IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

DESIGN AND FABRICATION OF SUGARCANE TRASH REMOVAL EQUIPMENT

[1]B.Babu, [2]P.Esakkiappan, J.Dinesh, P.S.Aswath Krishnan, R.Ahash

[1]Assistant professor, [2]Ug student

[1]Mechanical Department,

[1]Amrita college of Engineering and Technology, Nagercoil

Abstract: Now a days the agricultural activities were modified, due to the newer technologies. At the time of harvesting the sugarcane, there are some processes to remove the sugarcane trash. Till now there is no proper and safest equipment for this activity. So, we are going to fabricate a sugarcane trash removal equipment with ball bearing. Our equipment should safe for both crop and farmer. The equipment should cheaper and more efficient.

Therefore, we are going to fabricate a trash removal equipment using ball bearing. The ball bearing should move over the sugar cane. We are providing a v shaped blade on the ball bearing and it remove the trash. It is a safe method for both Farmar and the crop.

***Index Terms* – Sugarcane system, Trash Removal Technique, Ball bearing system**

I. INTRODUCTION

Ball bearings can meet the requirements of a majority of precision bearing applications, providing excellent static stiffness, adequate damping and low friction at a relatively low cost. They are also available in a wide range of types and sizes and can be mounted in different arrangements to meet a variety of requirements. The one limitation is perhaps the non-synchronous motion error inherent in a rolling bearing geometry. Whilst peak–peak motion errors as low as 50 nm have been achieved in computer disc drive bearings, the motion error is predominantly asynchronous and is still considerably higher in level than can be achieved with most fluid film bearing types. Ball bearings can meet the requirements of a majority of precision bearing applications, providing excellent static stiffness, adequate damping and low friction at a relatively low cost. They are also available in a wide range of types and sizes and can be mounted in different arrangements to meet a variety of requirements. The one limitation is perhaps the non-synchronous motion error inherent in a rolling bearing geometry. Whilst peak–peak motion errors as low as 50 nm have been achieved in computer disc drive bearings, the motion error is predominantly asynchronous and is still considerably higher in level than can be achieved with most fluid film bearing types. All bearing turbocharger technology has started to be adopted for mass-production engines due to the potential benefit in transient performance and fuel consumption. Compared to the conventional journal bearing, the low friction of the ball bearing allows the turbocharger to accelerate faster so that the engine can be supplied with boost pressure more quickly following a transient torque request and under steady state offers reduced engine back pressure, which can reduce engine fuel consumption. In this study, the benefits of using a ball bearing turbocharger compared to a conventional journal bearing turbocharger were identified first in simulation and then validated in a back-to-back comparison of two otherwise identical turbochargers through extensive experimental analysis.

The cold start engine performance was significantly improved as the ball bearing turbocharger was able to boost the engine to the full load level within a few engine cycles. The hot engine transient response was also improved, but the full potential of the ball bearing turbocharger in terms of the transient performance can be further exploited by recalibrating the engine. The fuel consumption of the engine was greatly reduced by the ball bearing turbocharger. However, closer scrutiny reveals that the insufficient EGR rate of the ball bearing turbocharger equipped engine was the main cause of the reduced BSFC, and that further engine calibration is a must before any fair evaluation of the BSFC benefit can be done. Ball bearings provide axial location for a rotating shaft, but will usually carry a substantial radial load. A rotating shaft is supported by at least two bearings: normally, one is a ball bearing and the other a roller bearing.

