

Power Amplification through Pulsed Power Transmission using Pulse Pulley with Practical Performance and the Multiplication Theory for Impulsively Transmitted Input Power 'x'

Saurabh Vikas Chaudhari.

Mechanical Engineer, Researcher and Inventor, Savada, Jalgaon (Maharashtra), India

ABSTRACT: Gravitational force of attraction is present everywhere in the universe, on our Earth too. But, there is not a single device invented to add and utilise this gravitational energy in our working mechanisms through power transmission. The pulse pulley is a device which is capable to harness some amount of gravitational energy in provided input power to the mechanism during running conditions to get maximum possible power output. Gradual power transmissions we are using currently are not capable to add such gravitational energy in mechanism. When practical testing are carried out it is found that not only theoretically but also in practical conditions use of pulse pulley gives maximum output and also shows that, during the addition of each power pulse gravitational energy get harnessed in output shaft, wherein the magnitude of output power of impulsive power transmission is depend on speed of the input shaft on which impulsive power transmitting device is mounted.

KEYWORDS: Pulse pulley, I. C. Engine, Power pulses, Impulsive power, Gravitational energy, refabrication, Multiplying efficiency, Pollution control.

I. INTRODUCTION

Mass and weight are two different physical quantities, where mass remains constant but the value of weight changes from planet to planet or say place to place depending upon gravitational force of attraction. Applying of mass on same surface with different ways creates different results on that surface.

For example: If we put a mass of 10 kg on a steel plate smoothly or say gradually (i.e. 0-1-2- up to 10 kg), it will create effect "x" but when this similar mass of 10 kg is applied on same steel plate suddenly (i.e.0-10 kg), the generated effect will be "2x". In this example, we kept the mass constant in both the cases i.e. 10 kg, but the way we applied it on a surface of steel plate changes the results up to twice. This shows that at the instant of impact the value of gravitational energy acting on a mass of 10 kg becomes twice. This phenomenon is like hammering effect, and can be used for power amplification through power transmission using power transmitting devices capable to generate such power pulse in milliseconds without crating vibrations in a system.

Pulse pulley, is designed such that it can create power pulses at high speed during power transmission, wherein pulse pulley is a next level device of pulse wheel/ flywheel. Pulse pulley is designed completely different from conventional pulleys we are using presently in our systems and mechanisms. Due to high rate of industrialization in developing and developed countries the demand for electricity is increasing continuously day by day with high rate. Many types of electronics products are arrived in market putting load on available power sources. Available power sources not sufficient to fulfil this demand hence new power plants are need to be setup. In world, maximum energy is generated through coal powered thermal power plants which adds hazzarding pollutants to the air and pollutes the environment wherein, efficiency of the thermal power plants powered by the coal and radioactive materials is near about 35% to 45% and 33% to 35% respectively. Generation of electricity by wind power, water power, and solar

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

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power needs to pay more cost and also the power plants based on these power inputs cannot install anywhere, they have many geographical limits.

And here power multiplication i.e. amplification systems with pulsed power transmission mechanism can be used. This will reduce our need to build new power plants and can run on outputs of present power generating power plants. In this research paper I have illustrate performance of pulse pulley theoretically and practically.

II. RELATED WORK

The pulsed power transmission system is completely opposite to that of continuous power transmission, where the power is transmitted from input shaft to the output shaft discontinuously i.e. impulsively. Actually the pulsed power transmission system has two origins,

[01] Pulsed power transmission based on Internal Combustion Engine.

[02] Pulsed power transmission based on gravitational energy i.e. $P_{impulsive} = 2 P_{actual}$.

[01] Pulsed power transmission based on Internal Combustion Engine:

With four cylinders and four strokes, to complete the four stroke cycle, each piston completes its power stroke before the next piston starts a new power stroke, resulting in a pause between each power stroke and a pulsating delivery of power. This shows that the power added to the engine shaft is impulsive in nature.

