TAMPERE UNIVERSITY OF TECHNOLOGY

COURSE NAME:- MOBILE HYDRAULICS :: COURSE CODE:-IHA-2306 :: DATE:-18.02.2017

PROJECT TOPIC:- **The design of the hydrostatic drive train of a mobile working machine**

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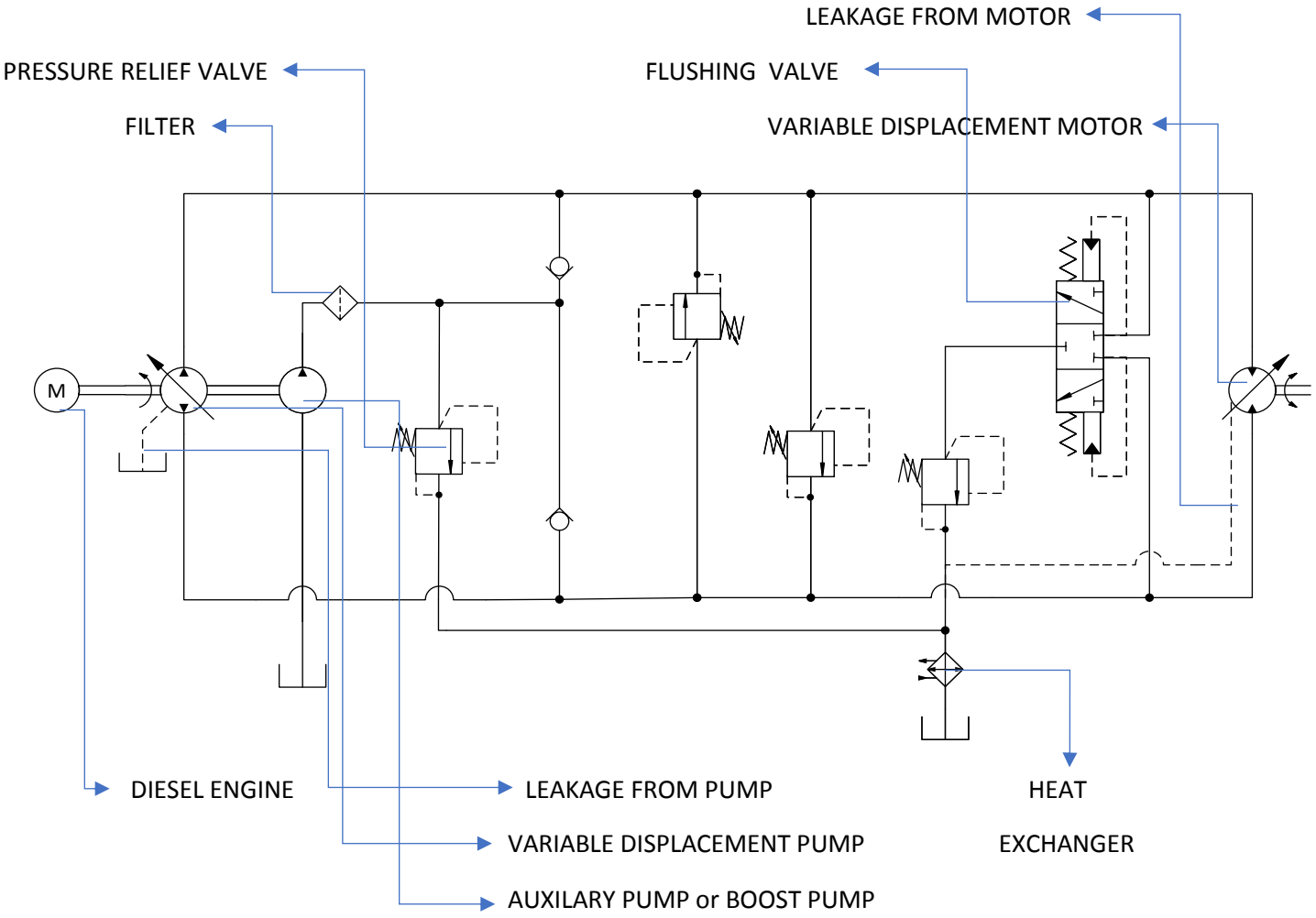
INTRODUCTION:

Hydrostatic drive chain is a closed hydraulic circuit which generally consists of a hydraulic pump which is driven by a diesel engine, a motor which produces a torque. In our project we also used an auxiliary pump. We observe the variation of change in nature between the displacement of pump and motor and velocity with force. It is observed when the vehicle start to move from point 1 to point 2. Initially it has a full displacement of motor but the displacement of pump is zero with corresponds to maximum force at almost zero velocity as the vehicle starts to move there is an exponential drop in force with increase in velocity and we observe the displacement of pump also increases at a certain point say 3 the motor and pump has a maximum displacement and after that displacement of motor decrease exponentially. We tally our calculated result with the Simulink model provided to us.

