

FORKLIFT SAFETY: INDUSTRIAL COUNTERBALANCE LIFT TRUCKS

COURSE OUTLINE

- **One of the best "tools" for moving materials around the workplace quickly and efficiently is a specialized piece of equipment that OSHA calls a "powered industrial truck".**
 - These include vehicles such as the tractors that pull luggage carts at airports...and the heavy duty boom-lifts used on construction sites.
- **The most common type of "powered industrial truck" is called an "industrial counterbalance lift truck", but most of us call it a "forklift".**
- **While forklifts make our jobs a lot easier, they can also be very dangerous.**
 - More than 100 workers are killed and thousands severely injured in forklift accidents every year.
 - The people who get hurt include both pedestrians and forklift operators.
- **In addition to the human cost, these accidents can damage materials, facilities and the forklifts themselves.**
- **You and a forklift can make a productive team.**
 - But to do that you need to understand the machine's limitations and how to operate it safely.
- **Contrary to what many people think, driving a forklift is not like driving a car.**
 - Forklifts have different controls.
 - They are heavier than cars.
 - They steer with their rear wheels.
 - They are naturally unstable.
- **Forklifts are designed so that they can raise, transport and lower heavy loads.**
 - Because of the counterweight it carries to balance these loads, a forklift can weigh twice as much as an automobile.
 - Forklifts have also been designed to get in and out of tight places easily, so they have a very narrow wheelbase.
- **Most forklifts have the counterweight at the back and the forks at the front, which puts the machine's "center of gravity" somewhere in the middle.**

- **In terms of stability, the vehicle acts like a seesaw.**
 - When you put a load on the forks, you add its weight to the forklift, and shift the forklift's center of gravity forward.
 - If the load on the forks weighs less than the machine, the center of gravity will be behind the front wheels, and the forklift will still be stable.
- **If the load and the truck weigh the same, the center of gravity will be on the front wheels.**
 - This means the forklift could easily become unstable (if you had to stop quickly, for example).
 - When the center of gravity is so far forward, the rear wheels that do the steering have very little traction.
 - If the rear wheels skid, you could lose control of the truck.
- **If the load that is on the forks weighs more than the counterweight, the center of gravity shifts to in front of the front wheels.**
 - This can cause the back wheels to come off the ground.
 - And the forklift can tip forwards.
- **The "stability triangle" is a "map" of a forklift's suspension.**
 - You can find it by drawing three imaginary lines connecting a forklift's two front wheels and the pivot-point of the rear axle.
- **To keep the forklift stable, its center of gravity must stay within the stability triangle.**
 - The more weight you put on the forks, the more the center of gravity shifts to the base of the triangle.
 - If a load is heavier on one side than the other, this can pull the forklift's center of gravity outside of the stability triangle as well.
 - A forklift's center of gravity can move depending on how you load it.
 - The closer you can keep the center of gravity to the middle of the stability triangle, the more stable a forklift will be.
- **Operating a forklift safely begins before you even climb onto the machine.**
 - It starts with you asking yourself if you're ready to drive.
 - If anything has happened that could affect your focus, you should think twice about getting into a forklift's driver's seat.
 - You should never drive a forklift if you are under the influence of drugs or alcohol.

- **Once you are in your forklift...**
 - Be sure to buckle up before you turn the key.
 - Look around to make sure the way is clear before you start driving.

- **When you're driving, be sure to follow the normal "rules of the road".**
 - Keep to the right.
 - Give pedestrians the right of way.

- **Always face in the direction you're traveling.**
 - Keep your arms and legs inside the cab.

- **Keep the forklift under control at all times.**
 - Jerky and erratic driving can cause accidents.
 - Never engage in horseplay behind the wheel

- **With or without a load you should always drive with the forks lowered to between 4 and 6 inches off the ground, with the mast tilted back.**

- **Don't drive any faster than a normal walking speed.**
 - This helps to keep the forklift stable and gives you more time to respond to what's going on around you.
 - It also makes it easier to come to a safe stop.