Similarly, in two cylinder engine there are 2 power strokes taking place in alternate rotations i.e. first power stroke take place between 0^0 to 360^0 and second power stroke takes place between 361^0 to 720^0 rotation of engine shaft. This shows that there is pulsating delivery of power to the engine shaft resulting in generation of twice the power than the single cylinder engine of half of its capacity, where the magnitude of each power pulse is same.

[02] Pulsed power transmission based on gravitational energy:

In the process of finding Strength of Material (SOM) of any component, the calculation and analysis of stress developed on the component when the load is applied is one important method among other methods. And I observed that, when the mass M is gradually applied on the metal bar which is vertical in position and its upper end is fixed rigidly, and then the resultant stress σ developed in the metal bar is given by $\sigma = \frac{w}{A}$ (N/ mm²), where ($w = M * 9.81\text{m/sec}^2$) but again when the same mass M is applied on the metal bar suddenly then developed stress σ is given by $\sigma = \frac{2w}{A}$ (N/ mm²). Both equations shows that stress developed during the sudden application of load is twice than that of the stress developed during the gradual application of load even the mass M was constant in both the cases.

This shows that, when the mass is applied suddenly on the object, the magnitude of the gravitational constant “g” acting on the mass which is 9.81 m/sec^2 becomes twice at that instant i.e. $9.81 * 2 = 19.62 \text{ m/sec}^2$ i.e. $P_{impulsive} = 2 P_{gradual}$. This theory describes that during transmission of each power pulse some amount of gravitational energy get added in the output shaft, resulting in increase of power output.

A groundbreaking invention by William Mcreavy ‘The vibrating hammer i.e. Jackhammer’ is used to break concrete slabs, stones, and road is also based on same methodology. Due to its mechanism operated by pneumatic, hydraulic or electromagnetic power, the attached bit i.e. chisel is blown for several times per sec which helps to break faster. During these impacts, some amount of gravitational energy gets added with applied force.

Pulse wheel/ flywheel is the impulsive power transmission capable mechanical component but, it is found that there was absence of high strength grip between the surfaces of power wheel and friction tooth(s) mounted on pulse wheel/ flywheel, and get heated quickly. Also it is found that the contacting surfaces of power wheel and the friction tooth(s) of pulse wheel/ flywheel get wear out quickly.

A reciprocating electric motor is a motor in which the armature moves back and forth rather than circularly. Daniel Davis was an early maker of reciprocating electric motors. A reciprocating electric motor uses an alternating magnetic field to move its armature back and forth, rather than circularly as in a conventional electric motor. A single field coil may be placed at one end of the armature's possible movement, or a field coil may be used at each end. As a practical motor it has several disadvantages. Magnetic field strength drops off rapidly with increasing distance. In the reciprocating electric motor the distance between armature and field coil must necessarily increase considerably over its minimum value, this reduces the motor's output power and starting force. Vibration is also an issue in its working.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

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Similar to above mechanism Shirsendu Das has proposed 'an electromagnetic mechanism which works like an engine', in this mechanism two solenoids are used one at top side and one at the bottom of cylindrical cavity in which piston reciprocate. It cannot produce power like an engine. It can provide less uniform torque at crank-shaft than engine and it is not applicable for multi-cylinder system.

Hence to overcome all the losses in present systems and using their pros, innovative pulsed power transmission capable component is designed, resulting in origin of pulse pulley.

III. SCOPE OF THE RESEARCH

This research will guide to increase the efficiency of the current power generating systems by switching gradual power transmission to pulsed power transmission and to develop new capabilities of power transmitting devices. It will reduce our need to install new power plant to satisfy increasing demand of electricity and will reduce environmental pollution. The devices like pulse pulley can be used in modern automobiles running on stored electricity in batteries by reducing consumption of traction motors. This research will help to increase the efficiency of power generating systems at greater extent. This research will also be helpful to re-fabricate internal combustion engines i.e. its implementation can reduce power consumption of internal combustion engines by half. The research on pulsed power transmission can bring revolution in automobile manufacturing, power generation sector and in designing industrial machineries. Also we are looking for new planets to settle them as an option to Earth, but we can't guarantee that, there will be presence of solar energy and wind energy or not. But in any corner of the universe there is presence of gravitational energy which we can utilise to multiply capacities of available power sources.

