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DESIGN & FABRICATION FOR MOTORCYCLE TWIN HANDLING MODE

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ABSTRACT:

In this project, we creating an adjustable twin handling motorcycle similar to that car. As an example, if we select sport mode on the motorcycle, the handle moves forward, and if we select city mode, the handle moves backward. As a result, driving in both modes is simple. The project that deals with the motorcycle's adjustable twin handling. Prior to the current period of motorcycles, the evolution of motorcycles played a role in achieving standardization. To design it in a sufficient way to ensure the multitasking performance motorcycles, it takes a variety of thoughts and ideology. This idea is an example of the kind of evolution where we do acquire a motorcycle that serves a dual purpose of being both a sports motorcycle and a city motorcycle.

Today's motorcycles probably serve two functions: one as sporting vehicle and the other as city transportation. Even in terms of fuel efficiency, the miles per gallon of the two motorcycles vary. The idea behind this is to create a special motorcycle that combines both concepts into one vehicle so that the rider can experience both on two wheels. It can offer a simple task and time saving activity where we can quickly move between tasks. This enables motorcycles to go more quickly and save time in many locations. The bicycle may be converted, allowing us to use it as a sports motorcycle while commuting in cars. The handlebars that lower in the sport mode and rise in the city mode so the user can experience it in various environments.

KEY POINTS: TWIN HANDLING MODE,HYDRAULIC CYLINDER,DCMOTOR,PUMP

INTRODUCTION:

The project that deals with the motorcycle's adjustable twin handling.

Prior to the current period of motorcycles, the evolution of motorcycles played a role in achieving standardization. To design it in a sufficient way to ensure the multitasking performance motorcycles, it takes a variety of thoughts and ideology. This idea is an example of the kind of evolution where we do acquire a motorcycle that serves a dual purpose of being both a sports motorcycle and a city motorcycle.

LITERATURE REVIEW :

According to Stodmon (2007), a British study on the postural evaluation of riding posture in various bikes (sports/standard) found that longer riding times with static posture were linked to increased postural hazards.

Maarof et al. (2014) used postural assessment tools (RULA and REBA) to measure riding postures for several motorbike models (sport, standard, and cruiser) among Malaysian users.

Velagapudi et al. (2010) studied muscle fatigue during motorcycle riding. It was revealed that the muscular weariness caused by riding a motorbike in heavy traffic on a bumpy road was the same for forward-leaning and erect/straight positions.
Rashid et al. (2015), 2018; Balasubramanian and Jagannath (2014). The majority of studies used electromyography (EMG) to measure muscle activity when the rider wasexhausted 6.

Muhammad et al. (2015) used a heart rate monitor to measure pain in riding positions, taking into account psychological and social factors that may affect cardiac muscle activity.
Karegam et al. (2008) and Karuppiah et al. (2012) developed lumbar support seats to reduce pain when riding a motorbike for long periods of time. These operations were designed to increase the comfort of specific body locations, including the lower back andbuttocks.

The study assessed subjective discomfort while riding a scooter/bicycle in the lab. The current and widely used Japanese Automobile Standards prescribe a dimensional adjustment range for the three components (handlebar, seat and footrest) in the motorcycle frame. The recommended handlebar width for example(JASO T003:2009, 2009).

Motorbike riders' posture may be influenced by these moveable elements. The criteria were developed by conducting a photographic survey of 12 young (17-year-old)

Japanese boys (stature: 171 2 cm) riding seven different engine capacity motorcycles.

It's important to understand how variations in dimensions (within the range allowed by these guidelines) affect postural joint angles and comfort levels. Unfortunately, present standards do not throw light on these issues.

Mathurkar presented a lumbar support seat design and compared it to existing chairs using CAD/CAE models.
These treatments sought to improve static sitting comfort, especially in the lower back, during long rides.Ray and Praveen, 2018.

The research did not seek to increase motorcyclists' general comfort. As a result, the literature clearly shows that there is a lack of study on enhancing motorcyclists' whole- body comfort when riding. One of the most important factors influencing a motorcyclist's comfort/discomfort posture is the duration of their ride.