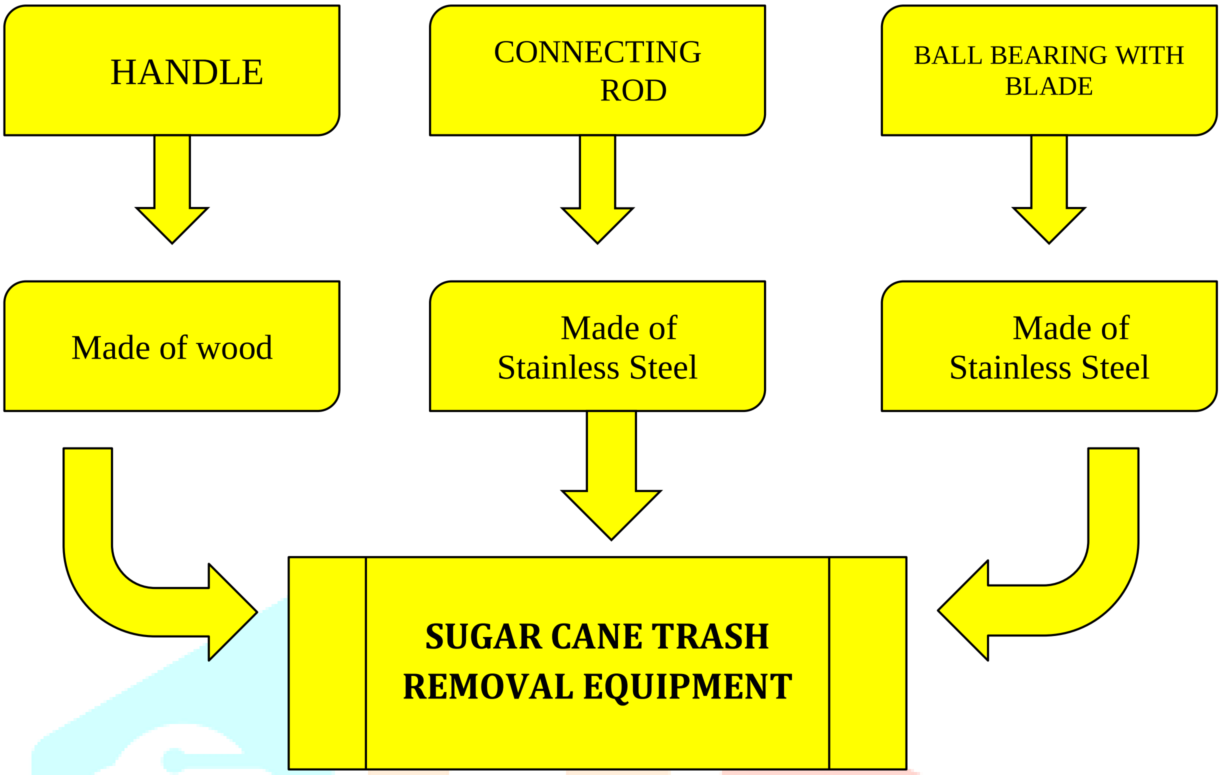
Main shaft location bearings are situated in the internal gearbox on three-shaft engines and on many two-shaft engines. Putting these highly-loaded bearings in a relatively cool part of the engine greatly simplifies design of the load paths through the engine structures. Accurate axial location provided by the ball bearings is essential for close control of compressor tip clearances.Ball bearings have been previously demonstrated by multiple investigators to provide mechanical (and consequently combined turbine) efficiency benefits for turbochargers.

Impact of ball bearing on combined turbine efficiency. Data is measurement on the BorgWarner test stands in Arden, NC USA. Efficiencies are normalized to the peak combined efficiency attainable by running the same turbine aero with journal bearings.

Greater benefit is seen at low speeds because the power consumed by the bearings is a greater percentage of the total power of the turbocharger at lower speeds. For each constant speed line, it is also surmised that there is greater benefit at low expansion ratios because the thrust load is generally highest there. This results in higher power consumption by the hydrodynamic thrust bearing whereas the ball bearing cartridge power consumption is not as sensitive to thrust load.

This reduction in bearing power consumption is expected to produce better transient response, helping to overcome the increased inertia of the new impeller designs. Given the obvious benefit to the present development ball bearings have been slated for introduction to the high efficiency turbocharger.

II. METHODOLOGY



III. SELECTION OF MATERIAL

Wood is a porous and fibrous structural tissue found in the stems and roots of trees and other woody plants. It is an organic material – a natural composite of cellulose fibers that are strong in tension and embedded in a matrix of lignin that resists compression. Wood is sometimes defined as only the secondary xylem in the stems of trees, or it is defined more broadly to include the same type of tissue elsewhere such as in the roots of trees or shrubs. [citation needed] In a living tree it performs a support function, enabling woody plants to grow large or to stand up by themselves. It also conveys water and nutrients between the leaves, other growing tissues, and the roots. Wood may also refer to other plant materials with comparable properties, and to material engineered from wood, or wood chips or fiber.

IV. HANDLE EXPERIMENTATION

Wood and timber material undergo simple tension, compression and flexural testing to determine their suitability for a specific application. For tensile testing a wood material is placed into a universal testing machine and loaded in a manner that pulls the sample apart resulting in the sample failing in tension.

Acoustic (stress wave) velocity.
Airborne laser scanning (LiDAR) and photogrammetry.
Kiln for timber drying.
Magnetic resonance imaging (MRI).
Wood strength, stiffness and density measurement.

Terrestrial laser scanning (TLS)
X-ray densitometry.
The Itrax Multicancer.

