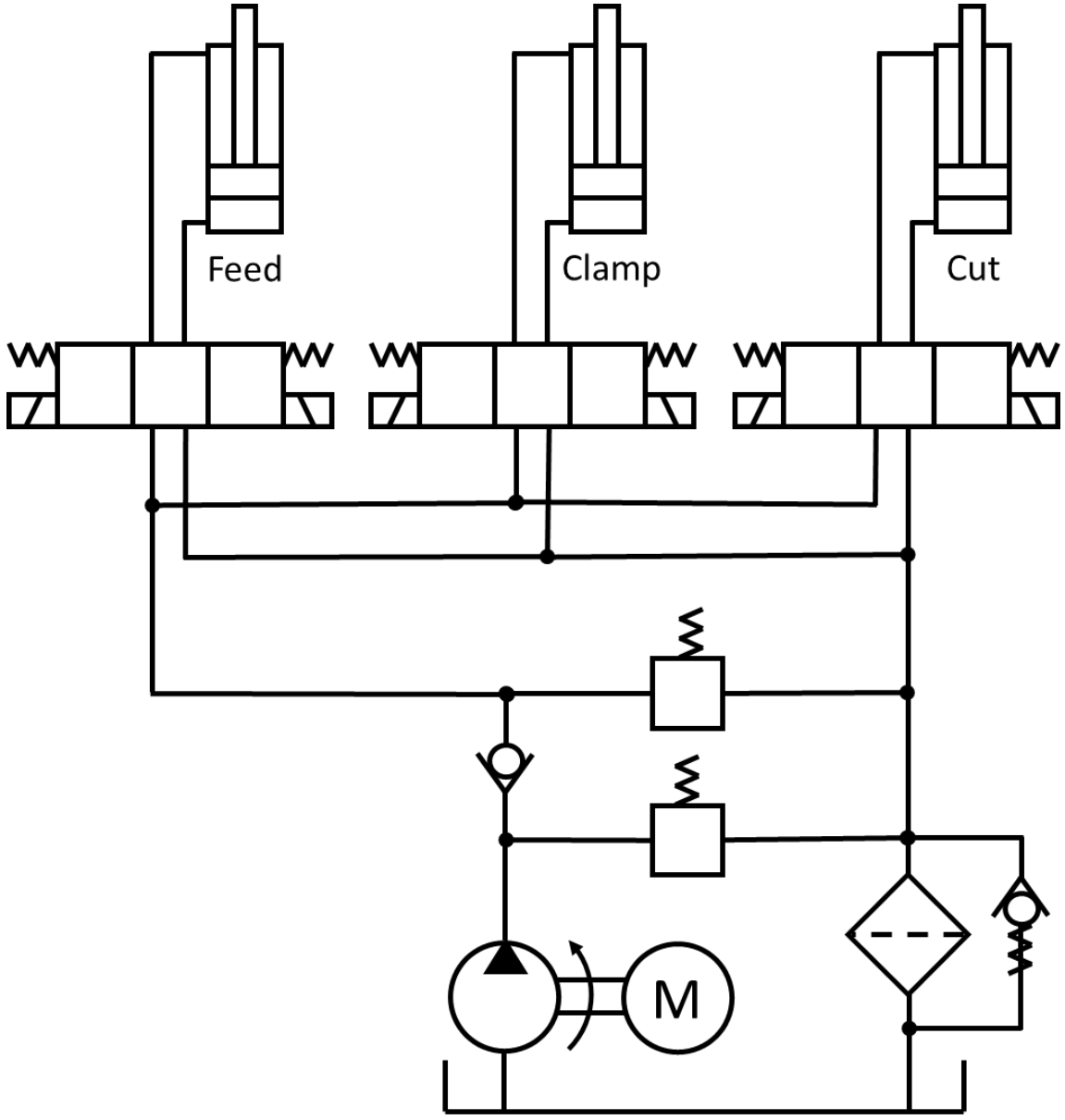
System:

You are required to design a hydraulic system for an automated turning machine to control the following three operations:

