UNC CHARLOTTE
Department of Engineering Technology

Laboratory Safety Analysis

Operating TQ Steam Motor and Energy Conversion Demonstrator

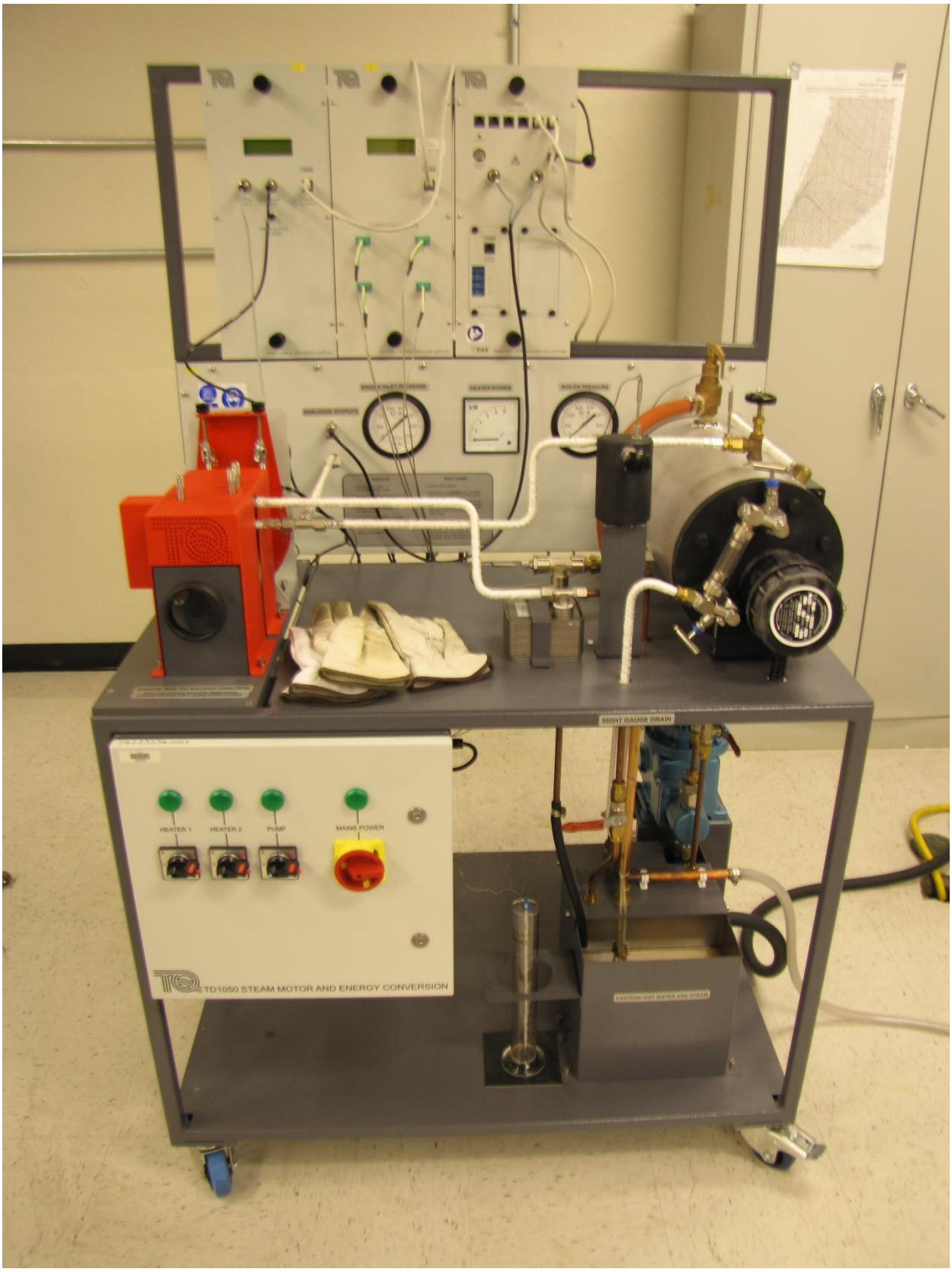
Location: Smith 129
Required Training: The Steam Motor and Energy Conversion Demonstrator is designed and intended for use by properly trained and experienced operators. If you are not familiar with the proper and safe operation of this unit, do not use until proper training and knowledge have been obtained.
Required Personal Protective Equipment (PPE): Safety glasses
Reference Materials: Manufacturer's safety rules and operating instructions.

