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Review paper on Dual Mass Flywheel

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ABSTRACT

The Dual Mass Flywheel (DMF) is primarily used for dampening of oscillations in automotivePower trains and to prevent gearbox rattling. This mainly includes a model for the two arc springs in the DMF and their friction behavior. Both centrifugal effects and redirection forces actradially on the arc spring which induces friction. A numerical simulation of the DMF model iscompared to measurements for model validation. Finally, the observability of the engine torqueusing the DMF is discussed. For this purpose, a linear torque observer is proposed and evaluated. It has been speculated that the use of a dual-mass flywheel (DMF) can lead to attenuation of clock metallic noise, even though it's main purpose has been to counter transmission rattle by reducing the input torsion impulse. The effect is also highlighted by the main frequency reducing content of the response when DMF is employed.

1. INTRODUCTION

The rapid development of vehicle technology over the last few decades has higher performance engines paralleled by an increased demand for driver comfort. The Weight-saving vehicle concepts as well as wind tunnel-optimized bodies now allow other sources of noise to be perceptible to the driver. In addition, lean concepts, extremely low-speed engines and new generation gearboxes using light oils contribute to this. The middle of the 1980s, this advancement has pushed the classic torsion damper as an integral part of the clutch driven plate to its limits. Extensive development by researchers resulted in a simple, but very effective solution – DMF – a new torsion damper concept for the drive train. In today's world power train control systems need accurate torque information to perform various tasks. It includes for example the clutch actuation in automated manual transmissions and dual-clutch transmissionsand the control of electric motors in hybrid power trains. Dual mass flywheel of indirect torque estimation is needed because the direct measurement of the transmitted torque using Strain gauge cannot be done in volume production cars for economic reasons.

2. LITERATURE REVIEW

- **N.N. Suryawanshi, D.P. Bhaskar (2015) [1]:** Studied that experimental study of dual mass flywheel on convection flywheel on two stroke engines.DMF used for dampening of oscillations in in automotive power trains on to prevent rattle of gearbox. the author expressed a model of two stroke engines and to perform operation and after getting result found that, the DMF was more efficient than convention flywheel.
- **TejashriKhochare (2015)[2]:** focused on development of new flywheel for two stroke engine system using helical spring and multi-mass system to improve inertia of flywheel and to improve engine efficiency. comparative analysis of spring mass flywheel and conventional flywheel on two stroke engines after that getting result was found that the DMF is 1.3 times effective than the conventional flywheel.
- **Govinda A, Dr. Annamalai K. [3]:**Studied the design and analysis of arc spring used in DMF. This work was carried out by the study of effect of arc spring on DMF.When the operating speed is low, vibration occurs due to the torsional resonance, this can be avoided using DMF.
- **Zhow Bin. [4]:** Performed operation on torsional vibration signal simulation and analysis of dual mass flywheel based on Lab View, analysis on torsional vibration waveform the non-contact method used for above analysis performing operation in lab obtained the result of the simulation and analysis in the form of waveform.

3.PROPOSED DESIGN

Components :

1.Primary flywheel-The primary flywheel is connected to the crankshaft of the engine. The inertia of the primary flywheel combines withcrankshafts to form one whole.

2. Plain bearing-The bearing is positioned in the primary flywheel. The primary and the secondary flywheels are connected via a pivoting bearing. The weight forces applied by the secondary flywheel and the clutch pressure plate. The same time, it bears the release force applied on the DMF during clutch disengagement. The pivoting bearing allows not only both flywheels to rotate against each other, but also a gentle tilting movement (wobbling).

3. Arc springs-In order to make ideal use of the available space, a coil spring with a large number of coils is fitted in semicircular position,and so-called arc spring lies in the spring channel of the DMF and is supported by a guide. Under operation, the coils of the arc spring slide along the guide and generate friction and thereby damping. To prevent the arc springs from wear, the sliding contact areas are lubricated. The optimized shape of the spring guides helps to reduce friction significantly, besides improved vibration damping, arc springs help to reduce wear.

