Design And Fabrication of Brake Bleeding Machine

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Abstract— The brake bleeding machine is mainly used to re-fill the brake fluid in the automobile brake fluid reservoir. The existing procedure is manual and minimum of three technicians required to refill the fluid. In this machine the usage of gear pump to use the pressurized laminar flow by obtaining no air presence in the fluid flow. The simple construction of this machine helps to fill the brake fluid lesser then minutes and reduces the manpower. With application of manpower these brake fluid filling may succeed in one or more time. But with this help of this machine we can perfectly ensure the fluid refilling with in one time. The simple in design and assembly of this component ensures the time saving and work efficacy in the automobile garages. The main applications of this machine are cars, trucks, bikes, special purpose mobile carts, etc.,

Keyword – Break, Automation, brake fluid, Replacement

I. INTRODUCTION

The recent development in the automobile engineering is vast and it requires periodic maintenance and services to increase the reliability of a car and efficient tools needed. In order to do the quick service, the aftermarket service industry needed time saving, manpower saving with high efficiency. A brake is a mechanical device that inhibits motion by absorbing energy from a moving system. It is used for slowing or stopping a moving vehicle, wheel, axle, or to prevent its motion, most often accomplished by means of friction. A hydraulic brake is an arrangement of braking mechanism which uses brake fluid, typically containing glycol ethers or diethylene glycol, to transfer pressure from the controlling mechanism to the braking mechanism. In a hydraulic brake system, when the brake pedal is pressed, a pushrod exerts force on the piston(s) in the master cylinder, causing fluid from the brake fluid reservoir to flow into a pressure chamber through a compensating port. This results in an increase in the pressure of the entire hydraulic system, forcing fluid through the hydraulic lines toward one or more callipers where it acts upon one or more calliper pistons sealed by one or more seated O-rings (which prevent leakage of the fluid). The brake calliper pistons then apply force to the brake pads, pushing them against the spinning rotor, and the friction between the pads and the rotor causes a braking torque to be generated, slowing the vehicle. Heat generated by this friction is either dissipated through vents and channels in the rotor or is conducted through the pads, which are made of specialized heat-tolerant materials such as Kevlar or sintered glass. Alternatively, in a drum brake, the fluid enters a wheel cylinder and presses one or two brake shoes against the inside of the spinning drum. The brake shoes use a similar heat-tolerant friction material to the pads used in disc brakes. Subsequent release of the brake pedal/lever allows the spring(s) in the master cylinder assembly to return the master piston(s) back into position. The hydraulic braking system is designed as a closed system: unless there is a leak in the system, none of the brake fluid enters or leaves it, nor does the fluid get consumed through use. Leakage may happen, however, from cracks in the O-rings or from a puncture in the brake line. Cracks can form if two types of brake fluid are mixed or if the brake fluid becomes contaminated with water, alcohol, antifreeze, or any number of other liquids.

II. METHODLOGY AND IMPLEMENTATION

2.1. PUMP AND HOLD METHOD PROCESS

The braking system on car is vital because it affects vehicle safely and performance. Unfortunately, brake fluid

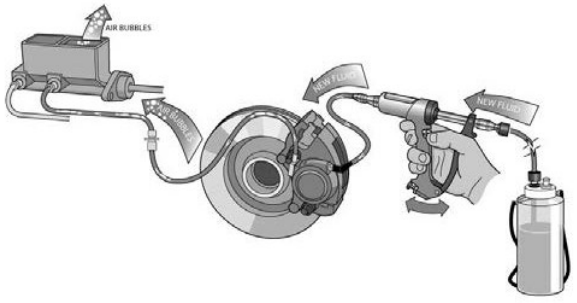
often gets neglected. The major sign of neglect is a "spongy" feel of the brake pedal, this indicates moisture in the system. Brake fluid can absorb up to 7% moisture, but after that you get water and that means problems will develop. Another sign of neglect is brake fluid that has a dark or murky brown color. If you have one of these symptoms, then it's probably time to replace your brake fluid existing treatments, this device is a good candidate as a global standard of care for HIE treatment in developing countries.

2.2 VACUUM METHOD

The order in which you need to bleed the brake system (assuming you are bleeding all four brake lines) changes for front-wheel drive and rear-wheel drive models. Consult your car owner's manual or repair manual for the correct sequence for your particular model. Before you remove the cap, wipe the brake master cylinder clean with a shop rag to get rid of grease and dust so you don't contaminate the brake hydraulic system, and follow the next suggestions. When flushing the system, remove as much fluid from the reservoir using your vacuum pump or turkey baster and add new brake fluid up to the MAX mark. Body. The infant cannot survive with the thermal loss which in turn body of the infant need's warm environment. The required temperature range is 36.5 to 37.2. Temperature greater than this is very harmful for the infant. Thus, temperature is the one of the most important phenomena which is to be controlled.