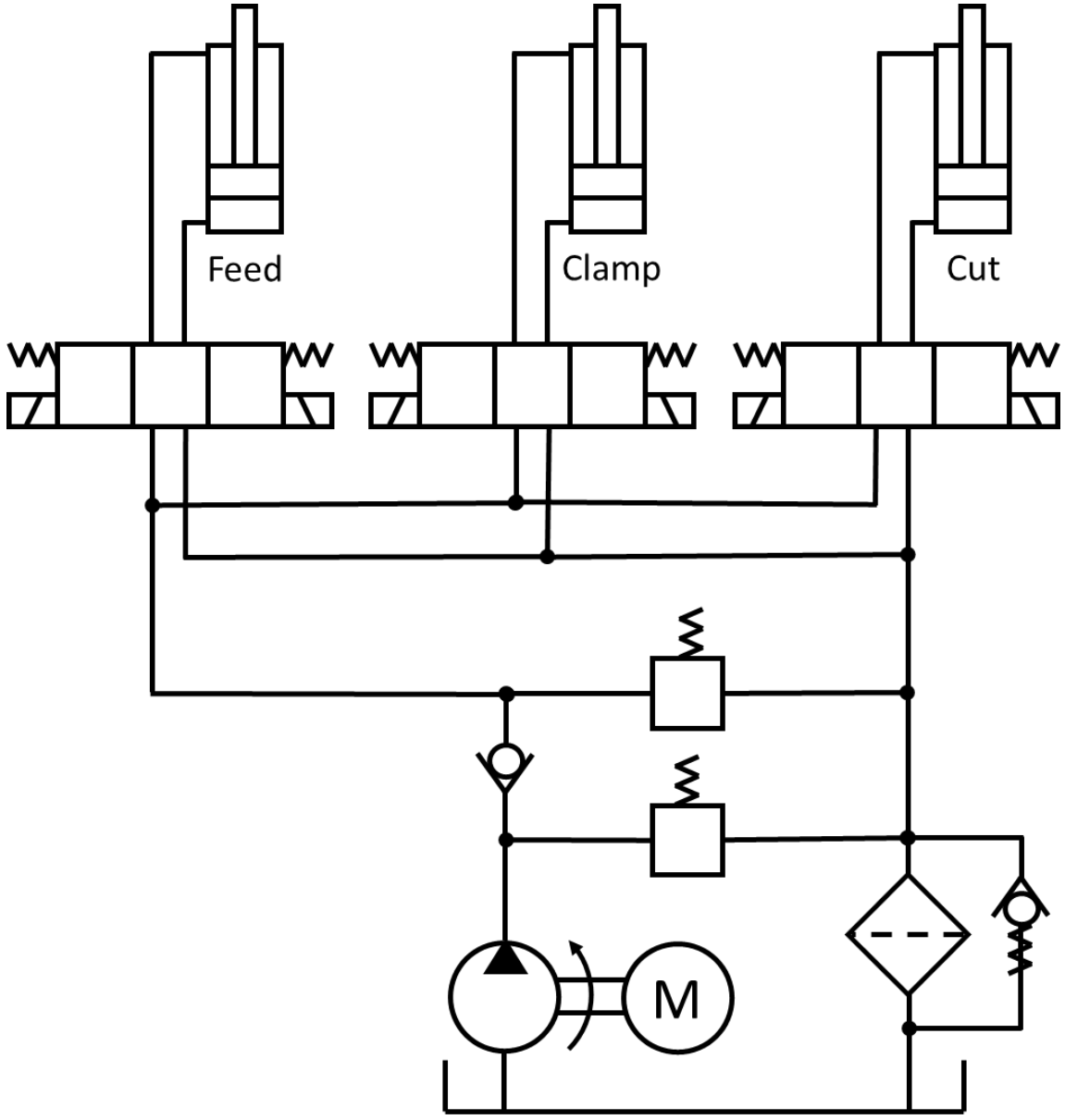
1. Workpiece feeder, (Stroke = 200 mm)
2. Turret clamp operation, (Clamp force= 400 N, Stroke = 150 mm)
3. Carbide cutter operation, (Cutting force = 800 N, Stroke = 250 mm, Speed = 500 mm/min).
4. Make an engineering best practice assumptions for any missing information required to carry out the design process. Make sure to indicate what assumptions you must make and how did you arrive at the selected values.



Design:

Consider the following requirements for your system design:

1. Complete the missing information on the given schematic diagram. This is a preliminary design; you need to make sure the design is correct to perform the intended system function, you are required to modify the design by adding any additional components required to perform the intended function
2. All cylinders need to have the same bore and rod dimensions,
3. Circuit should not allow workpiece feed unless cutting tool and clamp cylinders are fully retracted.
4. Circuit should not allow cutting tool cylinder to advance unless clamping force requirement is met.
5. Circuit should provide a protection against pump loss of power.



Submission:

Submission requirements:

- Report
  1. A report outlining your design process,
  2. A full list of each hydraulic component with a detailed description of its functionality and design parameters process.
  3. What additional components would be required to provide the design requirements.
- Simulation model/results
  1. A Simscape/MATLAB simulation model, for design validation.
  2. Detailed simulation results with analysis to confirm system functionality.