4. Flange-The task of the flange is to transfer torque from the primary flywheel as well as arc springs to the secondary flywheel in other words, from the engine to the clutch. The flange is tightly riveted to the secondary flywheel with its wings sitting between the arc spring channel of primary mass. The gap between the arc spring stops in the arc spring channel is big enough to enable the flange to rotate.

5. Primary cover-To prevent the flywheel from wear and rust also damage.

6. Secondary flywheel-the secondary flywheel the DMF connects to the drive train on the gearbox side. Interacting with the clutch and the clutch cover is bolted to its outer edge, after the clutch has been engaged and the integral clutch spring mechanism presses the driven plate against the friction surface of the secondary mass.

4. Block Diagram

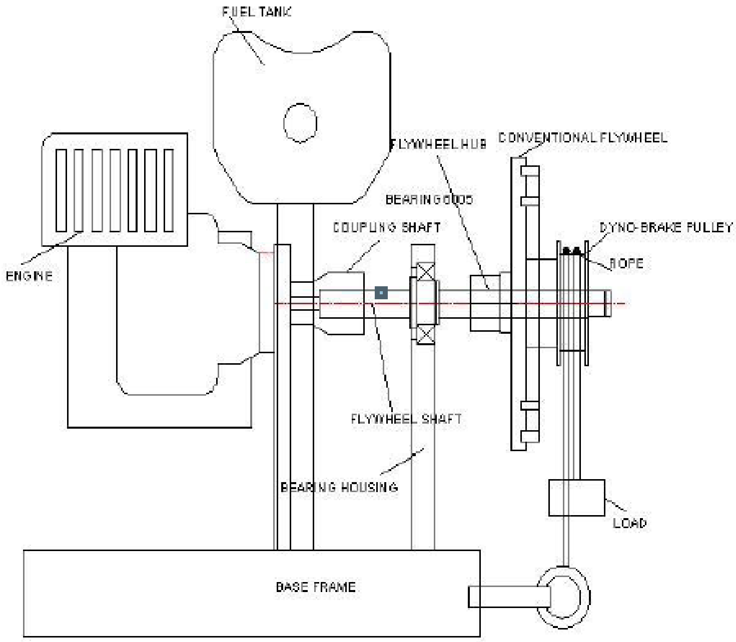
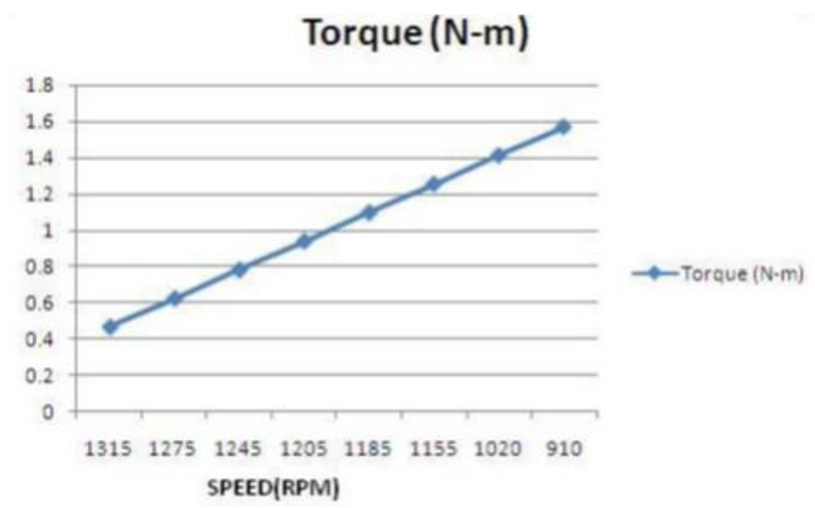


