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DESIGN AND IMPLEMENTATION OF HYDRAULIC PRESSS SYSTEM USING MATLAB

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ABSTRACT
In this paper we presented the design, analysis, and simulation of the hydraulic system. A dynamic model of a closed hydraulic system by utilizing the MATLAB- SIMULINK software, the effects of various design parameters on the overall response of the system are investigated.

I. INTRODUCTION
This chapter will be an introduction to this thesis. At first, a short introduction will be given to a review of dynamical analysis of hydraulic system (Presses) and modelling of hydraulic system using Simulink in matlab will be carried out.

The hydraulic press, invented by Englishman John Brahmah, was one of the first workable pieces of machinery developed that used hydraulics in its operation. It consisted of a plunger pump piped to a large cylinder and a ram. This press found wide use in England because it provided a more effective and economical means of applying large forces in industrial uses.Convenient working height. Hydraulic doorstops keep heavy doors from slamming. Hydraulic brakes have been standard equipment on auto- mobiles, since the 1930s. Most automobiles are equipped with automatic transmissions that are hydraulically operated. Power steering is another application of hydraulic power. Construction workers depend upon hydraulic power for the operation of various components of their equipment, **[1]**.For example, the blade of a bulldozer is normally operated by hydraulic power.

There are many hydraulic systems in the engineering applications composed of pumps, motors, pipes, pistons, valves, filters, and accumulators that use nearly incompressible fluids such as water or hydraulic oil. Such systems are found in machine tools, earth-moving equipment, power transmissions, and aircraft control surface servomechanisms. Generally, these systems have high pressures and low fluid velocities so that the static pressure dominates the dynamic pressure. The performance of a hydraulic control system is strongly influenced by the dynamic characteristics of its control valves,**[2].**Almost every hydraulic system is equipped with a pressure regulator system to maintain the working pressure of the system at a predetermined level

Hydraulic actuators are used in a lot of different mechanical applications like wind mills, industrial production such as robots and processing machinery, construction machines such as cranes and excavators, just to name a few. The term Hydraulic actuators cover a group of components in machine design which can create a rotating or linear motion by utilizing a pressurized fluid. Actuators generating rotation are called motors while linear hydraulic actuators are called cylinders. The focus in this thesis will be on hydraulic cylinders.

Hydraulic actuators are widely applied in hydraulic servo-systems, which is a system that is made up of several individual hydraulic components such as pump, valves, actuators, sensors and the connecting elements in- between. These components are interconnected so they can perform a pre-defined task through the hydraulic transfer.

II. HYDRAULIC SYSTEM DESIGN AND ANALYSIS PROCESS
Once the design goals are established for a given hydraulic system, the actual design process can be initiated. The generalized hydraulic system design and analysis process is illustrated in Fig. 2.1. From the design goals, the design concept to be integrated into the hydraulic system must be established and a system schematic must be developed along with the operational specifications for the system. Once these tasks are completed the

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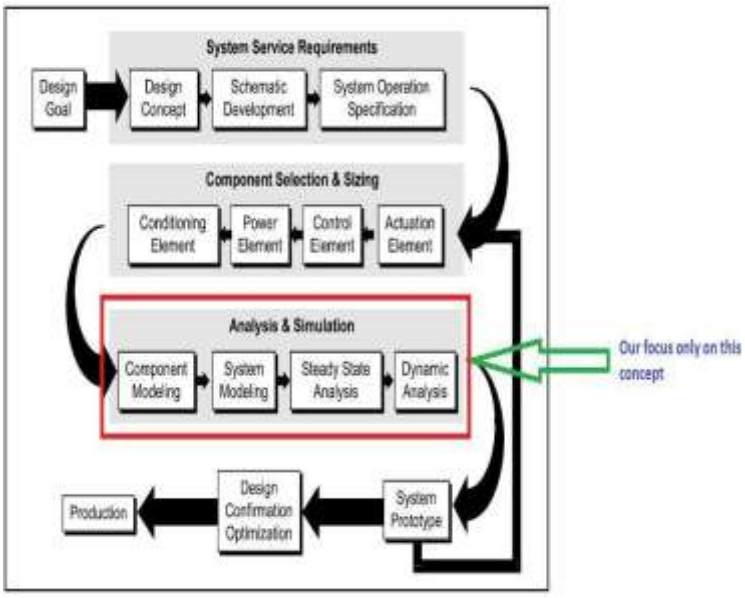
designer will enter into the component sizing and selection process. In the past when the sizing and selection phase was completed, the components would be purchased and a prototype system constructed. The system performance was not simulated and the success of a particular system was mainly a result of the experience of the designer and luck. The actual performance characteristics were evaluated through laboratory and field tests using the system prototype.



