

## **MODULE 1 – PRODUCT KNOWLEDGE MODULE**

A qualified Concrete Delivery Professional (CDP) must have a good basic understanding of the product he mixes and delivers. The CDP is largely responsible for the condition and quality of the concrete in the mixer drum and delivering it per customer requirements.

The Concrete Delivery Professional routinely makes judgment calls based on product quality. Is a load too wet or dry? Is there too much sand or stone in it? Does a load of old concrete present a danger of hardening in the drum?

The CDP with thorough product knowledge can make good judgments and provide better customer service for the company. Other potential benefits include reduced maintenance costs and improved overall efficiency. The CDP also represents the concrete producer on the jobsite. Concrete that is not placed, finished, or tested properly can develop quality problems that can impact the concrete supplier and the customer. The ability to spot quality problems and report them to the company can often eliminate these problems.

The objectives of this module include:

- Provide a working knowledge of the composition of ready mixed concrete.
- Provide information on the factors that can affect concrete quality, and how the actions of the Concrete Delivery Professional can affect product quality.
- Describe the proper methods of placing, finishing and testing concrete.

### **CHAPTER 1 – FUNDAMENTALS OF CONCRETE**

After studying this chapter, the CDP should be able to:

- Describe how concrete is made and the common ingredients used in it
- Explain the basics of good concrete
- Describe the properties of plastic and hardened concrete
- Define several quality-related terms used in the ready mixed concrete and concrete construction industries.

### **CHAPTER 2 – COMPONENTS OF CONCRETE**

After studying this chapter, the CDP should be able to:

- Describe how cement works and why different types of cement are used.
- Describe aggregate types and how they affect concrete quality.
- Explain why entrained air is used in concrete and recognize how air content can be affected in concrete.
- Describe other cementitious materials and pozzolans, why they are used, and recognize how they affect the concrete mix.
- List basic types of admixtures and their effects on concrete.
- Describe the use of value-added products such as fibers and color.

### **CHAPTER 3 – BATCHING, MIXING & DELIVERY**

After studying this chapter, the CDP should be able to:

- Identify different types of concrete plants and their effect on loading and mixing procedures.

- Identify proper mixing techniques, effects of adding water, and mixing effects on product quality.
- Recognize the effect time and temperature has on concrete mixing and delivery.
- Describe methods used to ensure product quality in cold and hot weather.

### **CHAPTER 4 – HANDLING, PLACING AND FINISHING**

After studying this chapter, the CDP should be able to:

- Describe methods of placing concrete and the advantages & disadvantages of each.
- Identify how placing methods can affect concrete quality, and understand the do's and don'ts of handling, placing and finishing concrete.
- Describe concrete curing and how it affects concrete properties.
- Briefly describe concrete cracking and means to control it.

### **CHAPTER 5 – TESTING**

After studying this chapter, the CDP should be able to:

- Describe proper procedures for sampling concrete to conduct tests.
- Recognize proper procedures for testing fresh concrete, including measuring temperature, slump, unit weight, air content and making cylinders and beams for strength tests.
- Explain the effect improper testing can have on the company and the customer.

## **MODULE 2 – ENVIRONMENTAL MODULE**

An important goal of the ready mixed concrete industry is to be a responsible corporate citizen and neighbor. Environmental conservation is a vital part of those efforts.

Many people have an impression of the concrete industry as being dirty and noisy. Things like dirty plants or trucks, runoff water polluting streams or rivers, and noisy or dusty operations can reinforce this image. We can change this image if the production and delivery of ready mixed concrete is done in an environmentally friendly way. The Concrete Delivery Professional can play an important role in showing others that the concrete industry cares about the environment.

Most of the information in this module is presented to increase the CDP's knowledge about environmental issues faced by the ready mixed concrete industry. It provides background information so that the CDP can better understand the specific things he or she can do to minimize environmental impact.

The objectives of this module include:

- Create a better understanding of how ready mixed concrete operations can affect the environment.
- Create an awareness of specific environmental regulations that affect the industry.
- Show the best practices that ready mixed concrete operations can use to minimize environmental impact.
- Outline specific tasks that the CDP can perform to assist in environmental compliance and improvement.

### **CHAPTER 1 – ENVIRONMENTAL AWARENESS**

After studying this chapter, the CDP should be able to:

- Understand importance of industry environmental responsibility and the role of the Concrete Delivery Professional
- Be aware of environmental regulations that affect the CDP
- Understand the concept of environmental best management practices (BMPs) and how the CDP can use them
- Understand the concept of pH and how portland cement and acids affect pH levels.