V. PREPARATION OF AN CONNECTING ROD

Stainless steel 276 is a group of ferrous alloys that contain a minimum of approximately 11% chromium, a composition that prevents the iron from rusting and also provides heat-resistant properties. Different types of stainless steel include the elements carbon (from 0.03% to greater than 1.00%), nitrogen, aluminium, silicon, sulfur, titanium, nickel, copper, selenium, niobium, and molybdenum. Specific types of stainless steel are often designated by their AISI three-digit number, e.g., 304 stainless. The ISO 15510 standard lists the chemical compositions of stainless steels of the specifications in existing ISO, ASTM, EN, JIS, and GB (Chinese) standards in a useful interchange table. Stainless steel is used for industrial equipment when it is important that the equipment lasts and can be kept clean. Stainless steel's resistance to rusting results from the presence of chromium in the alloy, which forms a passive film that protects the underlying material from corrosion attack, and can self-heal in the presence of oxygen. Corrosion resistance can be increased further, by increasing the chromium content to levels above 11%;addition of 8% or higher amounts of nickel; and addition of molybdenum (which also improves resistance to "pitting corrosion").

The addition of nitrogen also improves resistance to pitting corrosion and increases mechanical strength. Thus, there are numerous grades of stainless steel with varying chromium and molybdenum contents to suit the environment the alloy must endure.

Resistance to corrosion and staining, low maintenance, and familiar luster make stainless steel an ideal material for many applications where both the strength of steel and corrosion resistance are required. Moreover, stainless steel can be rolled into sheets, plates, bars, wire, and tubing. These can be used in cookware, cutlery, surgical instruments, major appliances, construction material in large buildings, industrial equipment (e.g., in paper mills, chemical plants, water treatment), and storage tanks and tankers for chemicals and food products. The material's corrosion resistance, the ease with which it can be steam-cleaned and sterilized, and the absence of the need for surface coatings have prompted the use of stainless steel in kitchens and food processing plants.

VI. CONNECTING ROD EXPERIMENTATION

A tensile strength test, also known as tension test, is probably the most fundamental type of mechanical test you can perform on material. Tensile tests are simple, relatively inexpensive, and fully standardized. By pulling on something, you will very quickly determine how the material will react to forces being applied in tension. As the material is being pulled, you will find its strength along with how much it will elongate.

Test are performed as per the ASTM E8, ASTM A370, ASTM B557, IS/ BS Standard. Tensile test measures the resistance of a material to a static or slowly applied force. Machined specimen is placed in the testing machine and load is applied. Strain gage or extensometer is used to measure elongation. The stress obtained at the highest applied force is the Tensile Strength.

The Yield Strength is the stress at which a prescribed amount of plastic deformation (commonly 0.2%) is produced. Elongation describes the extent to which the specimen stretched before fracture. Information concerning the strength, stiffness, and ductility of a material can be obtained from a tensile test. Variations of the tensile testing include; Room Temperature, Low Temperature, Elevated Temperature (ASTM E21), Shear, Temperature and Humidity, Combined Tension and Compression, Through Thickness, True Strain, Notched Tensile, and r (ASTM E646) & n (ASTM E517) values.

Tensile strength measures the force required to pull something such as rope, wire, or a structural beam to the point where it breaks. The tensile strength of a material is the maximum amount of tensile stress that it can take before failure, for example breaking.

Yield strength stress a material can withstand without permanent deformation. This is not a sharply defined point. Yield strength is the stress which will cause a permanent deformation of 0.2% of the original dimension. Point at which material exceeds the elastic limit and will not return to its origin shape or length if the stress is removed. This value is determined by evaluating a stress-strain diagram produced during a tensile test.

A value called "yield strength" of a material is defined as the stress applied to the material at which plastics deformation starts to occur while the material is loaded.

Ultimate Tensile Strength The maximum stress a material withstands when subjected to an applied load. Dividing the load at failure by the original cross-sectional area determines the value Breaking strength - The stress coordinate on the stress-strain curve at the point of rupture

One of the properties you can determine about a material is its ultimate tensile strength (UTS). This is the maximum load the specimen sustains during the test. The UTS may or may not equate to the strength at break. This all depends on what type of material you are testing. brittle, ductile, or substance that even exhibits both properties. And sometimes material may be ductile when tested in lab, when placed in service and exposed to extreme cold temperature, it transitions to brittle behavior.