2.3. REVERSE METHOD

Reverse Bleeding utilizes fluid paths in which enhanced braking mechanisms offer almost no resistance. Metering valves, proportioning valves, and anti-lock valving are designed to manipulate braking pressure, while proving minimal resistance to fluid as it returns to the master cylinder following the release of braking pressure. During pressure bleeding the fluid in the reservoir is pressurized. The pressurized fluid can pass through the master cylinder to the bleeder valves.



2.4. GRAVITY BLEEDING

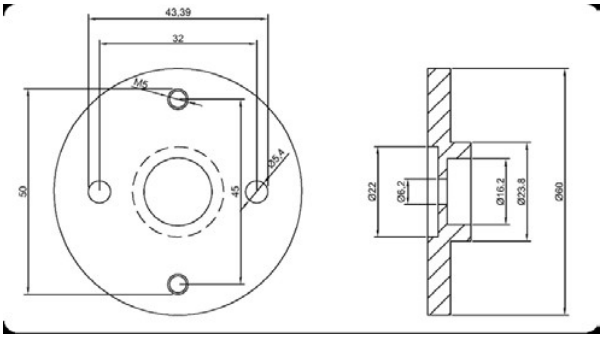
Using the automotive jack, raise your vehicle till it is slightly above the ground. Once done, rest your car on the four jack stands and start removing the wheels one by one. Bear in mind that the car must be supported "evenly" on the jack stands.A slight mistake can result in your car falling from one end and getting damaged. Once the wheels are removed, you will gain access to the brake calipers. This is where you begin gravity bleeding your brakes. A good sequence to follow is; passengers rear, driver rear, passengers front, then drivers front).

Try locating the brake fluid reservoir next to your brake calipers. Once found, loosen the cover and the bleeder caps with the vice grip pliers. Be very careful while removing the covers and caps, so that you don't damage anything. If the bleeders are dripping fluid, tighten the caps just enough so they are not weeping. At the first wheel, place one side of the plastic tubing over the bleeder, while raising the other end to make sure it stays above the fluid reservoir. It is crucial that the tubing is extended to a level higher than the reservoir for optimal air cleaning.

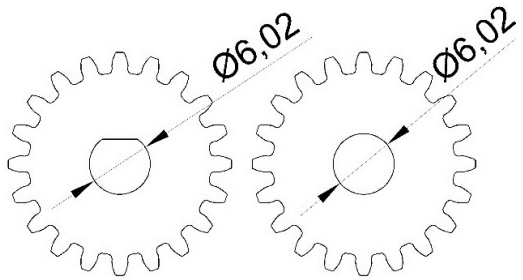
III. DESIGN OF BRAKE BLEEDING MACHINE

The design process initiates with selection of material and its required specifications. The major part and child part lists are cabinet, pump, DC / AC Motor, Non-return valve, PVC pipes, 2 push fitting connections, PCB(printed circuit board), Pressure switch, foot valve, quick release couplings, power cables, Alligator clips, fuse, Pressure reset switch, Emergency indicator LED, ON/Off switch, pressure regulator, pressure gauge. The outer most covering body is made of stainless steel and it mainly preferred for rust prevention. The brake fluid consists of high oxygen molecules in the use of brake oil when it may spill on or on the cabinet it should not make the part rusty. The selection is made of non-ferrous material. Among the nonferrous materials the

stainless steel and aluminum are the cheapest material. The selection is purely based on the rusting property of the material. The Cabinet is made of stainless-steel grade of SS304 with the thickness of 1.2mm. The sheet has to be laser cut and it must be bended on the press brake with the tonnage of 250metric ton as per our required specifications. The parts need to be laser cut and bended as per the required shape and design and welded with TIG welding and make the glossy finish process with polishing process. The Pump is a direct coupled pump with DC motor. The motor shaft is the driven shaft which is directly coupled to the pump driver gear for making the pump efficient. The pump here we chosen is simple gear pump. The pump block is also made of stainless steel. The material grade of the pump block is SS304. The stainless-steel selection is for the prevention of rust. The block has to be milled using programable vertical milling machine ensures the Geometric Dimensioning and Tolerancing (GD&T) as per the dimensions. The block is simple rectangular block with four M5 screw's drill and counter bore. The motor and pump are coupled by the round disc plate made up of hardened steel with the material of OHNS having 25~28 HRC with Ni-Cr plating. This coupling mates pump and motor together. This coupling having the space of keeping the oil seal so that the pressured oil cannot move to the motor assembly.