DESCRIPTION OF EQUIPMENT HYDRAULIC CYLINDER:

This mechanism is used to generate linear motion and force in power transfer applications. In other words, a hydraulic cylinder transfers the energy contained in hydraulic fluid into a force that allows the cylinder to travel in a straight path.

Operation of a Hydraulic Cylinder:

As hydraulic fluid is injected into the bottom side of the hydraulic cylinder, the piston rod begins to move outwards. The hydraulic fluid is pumped back into the reservoir by the piston in the reverse operation. The cylinder pressure is the ratio of unit force per unit piston area.

The pressure created in the piston rod chamber equals the unit load divided by the unit piston area and unit piston rod area difference. When hydraulic fluid is introduced into the piston rod chamber and the fluid travels smoothly (without pressure) from the piston region to the reservoir, this calculation is employed. As a result, the hydraulic cylinder's expansion and retraction (push and pull) motion is enhanced.

Classification Of Hydraulic Cylinders According to Function:

1. Single Acting Cylinders:

During both expansion and retraction, the single acting cylinder's fluid is under pressure from one side of the cylinder. When the fluid pressure is turned off, a spring or an external weight is employed to restore the cylinder top to its original position.

2. Double Acting Cylinders

The fluid pressure is applied in both directions in double acting cylinders. Because of the inherent mechanical issues connected with springs, single cylinders are seldom using in large stroke applications. There are of two types:

- Single rod ended.
- Double rod ended. **Cylinder Classification Based on Specifications:**

1. Plunger Cylinders:

These cylinders are also referred to as Ram cylinders. These hydraulic cylinders are installed in an upright position. This is done so that when the fluid supply is cut off, the weight on the cylinder causes it to return to its previous position. Plunger cylinders are commonly seen at vehicle servicing centers.

2. Telescoping Cylinders

Multiple stage hydraulic cylinders are another name for telescopic cylinders. These cylinders have a maximum of six phases. These are very useful in applications with limited space.

Telescopic cylinders are classified as either single or double action. These cylinders have a large stroke and are employed in applications such as cranes and forklifts.

3. Cable Cylinders:

The cable cylinders might be hydraulic or hydraulic-powered cylinders of the double action kind. These cylinders have lengthy strokes and provide a considerable amount of thrust. The cable cylinders can be used in confined spaces.

4. Diaphragm Cylinders:

Diaphragm cylinders are of two types i.e., flat
diaphragm and rolling diaphragm. These cylinders have no leak around the piston.

5. Components of A Hydraulic Cylinder: Hydraulic cylinders are made up of a variety of components the cylinder bottom, cylinder bottom connection, cylinder barrel, and cylinder head are the various components. It also includes a piston, a piston rod, and a piston rod connector. In addition, certain hydraulic cylinders may include feet. These are used to hold the barrels in place.

The cylinder barrel is a thick tube that must be machined from within. The interior of the barrel is either honed or ground, or both in certain situations. In most of the hydraulic cylinders, the cylinder barrel and bottom are welded together.

The welding of the cylinder's bottom to the barrel may cause damage to the barrel's inside.

As a result, it is preferable to have the two screwed together. This form of connection will be

useful during cylinder barrel repairs or maintenance. The barrel, on the other hand, is locked to the cylinder head.

A basic lock mechanism is utilized for a simple cylinder. Flanged or screwed connections are employed in the majority of hydraulic cylinders. Flanged connectors are the greatest and most costly form of connection. It is regarded as the best method of connection since a flange is welded onto the tube prior to machining.

Another advantage is that the flange is always fastened and may be readily.

removed when needed. The disconnecting and alignment processes when installation is substantially more difficult for larger hydraulic cylinders. This issue is more prevalent when the screw size ranges from 300 mm to 600 mm. Bending moments should not be imposed on the hydraulic cylinder during expansion and retraction motions. Because none of the aforementioned issues emerge, the single clevis connection with a ball bearing is deemed the most acceptable connection. Specification to be Considered while

purchasing:

The following specifications must be taken into account when buying a hydraulic

cylinder:

Bore Diameter:

It is the diameter of the cylinder bore.

