



Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Experimental investigation on nano refrigeration using TiO₂ CuO and Al₂O₃ as refrigerants

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ARTICLE INFO

Keywords:

Refrigerant
Nanoparticles
COP
HFC134a

ABSTRACT

Volatility of heat flow is vital in the refrigeration and cooling frameworks. However, working fluid was utilized in cooling cycle and they were devouring an Earth-wide temperature boost coefficient at undeniable level, However the an Earth- wide temperature boost up capability of HFC134a is marginally high, it should attested that it is a drawn out elective refrigerants which affect the atmosphere of nation.. By expansion of Nano powders to the outcomes of refrigeration cycle which upgrades in the properties of thermos physical and intensity to improve qualities of the working fluid, accordingly working on the execution of the refrigeration framework. In this work, looking at the impact of utilizing, TiO₂,CuO,Al₂O₃ - R134a and inorganic oil in the fume pressure framework on the dissipating heat transmission coefficient. Polyester Oil was tried alongside reasonableness what's more, natural accommodating refrigerant R-134a. Results show that TiO₂,CuO,Al₂O₃ nanoparticles concentration of 0.8 wt% is ideal and gives most noteworthy intensity move improvement and work on the coefficient of Performance(COP). A test rig of mechanical assembly was fabricate as indicated by the public guidelines of India. Nano TiO₂ fixations went from 0.05 to 0.8% volume extent and molecule size from 10 to 70 nm. That's what the outcomes show that evaporator warmth move coefficient increments with the utilization of Nano TiO₂,CuO, Al₂O₃. Finally it is observed that after mixing the TiO₂,CuO, Al₂O₃ in HFC134A, there was a drastic decrease in evaporator temperatures at faster rate.

1. Introduction

The way to major advances in innovation is the organizing of new materials which are novel and fundamental to meet the challenges by subbing customary materials. With colossal examination and innovative examination over the globe: -nano has definitely changed and tested each part of the manner in which we think in science and innovation. Nanostructured materials envelop a wide class of materials like composites, nanocrystalline materials, slight movies, multi-facets, etc. Their uniqueness is in showing a clever conduct in properties, for example, optical, warm, attractive and electrical because of a few new material science peculiarity, or because of speculations like nuclear connection points, quantum repression, attractive spaces and some more.

Despite having a relatively high greenhouse warming potential (GWP), (1–1–1–2-tetrafluoroethane, or HFC134a, is primarily used as a working fluid in refrigeration around the world. HFC134a has long been accepted as a reliable alternative refrigerant in many countries. Nano refrigerants have emerged as significant alternatives to common

working fluid like HFC134a used in refrigeration systems in the current fashion. According to Saidur et al. (2011), nanoparticles are used in refrigeration frameworks due to their remarkable changes in thermo-physical properties and heat transfer capacity, which are used to improve the efficiency and dependability of refrigeration and cooling frameworks. According to Elcock (2007), TiO₂ nanopowders can be used as additional materials to work on the inorganic oil's ability to dissolve when combined with hydro-fluorocarbon (HFC) refrigerant.

Additionally, according to the authors, refrigeration systems using HFC134a, mineral oil, and TiO₂ nanoparticles appear to perform similarly to HFC134a and Poly ester oil systems while returning more ointment oil to the blower. According to H.K. et al., conventional mineral oil should not be used as a grease since refrigeration equipment uses the solid synthetic extreme of HFC134a. Additionally, inorganic oil as a lubricant causes stream gagging and intense friction in the blower. In order to improve the functioning of liquid characteristics and the energy viability of the refrigeration system associated to a reduction in CO₂ outflow, nanopowder particles can be used. Nanotechnology is the

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<https://doi.org/10.1016/j.matpr.2023.07.044>

FABRICATION & PERFORMANCE ANALYSIS OF DUAL-SIDE RECIPROCATING PUMP USING SCOTCH YOKE MECHANISM

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Abstract: In this project, an attempt has been made to use a double-acting reciprocating hydraulic pump to get an increased water supply for water supply output a mathematical calculation has been done.

