



Ain Shams university
Faculty of Engineering



Mechatronics Department

Hydraulic and Pneumatic Control Laboratory

Regenerative Hydraulic Circuit

Name: -----

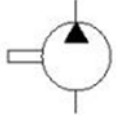
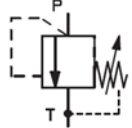
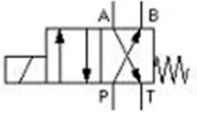
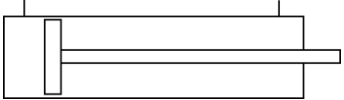
Presented to: Prof. Dr. / Magdy Abdel-Hameed



1. Objective

- Get familiar with the regeneration concept.
- Practice the hydraulic circuits building.
- Understand the cylinder forces equilibrium.
- Understand the relation between the cylinder velocity and the flow-rate supplied by the pump.
- To increase the Speed of the Cylinder during extension without increase the pump flow rate output

2. Hydraulic Components used

Uni-directional PDP	
Pressure relief valve	
4/2 DCV	
Double acting cylinder	

3. Description

The term regeneration can be applied to any system that diverts all or part of its output and adds it to its input to enhance some aspect of its performance in hydraulic cylinder. Regeneration means that the fluid flowing out of the rod end of the cylinder during extension is returned to the inlet side of the cylinder in order to increase the extension velocity. This concept allows the extension speed to be increased significantly without increasing the pump flow output. This means that regeneration circuits save money because a smaller pump, motor, and tank can produce the desired cycle time. It also means that the circuit costs less to operate over the life of the machine. As shown in Fig.1.



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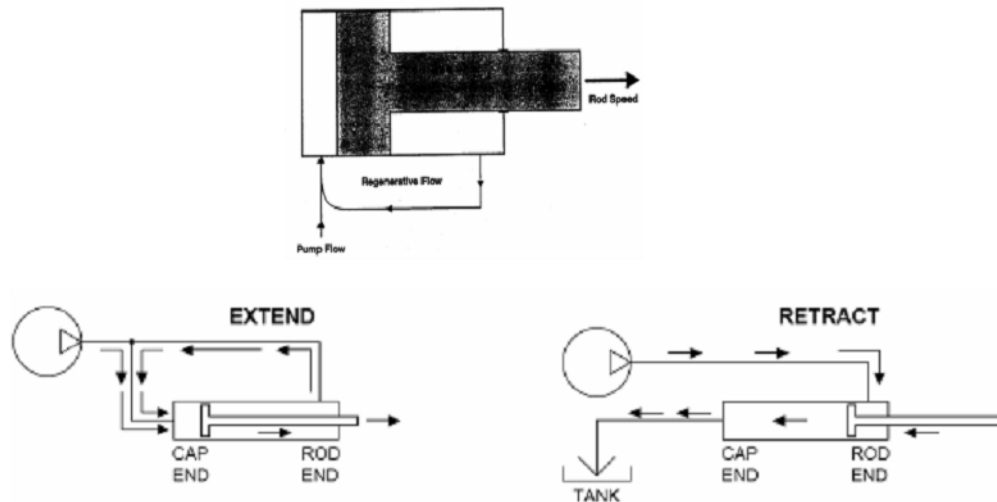


Fig.1. Regeneration Circuit

A regeneration circuit can be used in the Hydraulic Shaper M/Cs where the return stroke is need to be faster than the cutting stroke, in order to save machining time of the w/p where the return stroke doesn't perform any cutting process so it's needed return faster as shown in Fig.2.

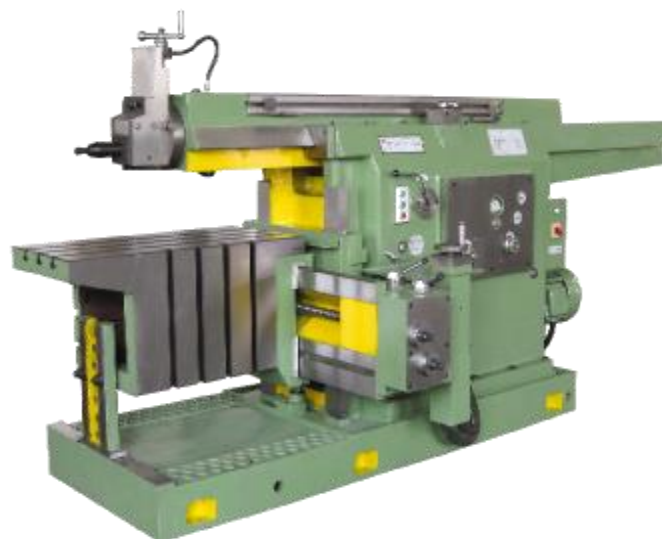


Fig. 2 Hydraulic Shaper M/C

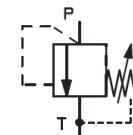
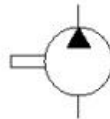
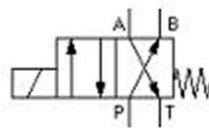
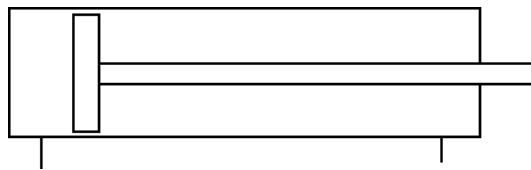


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4. Design of hydraulic circuit



Givens:

$D = 25\text{mm}$.

$d = 18\text{mm}$.

$Q = 2\text{ l/min}$.

$P =$



4. Discussion

1. Describe the mode of operation of the circuit

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2. Estimate the rules of the advanced and return-stroke speeds and the load-carrying capacity during extension and retraction?

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3. Estimate $V_{cyl\ extension}$, $V_{cyl\ retraction}$, $Thrust_{Extraction}$, $Thrust_{Retraction}$.

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