- **If you make a turn while you're moving, a forklift's center of gravity will shift to the outside of the turn.**

- **To maintain stability while turning...**
 - Brake carefully to slow down gradually.
 - Come to a complete stop before changing directions.
 - Then proceed slowly through the turn.
 - Turn the steering wheel in a slow, smooth, sweeping motion.
 - Never make a turn with the forks raised more than 4 to 6 inches off the ground.

- **Keep an eye on the surfaces that you're traveling on.**
 - Grease, water and other liquids will make any of them more slippery.
 - Even dry materials like sand, gravel or trash can cause a forklift to skid.

- **Take care to keep some space between your truck's wheels and the edges of ramps, elevated platforms and loading docks.**
 - Running even one wheel off the side could easily tip the forklift over.
- **Pedestrians aren't always easy to see, but you can help to keep them safe by...**
 - Sounding your horn whenever you are approaching a cross-aisle or make a turn.
 - Using your horn if you do see someone in your vicinity and they haven't noticed you as well.
 - Making eye contact to verify that they've heard you and can get out of the way.
 - Remembering that they always have the "right-of-way".
- **Accidents can happen, even to careful operators.**
 - So you need to know what to do in case your forklift tips over.
- **Do not try to jump out of the forklift if it tips over.**
 - Studies show that will probably get you killed.
- **Instead, you should...**
 - Brace your feet.
 - Grab onto the steering wheel and pull yourself tight up against it.
 - Lean in the opposite direction from the way the vehicle is tipping and hang on.
- **When your shift is over, or any time you're going to leave a forklift unattended, be sure to secure it.**
 - Lower the forks to the ground.
 - Set the parking brake.
 - Turn off the motor.
 - Take the keys with you.
- **If you have to park on an incline, chock the wheels to make sure the forklift stays right where you left it.**
- **Keeping a forklift's center of gravity within the "stability triangle" is important, and how the mast and forks are positioned can affect its stability significantly.**
 - Raising a payload, or even just the forks, raises the truck's center of gravity, too.
 - The higher you raise its center of gravity, the more unstable a forklift becomes.

- **Every forklift has a maximum weight it can lift, known as its "load capacity".**
 - You need to know this weight limit, so you don't overload the truck.
 - The "load capacity" will also indicate how far back on the forks a load's center of gravity should be for the truck to lift the load safely.
- **The distance from the vertical part of the forks or the backrest to the load's center of gravity is known as the "load center".**
 - The load center for most forklifts is 24 inches, half the depth of a standard pallet.
- **Loads can come in different shapes and sizes, with different load centers.**
 - For example, a forklift might be rated to safely lift 4,000 pounds on a 24 inch load center,
 - But if you pick up a 4,000 pound load that has a 36 inch load center it will shift the forklift's center of gravity further to the front.
 - This could cause the forklift to tip forward.
- **You may have to rearrange the materials on a pallet or the forks to get the correct load center for a lift.**
- **Be sure to adjust the width of the forks to give a load even support.**
 - Wider is usually better.
- **Any load that has been badly stacked, or that is on a damaged pallet, is naturally unstable no matter how you support it.**
 - This can make your forklift unstable as well, so you should have it restacked on a new pallet to prevent problems.
- **To pick up a load on the floor or on top of a stack, make sure to position the forklift squarely with the pallet.**
 - Drive forward slowly, sliding the forks into the pallet until it touches the vertical portion of the forks or the backrest.
 - The length of the forks should be two-thirds the length of the load at a minimum.
 - Center the load side-to-side whenever possible.
- **Raise the load only as much as you need to, with only enough backward tilt to stabilize it.**
 - Before you move off, lower the forks to between 4 and 6 inches off the ground.

