Designing A Flywheel To Generate Higher Energy In Small Cycle

VELURU JAYA KISHORE
Mtech Student, Dept. Of MECH
GOKUL KRISHNA College Of Engineering
Sullurpeta, Nellore, Andhra Pradesh, India

P SUBRAMANYAM
Assistant Professor, Dept. Of MECH
GOKUL KRISHNA College Of Engineering
Sullurpeta, Nellore, Andhra Pradesh, India

Abstract: **In machines where the procedure is intermittent like punching machines, shearing machines, riveting machines, crushers etc., the flywheel stores energy in the source of energy throughout the greater portion, from the operating cycle and provides up throughout a small duration of the cycle. Thus the power in the source of energy to machines is provided practically in a constant rate through the operation. However, the flywheel has undoubtedly the finest inertia even just in a multi cylinder engine. Apart from its principle function, the fly wheel works as a person in the friction clutch, & it always carries even the ring gear from the electric starter. ANSYS Mechanical software provides a comprehensive product solution for structural straight line/nonlinear and dynamics analysis. The merchandise provides a complete group of elements behavior, material models and equation solvers for an array of engineering problems. Additionally, ANSYS Mechanical offers thermal analysis and coupled-physics abilities involving acoustic, piezoelectric, thermal-structural and thermal-electric analysis. SolidWorks utilizes a 3D design approach. While you design a component, in the initial sketch towards the final model, you develop a 3D entity. Out of this 3D entity, you may create 2D sketches, or mate different components to produce 3D assemblies. You may also create 2D sketches of 3D assemblies.**

Keywords: **Designing Flywheel; Multi Cylinder Inertia; Solid Works; ANSYS;**

I. INTRODUCTION

Inside a combustion engine, & particularly in one with a couple of cylinders, energy is imparted towards the crankshaft occasionally, & to keep it rotating in a fairly uniform speed within substantially constant load, it's important to have a flywheel. In one cylinder engine(4 Stroke), by which there's just one power stroke in 2 revolutions from the crankshaft, a substantial fraction of one's generated per cycle is kept in the flywheel, & the proportion thus stored decreases with a rise in no. of cylinders. Inside a 4 cylinder engine about 40% from the energy from the cycle is temporarily stored [1]. However, not every one of this energy adopts flywheel. Throughout the first 1 / 2 of the ability stroke, when energy has been provided excessively through the burning gases, all the reciprocating areas of the engine are now being faster & absorb energy besides, the rotating parts apart from the flywheel also provide some flywheel capacity, & this cuts down on the proportion from the energy from the cycle which should be kept in the flywheel. Inside a 6 cylinder engine the proportion from the energy which should be absorbed & came back through the moving parts comes down to about 20%. The higher the No. of cylinders the smaller sized the flywheel capacity needed per unit of piston displacement, since the overlap of power strokes is larger & besides other rotating areas of the engine have greater inertia. However, the flywheel has undoubtedly the finest inertia even just in a multi cylinder engine [2]. Apart from its principle function, the fly wheel works as a person in the friction clutch, & it always

carries even the ring gear from the electric starter. A flywheel utilized in machines works as a reservoir which stores energy throughout the period once the way to obtain energy is much more compared to requirement and releases, it throughout the period when the advantages of energy is much more than supply. In situation of steam engines, car engines, reciprocating compressors and pumps, the power is developed during one stroke and also the engine would be to run for the entire cycle around the energy created in this one ,stroke. For instance in I.C. engines, the power is developed, only during power stroke which is a lot more compared to engine load with no energy has been developed during suction, compression and exhaust strokes in situation of 4, stroke engines and through compression in situation of two stroke engines. The surplus energy developed during power stroke is absorbed through the flywheel and releases it towards the crankshaft during other strokes by which no energy is developed, thus rotating the crankshaft in a uniform speed. Just a little, consideration can have that whenever the flywheel absorbs energy, its speed increases so when it releases, the rate decreases. Hence a flywheel doesn't conserve a constant speed; it really cuts down on the fluctuation of speed. Note: The part of the governor in engine is entirely not the same as what flywheel .It regulates the mean speed of the engine when you will find variations within the load, e.g., once the strain on the engine increases it might be essential to boost the way to obtain Working fluid. However, once the load decreases, less working fluid is needed.

The governor instantly controls the availability, of working fluid towards the engine using the different load condition and keeps the mean speed within certain limits [3]. As discussed above, the flywheel doesn't maintain constant speed. It really cuts down on the fluctuation of speed. Quite simply a flywheel controls the rate variations brought on by the fluctuation from the engine turning moment during each cycle of operation. It doesn't control the rate variations brought on by the different load.
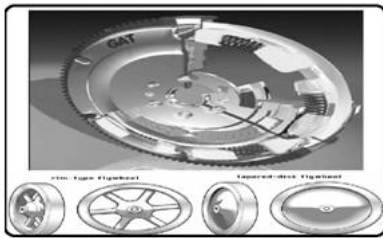

Fig.1.Flywheel model

II. METHODOLOGY

Developing a model starts with a sketch. In the sketch, you may create features. You are able to combine a number of features to create a part. Then, after that you can combine and mate the right parts to produce a set up. In the parts or assemblies, after that you can create sketches. A sketch is really a 2D profile or mix section. To produce a 2D sketch, you utilize an airplane or perhaps a planar face. Additionally to 2D sketches, you may also create 3D sketches which include a Z axis, along with the X and Y axes. You develop sketches from part or set up models. Sketches can be found in multiple views. Views include some standard 3 views, isometric view (3D), and so forth. You are able to import the scale in the model document, add annotations for example datum target symbols, and so forth. SolidWorks utilizes a 3D design approach. While you design a component, in the initial sketch towards the final model, you develop a 3D entity. Out of this 3D entity, you may create 2D sketches, or mate different components to produce 3D assemblies. You may also create 2D sketches of 3D assemblies. Probably the most effective features within the SolidWorks application is the fact that any change you are making to some part is reflected in almost any connected sketches or assemblies. The SolidWorks application includes a number of interface tools and abilities that will help you create and edit models efficiently. These power tools and abilities range from the following: Home windows functions SolidWorks document home windows and performance selection and feedback. ANSYS Mechanical software provides a comprehensive product solution for structural straight line/nonlinear and dynamics analysis. The merchandise provides a complete group of elements behavior, material models and equation solvers for an array of engineering problems.