Hydraulic System Design and Analysis Process

Literature Review

Zhang Meng et al[1]: -The press system for shaping is incredibly necessary instrumentality in partbusiness. Since this type of system is incredibly complicated, like flow nonlinear, this may cause that its dynamic performance is tough to get. During this paper, a simulation primarily based dynamic performance analysis methodology is projected to investigate the system dynamics. First, a simulation model of the press system is made supported the industrial package AME Sim, upon that its dynamic performance is analysed and calculable. Then simulation results show the effectiveness of the projected methodology

SeongJin Cho et al[2]:-Several industrial motion systems use electronic motors. However, huge powersystems that create automobile frames, roll mixing machines and lots of alternative systems can't use electronic motors due the latter's comparatively little power. So as to unravel this downside, we have a tendency to propose victimization hydraulic systems. The open-loop management methodology and therefore the close-loop management methodology are wide wont to management hydraulic systems. Among hydraulic systems, we have a tendency to specialise in the management press system; significantly, the press system that operates with vertical movement and has huge weight. During this case, if the close-loop methodology is applied to the press system, then vibration and noise issues can occur because of the inertia of the press system

Hydraulic System

A hydraulic system contains and confines a liquid in such a way that it uses the laws governing liquids to transmit power and do work. This chapter describes some basic systems and discusses components of a hydraulic system that store and condition the fluid. The oil reservoir (sump or tank) usually serves as a storehouse and a fluid conditioner. Filters, strainers, and magnetic plugs condition the fluid by removing harmful impurities that could clog passages and damage parts. Heat exchanges or coolers often are used to keep the oil temperature within safe limits and prevent deterioration of the oil. Accumulators, though technically sources of stored energy, act as fluid storehouses

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III. CASE STUDY ON HYDRAULIC PRESS:-

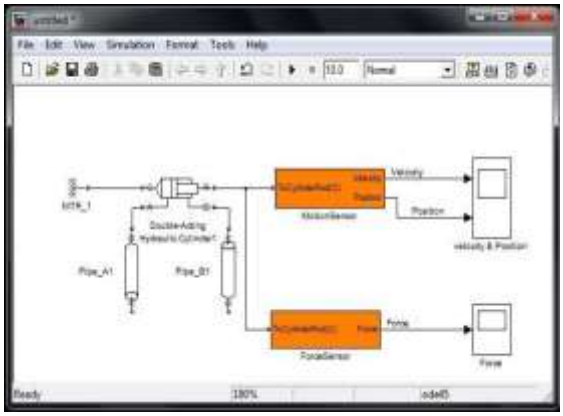
C-FrameHydraulic Press

Model Number	**MHPL15-15M**
Tonnage Capacity	15 tons
Piston Diameter	4.0"(101 mm)
Rod Diameter	2.5"(63.5 mm)
Stroke	10"(254 mm)
Ram Speeds (in./min.)*	
Advance	1644
Press	146
Return	1054

Hydraulic Pump Flow	35 GPM
Operating Pressures	200psi
Stroke	0.5"-10.0"
Motor HP/RPM	15 HP/1800 RPM
Reservoir Capacity	60 Gallons (227 lits)
Weight	5950 lbs.

MHPL-15 C- frame Hydraulic press is used in various applications such as Riveting, Embossing, Punching, Straightening, Stamping, Crimping, and Assembling. In this Project the team thought that if we improve the tonnage capacity force of this Press so that we can use this model for further applications. Hence we have taken some assumptions for creating this model

IV. RESULT & SIMULATION



Modeling of Double acting cylinder in simhydraulic

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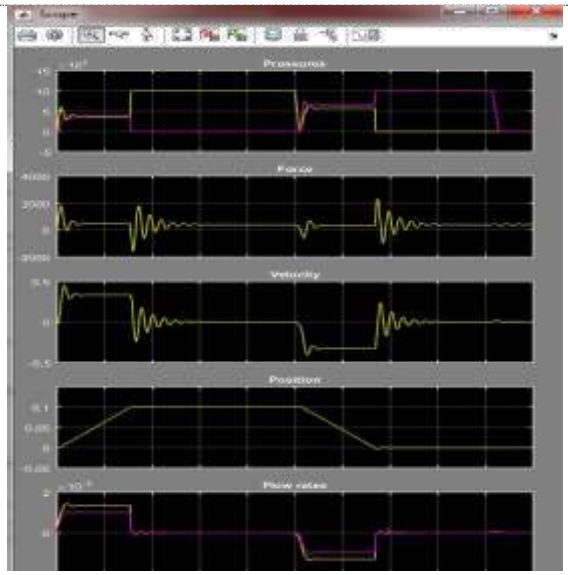
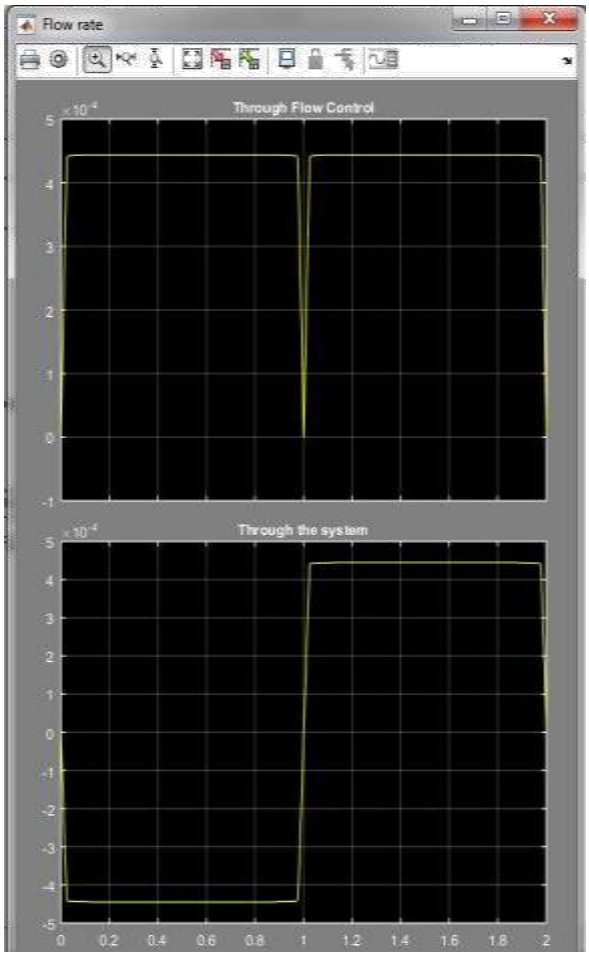