### **CHAPTER 2 – WATER AND SOLIDS MANAGEMENT**

After studying this chapter, the CDP should be able to:

- Recognize how process water and storm water are generated, and methods used to conserve or recycle them
- List proper guidelines for truck cleaning at the plant
- List methods of managing returned concrete
- List proper jobsite washout procedures

### **CHAPTER 3 – ADMIXTURE, CHEMICAL AND FUEL MANAGEMENT**

After studying this chapter, the CDP should be able to:

- Be familiar with proper chemical storage methods, and the elements of a Spill Prevention, Control, and Countermeasures Plan
- Recognize sources of potentially hazardous liquids on truck mixers
- Understand proper truck fueling procedures

### **CHAPTER 4 – OTHER ENVIRONMENTAL ISSUES**

After studying this chapter, the CDP should be able to:

- Recognize the value of plant and truck aesthetics.
- Understand sources of air emissions and how they are controlled.
- Recognize noise pollution sources and ways to control them.

## **MODULE 3 – CUSTOMER AND COMPANY RELATIONS MODULE**

The Concrete Delivery Professional is the ready mixed concrete producer's main contact with customers on a daily basis. The success of the producer can directly depend on the customer service skills of the CDP. Customers will often choose to do business with producers whose employees have excellent customer service skills, over other producers who may have cheaper prices.

Good customer service goes beyond dealing with those who actually purchase the concrete. Owners, testing agencies and other parties in the construction process should also be considered as customers and must be treated by the CDP with the same skills.

The study guide will also suggest some ways that the CDP can deal with specific job situations, such as problems with product and safety issues on the job, while maintaining good customer relations.

Good relationships with other employees are just as important as relationships with customers. The ideas of teamwork and cooperation are often talked about, but not always given high priority. Being a successful concrete producer takes much more than competitive pricing and shiny trucks. It requires all employees of the producer to work together on a consistent basis, providing excellent customer service that encourages repeat business.

The objectives of this module include:

- Creating a better understanding for the CDP of how their individual and company actions can affect success
- Providing suggestions on dealing with specific types of common issues faced daily by the CDP
- Demonstrating how important it is for the CDP to work with others in his or her company, and how to make that happen

### **CHAPTER 1 – BASICS OF CUSTOMER SERVICE**

After studying this chapter, the CDP should be able to:

- Understand the benefits of maintaining a satisfied customer, and the costs of dissatisfied customers
- Describe appropriate Concrete Delivery Professional personal appearance
- Understand importance of a good company public image, and how the CDP can affect it
- Identify the different requirements of various customer types (homeowner, residential contractor, commercial contractor)
- Recognize how to deal with other stakeholders involved in the construction process, such as owners and testing agencies.

### **CHAPTER 2 – DEALING WITH SPECIFIC CUSTOMER ISSUES**

After studying this chapter, the CDP should be able to:

- Recognize how to deal with product problems, such as shortages, wrong mix, load too wet, and problems with acceptance testing.
- Recognize how to deal with jobsite problems, such as language difficulties, customer requirements for maneuvering truck on job site, property line issues, and getting stuck.

- Recognize how to deal with customer and delivery problems, such as delays due to driver getting lost, and other scheduling issues beyond the CDP's control.
- Recognize how to deal with safety problems, such as communicating safety information to customer (cement burn) and dealing with unsafe customer behavior during unloading.

### **CHAPTER 3 – DEALING WITH YOUR COMPANY AND FELLOW EMPLOYEES**

After studying this chapter, the CDP should be able to:

- Recognize the value of teamwork and the role other employees play in company success.
- Understand the importance of good dispatcher/CDP relationships, and proper radio protocol/conduct.
- Recognize the importance of proper recording and documenting on batch tickets and other required paperwork
- Understand the value of a positive attitude and good work ethic, and how a negative attitude can affect the customer, the company and other employees
- Describe methods of coping with conflict and stress on the job.

## **MODULE 4 – SAFETY MODULE**

### *SAFETY IS JOB #1 – SAFETY STARTS WITH YOU – SAFETY FIRST*

Everyone has heard different slogans or themes about safety. But what do they really mean? What are these slogans and themes trying to achieve? Safety is not a slogan, or a set of policies and procedures. It is a frame of mind, an attitude that the CDP must develop in the performance of his or her daily tasks. Having the proper attitude, safety becomes second nature.

