TO STUDY AND WORK ANALYSIS OF VOLVO CRANE IN INDUSTRIAL SECTOR

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ABSTRACT

Experimental investigations on several commercially available and newly fabricated crane are conducted in industries to evaluate performance trends. Experimental are analyzed and the parameters determining the crane performance and working load capacity. It is found that how we used crane with different application in industrial sector with different works. Finally, the crance has much more applications and in the paper work also show cost analysis for installation is very low and easily fabricated in small sector.

Keywords: *Object of Volvo crane, Design Phenomena, Cost Analysis, Applications.*

I. INTRODUCTION

We Wanted To Understand The Principal Of Volvo Crane, So We Decided To Modify Existing Volvo Crain, And Do Necessary Changes. We Have Modified And Have Understood Most Of The Parts Used In The Project. We Learnt A Lot From This. After Along Thoughtfully Decision We Decided To Take Up Project Of Volvo Crain. This Mechanism Has Its Own Versatile Features. At Vary Right, It Looks Very Simple But It Consists Of All Types Of Mechanical Process Like Milling, Casting, Turning, Drilling, Welding Etc. Thus, We Can Assume That All Type Of Our Skills Can Be Used In This Project. The Main Factor Which Considered Important For The Selection Is That The Project Can Be Easily Made Within Short Time Period And We Can Use Our Design And Machining Skills Very Well, The Other Factor For Selection Is That The Project, So As To Acquired Positive Practical Approach And Knowledge Which Increases Our Skills Simultaneously. We Also Learnt To Solve The Problem Arises During Manufacturing Process.

Selection Of Project

- Market Survey
- Production Capacity
- Investment Decision
- Design And Drawing
- Selection Of Material
- Selection Machines, Tools And Equipment's Required.
- Resource Labor, Transportations, Loss Of Manufacturing.
- Including Material Required Process
- Inventory Planning
- Process Planning
- Coasting
- Testing Of Project
- Market Response Of Project.
- It Enables You To Evaluate Viability Of An Enterprise By Arcing At A Year Estimate Of Seals.
- It Makes It Possible For You To Estimate Scale And Utilization Of Install Capacity With Reference Propose Enterprise.
- You Can Judge Weather Proposed Capacity Is On Higher And Lower Size.

• It Provident A Preliminary Input For The Marketing Strategy And Process Formulation Or The Enterprise (A Market Program Is A Set Decision Refried In A Respect Of Various Market Related To Issued It Influents The Market Performance Of An Enterprise.) Market Survey Is Usually Focused On Gross Market Demands Present And Future. It Typically Highlights The Gaps Between Expected Market Demand And Supply In Respect Offer Given Product. Such A Gap Could Be Positive (Demand Exceed Supply) And Therefore Favorable. The Gap Could Be Negative A Favorable Gap Is Does Not Guaranty Market Success For An Enterprise A Market Success Is And Between Of Favorable Demand Supplies Gap As Well Effective Market Program.

2. THE VARIOUS TYPES OF CRAIN WITH HISTORY:

2.1 History of Crane

- A Crane Is A Machine That Is Capable Of Raising And Lowering Heavy Objects And Moving Them Horizontally.
- Cranes Are Distinguished From Hoists, Which Can Lift Objects But That Cannot Move Them Sideways. Cranes Are Also Distinguished From Conveyors That Lift And Move Bulk Materials, Such As Grain And Coal, In A Continuous Process.
- The Word Crane Is Taken From The Fact That These Machines Have A Shape Similar To That Of The Tall, Long-Necked Bird Of The Same Name.

Mechanical Principles

Broken Crane In Sermetal Shipyard, Former Ishikawajima Do Brasil - Rio De Janeiro. The Cause Of The Accident Was A Lack Of Maintenance And Misuse Of The Equipment. Cranes Can Mount Many Different Utensils Depending On Load (Left). Cranes Can Be Remote-Controlled From The Ground, Allowing Much More Precise Control, But Without The View That A Position Atop The Crane Provides (Right). The Stability Of A Mobile Construction Crane Can Be Jeopardized When Outriggers Sink Into Soft Soil, Which Can Result In The Crane Tipping Over. There Are Three Major Considerations In The Design Of Cranes. First, The Crane Must Be Able To Lift The Weight Of The Load; Second, The Crane Must Not Topple; Third, The Crane Must Not Rupture.

