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INNOVATION IN A WATER WELL POTABLE DRILLING MACHINE DESIGN ANALYSIS

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ABSTRACT

Creativity makes ideas and innovation exploits them. Good design bonds the two. Concept/ideals/markets influence it to become attractive and practical proposition for users or customers. Design is associated readily with industrial design product for manufacturing products. The presentation is much larger in design. For instance, sustainability, designing for function, aesthetic appeal; for ease of manufacture

The advance of wells for groundwater supplies in rural areas, particularly in developing countries, like Nigeria is of major concern; a narrow aquifer may prove to be sufficient in small communities, in such areas. These communities use their own initiative to acquire water for drinking, either surface water sources or groundwater sources. Water is fetched using buckets tied to ropes; unfortunately, human activities have poisoned the natural water sources, many are even drying up due to deforestation and underprivileged land husbandry, greatly reduced unless treated, high level of poverty makes water treatment virtually impossible. In respect of the above, it is essential to provide a means of exploring groundwater for rural dwellers since the surface water they rely on has been polluted by both industrial and domestic activities. Our research goal is to analyze, produce a low-cost, easy-to-use drilling machine, which will be used comfortably and effectively for rural dwellers.

KEYWORDS: Design; innovation; groundwater; analysis; portable drilling & sustainability

INTRODUCTION

The central factor of innovative humanization of technologies and the crucial factor of cultural besides economic exchange is known as design.

Design can include wide-ranging activities aimed at planning and designing procedures, technical specifications and other user and functional characteristics for current products and processes.

The recent financial catastrophe and economic hold-up have made the need to find complementary innovation drivers and models more acute and the external funding became difficult to obtain. It is noted that innovation came, not to discontinue R&D, but it should be encouraged as well as innovation activities that are close to shop and have low capital requirements. Existing expertise must be used in innovative ways to bring approaching innovation, incremental, or radical, produce and services that are healthier, adapted to user. Water, "The drop of life, as many fondly call it, can be an indispensable substance, since life is concerned."

Its many uses and applications, to mention a few, include generating electricity, agriculture, support of life, etc. In summary, without this substance, nothing in life would move. (Life water, 2004). The major challenge in providing

groundwater for domestic use is its exploration from the aquifer.

Adequate machines and construction technologies used in well construction are normally larger in size, which make it difficult to access rural route. Complicated operation procedures make the whole process costly because it cannot be operated by the rural dwellers. With this in mind, nature is generous enough to make the provision of water at a good appreciable proportion.

This is justified when a glance is made at geology. At this point, it is observed that a higher portion of the world is made up of water. It is even understood that the world was founded upon water (from the Bible). In spite of this geologic fairness, the demand for water has so raised that man, through his whims for discovery, has devised many means through which the substance can be accessible to areas where its availability might be reduced. Out of such quest and exploration came the idea and art of drilling a well paroxysms or water.

Though the groundwater may be thought of as being a portion of water or hydrologic cycle, it is called to note that there are some, which deviate from this norm and come to exist on their own, though these categories of water exists in diverse forms, a more appreciable one is the "JUVENILE" water (Hydra-Fab Mfg. Inc. 2009). This is a form of new water, which is obtained from magmatic or cosmic origin.

This had been trapped in the magma formation of the world for an appreciable portion of geologic period. Other sources, which have also harbored underground water include:

The Connate: this consists of fossil interstitial water that has migrated from its original location, is highly mineralized.

The Metamorphic: this water has links with rocks during their metamorphism, also the magmatic and volcanic waters. Groundwater occurs in various formations geologically. These formations hence affect the extent or quality/quantity of water that could be obtained at any point in time. Such properties include:

The Aquifers: the materialization which consists of adequate saturated penetrable material to yield substantial quantities of water of well and springs. It implies the capacity to accumulate and transit water, unconsolidated gravels and sands are the characteristics. Other terminologies that can be employed for an aquifer are groundwater reservoir and water bearing-formation. There are various types of aquifers, which include:

The Unconfined Aquifers: this one is in various undulated water table forms and slopes, liable on area of discharge, recharge pumpage from well and permeability.