Dual side doubles acting reciprocating water pump setup using the scotch yoke mechanism consist of two reciprocating water pump setup in which a piston is a provider for the pumping action here, a clamp plate is used to guide the piston to move in a reciprocating motion, and a specified motor is operated to run the clamp plate due to this motion of the piston high pressure is attain inside the pump and water is pumped out here the reciprocating motion of a piston is the key function for the operation of the pump and a result of this repeated action.

Trust is developing inside the pump due to this crust delivery of water for the cylinder carry out the delivery action takes place by a moment of the piston as the flow of water is constant so the water delivered will be high pressure here in this work double side action of a pump is been utilize for doing work on the pumping of water intern discharge rate and efficiency of pump will be double when compared with a single input for motor further a test analysis is been carried out on the performance of double acting reciprocating pump by changing using the different pulleys of varied size for the same scotch yoke mechanism and a comparison between the tests setup can be done over the parameters such as discharge, torque and efficiency of the pump and assess the performance of engine finally conclusion can be depicted.

Keywords: Scotch Yoke, Pulley, V-Belt drive, Motor, Reciprocating Pumps, Camshaft.

1. INTRODUCTION

A pump is a Mechanical device that converts mechanical energy into hydraulic energy. This pump is classified into two types;

- i. Positive Displacement and
- ii. Non-Positive Displacement pump

In a positive displacement pump, the liquid is transferred positively from one stage to another stage by the to and fro motion of the piston or piston of the pump. In a non-a positive displacement pump the liquid is transferred by the centrifugal force. This force is caused due to the rotary movement of an impeller. In this project, the radial piston pump is a positive displacement pump. The salient features of a Radial piston pump have been retained in our project model and this has been achieved with great care. Due to the high precision work involved in producing radial piston pumps and the higher cost, these

Cooling the Future: Advancements in Thermal Management for Electronic Devices

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Abstract: The rapid evolution of electronic devices, characterized by increased power and miniaturization, has necessitated innovative thermal management solutions. This journal, "Cooling the Future: Advancements in Thermal Management for Electronic Devices," delves into the multifaceted realm of thermal cooling technologies. With electronic devices generating heat at an unprecedented rate, the need for efficient heat dissipation mechanisms has never been more pressing. This abstract provides a glimpse into the journal's comprehensive exploration of passive and active cooling methods, including liquid and phase-change cooling, alongside cutting-edge developments such as advanced materials and smart thermal management. The review showcases the ever-expanding horizons of thermal management, emphasizing the paramount importance of these advancements for sustaining device performance, longevity, and environmental responsibility in our fast-paced digital age.

Keywords: Thermal cooling , Active cooling methods , Electronic devices .

1. INTRODUCTION

In the ever-accelerating world of technology, electronic devices have made remarkable progress, continually pushing the boundaries of what is possible. This progress, however, comes with a formidable challenge: the generation of heat within these devices. As electronic components become more powerful and compact, the efficient management of heat has become a pivotal concern for engineers and researchers alike. This journal, titled "Cooling the Future: Advancements in Thermal Management for Electronic Devices," embarks on a journey into the intricacies of thermal cooling technologies and their evolving role in sustaining the future of electronics.

The generation of heat within electronic devices is an inevitable consequence of electrical resistance, transistor switching, and other processes fundamental to their operation. The implications of this heat, if left unaddressed, can range from reduced performance and a shortened lifespan of components to permanent damage. Thus, the implementation of effective thermal

Numerical Simulation on Solar Drying System using FEA

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Abstract

For the country's economic prosperity and food security, agricultural crops, fruits, and vegetables must be stored for longer periods of time. Due to the lower return on investment for the products on the market, farmers across the nation are experiencing severe challenges in the farming industry. Agricultural produce's perishable nature is the main cause for concern, which can be reduced by using the right solar drying processes. Since moisture is the major food supply for bacteria and fungus to live, a higher moisture content is vital to the rotting of products. The products' wetness can be removed using a solar drier. A fresh geometrical configuration for the solar dryer is created by taking into account and combining various geometries that we encounter every day. The fluctuations in and around the trays inside the chamber are noticed using these drying chamber geometries that have been simulated using entrance velocity. Truncated Cone over Cylinder with Side Air Feed exhibits the best performance among the simulated geometries. To achieve the best tray location for uniform heating and optimum air circulation, trays are positioned in this geometry at various distances and in various orientations. Tray distances of 0.3 m, 0.2 m, and 0.1 m with a 90° orientation exhibit the best results following modelling of various tray positionings. Therefore, it is suggested that the Solar Dryer with Truncated Cone above the Cylinder with Side Air Feed, having Tray Distances of 0.3 m, 0.2 m, and 0.1 m, with 90° orientation, be used as the optimum model with superior location.