Lifting Capacity,

Cranes Illustrate The Use Of One Or More Simple Machines To Create Mechanical Advantage.The Lever. A Balance Crane Contains A Horizontal Beam (The Lever) Pivoted About A Point Called The Fulcrum. The Principle Of The Lever Allows A Heavy Load Attached To The Shorter End Of The Beam To Be Lifted By A Smaller Force Applied In The Opposite Direction To The Longer End Of The Beam. The Ratio Of The Load's Weight To The Applied Force Is Equal To The Ratio Of The Lengths Of The Longer Arm And The Shorter Arm, And Is Called The Mechanical Advantage. The Pulley. A Jib Crane Contains A Tilted Strut (The Jib) That Supports A Fixed Pulley Block. Cables Are Wrapped Multiple Times Round The Fixed Block And Round Another Block Attached To The Load. When The Free End Of The Cable Is Pulled By Hand Or By A Winding Machine, The Pulley System Delivers A Force To The Load That Is Equal To The Applied Force Multiplied By

The Number Of Lengths Of Cable Passing Between The Two Blocks. This Number Is The Mechanical Advantage.

The Hydraulic Cylinder. This Can Be Used Directly To Lift The Load Or Indirectly To Move The Jib Or Beam That Carries Another Lifting Device. Cranes, Like All Machines, Obey The Principle Of Conservation Of Energy. This Means That The Energy Delivered To The Load Cannot Exceed The Energy Put Into The Machine. For Example, If A Pulley System Multiplies The Applied Force By Ten, Then The Load Moves Only One Tenth As Far As The Applied Force. Since Energy Is Proportional To Force Multiplied By Distance, The Output Energy Is Kept Roughly Equal To The Input Energy (In Practice Slightly Less, Because Some Energy Is Lost To Friction And Other Inefficiencies). The Same Principle Can Operate In Reverse. In Case Of Some Problem, The Combination Of Heavy Load And Great Height Can Accelerate Small Objects To Tremendous Speed (See Trebuchet). Such Projectiles Can Result In Severe Damage To Nearby Structures And People. Cranes Can Also Get In Chain Reactions; The Rupture Of One Crane May In Turn Take Out Nearby Cranes. Cranes Need To Be Watched Carefully.

Stability,

For Stability, The Sum Of All Moments About The Base Of The Crane Must Be Close To Zero So That The Crane Does Not Overturn.[36] In Practice, The Magnitude Of Load That Is Permitted To Be Lifted (Called The "Rated Load" In The Us) Is Some Value Less Than The Load That Will Cause The Crane To Tip, Thus Providing A Safety Margin. Under Us Standards For Mobile Cranes, The Stability-Limited Rated Load For A Crawler Crane Is 75% Of The Tipping Load. The Stability-Limited Rated Load For A Mobile Crane Supported On Outriggers Is 85% Of The Tipping Load. These Requirements, Along With Additional Safety-Related Aspects Of Crane Design, Are Established By The American Society Of Mechanical Engineers. In The Volume Asme B30.5-2010 Mobile And Locomotive Cranes. Standards For Cranes Mounted On Ships Or Offshore Platforms Are Somewhat Stricter Because Of The Dynamic Load On The Crane Due To Vessel Motion. Additionally, The Stability Of The Vessel Or Platform Must Be Considered. For Stationary Pedestal Or Kingpost Mounted Cranes, The Moment Created By The Boom, Jib, And Load Is Resisted By The Pedestal Base Or Kingpost. Stress Within The Base Must Be Less Than The Yield Stress Of The Material Or The Crane Will Fail.

2.2 Types Of Cranes

Depending On Various Features Like Mobility, Capacity And Industry They Can Be Used In, There Now Are Some Variants Of The Basic Cranes.

- Broadly Classifying, Cranes Can Be Either Mobile Or Fixed. Mobile Cranes, As The Name Suggests Can Be Moved Around From One Place To Another, With Or Without Loads.
- While Fixed Cranes Although Able Of Lifting Heavier Loads, Cannot Be Moved Or Used For Transport.
- However, Modern Fixed Cranes Now Combine The Special Features Of The Two Crane Types To Present Some Major Advancement In The Lifting Industry.