Maximum operating pressure:

The maximum working pressure a cylinder can carry is known as maximumoperating pressure.

Rod Diameter:

It is the diameter of the piston or the rod that are used in hydraulic cylinders.

Stroke:

The distance traveled by a piston in a hydraulic cylinder is known as stroke. A stroke might be many feet long or a fraction of an inch long.

Type Of Cylinder:

The different types of cylinders are tie- rod cylinder, ram cylinder and weldedcylinder.

Tie-rod cylinder:

These types of hydraulic cylinders

make use of a single or multiple tie- rods to provide extra stability to the cylinder.The tie-rods are generally positioned on the cylinder's outside diameter. In this sort of hydraulic cylinder, the tie-rods bear the majority of the weight.

Welded cylinder:

There are heavy-duty welded cylinders used to balance the cylinder.

Ram cylinders:

As the name suggests, this cylinders act as a ram. The cross-section of the moving components is half of the cross- section area of the piston rod. These hydraulic ram cylinders are generally employed to pull rather than push. The ram cylinder is a hydraulic cylinder used in high-pressure applications.

HYDRAULIC SOLENOID VALVE:

A solenoid valve is an electrically actuated valve. A solenoid, which is an electric coil with a moveable ferromagnetic core in the middle, is used in the valve. The plunger is the name given to this core. The plunger shuts a tiny aperture while at rest. An electric current is sent through the coil to generate a magnetic field. The magnetic field pulls on the plunger. As a result, the plunger is drawn towards the middle of the coil, causing the orifice to open. This is the fundamental concept that allows solenoid valves to open and close. Solenoid valves are common components in gas and liquid circuits. The possibilities are limitless. Heating systems, compressed air technologies, industrial automation, swimming pools,sprinkler systems, washing machines, dental equipment, vehicle wash systems, and irrigation systems are some applications for solenoid valves.

CIRCUIT FUNCTIONS OF SOLENOID VALVES:

Solenoid valves are used in pipes to shut, dose, distribute or mix the flow of gas or liquid. A solenoid valve's circuit function reflects its particular purpose. A two-way valve contains two ports (inlet and exit) as well as two settings (open or closed). A 2/2- way valve can be 'usually closed' (closed when de-energized) or 'normally open' (open when de-energized). Because it has three ports and two locations, a 3/2-way valve may switch between two circuits. 3/2-way valves can perform a variety of tasks, including generally closed, normally open, diverting, and universal. More ports or valve combinations are available in a single structure. A symbol can be used to represent the circuit function.

The most frequent circuit functions are illustrated here. A valve's circuit function is represented by two rectangular boxes for the de-energized (right side, visualized by) and energized (left) states. The flow direction between the valve ports is shown by the arrows in the box. A 2/2-way Normally Open (NO) valve, a 2/2- way Normally Closed (NC) valve, and a 3/2-way Normally Closed valve are shown in the examples. Please see the valve symbols page for additional information on valve symbols and circuit operations.

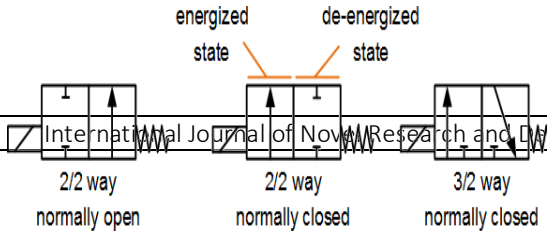

FIG: 1 CIRCUIT FUNCTIONS OF SOLENOID VALVE

bar to the maximum permitted pressure. The shown solenoid valve is a typically closed, direct operated 2/2-way valve.