- **If the load obstructs your forward vision, operate the forklift in reverse, with the load trailing.**
 - This will give you a clear view in the direction you're traveling.
- **Always check your overhead clearance when your forklift is in motion, as well as when you are raising and lowering the mast.**
 - Things like lights, sprinkler systems, pipes and low doorways can be damaged if you hit them, and could cause a tipover as well.
- **The metal mast and forks will conduct electricity, so keep them at least 10 feet from any electrical wires or equipment.**
- **A forklift can be very convenient for raising coworkers up high when they need to perform maintenance or other tasks off the ground, but only if you do it safely.**
 - Never lift someone who's standing on the bare forks, or on a pallet.
- **To lift people safely with a forklift you need to use an aerial platform or "cage".**
 - Make sure the platform is firmly against the vertical part of the forks or the backrest, then secure it with a safety chain.
 - Never move a forklift with the platform elevated or with someone on it.
- **Always stay with the truck when the platform is raised.**
 - Don't let anyone walk under the platform.
 - Never let anyone climb the mast.
- **A busy workplace presents a lot of challenges for a forklift operator.**
 - With so much going on, and so many people on the move, you have to stay alert and be sure to follow safe driving practices.
- **Your vision will naturally be limited at intersections, doorways and elevators.**
 - These locations typically have a lot of vehicle and foot traffic.
- **Watch carefully for pedestrians and other vehicles.**
 - Sound the horn to let people know that you're approaching.
 - Come to a complete stop before changing direction.
 - Look both ways before moving off again.

- **Don't assume that pedestrians will see you.**
 - Always check for them before you move your forklift.
 - Watch out for them when you're in motion.
 - Make eye contact with them to verify that they're aware of you.
 - When in doubt, give pedestrians the right of way.

- **Since they may not understand a forklift's potential hazards, it's up to you to remind pedestrians to keep their distance, even when the lift is stopped.**
 - Never drive your forklift up to a pedestrian who is standing in front of a bench, wall or other fixed object.

- **Don't let anyone walk under raised forks, whether they're loaded or not.**

- **Don't let coworkers ride on your forklift, and never let anyone ride on the load.**

- **When you're driving, stay at least three lengths behind other forklifts that are travelling in the same direction.**
 - Do not pass them at intersections... or even straightaways.

- **If you have to operate a forklift on ramps, slopes or grades, the rules are different depending on whether the lift you're driving is loaded or unloaded.**

- **You should always keep the forks of a loaded forklift pointed up any grade.**
 - If you drive a loaded forklift forward down an incline, the load is likely to slide off the forks.
 - This means driving in reverse on the way down a ramp, and going forward on the way up.

- **When you're going up a slope have a coworker "spot" for you if the load you're carrying blocks your view.**

- **With an unloaded forklift, you should keep the forks pointed down the grade.**
 - Drive forward going down the incline, and backward going up.
 - This helps the vehicle's drive wheels maintain their traction, and prevents skids.

- **Always proceed slowly and travel straight up and down an incline.**
 - Don't turn or try to travel across one.
 - The truck will become dangerously unstable, and it's very likely to tip over sideways.

- **Trucks, trailers and rail cars often carry materials that forklifts are called upon to handle, but they also have some safety issues you need to pay attention to.**
 - Before you drive onto these vehicles, make sure that they have their brakes applied and their wheels chocked to prevent them from moving unexpectedly.
 - Take a good look at their floors, too... if they can't support the weight of your forklift and its load, you could fall right through them.
- **Whether you're loading or unloading, always use a "dock plate" to bridge the gap between trucks or rail cars and a loading dock.**
 - Make sure the plate is in good condition, and secured firmly in place.
 - Verify that it's rated to handle the weight of your forklift plus the weight of the load it will be carrying.
 - Drive across the dockplate slowly and carefully.
- **Like any machine, a forklift must be in good shape to operate safely... so make sure you give it a thorough inspection every time you use it.**
- **Begin your inspection with a visual "walkaround".**
 - Look for obvious damage, missing parts, or fuel or oil leaks.
- **If the forklift has an internal combustion engine, you should check...**
 - The fuel.
 - The oil levels in the crankcase and transmission.
 - The coolant.
- **For an electric forklift you should check the electrolyte levels in the battery.**
 - "Electrolytes" (also known as "battery acid") are very corrosive, so be sure you put on personal protective equipment first, including eye protection, a face shield, rubber apron and rubber gloves.
 - Examine the battery terminals for corrosion or loose connections as well.
- **Inspect the condition of the tires of any forklift that you're using.**
 - Look for damage and remove any foreign objects that may have gotten stuck in them.
- **Verify that the steering works, and moves freely.**
- **Check the brakes.**
 - This includes the parking brake.