IV. PULSE PULLEY

Pulse pulley is consisting of two parts one is gripping arc and second is slipping arc. As their name suggest, gripping arc holds the grip with belt drive and slipping arc creates the pause in power transmission because it does not create frictional grip with belt drive.



Fig. 1 designed and fabricated Pulse pulley

Fabricated and designed pulse pulley is shown in above figure 1, where gripping arc is same as the conventional pulley, the only difference is that the contact starting edges of gripping arc are filleted to make smooth contact and to avoid wear and tear of belt drive. Slipping arc in pulse pulley is designed such that it creates slip with the touching surface of belt drive. Rollers mounted on axles are provided in the base of slipping arc to support belt drive and the side edges are

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designed straight. The function of side edges of slipping arc is only to hold belt drive on pulse pulley and not to create a grip with it. Pulse pulley is designed to mount on input shaft. As the power transmits from input shaft to output shaft, it is completely depend upon the length of gripping arc to maintain time for which power is going to be transmitted in one rotation.

Pulse pulley can transmit power only when there is conventional pulley (say power pulley) on output shaft, as it acts as a intermediate power transmitting component between pulse pulley and output shaft. When there is 1:1 power transmission ratio between pulse pulley and conventional pulley there can be maximum one gripping arc and one slipping arc. But, when the power transmission ratio is above 1:4 and shafts are closely mounted in mechanism then we can design two gripping and two slipping arcs in pulse pulley. Also to avoid power transmission losses, parallel mounting of pairs of pulse pulley and conventional pulley can be used on their respective shafts. The main advantage of pulse pulley is that, it can transmit power pulses of high strength as there is high frictional grip between belt drive and gripping edges of gripping arc, hence it can be used for re-fabrication of internal combustion engine.

V. PRACTICAL PERFORMANCE OF PULSE PULLEY

- **Description:**

For measuring difference between gradual and impulsive power transmission using conventional pulley and pulse pulley, I construct testing mechanism as shown in figure 2 bellow.



Fig. 2, top and side view of testing mechanism

In the testing mechanism, there are two shafts; one is input shaft on which pulse pulley is mounted and second is output shaft on which flywheel and power pulley is mounted. Both the shafts are supported by pillow bearings. Power pulley is a conventional pulley which used as an intermediate power transmitting component between pulse pulley and output shaft. There is ratio of 1:1.66 between pulse pulley and power pulley, which are connected through V-belt drive. Also there are two pulleys called as input pulley and output pulley mounted on input and output shaft respectively. Two separate nylon strings are wound around the input pulley and output pulley. Falling weight 3kg is attached with the string of input pulley and lifting weight 1.7 kg to the string of output pulley. The purpose of falling weight is to provide power to the input shaft using gravitational energy and lifting weight is used as load acting on output shaft. Due to constant falling weight, it get easy to provide constant input power and due to constant lifting weight constant load get applied during testing of gradual and impulsive power transmission.

As shown in following fig. 3, testing mechanism it kept at different heights to obtain heights of 100 inches and 196 inches for falling weight. The arrangement of the falling weight and lifting weight is made for each testing such that, the downward motion of the falling weight and upward motion of lifting weight starts simultaneously.

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(A High Impact Factor, Monthly, Peer Reviewed Journal)

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Fig. 3, testing mechanism kept at different heights during testing

Due to gravitational force of attraction on falling weight, the speed of the input shaft continuously increases till the falling weight touches the ground (datum) hence; test is carried out from variable heights to get variable speeds at input shaft.

- **Testing methodology:**

Tests are carried out at four different heights, in which falling weight of 3kg starts falling from the height of 25 inches, 50 inches, 100 inches, and 196 inches separately during gradual and pulsed i.e. impulsive power transmission. During performing each test on testing mechanism magnitudes of flywheel weight, falling weight, lifting weight, input pulley diameter, output pulley diameter, string length, pulse pulley diameter, power pulley diameter, belt drive length and power transmission ratio are constant (only pulse pulley is replaced by conventional pulley having same diameter to switch from impulsive to gradual power transmission), hence the difference between output power generated using gradual and impulsive power transmission is measured on the basis of height attained by the lifting weight.