VII. PREPARTION OF BLADE

Stainless steel 276 is a group of ferrous alloys that contain a minimum of approximately 11% chromium, a composition that prevents the iron from rusting and also provides heat-resistant properties. Different types of stainless steel include the elements carbon (from 0.03% to greater than 1.00%), nitrogen, aluminium, silicon, sulfur, titanium, nickel, copper, selenium, niobium, and molybdenum. Specific types of stainless steel are often designated by their AISI three-digit number, e.g., 304 stainless. The ISO 15510 standard lists the chemical compositions of stainless steels of the specifications in existing ISO, ASTM, EN, JIS, and GB (Chinese) standards in a useful interchange table. Stainless steel is used for industrial equipment when it is important that the equipment lasts and can be kept clean. Stainless steel's resistance to rusting results from the presence of chromium in the alloy, which forms a passive film that protects the underlying material from corrosion attack, and can self-heal in the presence of oxygen. Corrosion resistance can be increased further, by increasing the chromium content to levels above 11%; addition of 8% or higher amounts of nickel; and addition of molybdenum (which also improves resistance to "pitting corrosion").

The addition of nitrogen also improves resistance to pitting corrosion and increases mechanical strength. Thus, there are numerous grades of stainless steel with varying chromium and molybdenum contents to suit the environment the alloy must endure.

Resistance to corrosion and staining, low maintenance, and familiar luster make stainless steel an ideal material for many applications where both the strength of steel and corrosion resistance are required. Moreover, stainless steel can be rolled into sheets, plates, bars, wire, and tubing. These can be used in cookware, cutlery, surgical instruments, major appliances, construction material in large buildings, industrial equipment (e.g., in paper mills, chemical plants, water treatment), and storage tanks and tankers for chemicals and food products. The material's corrosion resistance, the ease with which it can be steam-cleaned and sterilized, and the absence of the need for surface coatings have prompted the use of stainless steel in kitchens and food processing plants.

VIII. BLADE EXPERIMENTATION

A tensile strength test, also known as tension test, is probably the most fundamental type of mechanical test you can perform on material. Tensile tests are simple, relatively inexpensive, and fully standardized. By pulling on something, you will very quickly determine how the material will react to forces being applied in tension. As the material is being pulled, you will find its strength along with how much it will elongate. Test are performed as per the ASTM E8, ASTM A370, ASTM B557, IS/ BS Standard. Tensile test measures the resistance of a material to a static or slowly applied force. Machined specimen is placed in the testing machine and load is applied. Strain gage or extensometer is used to measure elongation. The stress obtained at the highest applied force is the Tensile Strength.

The Yield Strength is the stress at which a prescribed amount of plastic deformation (commonly 0.2%) is produced. Elongation describes the extent to which the specimen stretched before fracture. Information concerning the strength, stiffness, and ductility of a material can be obtained from a tensile test. Variations of the tensile testing include; Room Temperature, Low Temperature, Elevated Temperature (ASTM E21), Shear, Temperature and Humidity, Combined Tension and Compression, Through Thickness, True Strain, Notched Tensile, and r (ASTM E646) & n (ASTM E517) values.

Tensile strength measures the force required to pull something such as rope, wire, or a structural beam to the point where it breaks. The tensile strength of a material is the maximum amount of tensile stress that it can take before failure, for example breaking.

Yield strength stress a material can withstand without permanent deformation. This is not a sharply defined point. Yield strength is the stress which will cause a permanent deformation of 0.2% of the original dimension. Point at which material exceeds the elastic limit and will not return to its origin shape or length if the stress is removed. This value is determined by evaluating a stress-strain diagram produced during a tensile test.

A value called "yield strength" of a material is defined as the stress applied to the material at which plastics deformation starts to occur while the material is loaded.

Ultimate Tensile Strength The maximum stress a material withstands when subjected to an applied load. Dividing the load at failure by the original cross-sectional area determines the value Breaking strength - The stress coordinate on the stress-strain curve at the point of rupture. One of the properties you can determine about a material is its ultimate tensile strength (UTS). This is the maximum load the specimen sustains during the test. The UTS may or may not equate to the strength at break. This all depends on what type of material you are testing. brittle, ductile, or substance that even exhibits both properties. And sometimes material may be ductile when tested in lab, when placed in service and exposed to extreme cold temperature, it transitions to brittle behavior.

