

## **PRESENTER'S GUIDE**

# **"FORKLIFT SAFETY: INDUSTRIAL COUNTERBALANCE LIFT TRUCKS"**

**Training for the  
OSHA POWERED INDUSTRIAL TRUCKS STANDARD**

# **OUTLINE OF MAJOR PROGRAM POINTS**

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The following outline summarizes the major points of information that are presented in the program. The outline can be used to review the program before conducting a classroom session, as well as in preparing to lead a class discussion about the program.

- **Moving materials around the workplace both quickly and efficiently takes a lot of skill, and it's a big responsibility.**
  - Your primary tool for the job is a specialized piece of "materials handling" equipment that OSHA calls a "powered industrial truck".
- **This category includes vehicles such as:**
  - The tractors that pull luggage carts at airports.
  - The heavy-duty boom-lifts used on construction sites.
- **But the "industrial counterbalance lift truck" is the most common type of powered industrial truck.**
  - It's what most of us call 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 themselves.
- **In addition to the human cost, there's also the damage these accidents do to 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.
- **This all means that forklifts "handle" in a very unique way.**
  - When they are "mishandled" they can be dangerous.
- **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.
- **This all sounds kind of complicated, so let's look a little closer.**

- **Draw an imaginary line connecting the two front wheels and the pivot-point of the rear axle.**
  - This is what's called the "stability triangle".
  - It's a "map" of a forklift's suspension.
- **To keep the forklift stable, its center of gravity must stay within the stability triangle.**
  - This sounds easy, but remember that the forklift's center of gravity can move depending on how you load it, and how you drive it.
  - The closer you keep the center of gravity to the middle of the stability triangle, the more stable a forklift will be.
  - That's how you keep it safely upright.
- **Driving a forklift safely begins before you even climb onto the machine.**
  - It starts with you asking yourself if you're ready to drive.
  - If your back is giving you trouble or you're angry about an argument you had with a coworker, or you're taking medication for a head cold or had a drink at lunch, be careful.
- **Anything that could distract you from operating a forklift safely should give you second thoughts about getting into the driver's seat in the first place.**
  - And you should never drive a forklift if you may be under the effect of drugs or alcohol.
- **Always be sure to buckle up before you turn the key.**
- **Before you drive off, look around to make sure the way is clear. 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, about 5 miles per hour.**
  - 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.
- **When making a turn, remember that a forklift's center of gravity will shift to the outside of the turn. To maintain stability:**
  - 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.
- **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 (studies show that will probably get you killed). Instead:**
  - 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.**
  - This 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 standard load center for most forklifts is 24 inches, half the depth of a pallet.**
  - But many loads can be "non-standard", and can come in different shapes and sizes, with different load centers.
  - For instance, while a forklift may be rated to safely lift 4000 pounds on a 24 inch load center, if you pick up a 4000 pound load that has a 36 inch load center, it will shift the forklift's center of gravity further to the front, and cause it to tip forward.
  
- **So for some types of loads you may have to rearrange the materials on their pallet or the forks to get the correct load center.**
  - Be sure to adjust the width of the forks to give a load even support as well (wider is usually better).
  
- **Any load that has been badly stacked, or that has a damaged pallet, is naturally unstable regardless of how you support it.**
  - This can make your forklift unstable as well, so you should have these loads restacked on new pallets to prevent trouble.
  
- **To engage a load on the floor or on top of a stack, make sure to position the forklift "square" 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, so you have 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.**
  - Obstructions like lights, sprinkler systems, pipes and low doorways can be damaged if you hit them, and could cause a tipover as well.
  - Remember that 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 work 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 in similar locations.
  
- **If you have to operate a forklift on grades, slopes or ramps pay special attention, because this can be tricky.**
  - The rules are different depending on whether the lift you're driving is loaded or unloaded.
  
- **For instance, if you drive a loaded forklift forward down an incline, the load is likely to slide off the forks.**
  - That's why you should always keep the forks of a loaded forklift pointed up any grade.
  - 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.**
  - To prevent them from moving unexpectedly, check that these vehicles have their brakes applied and their wheels chocked before you drive onto them.
  - 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's 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 needs to be in good shape to operate safely.**
  - You can help by giving 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, check the fuel, the oil levels in the crankcase and transmission, and the coolant.**
- **For an electric forklift you should inspect the electrolyte levels in the battery.**
  - "Electrolyte" (also known as "battery acid") is very corrosive, so be sure you put on personal protective equipment including rubber gloves, a rubber apron, and a face shield before checking or refilling it.
  - 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, including the parking brake.**
- **Examine the chain bearings, nuts and cotters on the mast, and 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, and check their alignment.**
- **Ensure that headlights, taillights, turn signals and warning flashers all function correctly.**
- **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 start your shift using a faulty lift.

- **You carry out another important form of forklift maintenance when you refuel or recharge the vehicle.**
  - The procedures that you should follow will vary, depending on which type of forklift you're operating.
- **How you refuel a forklift depends on what it runs on:**
  - 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 that's electrically-powered, 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.
  - Always switch off engines and motors before you begin refueling or recharging.
- **Now let's take a closer look at how to refuel a forklift that runs on compressed gas.**
  - There are some special issues with these lifts that you should know about.
- **Simply shutting off this type of forklift 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.

- **Strangely enough, compressed gases, even flammable ones, can cause frostbite.**
  - So you need to wear protective gloves while working with them.
- **Handle the compressed gas tanks carefully.**
  - Do not use metal tools when disconnecting and reconnecting them.
  - Always watch for signs of gas leaks in the system.
  - When you put a new tank in place, make sure that it engages the locking pin on the forklift.
- **Refueling a forklift that runs on gasoline or diesel fuel is fairly straightforward.**
  - It's pretty much 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.
  - To prevent sparks, keep tools and other metal objects away from the battery (this includes 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.

**\* \* \* 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!**