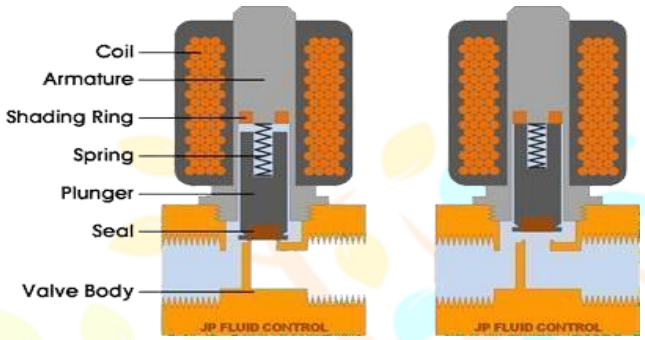

FIG: 2 FLUID CONTROL

DC MOTOR:

Type of operation:

Different operating groups can be assigned to solenoid valves. The most basic functioning concept is that of direct operated (direct acting) solenoid valves. The medium

passes via a tiny aperture that may be sealed by a plunger with a rubber gasket on the bottom. To close the valve, a tiny spring keeps the plunger down. The plunger is constructed of ferromagnetic material. The plunger has an electrical coil wrapped around it When the coil is electrically energized, a magnetic field is formed that pushes the plunger up towards the coil's core. This opens the aperture, allowing the medium to pass through. This is known as a Normally Closed (NC) valve. A Normally Open (NO) valve operates in the opposite manner: it is built differently such that the orifice remains open when the solenoid is not energized. When the solenoid is triggered, the orifice closes. The maximum operating pressure and flow rate of a solenoid valve are closely correlated with its orifice diameter and magnetic force. As a result, this technique is applied to relatively low flow rates.

Direct-operated solenoid valves do not require a minimum working pressure or pressure

difference, allowing them to be utilized from 0 DC Powered Pumps transport fluid in a

number of ways by using direct current from a motor or solar power. Motorized pumps employ hand-operated, electric, pneumatic, or hydraulic motors and run on 6-, 12-, 24-

, or 32-volts DC. Photovoltaic (PV) panels with solar cells that create direct current when exposed to sunlight are used in solar-powered DC pumps. Many DC-powered pumps transport fluids using centrifugal force or positive displacement.

Centrifugal pumps employ centrifugal force to produce velocity, spinning impellers to enhance velocity, and an output valve to push fluids through. Positive displacement pumps employ rollers, gears or impellers to transport fluid into a defined chamber, creating a vacuum that draws in additional fluid while liquid exists. The most popular type of positive displacement pump is the diaphragm pump. To avoid backflow, they have a single diaphragm and chamber, as well as suction and discharge check valves.

There are several

types of special DC-powered pumps available.

Macerators are pumping that empty sewage holding tanks and often feature a bronze cutter to grind waste down to a small particle size.

Circulation pumps keep media moving through distribution or process systems, whereas micro pumps employ a flexible construction to help circulate fluids in miniaturized systems. Small quantities of media are removed.

By sampling pumps for analysis. Magnetic drive pumps are suitable for laboratory, manufacturing line, chemical processing, general transfer utility and original equipment manufacturer applications because they employ a magnetic or electromagnetic drive. DC-powered pumps come in a variety of specs and features. The maximum discharge flow, minimum discharge pressure, intake size, and discharge size of devices vary. Continuous duty pumps retain performance criteria at 100% duty cycle, whereas adjustable speed pumps can run at speeds specified by the user. Run dry pumps may run for lengthy periods of time without pushed fluid or external lubrication. Some DC-powered pumps are corrosion-resistant, explosion-proof, or fulfil tight sanitary process application criteria.

Others are designed to pump sticky or stringy materials, feature a built-in grinding mechanism, or have centerline suction or discharge. Depending on the orientation of the pump stator / rotor assembly, DC driven pumps can transfer media either vertically or horizontally. Pumps are turned

on and off automatically by level control devices based on the media level. Pumps driven by direct current are utilized in a wide range of general industrial and commercial applications, as well as in the aerospace, automotive, food service, and medical industries. Pumps driven by direct current (DC) are used to transport liquids such as acids, chemicals, lubricants, and oil, as well as water, wastewater, and drinkable water. Some devices carry flammable or corrosive fluids, while others move non-liquid gas or air media.

