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Design and manufacturing of INVELOX to generate Wind power using nonconventional energy sources

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ABSTRACT

It is a new concept of wind harnessing which overcomes every drawback of traditional turbine and provide power output with reduced cost. Its peculiarity is that it eliminates the tower loading turbines. Today standardization of wind energy generation is hoisting the turbines with massive blades top on the tower. But as economic perspective they are not affordable also unsuitable causing harm to people and wildlife. Considering INVELOX on the other hand captures the wind Omni-directionally and funnel it to the ground level where impact of the high velocity wind on the turbine causes energy generation. And thereby INVELOX has proven to be a solution of all the problems arises due to the traditional windmills like low turbine reliability, downtime issues adverse environmental impact. the overall objective of this work is to model and to understand actual fluid flow inside the INVELOX where the wind turbines are situated. Various computations are carried out to check the relation between wind direction and inside geometry of system and now the study shows it is possible to capture, accelerate and concentrate to obtain higher power output. And hence INVELOX is better way of harnessing wind energy any time any were.

Keywords: Wind energy, nonconventional energy, affordable energy generation, ducted turbines, increased wind velocity.

I.INTRODUCTION

Energy Production is most important issue of today's era. We have been using different kinds of energy in our day to day life. We have been using fossil fuels in the form of energy since 1700's. The industrial revolution of 18 century gave rise to use of substance based energy forms i.e. fossil fuels like petrol, diesel, gasoline, etc. These energy forms are easily accessible in nature. But even though being easily accessible these energy forms are available in limited amount and world is leading towards population explosion on other hand. Also they have some drawbacks like they are getting unaffordable day by day, and their emission leads to pollution, thus causing damage to ecosystem. And now from 1970 onwards we started facing energy crisis due to all these factors. Hence it was need of time to adopt new energy generation techniques.

Soon world was introduced to few process based energy forms or in other words non-conventional source of energy. Solar energy, wind energy, tidal energy, thermal energy, hydel energy, etc. are some of the non-conventional forms of energy. From this wind energy are mostly used energy. And this is done with the help of windmills. And therefore the wind turbines have reached every part of the world. But in order to meet higher energy output bigger generators along with massive blades needed to be emplaced with the taller towers, which again lead to the increase in expenses. And if estimated the cost exceeds the cost of energy generation by hydel power and many other energy generation methods. Not only that they are also known to have ill effects on human and wildlife due to their tendency of producing low-frequency sound waves.

Many innovators [3,5] worldwide started searching for solutions in order to overcome these problems. And then they came up with biggest innovation that can prove to be boon in upcoming years. A newly developed technology has been introduced to world viz. INVELOX (increased velocity). Invelox is the patented technology that captures and delivers wind energy and provide more engineering control [1,2]. While the traditional wind turbines use huge turbine generators mounted on the top of the tall towers, INVELOX on other hand funnels the wind energy being on ground level. It is in fact a funnel shaped system which captures the air omnidirectional and accelerates the air naturally once it enters it. This air then drives the generator which is installed in the venture portion of the system. All this provides safe, pure and economical energy output.

II.LITERATURE REVIEW

Utilizing the wind energy for the wind energy for various application is an ancient concept. Initially wind energy was used for sailing boats, circulating the outside air in the houses for cooling purpose, agricultural purposes for cleaning harvested grains.

Innovation has helped in building massive devices for harnessing this wind energy, and better example of it is INVELOX. Till now we all are familiar of traditional wind turbines but we are unaware of its drawbacks. But INVELOX technology had succeeded in overcoming all the drawbacks of this traditional wind mills and is promising a better energy generation.

- This do not require site selection unlike in case of traditional wind. This INVELOX system can be retrofitted to residential buildings and factories.
- INVELOX [9] can be installed in the sites which are not suitable for traditional wind mills.
- It can be very helpful in militaries, since there are now sources of energy.
- With proper planning this technology can also serve the purpose of ventilation in the places where there is scarcity of ventilation.
- Irrespective of velocity of wind this technology can be installed in places with low velocity (2 m/s) to extremely high velocity like in typhoon conditions too.

- We are living in the era where meeting the energy need is the most crucial factor to be considered, but along with this we should also be concern of the maintaining the eco-friendly relations with the environment.
- Unlike traditional wind energy generation INVELOX does not cause any harm to the birds, biodiversity, wildlife.
- As compared to traditional wind mills the INVELOX [10] produce 5-6 times of energy acquiring the same amount of area.
- Traditional wind turbines have tendency to produce electromagnetic radiations which causes harm to the electronic devices. Gadgets like cellphones, televisions, etc. cannot be used in this areas.

