engineering **adventures**

Worksheet SZ1 & Training Record **Scissor Lift Sizing and Performance**		**Equipment Sizing**
Email:	Course:	Provider:

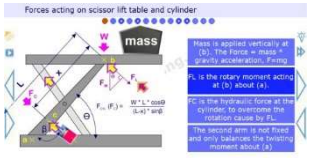
Expected Outcomes: (20-30mins)

Understand how to perform simple calculations to size the hydraulic pumps and actuators. Appreciate what legal requirements may apply and a how design risk analysis procedures used to identify and reduce risks.

Previous Knowledge Required:

Students should have completed worksheet IH 'Introduction to hydraulics' and FB 'formulas and fundamentals' or have a good working knowledge of hydraulic equipment.

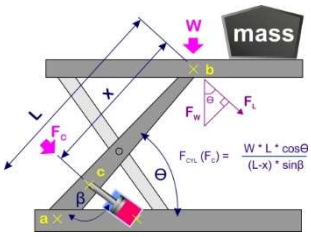
Self-driven micro-learning tutor (SDLT)



Complete the 'Scissor lift project' SDL app via www.e4training.com/hydraulic_courses/scissor1.php, phone app or CD/download

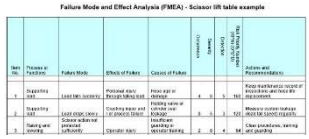
Date, score & time:

Coursework - follow ws_SZ2_calc_scissorlift.pdf & ws_SZ3_fmea_scissorlift.pdf



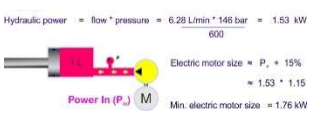
Understand how loads and forces are transmitted through the structure:

- Calculate the gravitational loads applied to the structure.
- Calculate the moments applied to pivot points.
- Resolve the forces acting on the cylinder.



Appreciate the importance of satisfying national legal requirements and demonstrating all risks have been identified and minimised:

- Satisfy European LOLER requirements for safe lifting. Or apply legislation applicable to your region.
- Complete FMEA ws_SZ3_fmea_scissorlift.pdf to demonstrate a good understanding of the risks to personnel from operating and maintaining lifting equipment.

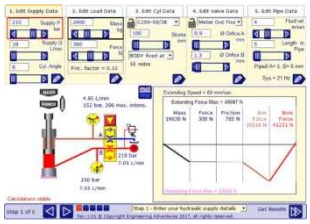


Complete a basic cylinder and pump sizing exercise:

- Print worksheet ws_SZ2_calc_scissorlift.pdf and re-work calculations for a different load mass.
- Calculate the cylinder diameter required.
- Calculate the pump flow rate required.
- Calculate the minimum electric motor size required.

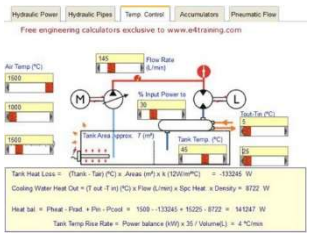
Submit calculations

Reproduce and submit the calculations in worksheet ws_SZ_calc_scissorlift.pdf using the new lift capacity.



Enter calculated results into the cylinder and valve design guide at www.e4training.com/design_guides/designcyl3.php :

- Set the cylinder size and load to your calculated values to check the supply pressure.
- Change the stroke and flow to check the cylinder speed.
- Set the orifice sizes to 6mm if you have no hydraulic speed control.
- Read the design guide instructions if you want to experiment with more complicated hydraulic control systems.



Enter calculated results into the hydraulic calculator at www.e4training.com/hydraulic_calculators/hydraulic1.php :

- Set the flow rate and pressure to your calculated values and check the hydraulic power in figure.
- Check the electric motor power in at the bottom of the screen.

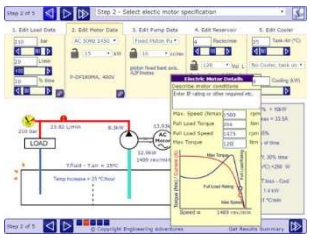
App date & duration

Correct your calculation worksheet before submitting if the values do not coincide. Provided calculation conditions are the same.

Additional video and instructional resources

Visit www.e4training.com/menusummary1.php for a full range of lessons covering all aspects of hydraulic system design and maintenance.

Further reading and experiments



Experiment with a hydraulic power unit design guide at www.e4training.com/design_guides/designpu3.php :

- Set the reservoir size based on flow rate.
- Confirm reservoir size provides stable temperature with expected duty cycles.
- Explore AC or DC motor performance.

Dates & durations (Optional):

Qualification pass requirements:

Students will need to complete and return all worksheets to their registered training provider. Methods of testing and qualification may vary between course providers.

For online certificates, students must post their results by clicking the email button that will appear in the app, once the training module has been completed.