PUMP:

A pump is a device that transports gases, liquids, or slurries. A pump transports liquids or gases from low pressure to high pressure and compensates for the pressure differential by providing energy to the system, such as a water system. Except in relatively low pressure-rise applications such as heating, ventilation and air- conditioning, where the operational equipment comprises of fans or blowers, a petrolpump is sometimes referred to as a compressor. Pumps function by pushing materialusing mechanical forces, either physically raising or compressing it.

Water pump that is operated by hand and has a reciprocating, positive displacement. A positive displacement pump moves a liquid or gas by capturing a set volume of fluid or gas and then pushing that trapped volume into the output pipe. They are quite cheap and are often used for pumping water out of bunds or tiny amounts of reactants out of storage drums. Constant energy addition. The conversion of additional energy to an increase in kinetic energy results in an increase in velocity. Conversion of increasing velocity into pressure rise. Kinetic head to Pressure Head conversion. Meet all of the heads, such as Kinetic, Potential, and Pressure. Addition of energy on a regular basis. Added energy causes fluid displacement in a closed volume. The displacement of fluid causes a direct rise in pressure. Before most residences had private water sources, one

type of pump that was previously prevalent across the world was a hand-powered water pump over a water well where individuals could handle it to retrieve water. Hand pumps are regarded as the most sustainable and low-cost method for clean water provision in resource environments. A hand pump allows access to deeper groundwater that is frequently not polluted, and it also increases the safety of a well by shielding it from contaminated buckets.

This means that communities are frequently left without spares and unable to use their hand pumps, forcing them to rely on traditional, and sometimes distant, polluting, supplies. This is bad since water projects frequently invest significant money to give ahand pump.

BEARING:

A bearing is a mechanism that allows for restricted relative motion between two pieces, most commonly rotation or linear movement. Bearings are classed generically based on the motions they enable and their

operating principle. Low friction bearings arefrequently used to improve efficiency, minimize wear, and enable high speeds. A bearing can minimize friction by its form, material, or by introducing and retaining a fluid between surfaces. By form, generally obtains an advantage by employing spheres or rollers. The bearing material's nature is utilized by material. Sliding bearings, often known as bushes bushings, bearings for journals Sleeve bearings, rifle bearings, and plain bearings are all options. Ball and roller bearings are examples of rolling- element bearings. The load is borne by rolling the axle slightly off-center in jewel bearings. Magnetic bearings, in which the load is carried by a magnetic field, are fluid bearings in which the load is carried by a gas or liquid. Flexure bearings, in which the motion is supports by a bending load element. Bearings vary widely in terms of the forces and speeds they can withstand. Radial forces, axial forces (thrust bearings), and moments perpendicular to the main axis are all possible. Bearings always require some degree of relative movement between surfaces, and various kinds have limitations on the maximum relative surface speeds they can handle, which can be expressed in feet per second or meters per second. The components that move There is significant overlap in capabilities, however simple bearings can normally manage the lowest speeds, whereas rolling element bearings are quicker, hydrostatic bearings are even faster, gas bearings are much faster, and magnetic bearings have no known maximum speed limit.

DESIGN OF EQUIPMENT AND DRAWING

To complete the machine's full operation, the hydraulic motorcycle posture adjustment comprises of the following components.