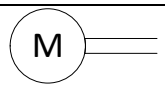
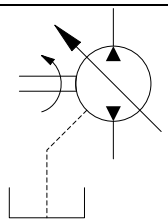
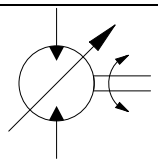
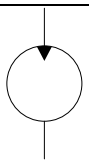
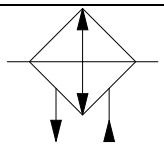
HYDRAULIC DIAGRAM:



LIST OF MAIN COMPONENTS:

1. DIESEL ENGINE
2. VARIABLE DISPLACEMENT PUMP
3. AUXILARY PUMP
4. VARIABLE DISPLACEMENT MOTOR
5. HEAT EXCHANGER
6. FLUSHING VALVE

LIST PARTS OF A HYDROSTATIC DRIVE OF A MOBILE HYDRAULIC MACHINE:

SL. NO	HYDRAULIC COMPONENTS	DIAGRAMS	ORDER SPECIFICATION
1	DIESEL ENGINE		
2	MAIN HYDRAULIC PUMP		A10VGT Series 11 | Axial piston variable pump.
3	HYDRAULIC MOTOR		A6VE Series 71 | Variable plug-in motor.
4	HOSES		16EFG5KXLL 4651-1392 1 1.53 5000 20000 6.0 200 1.55
5	AUXILARY PUMP		
6	HEAT EXCHANGER		OK-ELH 3

ROLE OF PUMP, MOTOR AND LOW PRESSURE CIRCUIT IN HYDROSTATIC DRIVE

1. ROLE OF VARIABLE DISPLACEMENT PUMP:

Pumps which are generally used in mobile machines in a hydrostatic drives are axial piston pumps with variable displacement. The axial piston pump uses the principal of swash plate.

This types of pumps are more compacts and economical to manufacture. By using a variable displacement pump which is operated by adjusting the angle of the swash plate this types of o pumps actually can adjust the discharge of the fluid per revolution and alter the system pressure accordingly to the load requirement and it can work efficiently on electrical signal. As a result it is more power efficient compared to other pumps.

1.1 AUXILARY PUMP

The auxiliary pump better known as a boost pump is attached externally and have following roles:

- Pumps extra fluid to the circuit to compensate the losses due to leakeage thus increasing the volumetric efficiency.
- It also pumps fluid into the system for lubrication thus enable smooth operation and reduces friction
- The boost pump also gives initial power to the axial piston pump at the beginning of hydrostatic transmission

2. ROLE OF HYDRAULIC MOTOR:

Hydraulic motor used in our project is a variable displacement axial piston motor. The motor variable displacement motor provide adjustable torque as an output due the pressure difference in fluid flow in the circuit and also provides an angular displacement. The torque can be adjusted according to the working load.

3. LOW PRESSURE CIRCUIT:

The boost pump senses the low pressure line and it get connected to it.

- The low pressure line controls the pressure for the hydraulic pump.
- With the help of flushing valve the low pressure line circulates the hydraulic oil to the circuit for cooling and filtration.

COMAPRISON BETWEEN CALCULATED RESULT AND SIMULATED RESULT:

	CALCULATED RESULT AT POINT 1	CALCULATED RESULT AT POINT 2	SIMULATED RESULT AT POINT1	SIMULATED RESULT AT POINT2
TRACTION FORCE (kN)	32.919	9.189	33.56	9.728
VELOCITY (Km/hr)	6.984	25.02	7.04	25.01
PRESSURE (bar)	400	194.202	406.9	210.2
PUMP INPUT (kW)	63.861	63.861	67.9	77.84
NATURAL FREQUENCY (rad/s)	6.821		6.83	

PLOTS AND SIMULATED GRAPHS:

1.