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• **Observation:**

Table 1, readings observed during testings performance of gradual and impulsive power transmission

Reading number	Gradual power transmission			Impulsive power transmission		
	Falling weight height in inches	Average maximum speed attained by input shaft in RPM	Maximum height attained by lifting weight in inches	Falling weight height in inches	Average maximum speed attained by input shaft in RPM	Maximum height attained by lifting weight in inches
1.	25	25	23	25	23	19.7
2.	50	60	39.5	50	60	33
3.	100	92	83.3	100	90	79
4.	196	138	161.56	196	140	166.56

As shown in table 1, maximum speed of the input shaft obtained in gradual and impulsive power transmission are near about same for same falling height of falling weight of 3kg. But in impulsive power transmission setup, falling weight touches the datum in less time as compare to gradual power transmission; because during each pause, the power transmission does not takes place but the falling weight travels extra falling distance equal to length of slipping arc.

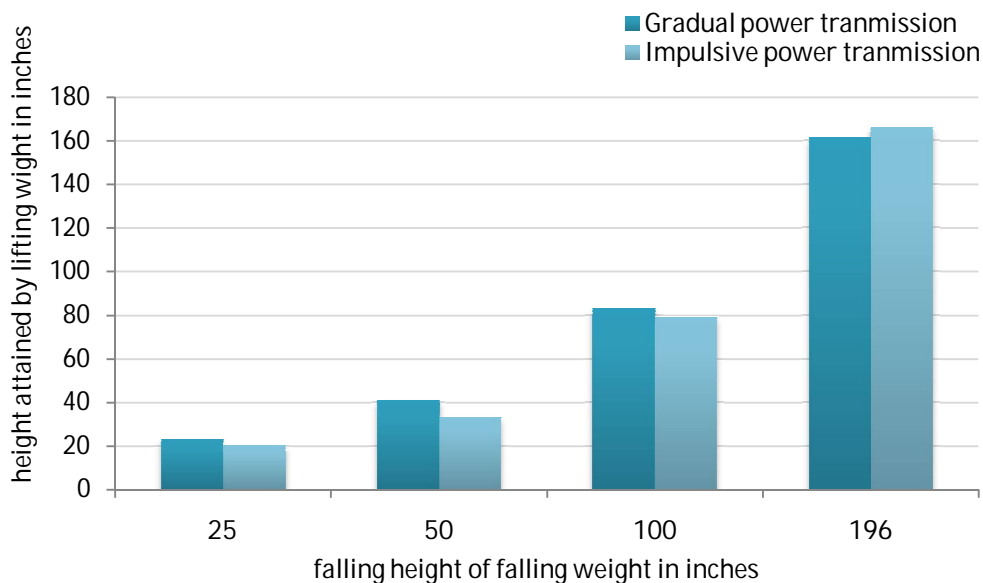


Chart 1, difference between gradual and impulsive power transmission at variable speeds of input shaft

From the above bar chart 1, plotted using results obtained from testing mechanism at variable speeds of input shaft we can see that as the speed of the input shaft increases the efficiency of impulsive power transmission increases. Also it is found that, at lower speed of input shaft gradual power transmission is more efficient than impulsive power transmission. According to readings, there is specific speed of input shaft which lies between 92 RPM and 140 RPM at which efficiency of gradual and impulsive power transmission is same.

Note: An electric motor is not a proper prime mover for taking readings of pulsed power transmission effect, due to its varying input power consumption. So it is better to use gravity powered mechanism or internal combustion engine (carburettor can be adjusted) to take readings and observation at constant input.