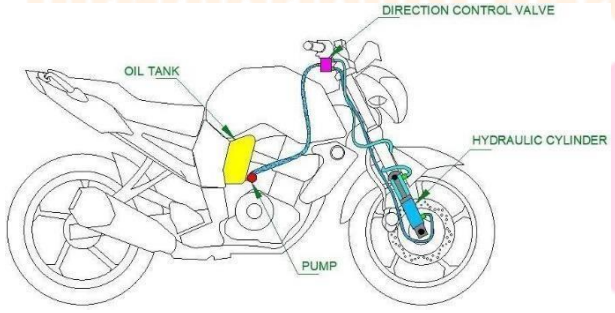

FIG:3 CONNECTION OF THE HYDRAULIC CYLINDER

- Motor
- Hydraulic cylinder
- PUMP
- DRAWING

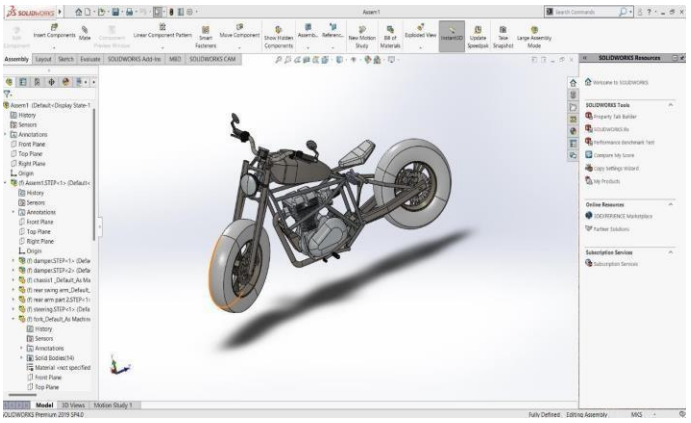

FIG:4 DESIGN IN SOLIDWORKS

WORKING PRINCIPLE:

Here were using the dc motor to drive the rotary pump. We have stored the oil in the reservoir. The hydraulic cylinder is fixed in between the fork and wheel shaft. It can be move up and down movement of we need. Solenoid valves are used to control the direction of the oil.

When the dc motor is rotating the pump, it circulates the oil from the reservoir to the cylinder by means of it lifts the fork.The concepts of fluid mechanics and hydraulics underpin the operation of telescopic hydraulic cylinders in motorcycle forks. When the motorcycle hits a bump or an impediment on the road, the suspension system compresses, and the telescopic hydraulic cylinders absorb the shock by converting the suspension's kinetic energy into hydraulic energy. This hydraulic energy is then dispersed through a set of valves and orifices that govern the flow of hydraulic fluid inside the cylinders and the damping effect.

The fluid is pushed from the lower to the upper half of the cylinder via the piston orifices during suspension compression. This produces resistance to the piston's action, slowing the compression and absorbing the shock. The size of the orifices, the viscosity of the hydraulic fluid, and the pressure inside the cylinder all influence resistance. The damping effect may be changed by adjusting the aperture size or the viscosity of the hydraulic fluid.

During suspension rebound, fluid is moved from the higher to lower parts of the cylinder via the piston orifices. This permits the suspension to return to its original position withoutbouncing wildly. The size of the orifices, the viscosity of the hydraulic fluid, and the pressure inside the cylinder all influence the rebound damping effect.

Rapid Upper Limb Assessment

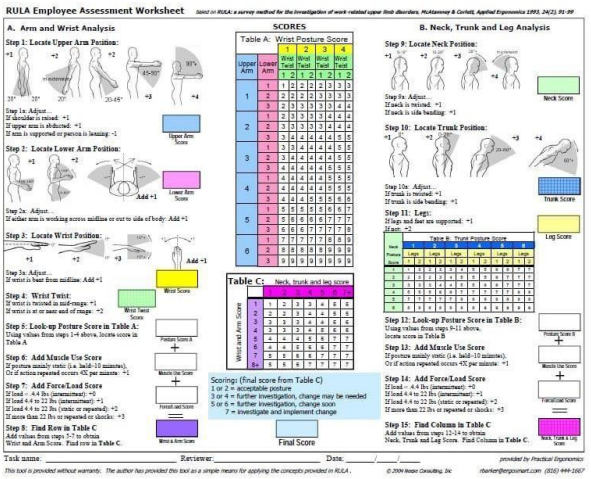

FIG:5 RULA CHART

The Rapid Upper Limb Assessment (RULA) is an ergonomic tool used to assess and resolve risk factors for musculoskeletal problems during repeated upper limb duties. The worksheet is divided into many critical steps. First, watch the worker's posture while performing the activity. Take note of the head, neck, trunk, and upper limb postures. To quantify the danger level associated with each observed position, assign a score based on established criteria. Second, evaluate the amount of force used throughout the task.