IX. MATING OF COMPONENTS

We are going to mate the components by using Arc welding.   Arc welding is a welding process that is used to join metal to metal by using electricity to create enough heat to melt metal, and the melted metals, when cool, result in a binding of the metals. It is a type of welding that uses a welding power supply to create an electric arc between a metal stick ("electrode") and the base material to melt the metals at the point of contact. Arc welders can use either direct (DC) or alternating (AC) current, and consumable or non-consumable electrodes The welding area is usually protected by some type of shielding gas, vapor, or slag. Arc welding processes may be manual, semi-automatic, or fully automated. First developed in the late part of the 19th century, arc welding became commercially important in shipbuilding during the Second World War. Today it remains an important process for the fabrication of steel structures and vehicles. Arc welding is a type of welding process using an electric arc to create heat to melt and join metals. A power supply creates an electric arc between a consumable or non-consumable electrode and the base material using either direct (DC) or alternating (AC) currents. Arc welding is a fusion welding process used to join metals. An electric arc from an AC or DC power supply creates an intense heat of around 6500°F which melts the metal at the join between two work pieces. The arc can be either manually or mechanically guided along the line of the join, while the electrode either simply carries the current or conducts the current and melts into the weld pool at the same time to supply filler metal to the join. Because the metals react chemically to oxygen and nitrogen in the air when heated to high temperatures by the arc, a protective shielding gas or slag is used to minimise the contact of the molten metal with the air. Once cooled, the molten metals solidify to form a metallurgical bond.

X. RESULT AND DISCUSSION

Sugarcane trash (leaves tops) removal takes 65% time of manual harvesting. Conventional trash burning in standing crop wastes all biomass material which can be used for trash farming and as a source of renewable energy to mitigate natural resources and energy crisis. Shortage of skilled labour and machinery for leaf removal during peak harvesting season causes late harvesting and about 10% deduction in selling price. A small sugarcane leaf stripping machine was designed and fabricated to deduce these problems. Main components of stripping machine were intake rollers, cleaning element, out take rollers, power transmission system and an engine as power source. Three combinations for intake rollers were fabricated. Three velocities i.e., CE1 (660 rpm), CE2 (763 rpm) and CE3 (1033 rpm) of cleaning element, two level of sugarcane leaf moisture content, M.C1 (8.2%) and M.C2 (17.60%) and three sugarcane verities, V1 (US-658), V2 (HSF-240) and V3 (CPF-249) were selected for machine performance evaluation. The results indicated that Inlet roller combination C3, cleaning element speed CE3, sugarcane crop variety. The Trash removal equipment is safer for both the farmer and crop (sugarcane)

XI. CONCLUSION

Now a days the agricultural activities were modified, due to the newer technologies. At the time of harvesting the sugarcane, there are some processes to remove the sugarcane trash. Till now there is no proper and safest equipment for this activity. So, we are going to fabricate a sugarcane trash removal equipment with ball bearing. Our equipment should safe for both crop and farmer. The equipment should cheaper and more efficient.

REFERENCES

[1] Sahu, P.K. 2006. Forecasting yield behavior of potato, mustard, rice, and wheat under irrigation. Journal of Vegetable Science 12(1): 81–99.

[2] Modeling and forecasting pelagic fish production using univariate and multivariate ARIMA models. Fisheries Science 73: 979–988.

[3] Saeed, N., A. Saeed, M. Zakria, and T.M. Bajwa. 2000. Forecasting of wheat production in Pakistan using ARIMA models. International Journal of Agricultural Biology 2(4): 352–353

[4] Prajneshu, S. Ravichandran, and S. Wadhwa. 2002. Structural time series models for describing cyclical fluctuations. Journal of Indian Society of Agricultural Statistics 55: 70–78

[5] Bajpai, P.K., and R. Venugopalan. 1996. Forecasting sugarcane production by time series modeling. Indian Journal of Sugarcane Technology 11(1): 61–65.

[6] H. Nordberg, K. Fernheden (ed.)Nordic Symposium on Mechanical Properties of Stainless Steels.Avesta Research Foundation, 1990. Metals Handbook (9:th ed), Vol. 4 American Society for Metals. 1981

[7] Design Manual of Light-Weight Stainless Steel Structures, Stainless Steel Building Association of Japan, Tokyo, Japan, 2005 [in Japanese]

[8] Design Manual for Structural Stainless Steel First Edition, Euro Inox, 1993 second edition, Euro Inox and The Steel Construction Institute, 2002 third edition, Euro Inox and The Steel Construction Institute, 2006

[9] Development of the use of stainless steel in construction Final report, Directorate-General for Research, European Commission, Technical Steel Research EUR 20030 EN, 2001

[10] Structural design of cold worked austenitic stainless steel Final report, Directorate-General for Research, European Commission, Technical Steel Research EUR 21975 EN, 2006

[11] EN 1993-1-4:2006 Eurocode 3. Design of steel structures: General rules. Supplementary rules for stainless steels, CEN, 2006