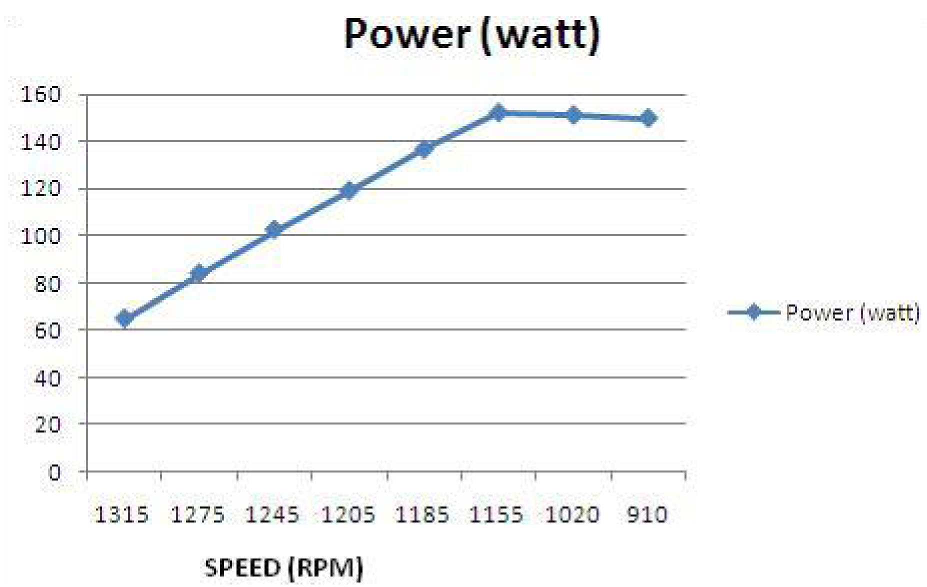
Fig.(1) Dual mass flywheel system of two stroke petrol engine

All engines have flywheels that balance out compression and power strokes, maintain idle and starting or reduce component wear. If the flywheel is too light the motorcycle requires more effort to start as idles badly, and is prone to stalling. The Weight is not the important factor here, but inertia. Inertia is stored energy, and is not directly proportional to flywheel mass. It's possible to have a light flywheel with much more inertia than a heavier flywheel. The motor develops must accelerate the flywheels before leaving the sprocket shaft and any used in come to with the flywheel up to speed is not available at the rear wheel. This will not show up on a steady-state or rear wheel dynamo or simple desk-top dynamo program, but is detectable in a transient dynamo that accelerates the engine at a specific rate 300 or 600 RPM per second are common. Flywheel inertia is stored when you revolution the engine slightly before letting, the clutch out this small amount of extra power helps in getting the motor cycle underway with minimal effort. By "the action of borrowing something" power for a few seconds. The engine must develop less to move from a standing start. Once the clutch is completely engaged then inertia cannon longer be borrowed the motorcycle can only use what it produces in real time when the clutch is slipped all flywheel weight reduces acceleration.

5. Performance Characteristic Curve of Conventional Flywheel:



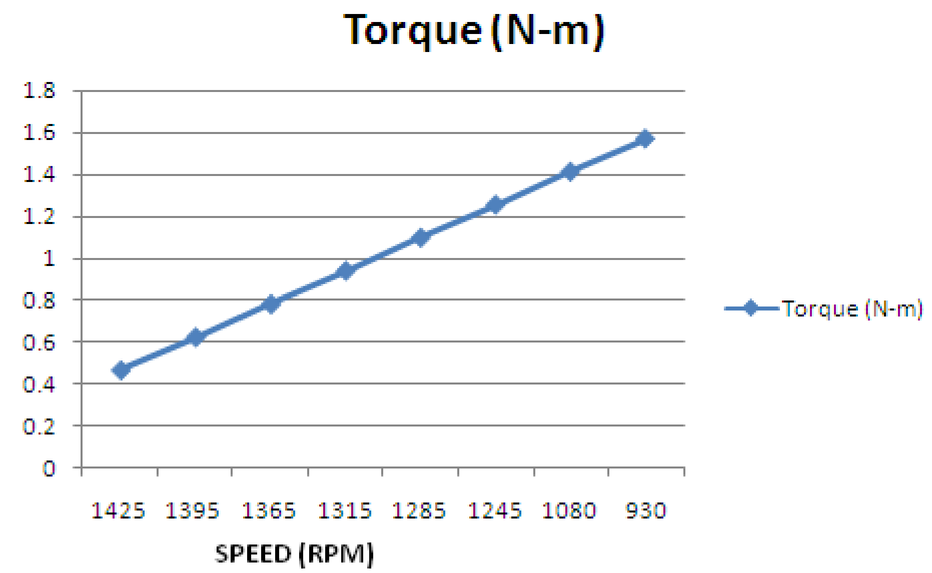
Graph 5.1Torque Vs Speed for Conventional Flywheel