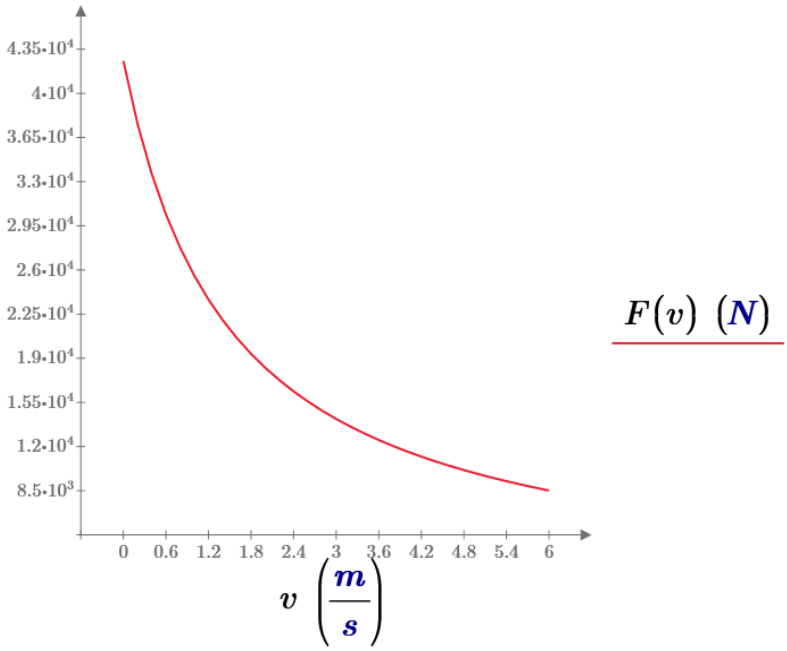


Figure 1. FORCE VS VELOCITY

2.