Task	Hazards	Controls
Wear safety glasses with side shields	High pressure steam.	• Students are required to provide their own safety glasses • See laboratory instructor or laboratory manager if you do not have safety glasses before using the equipment.
Inspect safety glasses for cracks, scratches or other damage. Ensure ANSI standard Z87.1 is stamped into the side of glasses.	High pressure steam, burns.	• If defects are found report to your laboratory instructor before beginning the experiment.
Put on PPE, including gloves and face shield if necessary.	High pressure steam, burns.	• Wear personal protective equipment at **all times** around this apparatus.

Inspect work area for oil, water or other foreign objects on the floor.	Slips, trips and falls.	• Clean area around equipment as needed prior to beginning experiment. • Empty steam condensate if remaining from prior runs
Visually inspect the electrical power cord.	Electrical shock	• If the electrical cord is damaged or worn the cord should be unplugged and tagged "Out of Service – Do Not Use". • Do not attempt repairs, notify laboratory manager immediately.
Ensure the electrical cord is connected to electrical outlet.	Electrical shock	• Caution: equipment is moveable, always disconnect electrical cords before moving.
Check water hose connections.	Water spills	• Make sure both the feed line (for the boiler and the condenser) and the drain line are properly routed and connected.
Filling boiler tank.	Water spills, high pressure steam.	• Make sure sight glass drain and boiler drain valves are closed, and both valves connecting the sight glass to the boiler are open • Do not overfill boiler. Water is incompressible, water getting into the engine can cause a hydraulic lock.

Firing the boiler.	High pressure steam, burns.	• Continuously monitor boiler pressure gauge and water lever in sight glass at all times. • Equipment must never be left unattended while operating. • Avoid contact with boiler surfaces, valve handles or other metal parts that are in contact with live steam, as they become very hot. When adjustments are necessary, use gloves. • Stay clear of the pressure relief valve, it may vent steam to relieve excess boiler pressure at any time during operation.
Run Experiment	High pressure steam, burns.	• Exercise caution when sampling condensed steam from engine. Condensate is hot and contains mixed oil and water. • Continuously monitor boiler pressure gauge and water lever in sight glass at all times. • Stay clear of the pressure relief valve, it may vent steam to relieve excess boiler pressure at any time during operation. • Avoid contact with all hot surfaces • Do not remove engine guards, which protect against injury from hot or moving parts.
Shut Down	High pressure steam, burns.	• Avoid contact with metal surfaces of the boiler, pipes, valves, condenser and engine as they will remain hot long after shut down. • Ensure that heater switches are off and allow engine to run until boiler pressure is exhausted.

		• Use gloves to open boiler drain valve and drain remaining water into cooling reservoir. • Leave cool water supply running for about two minutes to cool boiler water. • Cut off main power supply and water supply.
Clean Work Area and return all PPE to a clan storage area.	Injury	• Disconnect and remove all electrical cords and water hoses, store properly. • Drain water reservoir and waste tank into pans placed underneath the equipment and discard. • Clean up any spills of water, oil or mixed condensate.
For more information about this LSA, contact the *Department of Engineering Technology* at UNC Charlotte (704) 687-2305 or please visit our website at: http://www.et.uncc.edu\		
The development of Laboratory Safety Analyses is a very effective means of helping reduce incidents, accidents and injuries in the workplace. It is an excellent tool to use for training purposes and can also be used to investigate "near misses" and accidents.		


HEATER 1
HEATER 2
PUMP
MAINS POWER
TD1050 STEAM MOTOR AND ENERGY CONVERSION