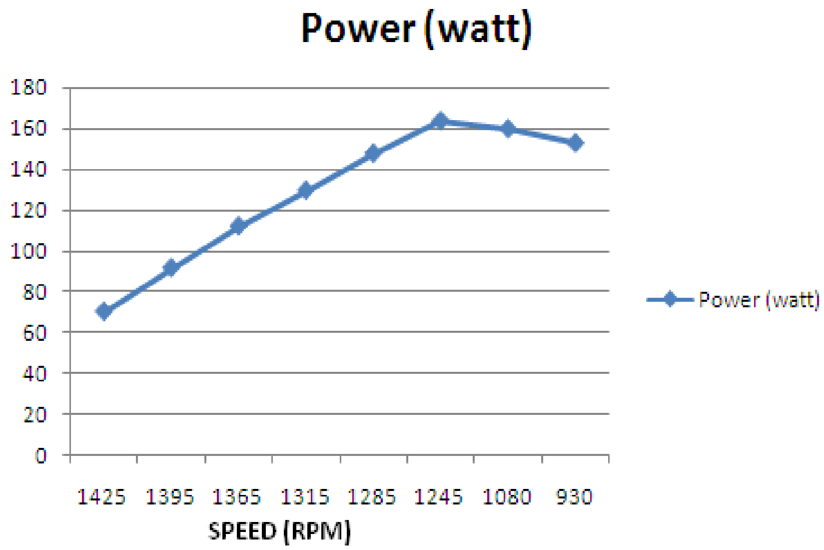
Graph: 5.2 Power Vs Speed for Conventional Flywheel.

Graph: 5.3 Efficiency Vs Speed for Conventional Flywheel.

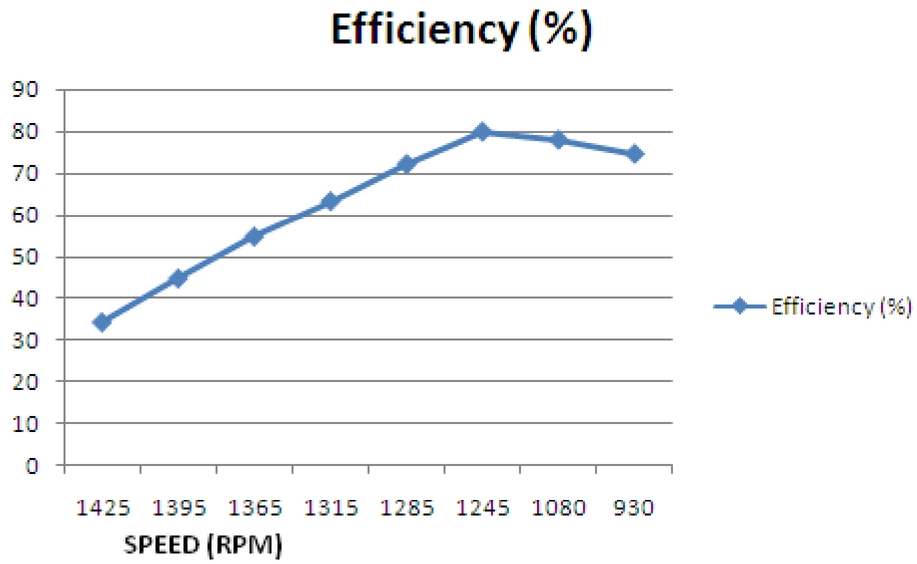
6. Performance Characteristic Curve of Dual Mass Flywheel (DMF)



Graph6.1 Torque Vs Speed For dual mass Flywheel.