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• Results:

1. The efficiency of impulsive power transmission depends upon the speed of input shaft on which pulse pulley is mounted. The speed of input shaft of a system or mechanism get categorised in lagging rpm, critical rpm, efficient rpm, and limiting rpm;
 - (a) Lagging rpm: it is the speed segment in which the efficiency of impulsive power transmission is less than the gradual power transmission due slow speed of the input shaft (here 92 rpm is lagging rpm).
 - (b) Critical rpm: it is the speed of the input shaft at which the efficiency of gradual power transmission and impulsive power transmission is same (here critical rpm lies between 92 rpm and 140 rpm).
 - (c) Efficient rpm: it is the speed segment of the input shaft in which the efficiency of impulsive power transmission is higher than gradual power transmission (here 140 rpm is efficient rpm).
 - (d) Limiting rpm: it is the extreme speed of input shaft above which efficiency of impulsive power transmission either decrease or cannot be increase. The values of lagging rpm, critical rpm, efficient rpm, and limiting rpm vary according to system or mechanism.
2. The pause in power transmission due to use of pulse pulley does not effect that much on the defined speed of the system due to flywheel i.e. gives same speed output as gradual power transmission.
3. Time of power pulse in which power pulse is transmitted from pulse pulley to output shaft is also important factor to get maximum efficiency of mechanism. Time of power pulse should not be less than 0.3 sec, but this time varies from system to system.
4. As the number of power pulses per rotation increases output power increases, because it increases the magnitude of gravitational energy getting stored in flywheel mounted on output shaft.
5. Time of transmission of power pulse is not only depend upon the length of gripping arc but also depends on wrap angle of pulse pulley (length of arc of wrap angle of pulse pulley + length of gripping arc = total length of grip).
6. Time of pause in power transmission also affects the power output, if the time of pause is very less as compare to time of griping i.e. time of transmission of power pulse then pulse pulley cannot add sufficient amount of gravitational energy in power receiving shaft.

VI. MULTIPLICATION THEORY FOR IMPULSIVELY TRANSMITTED INPUT POWER 'X'

This is a *provisional* theory, and it is illustrated in terms of number of power pulses per rotation; where torque and RPM are two integrant of power pulse. Multiplication theory of input power 'x' can be used only when power is transmitted from input shaft to output shaft impulsively i.e. in the form of power pulses. This theory can be illustrated by using dynamometer tested technical specification of single cylinder, two cylinder and four cylinder engines. This theory also promotes the 'Theory of Pulsed Power Transmission in Mechanical Engineering' which describes that impulsively transmitted power possesses more magnitude at output shaft than the gradually transmitted power i.e. $P_{impulsive} = 2 P_{gradual}$.

Illustration:

Dynamometer consumes power from the engine shaft continuously during each rotation, whether there is power stroke taking place or not. Hence here in description of theory, *we are considering power (developed) present at the output shaft of engine during each single rotation*. In the following description 'x' is the power developed in output shaft due to burning of fuel in combustion chamber of engine.

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[A] Theoretical illustration-

Table 2: description of the theory for impulsively transmitted input power 'x' in the form of power pulse using 4 stroke single cylinder, two cylinder and four cylinder engines.

[01]	4- stroke single cylinder engine:	
	between 0^0 to 360^0 rotation 0 power stroke	between 361^0 to 720^0 rotation 1 power stroke
	Input power = 0	Power generating during power stroke = x
	Power developed = 0	due to impulsive power addition in output shaft effect of input power x becomes = 2x
Hence, power output during each single rotation = $2x / 2 = x$		
.....(A)		
[02]	4- stroke two cylinder engine:	
	between 0^0 to 360^0 rotation 1st power stroke	between 361^0 to 720^0 rotation 2nd power stroke
	Power generating during power stroke = x	Power generating during power stroke = x
	due to impulsive power addition effect of power x becomes = 2x	due to impulsive power addition effect of power x becomes = 2x
Hence, power output during each single rotation = 2x		
.....(B)		
[03]	4- stroke four cylinder engine:	
	between 0^0 to 360^0 rotation 2 power strokes	between 361^0 to 720^0 rotation 2 power strokes
	Power generating during power stroke = x + x	Power generating during power stroke = x + x
	due to impulsive power addition, effect of power x + x becomes = 2x + 2x	due to impulsive power addition, effect of power x + x becomes = 2x + 2x
Hence, power output during each single rotation = $2x + 2x = 4x$		
.....(C)		