Fig: Fixed Cranes

In Mobile Crane the Most Basic Type Of Mobile Crane Consists Of A Truss Or Telescopic Boom Mounted On A Mobile Platform — Be It On Road, Rail Or Water. Common Terminology Is Conventional And Hydraulic Cranes Respectively.

Fig: Mobile Cranes

Overhead Crane Being Used In Typical Machine Shop. The Hoist Is Operated Via A Wired Pushbutton Station To Move System And The Load In Any Direction
Main Article: Overhead Crane

Fig: Overhead Cranes

Pick And Carry Crane

A Pick And Carry Crane Is Similar To A Mobile Crane In That Is Designed To Travel On Public Roads, However Pick And Carry Cranes Have No Stabiliser Legs Or Outriggers And Are Designed To Lift The Load And Carry It To Its Destination, Within A Small Radius, Then Be Able To Drive To The Next Job. Pick And Carry Cranes Are Popular In Australia Where Large Distances Are Encountered Between Job Sites. One Popular Manufacturer In Australia Was Franna, Who Have Since Been Bought By Terex, And Now All Pick And Carry Cranes Are Commonly Referred To As "Frannas" Even Though They May Be Made By Other Manufacturers. Nearly Every Medium And Large Sized Crane Company In Australia Has At Least One And Many Companies Have Fleets Of These Cranes. The Capacity Range Is Usually Ten To Twenty Tonnes Maximum Lift, Although This Is Much Less At The Tip Of The Boom. Pick And Carry Cranes Have Displaced The Work Usually Completed By Smaller Truck Cranes As The Set Up Time Is Much Quicker. Many Steel Fabrication Yards Also Use Pick And Carry Cranes As They Can "Walk" With Fabricated Steel Sections And Place These Where Required With Relative Ease...

Carry Deck Crane

A Carry Deck Crane Is A Small 4 Wheel Crane With A 360 Degree Rotating Boom Placed Right In The Centre And An Operators Cab Located At One End Under This Boom. The Rear Section Houses The Engine And The Area Above The Wheels Is A Flat Deck. Very Much An American Invention The Carry Deck Can Hoist A Load In A Confined Space And Then Load It On The Deck Space Around The Cab Or Engine And Subsequently Move To Another Site. The Carry Deck Principle Is The American Version Of The Pick And Carry Crane And Both Allow The Load To Be Moved By The Crane Over Short Distances.

Telescopic Handler Crane

Telescopic Handlers Are Like Forklift Trucks That Have A Telescoping Extendable Boom Like A Crane. Early Telescopic Handlers Only Lifted In One Direction And Did Not Rotate,[38] However, Several Of The Manufacturers Have Designed Telescopic Handlers That Rotate 360 Degrees Through A Turntable And These Machines Look Almost Identical To The Rough Terrain Crane. These New 360 Degree Telescopic Handler/Crane Models Have Outriggers Or Stabiliser Legs That Must Be Lowered Before Lifting, However Their Design Has Been Simplified So That They Can Be More Quickly Deployed. These Machines Are Often

Used To Handle Pallets Of Bricks And Install Frame Trusses On Many New Building Sites And They Have Eroded Much Of The Work For Small Telescopic Truck Cranes. Many Of The Worlds Armed Forces Have Purchased Telescopic Handlers And Some Of These Are The Much More Expensive Fully Rotating Types. Their Off Road Capability And Their On Site Versatility To Unload Pallets Using Forks, Or Lift Like A Crane Makes Them A Valuable Piece Of Machinery.

Crawler Crane

A Crawler Is A Crane Mounted On An Undercarriage With A Set Of Tracks (Also Called Crawlers) That Provide Stability And Mobility. Crawler Cranes Range In Lifting Capacity From About 40 To 3,500 Short Tons (35.7 To 3,125.0 Long Tons; 36.3 To 3,175.1 T).Crawler Cranes Have Both Advantages And Disadvantages Depending On Their Use. Their Main Advantage Is That They Can Move Around On Site And Perform Each Lift With Little Set-Up, Since The Crane Is Stable On Its Tracks With No Outriggers. In Addition, A Crawler Crane Is Capable Of Traveling With A Load. The Main Disadvantage Is That They Are Very Heavy, And Cannot Easily Be Moved From One Job Site To Another Without Significant Expense. Typically A Large Crawler Must Be Disassembled And Moved By Trucks, Rail Cars Or Ships To Its Next Location.