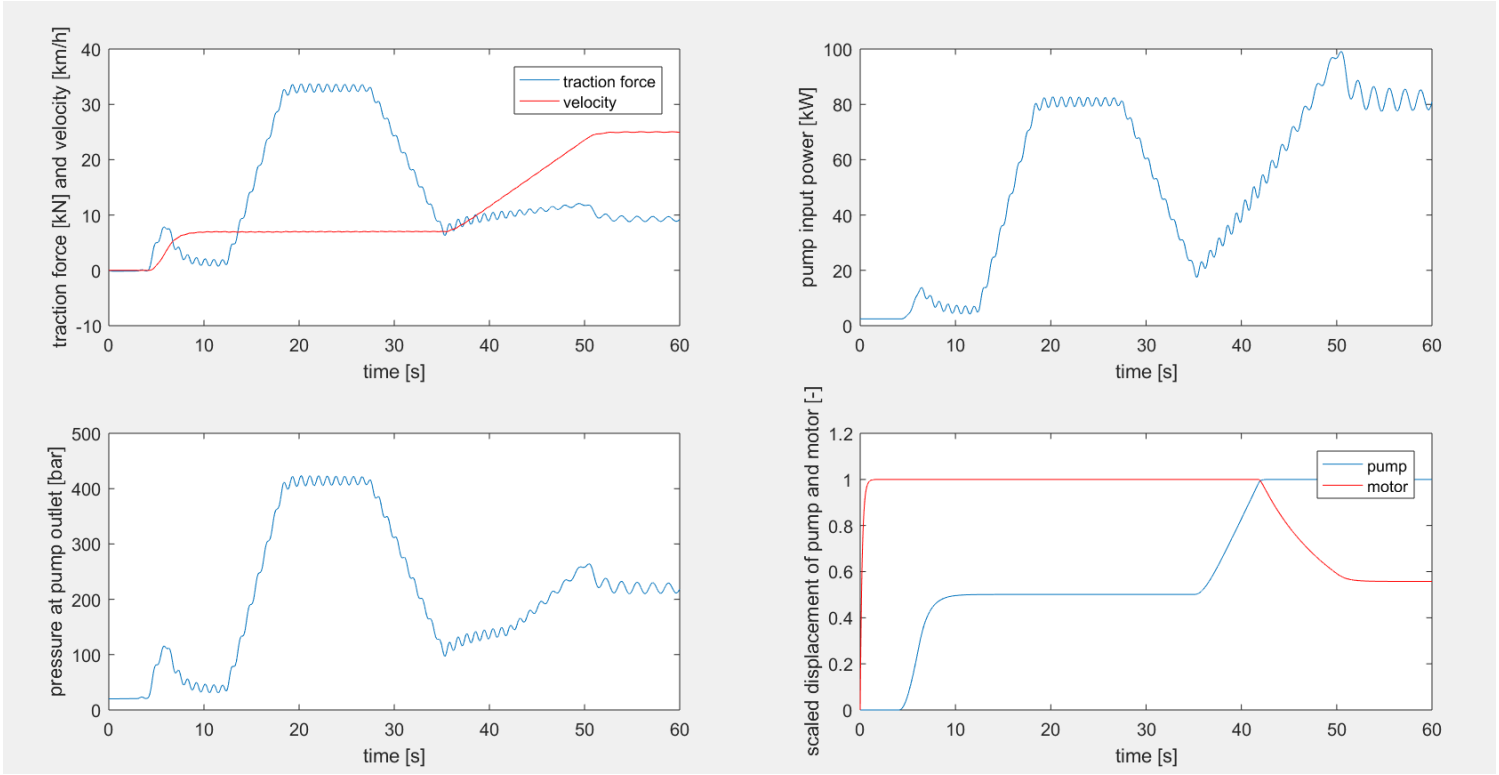


Figure 2. SIMULATED GRAPH OF VALIDATION MODEL

3.