In the above table, the result (A) is derived to compare it with the output results of multiple cylinder engine, result (B) and (C). Table 2 describes, magnitude of input power becomes twice due to impulsive power transmission only theoretically. The above theoretical illustration can be understood by comparing actual dynamometers readings of single cylinder, two cylinder and four cylinders 4-stroke engines.

Also it is found that, this theory not only works on engines having multiple cylinders but also works on magnitude of displacement i.e. magnitude of power pulse.

Table 3: description the theory of input power 'x' in the form of power pulse, when the magnitude of single power pulse is of twice the capacity of 'x'

[04]	4- stroke single cylinder engine:	
	between 0^0 to 360^0 rotation 0 power stroke	between 361^0 to 720^0 rotation 1 power stroke
	Input power = 0	Power generating during power stroke = 2 (x) = 2x
	No power addition = 0	because, here cylinder is of twice the capacity of x due to impulsive power addition effect of power x becomes = 4x
Hence, power output during each single rotation = $4x / 2 = 2x$		
.....(D)		

Results (A) and (D) theoretically describes, when the magnitude of power pulse becomes twice then the power generated due to that power pulse is also in twice the magnitude. The result (D) can be satisfied only by comparing two single cylinder 4-stroke engines, wherein engine displacement of one is twice than the other.

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[B] Practical illustration-

In this illustration results (B) and (C) with respect to result (A) are proved by comparing single cylinder engine with two cylinder engine, and single cylinder engine with four cylinder engine using their practical dynamometer readings. Wherein, the ratio of engine displacement between single and two cylinder engine is 1:2 and between single and four cylinders engine is 1:4.

Table 4: Comparison of single cylinder Honda GXV340 337cc engine with twin cylinder Honda GX630 688cc engine:

Engine displacement	337cc	688cc
Number of cylinders	1	2
Engine type	four stroke Petrol engine	four stroke Petrol engine
Power output	8.9 BHP at 3600 rpm 21.6 Nm at 2500 rpm	20.8 BHP at 3600 rpm 48.3 Nm at 2500 rpm
Total number of power strokes	1	2
between 0 ⁰ to 360 ⁰ rotation	0	1
between 361 ⁰ to 720 ⁰ rotation	1	1
Engine displacement ratio	1: 2.04 (688cc/337cc)	
Power output ratio	1: 2.33 (20.8 BHP/8.9 BHP)	

Table 5: Comparison of single cylinder Yamaha FZ25 249cc engine with 998 cc 4-valve 4- cylinder engine:

Engine displacement	249cc	998cc
Number of cylinders	1	4
Engine type	four stroke Petrol engine	four stroke Petrol engine
Power output	16.84 BHP at 6000 rpm 20 Nm at 6000 rpm	67.04 BHP at 6000 rpm 90 Nm at 3500 rpm
Total number of power strokes	1	4
between 0 ⁰ to 360 ⁰ rotation	0	1 st - 0 ⁰ to 180 ⁰ , 2 nd - 181 ⁰ to 360 ⁰
between 361 ⁰ to 720 ⁰ rotation	1	3 rd - 361 ⁰ to 540 ⁰ , 4 th - 540 ⁰ to 720 ⁰
Engine displacement ratio	1: 4 (998cc/ 249cc)	
Power output ratio	1: 3.98 i.e. 1: 4 (67.04 BHP/ 16.84 BHP)	

Dynamometer tested technical specifications described in Table 4 and Table 5 satisfies result (B) and (C) i.e. multiplication theory for impulsively transmitted input power 'x' *provisionally*. The word *provisionally* is used because; this theory is not practiced using technical data of engines having more than 4 cylinders. But it is seen that it works up to 4 cylinders engines in which power strokes does not overlaps with each other and there is pause between adjacent power strokes. The power output ratios may not be exact 1: 2 or 1: 4 but these ratios worth here.