Pressure, Force, position, Flow rate ,Velocity graph



Out put of Flow control, Pressure control and Directional controlling Minimum controlling valves

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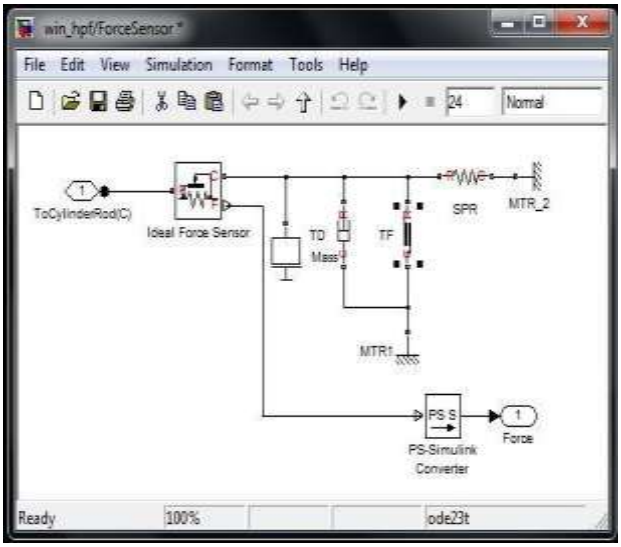

Modeling of Force sensor connected with Double acting cylinder in Simhydraulic

V. CONCLUSION

In this paper we presented the design, analysis, and simulation of the hydraulic system. A dynamic model of a closed hydraulic system by utilizing the MATLAB- SIMULINK software, the effects of various design parameters on the overall response of the system are investigated. The verification of the simulation results with the experimental studies justifies the proposed dynamic model. Several various nonlinearities of the system are takes into account through the modeling process. For the finding the transfer function of closed loop hydraulic system with increasing the frequency and constant amplitude of given input signal. By simulating the MATLAB-SIMULINK we achieved the smooth gradual decreases the magnitude of the output force. There's a pole in the origin as expected by the model and the resonance peak at 2.1-2.2 is the mechanical resonance of the whole system.

REFERENCES

[1] H. E. Meritt, Hydraulic Control Systems, John Wiley & Sons Inc., 1967. Design, Development and Optimization of Hydraulic Press. (2015). International Journal for Research in Applied Science & Engineering Technology (IJRASET), 3(2321-9653), pp.902-907.

[2] Ke Li, Jian Chen, Ziyuan Xiao, "An electro hydraulic system for Synchronized rooferection," AUTOMATION IN CONSTRUCTION, pp. 29-42, 2003

[3] Ch. Linsmeier and M. Reinelt, "Improved Mechanical Propertiesof Ti2AlN Based Intermetallic Alloys and Composites," Advanced Materials Research,vol. 12, pp.105-108, 2008.

[4] A.J.Barnes,"SuperplasticForming40YearsandStillGrowing," Journal of Materials Engineering and Performance, vol. 08(16), pp. 440–454, 2007.

[5] J. W. Yoon, F. Pourboghratc and K. C. Yang, "Springback prediction for sheet metal forming process using a 3D hybrid membrane/shell method," Int. Journal of Mechanical Sciences, vol. 44, pp. 2133–2153, 2002.

[6] Zhang Meng, W., Wang, X., Wang, Z. and Yuan, S. (2014). Structural Optimization of Cylinder-crown Integrated Hydraulic Press with Hemispherical Hydraulic Cylinder. Procedia Engineering, 81, pp.1663-1668

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