Railroad Crane

A Railroad Crane Has Flanged Wheels For Use On Railroads. The Simplest Form Is A Crane Mounted On A Flatcar. More Capable Devices Are Purpose-Built. Different Types Of Crane Are Used For Maintenance Work, Recovery Operations And Freight Loading In Goods Yards And Scrap Handling Facilities.

Floating Crane

Floating Cranes Are Used Mainly In Bridge Building And Port Construction, But They Are Also Used For Occasional Loading And Unloading Of Especially Heavy Or Awkward Loads On And Off Ships. Some Floating Cranes Are Mounted On A Pontoon, Others Are Specialized Crane Barges With A Lifting Capacity Exceeding 10,000 Short Tons (8,929 Long Tons; 9,072 T) And Have Been Used To Transport Entire Bridge Sections. Floating Cranes Have Also Been Used To Salvage Sunken Ships. Crane Vessels Are Often Used In Offshore Construction. The Largest Revolving Cranes Can Be Found On Sscv Thialf, Which Has Two Cranes With A Capacity Of 7,100 Tonnes (7,826 Short Tons; 6,988 Long Tons) Each. For Fifty Years, The Largest Such Crane Was "Herman The German" At The Long Beach Naval Shipyard, One Of Three Constructed By Hitler's Germany And Captured In The War. The Crane Was Sold To The Panama Canal In 1996 Where It Is Now Known As The "Titan

Aerial Crane

Aerial Crane Or 'Sky Cranes' Usually Are Helicopters Designed To Lift Large Loads. Helicopters Are Able To Travel To And Lift In Areas That Are Difficult To Reach By Conventional Cranes. Helicopter Cranes Are Most Commonly Used To Lift Units/Loads Onto Shopping Centers And Highrises. They Can Lift Anything Within Their Lifting Capacity, (Cars, Boats, Swimming Pools, Etc.). They Also Perform Disaster Relief After Natural Disasters For Clean-Up, And During Wild-Fires They Are Able To Carry Huge Buckets Of Water To Extinguish Fires.

Tower Crane Atop Mont Blanc

Tower Cranes Are A Modern Form Of Balance Crane That Consist Of The Same Basic Parts. Fixed To The Ground On A Concrete Slab (And Sometimes Attached To The Sides Of Structures As Well), Tower Cranes Often Give The Best Combination Of Height And Lifting Capacity And Are Used In The Construction Of Tall Buildings. The Base Is Then Attached To The Mast Which Gives The Crane Its Height. Further The Mast Is Attached To The Slewing Unit (Gear And Motor) That Allows The Crane To Rotate. On Top Of The Slewing Unit There Are Three Main Parts Which Are: The Long Horizontal Jib (Working Arm), Shorter Counter-Jib, And The Operator's Cab.

Components

Tower Cranes Are Used Extensively In Construction And Other Industry To Hoist And Move Materials. There Are Many Types Of Tower Cranes. Although They Are Different In Type, The Main Parts Are The Same, As Follows:

- Mast: The Main Supporting Tower Of The Crane. It Is Made Of Steel Trussed Sections That Are Connected Together During Installation.
- Slewing Unit: The Slewing Unit Sits At The Top Of The Mast. This Is The Engine That Enables The Crane To Rotate.
- Operating Cabin: The Operating Cabin Sits Just Above The Slewing Unit. It Contains The Operating Controls.
- Jib: The Jib, Or Operating Arm, Extends Horizontally From The Crane. A "Luffing" Jib Is Able To Move Up And Down; A Fixed Jib Has A Rolling Trolley That Runs Along The Underside To Move Goods Horizontally.

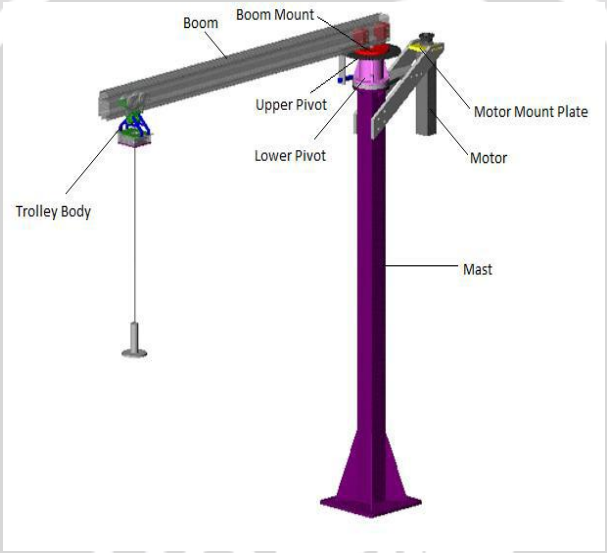
- Hook: The Hook (Or Hooks) Is Used To Connect The Material To The Crane. It Hangs At The End Of Thick Steel Cables That Run Along The Jib To The Motor.
- Weights: Large Concrete Counterweights Are Mounted Toward The Rear Of The Mast, To Compensate For The Weight Of The Goods Lifted.