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To prove theoretical illustration shown in table 3, which shows that if the magnitude of power pulse becomes twice then its output result becomes twice too. To illustrate this practically, in Table 6 the comparison between two single cylinder engines is shown; where one engine possesses twice the displacement (capacity) than other.

Table 6: Comparison of single cylinder Honda GX100 98cc engine with single cylinder Honda GX200 196cc engine:

Engine displacement	98cc	196cc
Number of cylinders	1	1
Engine type	four stroke Petrol engine	four stroke Petrol engine
Power output	2.8 BHP at 3600 rpm 5.7 Nm at 2500 rpm	5.5 BHP at 3600 rpm 12.4 Nm at 2500 rpm
Total number of power strokes between 0 ⁰ to 360 ⁰ rotation	1	1
between 361 ⁰ to 720 ⁰ rotation	0	0
Engine displacement ratio	1	1
Power output ratio	1: 2 (196cc/98cc) 1: 1.96 i.e. 1:2 (5.5 BHP/2.8 BHP)	

Technical specifications based on practical testing in above table 6 satisfied the result (D); described in table 3.

The purpose of making these comparisons and proving this multiplication theory of input power x is not to show that, as displacement of engine increases its power output increases. But, to prove that as we increase number of power pulses per rotation power output increases, also when we feed power to any output shaft with pause or intermittently i.e. in the form of power pulses the magnitude of developed power at the output shaft becomes twice in magnitude. This theoretical and practical illustration also proves the 'theory of pulsed power transmission in mechanical engineering' i.e. $P_{impulsive} = 2 P_{gradual}$ Where, P stands for power, which states that during transmission of power pulse some amount of gravitational energy gets harnessed into output shaft resulting into increase in magnitude of torque i.e. output power.

[C] Verification of 'Multiplication theory of input power 'x'':

For cross-checking the described theory, we have to compare above mentioned dynamometers reading with the theory in which effect of impulsive power addition is not considered. If we rewrite the results (A) and (C) of the proposed theory without considering the effect of impulsive power addition in the output shaft, then we get following table 7.

Table 7: multiplication theory of input power 'x' without considering effect of impulsive power addition

[01]	4- stroke single cylinder engine:	
	between 0 ⁰ to 360 ⁰ rotation 0 power stroke Input power = 0	between 361 ⁰ to 720 ⁰ rotation 1 power stroke Power generating during power stroke = x
	Hence, power output during each single rotation = $x/2 = 0.5x$(E)	
[02]	4- stroke four cylinder engine:	
	between 0 ⁰ to 360 ⁰ rotation 2 power strokes Power generating during power strokes = $x + x$	between 361 ⁰ to 720 ⁰ rotation 2 power strokes Power generating during power strokes = $x + x$
	Hence, power output during each single rotation = $x + x = 2x$(F)	

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After rewriting the theory, we get results (E) and (F), where comparison of these both results shows that magnitude of output power of four cylinder engine is four times greater than the output power of single cylinder engine i.e. $2x = 4(0.5x)$; and this comparison analogical with the technical specification of single cylinder and four cylinder engine described in table 5, where the output power of four cylinder engine is four times greater than single cylinder engine. According to our ideology of not considering effect of impulsive power transmission and considering output power only present in each single rotation, dynamometer readings of 998cc four-cylinder engine should be 33.68 bhp at 6000 rpm, because there are only two power strokes taking place in single rotation, but measured output at output shaft is 67.04 bhp; which is twice than the 33.68 bhp. This analysis shows that during each power stroke some amount of gravitational energy get added in output shaft of the engine. Same cross checking with two cylinder engine also shows effect of impulsive power transmission in output power.