The CDP does not have to think about safety; he or she knows what is safe behavior and what is not without thinking about it. Having the proper safety attitude, the CDP can expect to work a lifetime without serious injury. It is very easy in the hectic nature of the ready mixed concrete industry to take short cuts, or violate good safety practice in order to get the job done quickly. There is always pressure to hurry up, go faster, unload quicker, and get back to the plant for the next load. Accidents can happen if the CDP gives in to that pressure. It is possible to work safely and efficiently, but only if the CDP has the right safety attitude.

Every company will have their own detailed safety policies and procedures, which must be followed at all times. The information presented in this module is a brief overview of the safety issues the CDP must be familiar with.

The objectives of this module include:

- Providing information and procedures for the CDP to work safely
- Educating the CDP about safety rules and regulations in the construction industry
- Illustrating safe operation of the truck mixer under most jobsite conditions

### **CHAPTER 1 – PERSONAL SAFETY**

After studying this chapter, the CDP should be able to:

- Understand potential hazards of the CDP environment; particularly those which can affect personal vision, hearing and respiratory functions.
- Identify the purpose, correct use and care of Personal Protective Equipment (PPE).
- Understand the correct and incorrect methods of lifting objects to avoid back injury.
- Recognize the causes of cement burns and how to prevent them.
- Understand Hazard Communication regulations, and be able to read and use information presented in MSDS format
- Understand the physical and legal effects of alcohol & drug use.
- Recognize how fatigue can affect CDP performance.

### **CHAPTER 2 – TRUCK/MIXER SAFETY**

After studying this chapter, the CDP should be able to:

- List the steps of the Circle for Safety method for checking hazards around vehicle.
- Identify proper ladder climbing techniques, proper entry and egress from the truck cab, and the three-point climbing rule
- Recognize proper chute handling & cleaning procedures.
- Understand the purpose of lockout/tagout policies and recommended lockout/tagout procedures for truck mixers, as well as other heavy equipment.

- Understand confined space regulations and safe drum cleaning procedure.
- Recognize how to prevent objects from falling off, or being thrown from, the truck mixer in-transit.

### **CHAPTER 3 – ROAD SAFETY**

After studying this chapter, the CDP should be able to:

- Identify proper driving tactics relating to truck mixers, particularly the causes and prevention of rollovers
- Recognize procedures to safely operate truck mixer during inclement weather
- Identify proper procedures to follow if truck mixer is involved in an accident

### **CHAPTER 4 – JOBSITE SAFETY**

After studying this chapter, the CDP should be able to:

- Recognize unsafe ground and site conditions, and what to do if customer requires truck mixer to operate in those conditions
- Understand safe unloading procedures and how to prevent injuries to customers and other personnel during the unloading process
- Identify safety precautions required when placing concrete via concrete pumps, crane buckets, curb machines and other specialized equipment
- Identify hazards of power line contact and steps to take if contact occurs

## **MODULE 5 – VEHICLE MAINTNENANC AND OPERATIONS MODULE**

Successful delivery of ready mixed concrete requires that the CDP and the truck mixer perform as a complete unit. A properly functioning truck mixer is essential to the mixing and delivery process, and a well-trained CDP uses the truck mixer as a tool to get the correctly manufactured concrete product where the customer wants it. Like any tool, the truck mixer is only as good as the skill of the CDP operating it. But if the tool does not work correctly, the CDP will be very limited in their ability to deliver the product. Therefore, it is extremely important for the CDP to understand how a concrete mixer properly functions and what to do when it does not function properly.

As with all information in the CDP program, each individual producer may have specific procedures to follow in these knowledge areas. The CDP should always follow established company procedure if it conflicts with any information presented in this module. Producers can use the information presented to help structure or modify their own programs as well.

A proper foundation of heavy truck operating knowledge and skills are necessary for the CDP to perform essential tasks, especially in vehicle maintenance and operations.

The objectives of this module include:

- Providing the CDP with a working knowledge about truck mixer systems and their components
- Presenting best practices for vehicle inspection and operation, especially in inclement weather conditions
- Reviewing procedures that can help the CDP to deal with common malfunctions that may affect delivery.

### **CHAPTER 1 – TRUCK AND MIXER COMPONENTS**

After studying this chapter, the CDP should be able to:

- List the basic components of these truck and mixer systems:
  - Engine systems
  - Steering, chassis and drive train
  - Axles, suspension, wheels and tires
  - Mixer system
- Identify key areas in these systems that can affect delivery.