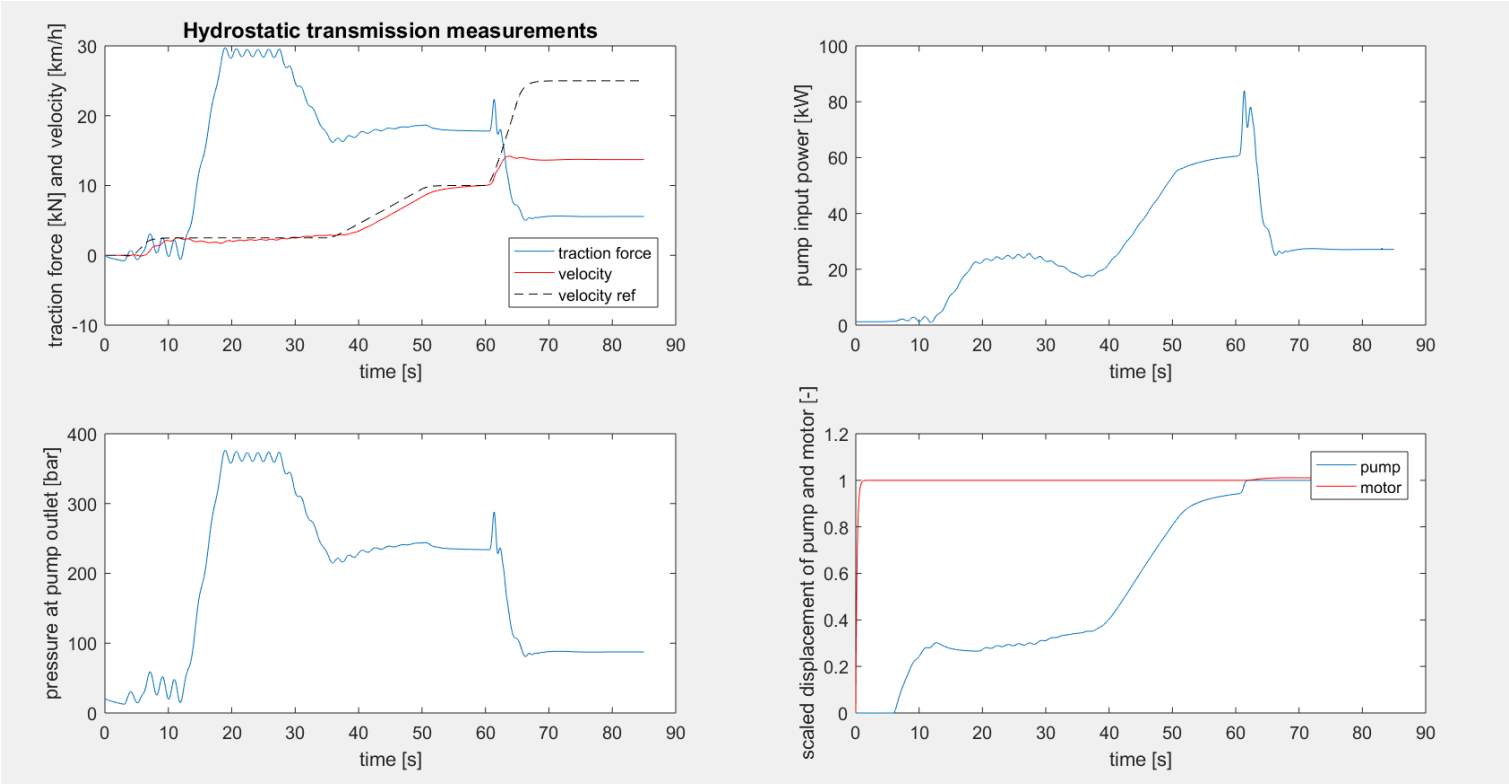


Figure 3. SIMULATED GRAPH OF FUEL CONSUMPTION 2

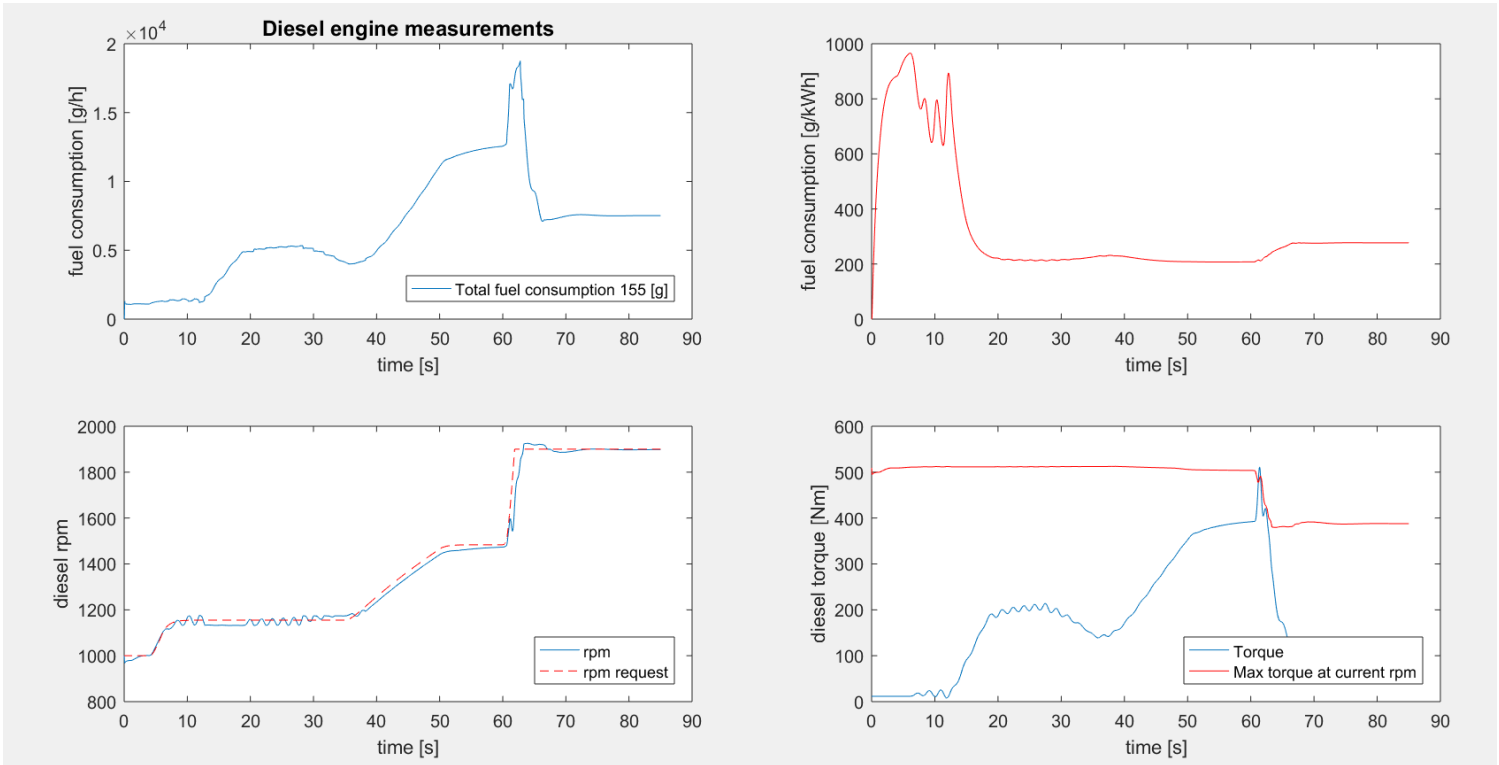


Figure 4. SIMULATION GRAPH OF FUEL CONSUMPTION1

CONCLUSION

It is observed by comparing the calculated and simulated result that a vehicle when it has a low rotational speed and high torque the vehicle is more fuel efficient.