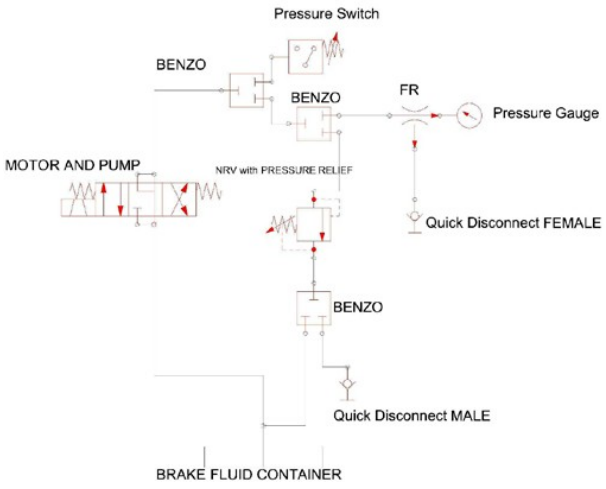
The gears are the main component of the pump. These gears are in pair and having the simple toothed corrected profile of attaining proper tooth mesh to increasing the efficiency of the pump. These gears are made up of Brass or Gunmetal (red brass) material. The gear is made thru the brass plate having thickness of 5 mm machined with wire cut. profile to attain proper GD&T.



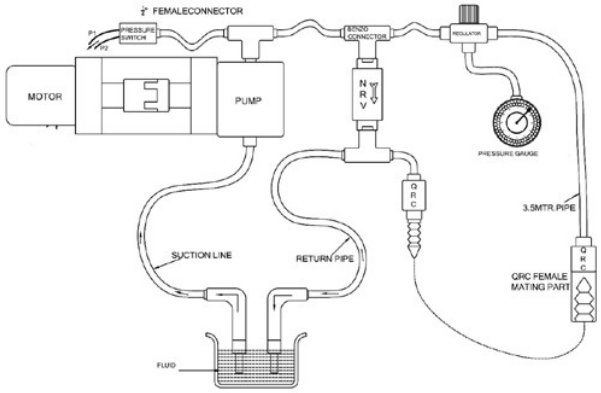
The gears in a transmission are analogous to the wheels in a crossed, belt pulley system. An advantage of gears is that the teeth of a gear prevent slippage. When two gears mesh, if one gear is bigger than the other, a mechanical advantage is produced, with the rotational speeds, and the torques, of the two gears differing in proportion to their diameters.

IV. PROPOSED IMPLEMENTATION

Hydraulics is a technology and applied science using engineering, chemistry, and other sciences involving the mechanical properties and use of liquids. At a very basic level, hydraulics is the liquid counterpart of pneumatics, which concerns gases. Fluid mechanics provides the theoretical foundation for hydraulics, which focuses on the applied engineering using the properties of fluids. In its fluid power applications, hydraulics is used for the generation, control, and transmission of power by the use of pressurized liquids.



A hydraulic circuit is a system comprising an interconnected set of discrete components that transport liquid. The purpose of this system may be to control where fluid flows (as in a network of tubes of coolant in a thermodynamic system) or to control fluid pressure (as in hydraulic amplifiers). For example, hydraulic machinery uses hydraulic circuits (in which hydraulic fluid is pushed, under pressure, through hydraulic pumps, pipes, tubes, hoses, hydraulic motors, hydraulic cylinders, and so on) to move heavy loads. The approach of describing a fluid system in terms of discrete components is inspired by the success of electrical circuit theory.



Just as electric circuit theory works when elements are discrete and linear, hydraulic circuit theory works best when the elements (passive component such as pipes or transmission lines or active components such as power packs or pumps) are discrete and linear. This usually means that hydraulic circuit analysis works best for long, thin tubes with discrete pumps, as found in chemical process flow systems or microscale devices. The process starts with pump, pumping fluid is transmitting to the pressure relief on- return valve then the flow was been routed to pressure regulator and to the pressure gauge. The flow was controlled here by the pressure regulator. Then the fluid passes thru the exit of pressure regulator and thru the exit hose. The exit hose connected to the brake master reservoir with the duplicate adaptor, these special adapters are made as per the brake fluid reservoir.

V. CONCLUSION

Pump Block to be machined and need to couple` with motor with it required parts. Procurement of standard items like wires, LED, switches, PU Hoses, Pressure switch, high pressure hoses, quick release couplers, regulator, Pressure gauge and other items. Manufacture the special type Non-Return valve with pressure relief. Manufacture the Printed circuit board as per the process requirement. Assemble the entire circuit as per the design. Once the assembly completed the machine need to be tested with the car and small testing unit to be prepared for the practicing. Time comparison and process success comparison with existing methods. Hence concluding the design process with this phase, the manufacturing, assembly and testing are handled.

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