Rises/falls in the water table resembles changes in the volume of water and storage within aquifer.

That type occurs whenever the body is separated from the main groundwater by comparatively impermeable stratum of small area extent and by a zone of ventilation above the main body of groundwater wells pitter-patter that source yield only temporary or small quantities of water.

The Confined Aquifers: these, which are also known as pressure aquifers, occur where groundwater confined under pressure is larger than distinctive, by overlaying relatively impermeable strata. The main region that confines the water contented can be called the confining bed. Restrained aquifers display only small changes in storage and serve main conditions for conveying water from recharge areas to location of natural or artificial water for conveying to leaky aquifers.

This occurs in lake sinks, where absorptive, superimposed, or essential by a semipervious aquitard, or semi-confining layer.

Porosity: those portions of rocks or soil not occupied by soil mineral matters can be occupied by groundwater.

These spaces are known as voids, interstices, pores, or pore spaces. Hence, porosity of a stalwart or soil is a portion of the contained interstices or voids. The Specific Surface: the water retentive property of a soil or rock is markedly influenced by its surface area. This area depends on the particle scope plus outlines the type of natural resource present. The specific period mentions the area per unit weight of the material (m^2/g). Surface Identification of Groundwater: Although groundwater cannot be seen on the earth's surface, diversity of techniques can provide information concerning its occurrence and under certain conditions even its quantity/quality from surface or above–surface locations.

Such techniques and methods employed for these investigations are normally less costly. Such methods include:

The Geologic Method: this involves a study and of Existing Topographic Maps Aerial Photographs Logs, Geologic and other Pertinent Records

Supplements are needed if possible when the geologic field exploration evaluation of available hydrologic on stream, springs and flow well yields springs; well yields; groundwater discharge, recharge levels and aquatic value.

Remote Sensing: in this method, photographs of the earth taken from aircrafts or satellites at various electromagnetic wavelength ranges provide useful information of groundwater condition. This approach has become an increasingly valuable tool for understanding surface water conditions.

The Geophysical Technique: this technique which employs the system of electric resistivity and seismic alteration methods provide only indirect indication of ground aquatic that underground hydrologic numbers must be contingent from surface data. Here, correct interpretation requires supplemental data from subsurface investigations to substantiate surface findings.

Countries that breed innovation produce new technologies and inspire adoption of these new technologies, which mature faster than those that do not. Innovation is the nature and transformation of new knowledge into new goods, processes, or services, which meets market needs.