- **Examine the chain bearings, nuts and cotters on the mast.**
 - Lubricate them as needed.
- **Make sure there's enough oil in the hydraulics reservoir.**
 - Look for evidence of any leaks.
- **Examine the forks for cracks or excessive wear.**
 - Check their alignment as well.
- **Ensure that you have properly functioning...**
 - Headlights.
 - Taillights.
 - Turn signals.
 - Warning flashers.
- **Test the horn, the back-up alarm and the warning beacon.**
- **Verify that there are seat belts, and that they work.**
- **If you find anything that isn't right, repair it or report it.**
 - Take the forklift out of service, if necessary.
 - Never use a faulty lift.
- **You perform another important form of forklift maintenance when you refuel or recharge the vehicle.**
 - Make sure to turn off the engines and motors before you begin.
- **The procedures that you should follow will vary, depending on which type of forklift you're operating.**
 - For compressed gases, like propane, you'll need to install a new gas cylinder.
 - For gasoline or diesel fuels, you'll be refilling its tank.
 - For a truck with an electric motor, you'll be recharging its battery.
- **All of these refueling procedures share one critical safety issue... the risk of fire and explosion.**
 - Gasoline, diesel fuel and gases like propane are all flammable.
 - Recharging an electric forklift can also be a fire risk, because the charging process can cause its battery to generate hydrogen gas, which is also flammable.

- **That's why all refueling and recharging areas must be well-ventilated... so that any fumes can disperse safely.**
 - There should be no open flames, electrical sparks or other ignition sources nearby.
 - Smoking is never allowed in these areas.

- **Simply shutting off a forklift that runs on a compressed gas can leave flammable residues in its fuel lines.**
 - To prevent this, close the shutoff valve on the fuel tank while the engine is still running.
 - Let the forklift run until it uses up the gas in the lines and stalls.
 - Then, disconnect the gas line from the tank.

- **Strangely enough, compressed gases, even flammable ones, can cause frostbite.**
 - So you need to wear protective gloves while working with them.

- **Always handle compressed gas tanks carefully.**
 - Do not use metal tools when disconnecting and reconnecting them... they can cause sparks.
 - Always watch for signs of gas leaks in the system.
 - When you put a new tank in place, make sure that it engages with the "locking pin" on the forklift.
 - Then reconnect the gas line, making sure it is properly seated and screwed on tight.

- **Refueling a forklift that runs on gasoline or diesel fuel is like filling up the gas tank in a car.**
 - For added safety, touch the nozzle of the hose to the truck's fill pipe before you start transferring fuel.
 - If you spill any of the fuel, wipe it up, and wait for the residue to evaporate before you restart the engine.

- **Recharging the batteries in electric forklifts can generate flammable hydrogen gas.**
 - The fact that their batteries can generate sparks as well makes the process even more dangerous.

- **For older trucks, open the battery compartment and disconnect the battery cable from the battery, then connect the cable from the charger to the battery.**
 - To prevent sparks, keep tools and other metal objects away from the battery, including jewelry and wristwatches.

- **The charging process can also cause the batteries to heat up, so leave the battery compartment lid open to help cool them off.**
 - This will also allow any hydrogen gas to dissipate safely.

- **Once the charger indicates the battery has a full charge you can disconnect the charger's cable and reconnect the forklift's cable.**
 - Charging can take a while, so many companies routinely do it overnight.

- **For newer electrical truck models, there is no need to lift the hood, or to start and stop the charger.**
 - Simply plug the charger's cable into the truck and it will start to recharge on its own.
 - When you're done recharging, unplug the cable and the truck is ready to go.

- **If you have questions regarding the recharging process, check your electrically powered truck's manual or talk to your supervisor.**

*** * * SUMMARY * * ***

- **A forklift is a specialized piece of equipment, and it has special handling requirements.**
- **Know how to keep a forklift stable under different operating conditions.**
- **Inspect your forklift before every use.**
- **Know how to refuel or recharge it safely.**
- **Make sure you can see clearly when operating your forklift, even if it means driving in reverse.**
- **Use caution in high-traffic areas.**
- **Stay alert for pedestrians and other vehicles.**
- **Operating a forklift in a busy workplace is a big responsibility, and it can be a challenge.**
- **Now that you know how the machine works, and how to deal with its limitations, you're ready to get the job done safely... every day!**