Keywords: Solar dryer, Simulation, Geometries, Tray Positioning, Drying Chambers.

1. Introduction

Food is the basic need of every living organism on this planet. Food products are produced in one place and are transported to different places. These products are essentials for human survival. These products contain humidity in them which makes them easily perishable. So, removing moisture from products is the best way to transport distant places. It can be done in many ways; in previous centuries, people used to spread the products in open space and expose the products directly to sun light, but it produces uneven moisture removal, insects and rodents consuming the crop and failure to achieve safe storage, this drying process is less efficient. Drying plays a vital role in improving the lives of the product by reducing the moisture content. According to Si, Xu et al. [1], there are different types of drying methods: Convection drying, Bed dryers, Drum drying, Freeze Drying, Microwave-vacuum drying, Shelf dryers, Spray Drying, Infrared radiation drying, combined thermal hybrid drying, Solar Drying/Sunlight, Commercial fooddehydrators, Household oven. Solar Drying is one of the cost-effective and economically

DESIGN AND FABRICATION OF A SINGLE-SHAFT SHREDDER MACHINE

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Abstract:

Currently, the largest source of pollution that produces dangerous pollutants that have an immediate impact on both the environment and human health is the way in which trash is disposed of. The majority of this trash is made up of plastic, rubber, paper, and soda cans. Nowadays, the majority of waste products are either non-biodegradable or take decades to breakdown, which increases the volume of rubbish in landfills. The ongoing processes of making and using rubber, plastic, and paper products as well as the intensified construction contribute to a significant buildup of waste, an imbalance, and a hazard to the environment. The requirement for decreasing domestic and technological waste and reintegrating them into the manufacturing process is evident in all industrial civilizations. This shredder machine assists with waste management and disposal by crushing used bottles and cans. This machine is inexpensive to operate and repair because it was built with locally accessible raw materials. The machine is made up of a three-phase electric motor, shaft, bearings, structural frame, cutters, a hopper, a shredding unit, and a discharge chute. The shaft has four cutters placed on it; they are driven by a belt to rotate. With a belt drive, the cutter shaft receives power from the electric motor. An internal cut is made due to the effects of tension, friction, and impact during the shredding process; cuts are created inside the shredding device. The twigs are crushed, and the little fragments are gathered in the shredder's discharge chute. The device is user-friendly and suggested for farmers and small and medium-sized business owners.

Key words: Recycling, Three phase motor, Plastic, Shredder machine

1. Introduction:

A shredder is a piece of machinery or gear used to shred things. While most online dictionaries define the shredder as "a device used for shredding documents as a security measure

DESIGN AND FABRICATION OF ORNITHOPTER

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1. Abstract:

In this essay, the theoretical idea of creating a powered ornithopter is presented. Taking into account concepts from various prior attempts to construct such a machine. The wings have been created in such a way that they roughly mimic the natural flapping of birds of the appropriate size and pattern. The mechanism described in this article is built on a number of bar linkages to replicate the precise flapping motion of a real bird. The concept is theoretically condensed before being computed and examined using tools for aerodynamics and other fields. Later development and prototype testing would confirm the validity of the given conclusions.

Keywords: Ornithopter, Aerodynamic Wings, Prototype

2. Introduction

People have always wanted to be able to fly like birds. Before the Wright Brothers' creation of flight, ornithopters had already been in development. Though the idea of flying like a bird could never be achieved in sustainable way, there have been notable progresses in the field so far. It has found that flapping flight has better propulsive efficiency than propeller based flight. The invention of hang gliders, and aircraft enabled us to soar in air which is great accomplishment in itself. But still, researchers are trying to understand and replicate the flapping flight of birds, which has seen little achievements. This mystery must be cleared up. The use of flapping wings for propulsion in powered or unpowered, manned or unmanned flight has been studied by a number of academic and non-academic organisations. Since humans are naturally not evolved with stronger limb muscles as birds are, it becomes unlikely for human to achieve similar performance without bridging the gap between the natural strength of the body and the equivalent strength of the limbs required to propel a wing. A system that is light enough and small enough to hang from a person's body would allow him to power the flapping motion of the wings, producing both lift and thrust.