DESIGN, MODELING AND SIMULATION OF MACHINE AND THE COMPONENTS

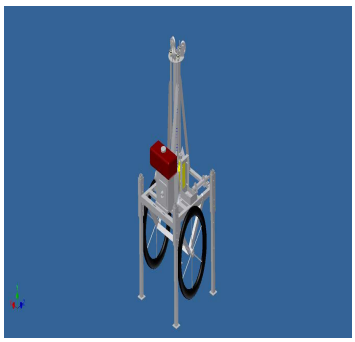


Figure 1: CAD Drawing

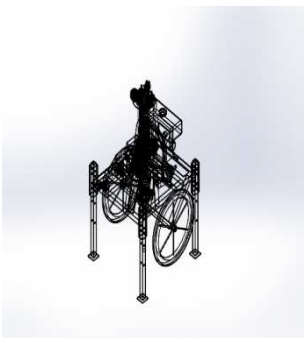


Figure 2: Wire Frame

Figure 3: Sustainability

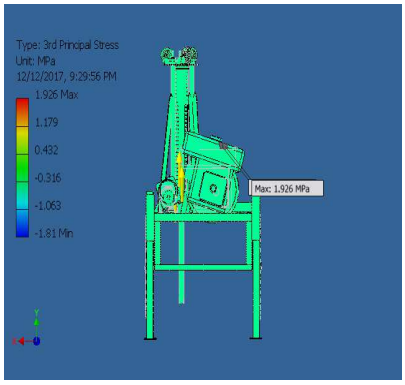


Figure 4: Simulation Analysis

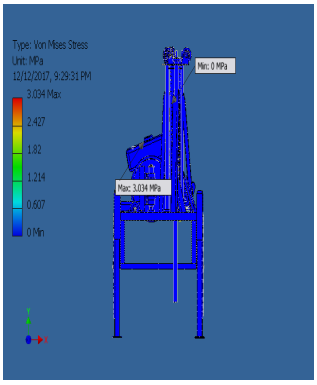


Figure 5: von Miss Stress

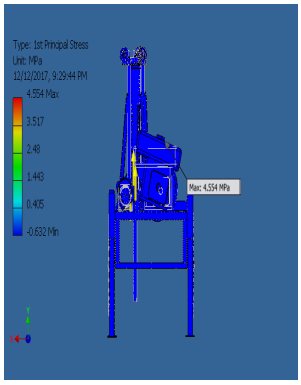


Figure 6: 1st Principal Stress

Figure 7(a): 3rd Principal Stress

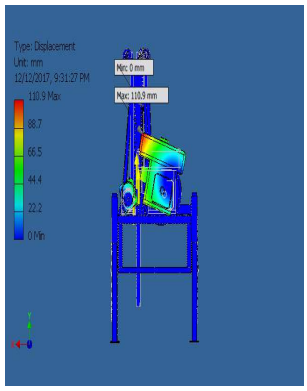


Figure 7(b): Deformation

Figure 8: 83rd Principal Strain

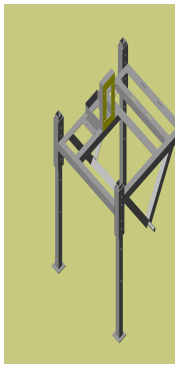


Figure 9(a): The Frame

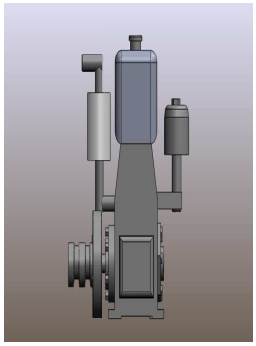
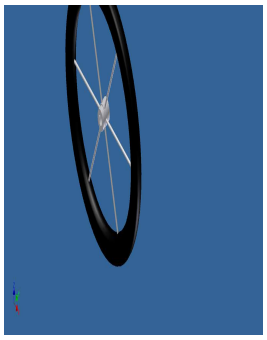
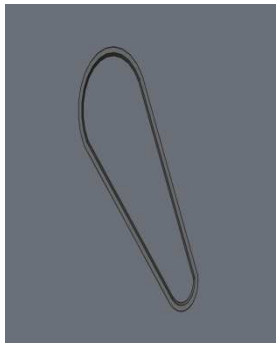


Figure 9(b): Prime Mover



9(c): wheel



9(d): Belt

INNOVATION

It is stated that countries that breed innovation produce new technologies and inspire adoption of these new technologies mature faster than those that do not. Innovation is the nature and transformation innovative technology into new goods, process and/or services, which meets market needs. innovation creates business and the fundamental source of growth in the business and production. Two important definitions are innovation of product and the outline of innovative production, significant qualitative change in an existing product. Innovation process: the overview of new process for production or conveying good and facilities.

Selected authors stressed on the third grouping of innovation, the organizational changes within them. We see this as being naturally within the second group, as diversity of novelty process 1, innovation products may be perceptible services, perceptible manufactured or a combination of the two. Examples of recent tangible product innovations that have had actual significant control on way people live and work are personal computers, mobile phones and microwave ovens.

Intangible products that complement with physical equipment include the various pieces of computer software needed to control the flow of information through these devices, prominent to the delivery of information, the supply of communication services, or the arrival of a correctly heated dinner. Equally, first-hand innovation processes are good ways of doing and making things arise from new combination of intangible and tangible inputs. A robotic deliver welding services than man with greater precision in assembling cars, it is a good system as computer control. Schumpeter used the word “innovation” in the beginning of the 20th century for the first time”. His philosophies/researches were developed by other authors.