3. OBJECTIVES OF CRANE

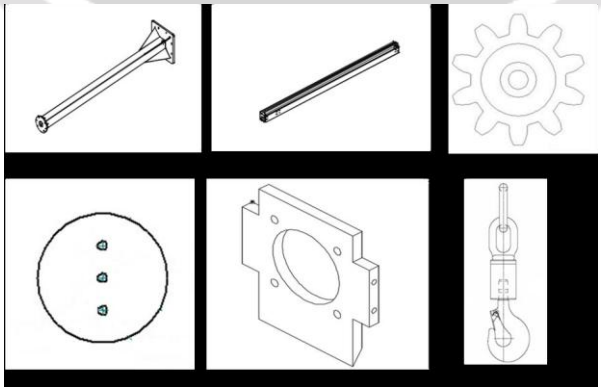
- The Crane Has 3 Degrees Of Freedom And Hence Can Locate & Pick Up Any Object In Its Three Dimensional Range.
- Our Crane Is Designed For Ease Of Transport Of The Material And Also For The Quick Setup Available Which May Use Effectively Because It Is Less Time Consuming.
- The Safety Features Built Into Our Industrial Crane Provide Peace Of Mind For Everyone At Jobsite., Our Industrial Crane Is Constructed For Safety
- Our Industrial Crane Provides Power Without Sacrificing Efficiency. Most Moving Parts Are Powered By Motor To Ensure Low Power Requirement During Operation.
- And Structure Is Coated With Rust Resistance Paint To Ensure A Long Service Life.

4. MAIN PARTS OF CRANE WITH DESIGN PHENOMENON

4.1 STRUCTURE



4.2 DESIGN OF DIFFERENT PARTS OF CRANE



4.3 Basic Structure Of Volvo Crain

1) BASE
2) SIMLESH PIPE
3) SHAFT

4) MOTOR
5) REMOTE
6) WIRE

5. FUNCTION OF MAIN PARTS OF CRANE WITH HARDWARE SECTION

- Mast:

  The Mast Provides A Crane With Its Height, And Comprises Individual Steel Sections Connected Together. The Number Of Sections Determines The Height Of The Crane. This Ensures It Has Adequate Height To Safely And Efficiently Carry Out The Work Required.

- Boom:

  The Boom Is The Working Arm Of A Crane. Formed Of Individual Steel Sections Connected Together. A Small Trolley Attached To The Underside Can Run The Length Of The Boom, And This Holds The Hoisting Mechanism.

- Chain And Hook:

  The Chain And Hook Sit Below The Small Trolley On The Boom. Raised And Lowered By The Hoisting Mechanism, It Picks Up Loads And Places Them In The Required Location.

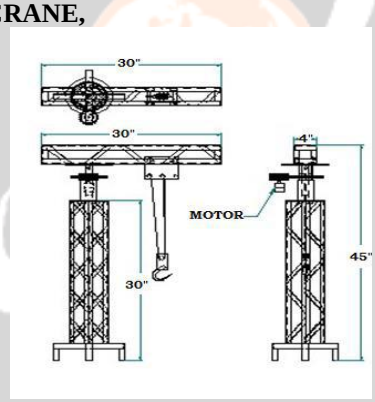
- Trolley:

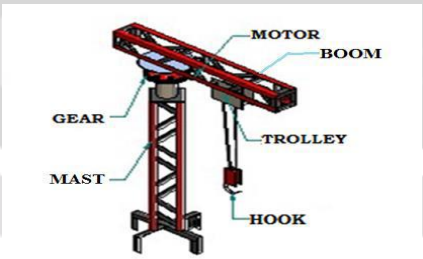
  The Trolley Is Used To Carry A Hook Through Which The Transmission Of The Material Can Be Done. It Travels In The Boom Section In Horizontal Direction In Order To Transmit Material In Such Direction.