3. Purpose

A bird can move forward by controlling the intricate, multiple degrees of freedom movement of its wing. The goal is to mimic a huge bird's flapping motion. Pitch, sweep, and dihedral movements of the wing in relation to the body are all included in flapping. According to earlier studies, typical flapping results in shock loading of the wing at the end of each stroke, which lowers the system's effective thrust. It is necessary to find a straightforward yet efficient technique to reduce this loading on the body and the wings. The goal of the project is to create a standalone framework with a power supply, flapping wings, and a control system that can be attached to a person, enabling the full human-machine system.

4. Project requirement

- Light weight design
- Low wing loading shock

Sensitive analysis and Design of Step Ladder layout using Metaheuristics with integrated scheduling

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Abstract

Universally specialists and scientists accept that flexibility assume a elementary play in modern factory segment. Only associated with modest parcel size generation since agility adaptable is an indispensable part to be incorporate into course of action of racks in format plan among the assembling fragment. In view of such conditions, considering NP hard double target issues is, regularly, a lumbering responsibility. In this work, researchers tended to about a populace based metaheuristics like differential development (DE) and sheep run technique (SRT) for making wrung order structure configuration issues in flexible system of manufacturing environment. The originators focused on twofold target headway of which fundamental objective is stressed over the versatile slot (FJSP) arranging issue, the accompanying objective focused on wrung order Layout issues where expelling the interest of machines with in lead-ins of wrung steps to control rigid transportation cost and hoarding lead time of employments on machines. The execution of the estimation (SRT and DE) is crisscross by benchmark issues. At long last, it is pondered that SRT outfits flawless outcomes at the point on par with DE. Further a literature comparison is done for the proposed results against literature results and conclusions depicted.

Keywords:- Flexibility, wrung order structure, metaheuristics, Tabu Search, sheep run technique

1. Introduction

In the present situation, mechanized assembling ventures are under prodigious stress which brought about by the increasing expense of vitality, materials, works, capital, and strengthening overall challenge. While these patterns will stay for quite a while, the issue fronting producing today run much cavernous. By and large, they come from the very idea of the assembling procedure itself. So as to beat that, Adaptable Manufacturing frameworks (@FMSs) are viewed as one of the most productive strategies to use in lessening or taking out assembling issues. FMS is in excess of a specialized arrangement[1]; it is a business-driven arrangement prompting improve gainfulness through decreasing lead times and stock levels and improved assembling viability through expanded operational adaptability, consistency, and control.

The FMS design includes assigning different hold for achieving full skill. The plan has an impact eager for elapsed time and cost [2] which ought to be resolved in the beginning of the FMS [3]. By and by, the most generally utilized sort of FMS designs [4] are as per the following:

1. Line or single column design
2. Circle format or oval shape design
3. Stepladder or pecking order or wrung structure layout
4. U-shaped format

Amongst the above Layouts, this paper addressed about wrung order layout with scheduling as restrictions utilizing Sheep Run Technique (SRT) and Tabu search method (TS).



FABRICATION OF FOUR-WHEEL STEERING

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Abstract :

Nowadays, every vehicle uses the two-wheel steering system to control the movement of the vehicle whether it is a front-wheel drive, rear-wheel drive, or all-wheel drive. But due to the awareness of safety, four-wheel steering vehicles are being used increasingly due to the high performance and stability that they bring to the vehicles. In this report, the performance of four wheels steered vehicle model is considered which is optimally controlled during a lane change manoeuvre in three types of conditions: low-speed manoeuvre, medium-speed manoeuvre, and high-speed manoeuvre. For parking and low-speed manoeuvres, the rear wheel steers in the opposite direction of the front wheels, allowing much sharper turns. At higher speeds, the rest wheels steer in the same direction as the front wheels. The result is more stability and less body lean during fast lane changes and turns because the front wheels don't have to drag non-steering rear wheels onto the path.