III.CFD (COMPUTATIONAL FLUID DYNAMICS) ANALYSIS

From literature review it is concluded that CFD test conducted on INVELOX system using ANSYS. The speed ratio is important design factor to be considered at the time of designing. From this result [6] it is concluded that the speed ratio is almost twice, speed ratio is the ratio of the velocity of wind at venturi section to the free stream velocity at inlet. The dimensions considered during the CFD analysis in ANSYS was 1.8 m diameter of the venturi section, height of 18m which is considered from the center of the inlet to the ground level. The result obtained showed that the inlet free stream velocity of the wind was 6 m/s and the velocity at the venturi was 12m/s. All this analysis shown in the figure (1.a) given below.

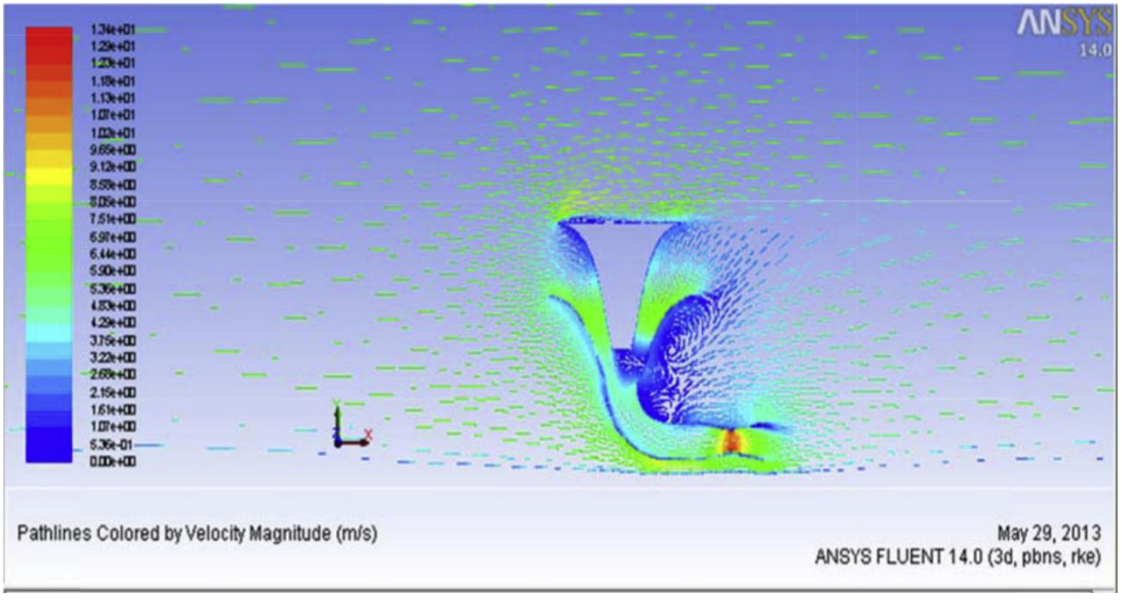

Fig. 1.a. CFD analysis using ANSYS [7]

The analysis was conducted by the keeping the horizontal plane perpendicular to axis of symmetry of the intake following results were obtained. This is shown by the fig. 1.b. below.

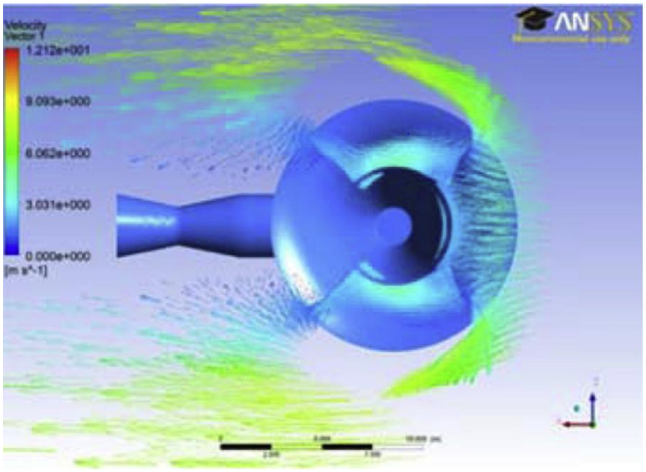

Fig. 1.b. top view

IV.CONCLUSION

Form this literature study it is concluded that wind is captured omni directionally and then funneled to get high power output [8]. It is also known that this technology can replace traditional wind mill in upcoming era. After going through all research paper it is known that power output is increased by increasing the mass flow rate or total energy drop across the turbine.

From the study of the research papers it is concluded that power obtained through Invelox systems is 5-6 times more than that power obtained by traditional wind mills with respect to size. Also there are no adverse impact on the environment. Hence there is no harm to the locality. There is no sound pollution caused due to Invelox unlike traditional wind mills.

Besides of having all the advantages it has one drawback, i.e. its cost increases with respect to its capacity. After studying this we came up with an idea of making further inventions in this system.

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