- Motor:

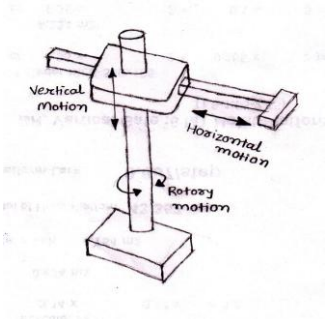
  It Is The Actuator Of The Crane. With The Help Of Motor Crane Can Get All Its Motions.

THREE MOTION INDUSTRIAL CRANE,



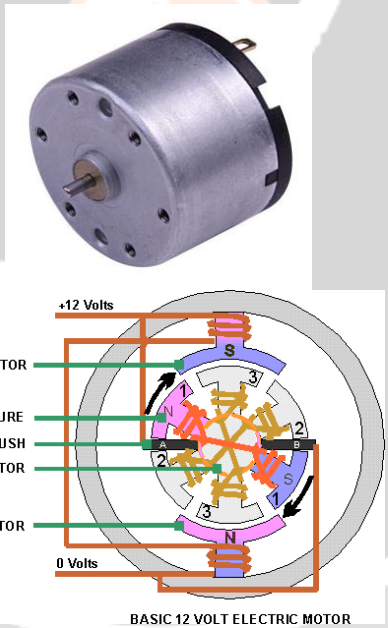


DIFFERENT MOTIONS OF CRANE



5.1 DC MOTOR:

A DC Motor Relies On The Fact That Like Magnet Poles Repel And Unlike Magnetic Poles Attract Each Other. A Coil Of Wire With A Current Running Through It Generates An Electromagnetic Field Aligned With The Center Of The Coil. By Switching The Current On Or Off In A Coil Its Magnet Field Can Be Switched On Or Off Or By Switching The Direction Of The Current In The Coil The Direction Of The Generated Magnetic Field Can Be Switched 180°. A Simple *DC Motor* Typically Has A Stationary Set Of Magnets In The Stator And An Armature With A Series Of Two Or More Windings Of Wire Wrapped In Insulated Stack Slots Around Iron Pole Pieces (Called Stack Teeth) With The Ends Of The Wires Terminating On A Commutator. The Armature Includes The Mounting Bearings That Keep It In The Center Of The Motor And The Power Shaft Of The Motor And The Commutator Connections. The Winding In The Armature Continues To Loop All The Way Around The Armature And Uses Either Single Or Parallel Conductors (Wires), And Can Circle Several Times Around The Stack Teeth. The Total Amount Of Current Sent To The Coil, The Coil's Size And What It's Wrapped Around Dictate The Strength Of The Electromagnetic Field Created. The Sequence Of Turning A Particular Coil On Or Off Dictates What Direction The Effective Electromagnetic Fields Are Pointed. By Turning On And Off Coils In Sequence A Rotating Magnetic Field Can Be Created. These Rotating Magnetic Fields Interact With The Magnetic Fields Of The Magnets (Permanent Or Electromagnets) In The Stationary Part Of The Motor (Stator) To Create A Force On The Armature Which Causes It To Rotate. In Some DC Motor Designs The Stator Fields Use Electromagnets To Create Their Magnetic Fields Which Allow Greater Control Over The Motor. At High Power Levels, DC Motors Are Almost Always Cooled Using Forced Air.