Keywords: Two-wheel steering, four-wheel steering, rack and pinion, intermediate shaft, oversteer, understeer.

Introduction:

In an automobile, the steering of the vehicle plays a major role in the control of the path of motion of the vehicle. The steering systems are designed to give the best control designed for the vehicle. The vehicles are designed with steering control to the front wheels or in certain cases steering control is given to the rear wheels. Yet in any vehicle, the steering control is given to only the front axle or in certain cases the rear axle. This is normally referred to as a two-wheel steering system.

The two-wheel steering system employs only two out of the four wheels of a light motor vehicle. We can observe that the turning radius of the vehicle increases as the vehicle becomes bigger, longer and wider. With the increased traffic in cities, smaller roads and congestion, the bigger the vehicle more pressure and strain the driver undergoes. This makes turning the vehicle in small corners difficult. Even when the vehicle is driven on highways the vehicle is subjected to understeer and oversteer. This effort can be reduced by even employing the rear wheels of the vehicle to provide steering action. In a general steering mechanism, the vehicle's rear wheels do not play a significant role in the steering control of the vehicle. The rear wheels are fixed along a straight path of motion. So, employing the rear wheels to provide steering action will help to reduce the turning radius of the vehicle thereby, reducing the steering effort on the driver. The rear wheels of the vehicle can move in two phases concerning the front wheels, in-phase, and counter-phase. In the counter phase, the rear wheels rotate in the opposite direction of that of the front wheels giving a reduced turning radius to the vehicle whereas, in phase, the rear wheels rotate in the same direction as the front wheels providing a sliding action of the vehicle. The system is called a four-wheel steering system.

In the present study, the steering system is designed to have a 3-mode function, counter-phase steering, in-phase steering and no steering modes. These modes are selectable depending on the driver. It helps reduce the turning radius by about 20% to 30%. This system allows the vehicle to have reduced understeer and oversteer of vehicles. The vehicle has a turning motion with a reduced radius in counter-phase and a sliding motion in in-phase.

PURPOSE:

Four Wheel steering is a system employed by some vehicles to improve steering response, increasing vehicle stability while manoeuvring at high speed or decreasing turning radius at low speed. With all four wheels steering, instead of only the front two, this technology offers unprecedented control and manoeuvrability.

- Increasing stability of the vehicle while turning.
- Increasing agility of the vehicle.
- Decreasing turning radius.
- Decreases chances of skidding.

THE MOTORIZED SCREW JACK DESIGN FOR VEHICLES

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Abstract:

With the advancement of technology, the work required to do any task has been progressively reduced. Superior designs can efficiently and economically reduce the quantity of manpower required to manufacture the desired result. A control screw is used to convert rotary motion into translatory motion. The Screw Jack is a screw design that functions as an authority screw in a straight aeroplane by lifting or lowering a large object with a tiny amount of force. It operates in a manner akin to a liable jet. The mechanical advantage of a screw jack is determined by its load to effort ratio. A lead screw must first be twisted before using the screw jack. A lead screw can be rotated electrically or manually to adjust the jack's height. In this article, the screw jack and electric motor will be combined, and the mechanical advantage will be increased by using the vehicle's battery to supply the necessary power for the operation.

Key words: Screw jack, Power screw, leads screw

1. Introduction:

A portable gadget called a screw jack raises or lowers the weight using a screw mechanism. The concepts behind how an inclined plane and a screw jack work are the same. The mechanical and hydraulic jacks are the two most popular varieties. Cylinder and piston assemblies make up a hydraulic jack. The load can be increased or decreased thanks to the movement of the piston rod. Mechanical jacks can be operated manually or with electricity.

Additionally, shock loads must be avoided or reduced. There are certain screw jacks with anti-backlash skin.

Long lifts may become dangerously overheated because the screw jack produces a lot of heat. The equipment's capabilities are increased by using oil lubricants. By utilizing a screw jack in accordance with its design and the manufacturer's instructions, you can maximize its capabilities and usefulness in addition to performing routine maintenance [1-2]. Observe the

IOT BASED GARBAGE WET & WASTE SEPERATOR- A PROTYPE MODEL

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ABSTRACT

The rapid growth in the population has also led to the surge in the volume of waste being generated on a daily basis. This increase in the generation of waste due to continuous growth in the urbanization and industrialization has become a severe problem for the local and the national government. It is also posing a serious problem for the local authorities to manage the wastes being dumped everywhere as landfill. To ensure the minimal risk to the environment and human health, it is necessary to take meticulous measures when segregating and transporting waste.

