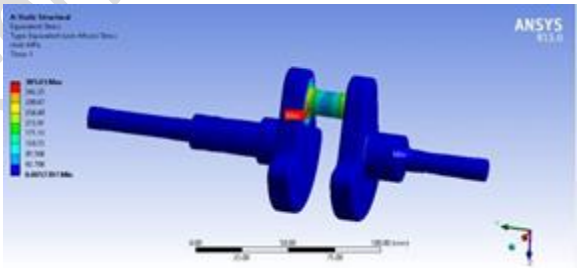


Safety factor
SAE 1045

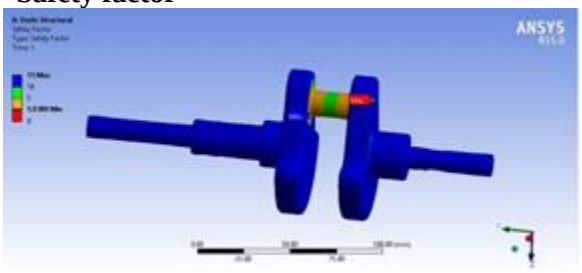
Deformation



stress



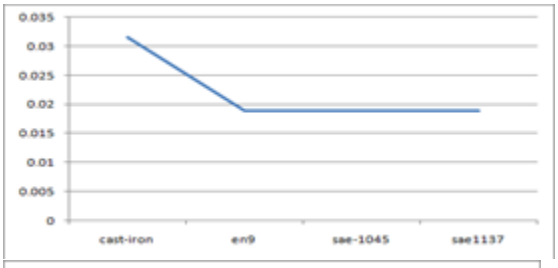
Safety factor

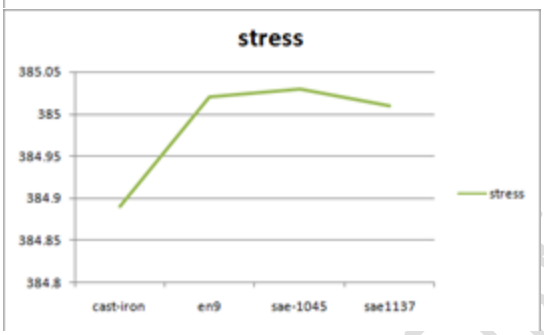


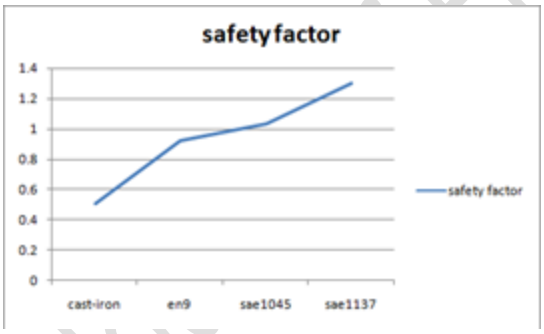
Result table

	Cast-iron	En9	Sae1045	Sae1137
Deformation (mm)	0.031471	0.01895	0.019	0.019
Safety factor	0.5066	0.92	1.03	1.2987
Stress (Mpa)	384.89	385.02	385.03	385.01

DEFORMATION







V.CONCLUSION:

The single cylinder crankshaft model was created by creo-2 software. Then, the model imported into ANSYS software. Then we analysing our model with 2 different cases in each case we applying four different material properties, we found deformations, von-mises stress, safety factor, by considering all results in cases SAE1137 material having good strength and low stress values at high rotational velocity and high pressure and torque respectively. By this changes we can say, this crankshaft can run at high velocity high rpm condition without braking and producing good strength to weight ratio also. The Value of Von-Misses Stresses that comes out from the analysis is far less than material yield stress so our design is safe and we should go for optimization to reduce the material and cost. Accurate stresses and deformation are critical input to fatigue analysis and optimization of the crankshaft.

FUTURE SCOPE OF WORK

- Analysis can be done on crank shaft by changing the fiber orientation of composite material.
- It can be obtained by doing the analysis with metal matrix composite crank shaft

REFERENCES:

1.Yu Ding and Xiaobo Li.,2011, " Crankshaft Strength Analysis of a Diesel Engine Using Finite Element Method," Asia-Pacific Power and Energy Engineering Conference

2. JianMeng., Yongqi Liu., Ruixiang Liu.,2011,"Finite Element Analysis of 4-Cylinder Diesel Crankshaft, " I.J. Image, Graphics and Signal Processing, 5, 22- 29

3. MENG Jian., LIU Yong-qi., LIU Ruixiang., and ZHENG Bin.,2011,"Intension Analysis of 3-D Finite Element Analysis on 380 diesel crankshaft," International Conference on Computational and Information Sciences

4.Mr.S.JPatil " Modal analysis of compressor crankshaft", International Journal of Scientific Reasearch, vol-2, Issue:7, ISSN: 2277-8179, Pages: 155- 158, July-2013.

[5] Momin Muhammad Zia Muhammad Idris" Optimization of crankshaft using strength analysis", International Journal of Engineering Reasearch and applications, Vol-3, Issue-3, ISSN:2248- 9622, Pages: 252-258, May-Jun-2013.

[6] RincleGarg, Sunil Baghla, "Finite element analysis and optimization of crankshaft", International Journal of Engineering and Management Reaserch, vol-2,Issue-6,ISSN: 2250-0758, Pages:26-31, December 2012.

[7] BDNS Murthy " Modeling analysis and optimization of crankshaft", vol-2, Issue-9, ISSN: 2278-0181, Pages: 749- 753, September-2013