We can also verify theory for multiplication of impulsively transmitted input power 'x', by analysing technical specification of two stroke engines, for this we have to compare two stroke single cylinders and two stroke four cylinder engine, wherein displacement of four cylinder engine 4 times than displacement of single cylinder engine. Specification of multicylinder 4-stroke engines having more than 4 cylinders are not used to illustrate this theory because, their power stroke overlaps, due to this there is absence of pulsed power transmission effect.

The above cross checking of theory shows that at the instant of adding of power developed (power pulse) during the power stroke some amount (twice approximately) of gravitational energy get added in the output shaft. The addition of gravitational energy due to impulsive power transmission increases power output, hence theory for multiplication of impulsively transmitted input power 'x' due to impulsive power addition gets proved.

VII. ADVANTAGES OF GENERATION OF POWER PULSE USING PULSE PULLEY DURING POWER TRANSMISSION

01. Capable to harness gravitational energy in systems running at higher speeds.
02. Easy to manufacture compact and high capacity power generating systems.
03. Capable to replace internal combustion engines.
04. Consumes less energy and gives more power than conventional power transmitting mechanisms.
05. Less pollution and silent working.
06. Low maintenance due to less moving parts.
07. Fabrication cost is low.
08. Easy to use in present working systems, as only few changes are required.
09. Efficient than gradual power transmission i.e. conventional power transmissions we are using today.
10. Pulse pulley is not a perpetual motion device, hence can work under load condition.
11. Due to impulsive power transmission some amount of gravitational energy gets added in output shaft, which is free in universe.
12. Capable to increase power output capacity of current power generating systems.
13. Easy to control number of power pulses per rotation of output shaft, by adjusting speed ratio between pulse pulley and power pulley.
14. Easy to maintain time of power pulse by adjusting length of gripping arc of pulse pulley at given speed.
15. The belt drive comes in contact with gripping edges of pulse pulley smoothly, results in low wearing of belt drive.
16. Due to compact design to minimise the losses during power transmission parallel pulse pulleys can be mounted on single input shaft.
17. Pulse pulley is option for Geneva wheel used in various mechanisms.
18. Mechanism can be used for re-fabrication of internal combustion engine, as their working is same.

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IX. CONCLUSION

Pulsed power transmission is efficient than conventional i.e. gradual power transmission we are using today, and capable to harness gravitational energy in the system during transmission of power pulses, resulting in increase in output power of the system or mechanism.

Also, the 'theory for multiplication of impulsively transmitted input power 'x'' originated from analysing internal combustion engine and 'theory of pulsed power transmission in mechanical engineering', originated from methods of applying load during testing strength of materials are scientifically interrelated with each other and can give us a better power transmitting devices to develop new capabilities in power transmission science. Time has come to switch for impulsive power transmission, to go green and fulfil our never ending energy demand.

ACKNOWLEDGEMENT

This research and invention is solely belongs to me, and funding for this research and development of its working prototype is provided by my mother. I dedicate this research to my mother Sarvodaya (Mamata) and my family who help me to complete my dream; Mechanical engineering, and my late uncle Er. Arun chaudhari (swami sir); who taught me to think bigger and innovative.

The content in this research paper is free and open to all, for the progress of energy science.

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International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 6, Issue 12, December 2017

BIOGRAPHY



Saurabh Vikas Chaudhari, Mechanical Engineer and inventor, working on gravity based power generating and transmission devices. He researched and collaborate the gravitational theories of Sir Isaac Newton and Mr. Lawrence Tseung to harness gravitational energy in running systems. He is the first, who puts the pulsed power transmission mechanism based on working phenomena of I. C. Engine and using mathematical calculation he proved, that the efficiency of mechanical system can be increased by using pulsed power transmitting components like 'pulse wheel/ flywheel' and 'pulse pulley'. He mathematically and practically proved that, during the power transmission using pulsed power transmitting components some amount of gravitational energy get harnessed in output shaft results in increase in power output. He proposed the concept of '*pulsebridization*' recently.

His main areas of research interest are designing machineries for the best performance, and enhancing the efficiency of present power generating and transmission systems to give better power generating solution than solar and wind power. Also he is working to replace internal combustion engine by re-fabricating them using pulse pulley.