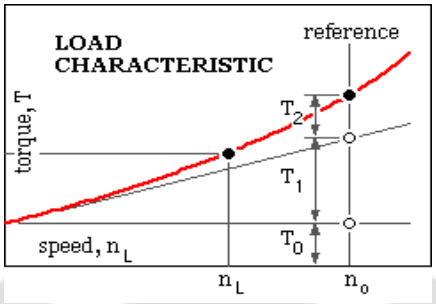


BASIC 12 VOLT ELECTRIC MOTOR

The Commutator Allows Each Armature Coil To Be Activated In Turn. The Current In The Coil Is Typically Supplied Via Two Brushes That Make Moving Contact With The Commutator. Now, Some Brushless DC Motors Have Electronics That Switch The DC Current To Each Coil On And Off And Have No Brushes To Wear Out Or Create Sparks. Different Number Of Stator And Armature Fields As Well As How They Are Connected Provide Different Inherent Speed/Torque Regulation Characteristics. The Speed Of A DC Motor Can Be Controlled By Changing The Voltage Applied To The Armature. The Introduction Of Variable Resistance In The Armature Circuit Or Field Circuit Allowed Speed Control. Modern DC Motors Are Often Controlled By Power Electronics Systems Which Adjust The Voltage By "Chopping" The DC Current Into On And Off Cycles Which Have An Effective Lower Voltage. Since The Series-Wound DC Motor Develops Its Highest Torque At Low Speed, It Is Often Used In Traction Applications Such As Electric Locomotives, And Trams. The DC Motor Was The Mainstay Of Electric Traction Drives On Both Electric And Diesel-Electric Locomotives, Street-Cars/Trams And Diesel Electric Drilling Rigs For Many Years. The Introduction Of DC Motors And An Electrical Grid System To Run Machinery Starting In The 1870s Started A New Second Industrial Revolution. DC Motors Can Operate Directly From Rechargeable Batteries, Providing The Motive Power For The First Electric Vehicles And Today's Hybrid Cars And Electric Cars

5.2 SPEED AND LOAD CHARACTERISTICS

The Relationship Between Torque Vs. Speed And Current Is Linear As Shown Left; As The Load On A Motor Increases, Speed Will Decrease. The Graph Pictured Here Represents The Characteristics Of A Typical Motor. As Long As The Motor Is Used In The Area Of High Efficiency (As Represented By The Shaded Area) Long Life And Good Performance Can Be Expected. However, Using The Motor Outside This Range Will Result In High Temperature Rises And Deterioration Of Motor Parts. If Voltage.



In Continuous Applied To A Motor In A Locked Rotor Condition, The Motor Will Heat Up And Fail In A Relatively Short Time. Therefore It Is Important That There Is Some Form Of Protection Against High Temperature Rises. A Motor's Basic Rating Point Is Slightly Lower Than Its Maximum Efficiency Point. Load Torque Can Be Determined By Measuring The Current Drawn When The Motor Is Attached To A Machine Whose Actual Load Value Is Known.
We Will Select The Most Suitable Motor For Your Application After Receiving Your Information

6. ADVANTAGES OF CRANES

• **They Have Multiple Power Options** - This Means That You Can Operate Them With Gas, Diesel Or Electricity. This Is A Great Advantage And Makes Them Applicable In Different Situations.

• **Remote Control Operation** – In Some Cranes, Much Like A Robot That Has This Heavy Duty Work Done Is Achieved By Remote Control.

• **Easy Transportation** - These Gadgets Are So Easily Transported And Can Be Placed Even Underground

• **Advanced Safety** - The Safety When Operating Such Devises Is Of Most Importance, Because You Are Dealing With Tons Of Weights And Feeling Secure With One Of Those Is Great.

• **Small Footprint** - The Greatest Advantage Of All - No Hydraulic Jack Or Crane Has Gone Places Where The Small Fellow Can Go.

7. APPLICATION

- Handling For Row Material
- Industrial Purpose
- Civil Work
- Dispatch Of Material
- Production Work , Etc.

8. COST ANALYSIS

S.N	COMPONENT LIST	NOS	COST	TOTAL COST (EACH COPMPONENT)
1.	BODY STRUCTURE	-	6800/-	5800/-

	DC MOTORS	4	380/-	1520/-
	REMOTE CONTROLLER	1	420/-	420/-
	BATTERY (RECHARGABLE)	1	900/-	900/-
	WIRE	-	300/-	300/-
	COLOUR BLACK	-	100/-	100/-
			TOTAL COST	9040/-

TOTAL COST (PROJECT)
= COMPONENT COST + WELDING CHARGES+
HANDLING CHARGE+ FAILURE CHARGES+ OTHER COST
=9040 + 1000 + 150 + 120 + 150
=10460/- PER FINAL COST

9. CONCLUSION

The Centrifugal Motor And The Structure Are Discussed In Regards To Their Operating Principle, Design, And Effect Of Viscosity, Performance, And It's Having Components. A Decision Can Be Made By Examining The Needs Pertaining To The Volvo Crain System, Initial Investment, Operating Cost, Maintenance, And Personnel's Knowledge About Volvo Crain.

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