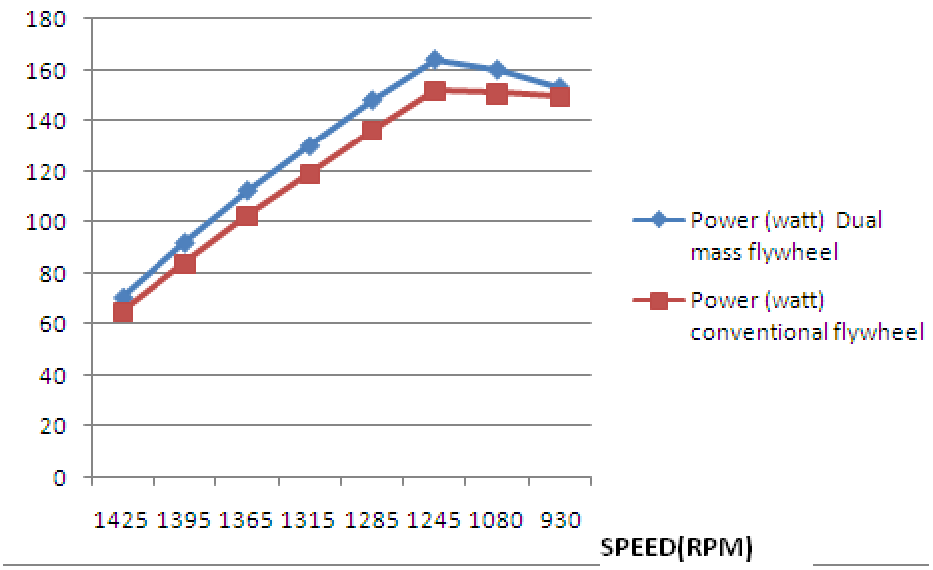


Graph: 6.2 Power Vs Speed for Dual Mass Flywheel

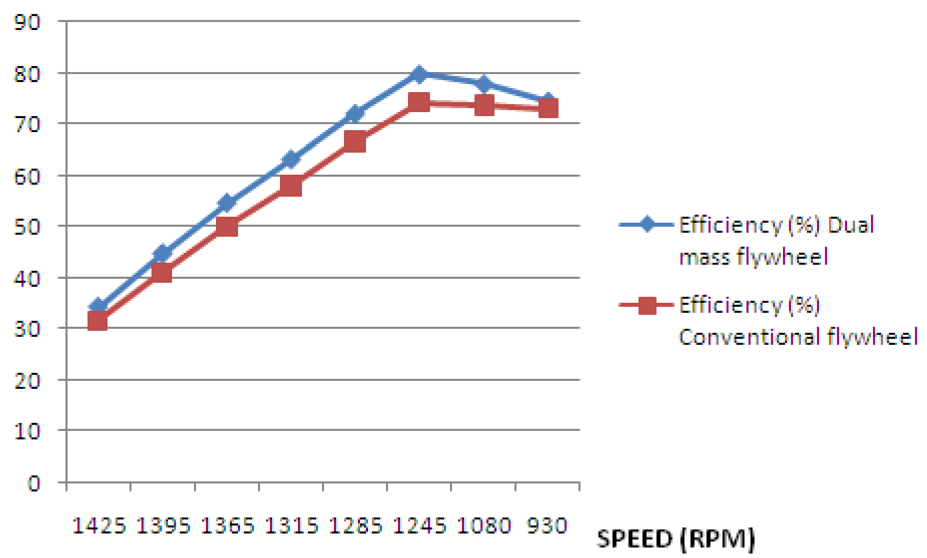


Graph: 6.3 Efficiency's Speed for Dual Mass Flywheel.

7. Comparative Performance Characteristics Curve



Graph: 7.1 Comparison of Power Output of Conventional and Dual Mass Flywheel.



Graph: 7.2 Comparison of Efficiency of Conventional and Dual mass flywheel

8. CONCLUSION

It is observed that there is approximately 7 to 8 percent increase in power output by using the Dual mass flywheel. It is also observed that the DMF is 5 to 6 percent efficient than the conventional flywheel which will also result in increasing economy of fuel in the engine. Size of DMF is increased but it can be reduced by using integrated assembly of clutch and flywheel. It has a good future scope for compact size. Cost for masses attached is increased but compensated in rise of efficiency and power output.

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