Segregation of waste in a proper manner brings to the limelight actual economic value of the waste. The traditional method used for segregating of waste in India is through rag pickers which are time-consuming and can have adverse effects on the health of the people who are exposed to such wastes. Here authors proposed the use of an Auto Waste Segregator (AWS) which is cheap and also an easy to use solution for segregation of household waste. It is designed to segregate the waste into three categories viz. metallic, dry and wet waste. The system makes use of moisture sensor for the segregation of wet and dry waste and inductive proximity sensor for the detection of metallic waste and an LCD display for displaying the result of segregation. It is evident from experimental reports that segregation of waste using AWS has been successful.

Keywords- dry waste, wet waste, AWS, segregation

INTRODUCTION

India suffers from inefficient and insufficient waste infrastructure and also from increasing rates of solid waste generation per capita. With the increase in population year after year, the amount of waste generated is increasing tremendously. This has led to many hazardous problems. The accumulation of the waste in large areas of land results in the formation of landfills which have dangerous consequences. The segregation of waste into wet, dry and metallic categories can help in discarding the waste appropriately and in implementing the principle of Reuse, Reduce and Recycle. The wet waste can be decomposed to produce manure for the plants, the metallic waste and the dry waste can be recycled.

DESIGN AND CONSTRUCTION OF A MACHINE WITH NUMEROUS FUNCTIONS

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Abstract: *The multipurpose machine for cutting, shaping, grinding, and drilling is preserved to be in the same attachment in this work. By doing this, the risk of material handling and damage to the machine table is removed. The motor powering this unit is a 1 HP, three phase, 1440 rpm motor. The Cast Iron slider and this are connected. This gives the slide the ability to convert the rotational movement into a reciprocating motion with a 75mm stroke length. To position the shaping machine at the desired angle, the slotting head can be adjusted. At the bottom edge, the head is soldered to the slider. One operation, such as shaping or slotting, may be performed in this machine. For holding the tool, a slot and tapped holes are provided in the tool head. The head can be fixed using a clamp that is provided and moved up or down using a column depending on the height of the task. The configuration can be used to machine slots and shaping in small projects like pulleys and other similar objects if a table with a machine vice having a longitudinal moment is mounted to the machine. If Cast Iron is utilized for the body and other parts instead of MS sheet, they will have a longer lifespan, reduced friction, better lubrication, and low production costs. If the right dies and brake setup are installed, this machine can also be used to punch small washers.*

Keywords: Shaping, Cutting, Grinding, Drilling, and Machine Operations.

1. INTRODUCTION

The multipurpose machine is used for the different machining operations such as grinding, drilling, shaping and cutting. By using this machine, we can do these operations at a time for saving the machining operation time. In this machine we have used 1H.P three phase motor for saving the consumption of power, transmits the power with the help of belt drives to the shafts. This machine is attached by the bearings, pulleys, shafts. etc. For doing the shaping and cutting operations the power is transmitted from rotating motion to reciprocating motion, for grinding and drilling operations the power is transmitted linearly. A significant part of the investment is usually used up for installation purposes in machines. Therefore, the work proposed was envisioned in such a way that the operations like drilling, sawing, grinding and other lathe functionalities do not consume additional costs for such operations. Various machining process in manufacturing industries are carried out by separate machining devices. It needs more space, time and investment that involve high expenses. But the fabrication of multi tool operating mechanical device encompasses three operations on a single machine. The operations are categorized as drilling, cutting, and grinding. It is a new concept specially meant to reduce the work time and save the cost. This is done to save the added investment cost that occurs during drilling and shaping the device in the industries. The machine operates the drilling machine with the bevel gear arrangements. Hence, we can carry out exactly the above mentioned four operations on the machine. The need for our work was found out in industries where mass production is carried out. In mass Production the transferring of work piece from one machine to another consumes time, human effort as well as power consumption for each and every machine. Thus, our project is the fabrication of machine which optimizes time, power consumption and capital cost.