He stated innovation as a process, product and organizational changes that did not necessarily initiate from new scientific discoveries (Žižlavský, 2011), but may arise from a blend of already existing technologies and their application in recent context. Žižlavský, 2011 stated that innovation originated from public research Autant–Bernard (2001). It is possible to summarize conferring these definitions do not conceal in technical/technological changes and improvements, but precise practical application is particularly created from research.

Innovative research and human capital are stressed in Zemplinerova and Autant-Bernard (2001) who well-thought-out the most important determinants of innovation. The innovative must have a bucketful of idea in any organization. Adair (2004) reported Process Innovation should be double in inventive parts, such as concept or thought that generate original ideas, and the implementation and marketing of innovations during creation. As stated by the following authors: Pitra (2006), the result of worker’s creativity in association must be always targeted at the customers, who bring added value in innovation. It is necessary to note that for people grounded in experience, skill and knowledge, inventive part is important.

For the human element factor, innovation process is essential. Based on investigation of external and internal conditions, people generate ideas that might benefit an organization to have completive advantage. Innovative capability of an organization can be subjected to closely on its intelligent and/or organizational data resources and capable to employ these resources in Periodical of Competitiveness separate it from its opponents for a certain period of time, as stated above. Martín-de Castro, Delgado-Verde, Navas-López & Cruz-González (2013). Nazari-Shrkouhi Azhdari, Dalfard Noruzy & Rezazadeh (2012) researches revealed that knowledge management and organizational learning directly prejudiced organizational innovation, whereas structural innovation/organizational learning directly prejudiced organizational

performance.

The technologically successful innovation development is indispensable for producing and sustaining an organization's competitive advantage. Martin de Castro *et al.* (2013) reported according to Zemplinerová (2010) the determining characteristics for gaining a prevailing percentage of market depending on the expenditure on research, development and introduction of innovation. Their survey reveals the worth of the part/regional innovation and they argue that organization must have innovative plans and support the knowledge runs from and to organization. Reported by the following authors -Autant-Bernard, Fadairo & Massard (2013). It is sustained by outcomes of Norruzy *et al*. (2012) and Autant-Bernard (2001).

COMPUTER

Computers like no other positively affect engineering. Many companies apply computer as tools in calculation, design, simulation, analysis of information, respectively. Computer is an accomplishment of numerous tasks in design process, as listed below:

Mesh Creation: Maxwell has its own meshing that is normally applied in each analysis, which allows one to run simulations without caring about mesh settings.

The mesh properties selected by Maxwell are usually the best for streamlining simulations, but if a more complicated analysis is made, one has to modify the mesh according to what the analysis or design needs.

Assigning Analysis: Here, nothing is changed or modified. An analysis for the solver is assigned. In a transient-type solution, however, more attention should be considered in this step.

Validation Check: This step assures that the design and/or model is ready for the final solution. Here, Maxwell goes over the design step-by-step: Geometry, Excitations, Boundaries, Optometric and Meshing

ANALYSIS OF PORTABLE WATER WELL DRILLING MACHINE

Analysis is the advance creating process in a simpler compound substance or material into smaller parts in mandate that have improvement.

Before Aristotle in 384 – 322 B.C., the exercise has been valuable in learning both calculation and rational perceptive. Engineering specialists in constructions, machineries and measurements also study various factors combined in the design. As displayed in figures 4–8, the general shear 3D state of stress is characterized by six stress components. Von Miss stress expressed either by six components as stress von Mises can also be expressed by the three principal stresses, has explained that stress von Mises is non-harmful scale stress measure.

$$\sigma_x,\ \sigma_v,\ \sigma_z \ and\ \tau_{xv} = \tau_{vx},\ \tau_{vz} - \tau_{zy},\ \tau_{xz} - \tau_{zx}.$$

Von Miss stress σ_{vm} expressed either by six components as

$$\sigma_{vm} = \sqrt{0.5 \times [(\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_2)^2 + (\sigma_2 - \sigma_1)^2]}$$