Consider the amount of effort necessary and any strong efforts made by the worker. Assign points based on the amount of force used.

Next, consider the task's length and frequency. Longer durations and greater frequency enhance the danger. The worksheet instructs the assessor on how to award suitable scores to these variables. Finally, RULA makes suggestions for remedial steps to mitigate detected risks. Changes to the workstation, equipment, or work process may be necessary to improve ergonomics and reduce the risk of musculoskeletal disorders. The RULA worksheet, by methodically analyzing these components, assists organizations in identifying and addressing ergonomic difficulties, ensuring a safer and healthier work environment for those doing repeated upper limb activities.

MERITS AND DEMERITS: MERITS

- Low cost.
- Easy to change the posture.
- Low power consumption

DEMERITS

- Poor handling
- It needs maintenance and periodic lubrication.
- Leakage issues

APPLICATIONS

- It is using for In all type of motorcycles

TECHNICAL FEATURES OF CYLINDER

Open length	7000 mm
Load capacity	1000 kg
Mounting configuration	Pivot mounts
Mounting condition: incline angle	25
Environmentalcondition	Dusty
System operating temperature	-10°C < T < +40°C

Technical features	Values and units
Load capacity	3000 kg
Operating pressure	160 bar
Stroke speed	34 m/min
Stroke length	7000 mm
Closed length	1000 mm

TABLE 1: TECHNICAL FEATURES OF CYLINDER

DIAMETER AND SLEEVE LENGTH OF 4- STAGE CYLINDER

No of stages	Diameter mm	Sleeve length mm
1	107	1750
2	126	1750
3	145	1750
4	165	1750

TABLE 2 DIAMETER AND SLEEVE LENGTH OF 4- STAGE CYLINDER

LIST OF MATERIALS FACTORS DETERMINING THE CHOICE OF MATERIALS:

The different elements that influence the selection of content are discussed below:

Properties:

The substance utilized needs to meet the specifications needed for the intended usage. Weight, surface finish, stiffness, capacity to withstand chemical assault in the environment, service life, dependability, and other characteristics must be feasible.

The selection of materials is significantly influenced by the four categories of principal qualities listed below.

- Physical
- Mechanical
- From manufacturing point of view
- Chemical

Melting point, thermal conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes, and other physical

characteristics are all involved.

The various Mechanical properties Concerned are strength in tensile, Compressive shear, bending, torsional, and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, modulus of elasticity, hardness, wear resistance, and sliding characteristics are all examples of mechanical qualities.

From the perspective of manufacturing, the different attributes in question are,

- Cast ability.
- Weld ability
- Forge ability
- Surface properties
- Shrinkage
- Deep drawing

Manufacturing case:

Special materials may be required when the lowest feasible production cost or surface characteristics are required by the application of appropriate coating substances.

Quality Required:

This has an impact on the production process and, eventually, the material. For example, it would never be advantageous to cast a smaller number of components that may be made more cost-effectively by welding or manually forging the steel.

Availability of Material:

Some materials may be scarce or in short supply.it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. It is important to consider both the material delivery and the product delivery date.

Space consideration:

Due to strong stress and space constraints, high strength materials may occasionally need to be chosen.

CONCLUSION:

Our project completed an impressive assignment in the automotive industry.
Additionally, this effort has brought down the concern's costs. The project is set up to complete the given necessary task in its entirety.
This research did not aim to improve motorcyclists' overall or whole- body comfort. As a result, it is clear from the literature that research on improving the whole-body comfort of riding position for motorcyclists is lacking. Motorcycling duration is one of the essential aspects that might impact the motorcyclist's comfort/discomfort posture.

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