Additionally, ANSYS Mechanical offers thermal analysis and coupled-physics abilities involving acoustic, piezoelectric, thermal-structural and thermal-electric analysis. ANSYS Structural software addresses the initial concerns of pure structural simulations without resorting to extra tools. The merchandise offers all the strength of nonlinear structural abilities - in addition to all straight line abilities -to be able to provide the greatest-quality, most dependable structural simulation results available. ANSYS Structural easily simulates the largest and many intricate structures [4]. ANSYS Professional software provides an initial step into advanced straight line dynamics and nonlinear abilities. That contains the strength of leading simulation technology within an easy-to-use package, ANSYS Professional tools provide users rich in-level simulation abilities without resorting to high-level expertise. ANSYS Design Space software is a straightforward-to-use simulation software program that gives tools to conceptualize design and validate tips on the desktop. A subset from the ANSYS Professional product, ANSYS design space enables users to simply perform real-world, static structural and thermal, dynamic, weight optimization, vibration mode, and safety factor simulations on all designs without resorting to advanced analysis understanding. The finite element method (FEM) (its request frequently referred to as finite element analysis (FEA)) is really a statistical way of finding approximate solutions of partial differential equations (PDE) in addition to of integral equations [5]. The answer approach relies either on eliminating the differential equation completely (steady condition problems), or rendering the PDE into an approximating system of ordinary differential equations, that are then numerically integrated using standard techniques for example Euler's method, Runge-Kutta, etc. The Finite Element Technique is great for solving partial differential equations over complicated domains (like cars and oil pipelines), once the domain changes (as throughout a solid condition reaction having a moving boundary), once the preferred precision varies within the entire domain, or once the solution lacks level of smoothness. In solving partial differential equations, the main challenge would be to create a formula that approximates the equation to become studied, but is numerically stable, and therefore errors within the input and intermediate calculations don't accumulate and make the resulting output to become meaningless. There are lots of ways of using this method, with pros and cons.
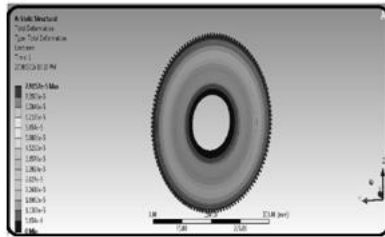
Fig.2.Proposed model

III. CONCLUSION

Just a little, consideration can have that whenever the flywheel absorbs energy, its speed increases so when it releases, the rate decreases. Hence a flywheel doesn't conserve a constant speed; it really cuts down on the fluctuation of speed. Note: The part of the governor in engine is entirely not the same as what flywheel .It regulates the mean speed of the engine when you will find variations within the load. You develop sketches from part or set up models. Sketches can be found in multiple views. Views include some standard 3 views, isometric view (3D), and so forth. You are able to import the scale in the model document, add annotations for example datum target symbols, and so forth. SolidWorks utilizes a 3D design approach. In solving partial differential equations, the main challenge would be to create a formula that approximates the equation to become studied, but is numerically stable, and therefore errors within the input and intermediate calculations don't accumulate and make the resulting output to become meaningless.

IV. REFERENCES

[1] Selig, M.S., Lyon, C.A., Giguère, P., Ninham, C.P., and Guglielmo, J.J., Summary of Low-Speed Airfoil Data, Vol. 2, SoarTech Publications, H.A. Stokely (ed.), 1504 N. Horseshoe Circle, Virginia Beach, VA 23451, 1996, 252 pages.

[2] Kathirvel, K., Job, T.V., Karunanithi, R., Swaminathan, K.R., 1991. "Energy expenditure pattern of power tiller operator". Agricultural Mechanization in Asia, Africa and Latin America 22, 18–20.

[3] Larrabee, E.E. and French, S.E. "Minimum Induced Loss Windmills and Propellers" Journal of Wind Engineering and Industrial Aerodynamics, 15 (1983) 317-327.

[4] Kalsirisilp, R., 1993. "Performance Evaluation of a Thai- Made Rice Combine Harvester". Asian Institute of Technology, M.Eng.Thesis No. AE 93-46.

[5] Finite Element ModellingAnd Analysis of Skin Panel Based On the Fiber Orientation

and Stacking Sequence by "Dr.R.Rajappan, Dr.S.Sundararaj and V.Pugazhenthi"

AUTHOR's PROFILE

Veluru Jaya kishore completed his B.Tech in Sri Venkateswara College of Engg. And Technology in Chittoor 2012. Now pursuing M.Tech in MACHINE DESIGN (Mechanical Engineering) in GOKUL KRISHNA College of Engineering, Sullurpeta, Nellore, Andhra Pradesh, India.

P.Subramanyam, received his M.Tech (Machine Design) degree, currently He is working as an Assistant Professor in GOKUL KRISHNA College of Engineering, Sullurpeta, Nellore, Andhra Pradesh, India.