Von Mises stress can be also expressed as three principal stress as

$$\sigma_{vm} = \sqrt{0.5 \times [(\sigma_1 - \sigma_2)^2 + (\sigma_2 - \sigma_3)^2 + (\sigma_3 - \sigma_1)^2]}$$

stress von Mises is normally used to present outcome since the basic safety for many engineering material is elastic-plastic properties (for instance, steel and aluminum should be able to be evaluated using stress von Mises). Stress von Mises the maximum failure criterion is based on the von Mises-Hencky theory, which states "the material that is ductile start to yield at a location when the stress von Mises become equal to stress limit. The strength yield is used as the stress limit in most cases. Failure criterion according to the von Mises in factor of safety (FOS) is expressed as

$$FOS = \sigma_{limit} / \sigma_{vm}$$

where σ_{limit} is yield strength.

DISCUSSIONS

The creation, transformation of new knowledge, altered goods, process and services that meet market needs are called innovation. Innovation generates new business and the source of growth in business and industry.

Innovation may allow existing markets to evolve with better value, allowing firms to compete against and build upon each other's improvements. Innovation sustaining does not upset existing markets. Such an innovation is called innovation sustaining.

DESIGN

Design is associated with industrial product and design for manufactured product.

The solicitation of design is much wider, such as designing for function, for ease to manufacture, design for reliability for aesthetic appeal, see figures 1–3 & 9, A, B and C.

Sustainability: Sustainable manufacturing comprises the combination of processes, decision-making and the environmental concerns of an active industrial system that will help to achieve economic growth without destroying the precious resource/atmosphere. Sustainability relates to the entire life cycle of a product, which involves selection of materials, extraction of those materials, like recycling parts, recovery, assembly methods, sustainability, retailing and product use. Manufacturers will focus on issues that they are concerned most, as shown in Figure 3.

SIMULATION

Simulation is a powerful method of modeling manufacturing systems, many diverse and intricate systems can be signified, predict system performance measures that are difficult to assess without a model. It is a proven and successful tool since 1950s, as illustrated in Figures 4–8.

Innovation Analysis in a Water Well Potable Drilling Machine Design

It is well known in Nigeria that those who work in the agriculture sector as a profession are poorer than other sectors. The living standard is so low and funds that help to facilities them in their business is a major handicap in the development.

Research indicates that the few available small processing apparatuses are not very efficient. The inefficiency of small-scale processing tools to farmers has increased the inability of their farming activities. The percentage of output and

input of agriculture is considered as agricultural productivity, while separately their goods are measured in masses, weight and overall agricultural outputs is difficult for them. Output is the value of market in the final output that excludes intermediate goods, like feed corn used in meat business.

The productivity measures partial output value associated with many different types of inputs, such as land and labor. The designated total factor of productivity (TFP) can be measured as Agricultural Productivity. The method of calculating agricultural productivity is associated with inputs and outputs index.

This productivity of agriculture was measured to remedy the well-known shortcomings of the partial measures of productivity; it is often hard to ascertain the factors that cause them to change. The technological developments usually attributed to deviation in TFP novelty, may be organized to bring forth positive changes in quality competitiveness and market share in the organizational context. Recent investigations highlight the complementary role of organizational culture in enabling establishment to explain innovative activity into tangible improvement performance. Organizations can expand profits and performance by providing work groups, opportunities and capitals to update employee's core job tasks. Research theme was derived against this background and the benefits are listed below; Nations see Innovation as important.

It is an economic driver of growth, increased welfare, linked to the creation of new types of jobs and destruction of old ones. In the recent book, Baumol stated that since the 18th century, all the economic growth was virtually and ultimately attributed to innovation.

CONCLUSIONS

It is a fact that countries that created new technology/encouraged innovation: companies which applied new know-how matures quicker than those who are not aware. Based on this discussion, the following policies are necessary. Efforts should be made to adopt and popularize the design – DFX and DFA, for the welfare of mankind, who have greater number of the state's population. If design machine innovations (our research) are adopted, effort in water and other agricultural processing equipments manufacturing will be minimized, and hunger and poverty will be eliminated in Nigeria.

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