### **CHAPTER 2 – PRE-TRIP INSPECTION**

After studying this chapter, the CDP should be able to:

- Identify the proper steps in a pre-trip inspection for rear-discharge truck mixers
- Identify additional or different steps in pre-trip inspection for front discharge mixers and mixers with liftable axles.

Federal Motor Carrier Safety Regulations require commercial vehicle drivers involved in interstate commerce to conduct an inspection of their trucks before beginning each trip. Many states have adopted the same rule for intra-state travel. Department of Transportation (DOT) regulations also require a post-trip truck inspection and must be completed by the vehicle operator at the end of each shift. Copies of these reports must be kept in the cab of the truck and by the maintenance supervisor. If a truck is involved in an accident, or investigated for any reason, DOT inspectors or law enforcement personnel may ask for these records to verify that mechanical problems have been reported and corrected per DOT guidelines. In order to adequately comply with these inspection regulations, as well as to make sure the vehicle is ready for daily operations, the CDP should follow a routine procedure when inspecting the truck and mixer. The NRMCA and its Operations and Maintenance Committee have developed a 7-step procedure for the CDP to use.

There are seven steps to the pre-trip inspection procedure:

- Step 1: Vehicle overview
- Step 2: Check engine compartment
- Step 3: Start engine and inspect inside cab
- Step 4: Turn off engine and check lights
- Step 5: Walk-around inspection
- Step 6: Check signal lights
- Step 7: Start engine and check brake system.

Additional mixer-specific functions covering liftable axles, all-wheel drive, and front discharge units have been added at the end of step 7.

Step 1 – The **VEHICLE OVERVIEW** involves looking for signs of major defects and vehicle obstructions. Start the vehicle overview by looking for puddles on the ground beneath the truck or dripping fluids. Check that no tires are flat. If the truck is leaning to one side, this is often an indicator of a broken or damaged suspension. Look around the vehicle for any hazard, including objects in the truck's path. Make sure the exterior mixer drum rotation control is in neutral. Close all air system petcocks left open at the end of the previous shift to drain and flush impurities out of the system. Check the post-trip vehicle inspection report from the last shift the truck was driven. If defects were noted, make sure that these items have been repaired.

Step 2 – **CHECK ENGINE COMPARTMENT** Check that the parking brake is applied or that the wheels are chocked. Raise the hood or tip the cab on cab-over-engine models. , Check the fluid levels: the oil, power steering fluid and radiator coolant. Check the condition of all hoses: look for cracks, bulges and splits. Check the belts for tightness; there should be no more than  $\frac{3}{4}$  of an inch of play in any direction at the center. Look for wear or cracks. Be sure to check the power steering belt, water pump belt, alternator belt and air compressor belt. Check all air lines and couplings for tightness and signs of fatigue. Check electrical wiring for cracks, and worn or burned spots. Next, check the steering mechanism thoroughly. Look for bent, loose or broken parts in the tie rod, steering arm assembly and steering gear box. The play in the steering wheel will be checked in Step 3, so pay attention to the steering system components that affect it. Look for missing nuts, bolts, cotter keys or other parts. Check the power steering pump and hoses for leaks. Check the front brakes while the hood is open. Look for cracked drums and shoes with oil or grease on them. Make certain the brake shoes are not missing, broken or worn dangerously thin. Brake chambers must be securely mounted, and should not be leaking, cracked, or dented. Make sure the hoses are not chafed or leaking. Check the adjustment of the brakes by pulling on the slack adjuster. If it moves more than about one inch, it probably needs adjustment. Check that the angle of the push rod and the adjuster arm is just over 90 degrees when the brakes are released. Close and secure the hood or cab. Be thorough with the brake inspection. Not only does the CDP.s safety depend on it, but also poorly adjusted or damaged brakes are cited by police officers in roadside checks of heavy trucks more than any other equipment problem!

Step 3 – **START ENGINE AND INSPECT INSIDE CAB** Depress the clutch and put the transmission shifter in the neutral position. Automatic transmissions should be put park or neutral. The interior mixer drum control should be in neutral. This is especially important in cold weather. Start the engine. Listen for unusual noises and check the gauges. The oil pressure gauge should show increasing or normal pressure and its warning light should turn off. The electrical gauge should show that the alternator is charging and its warning light should go off. The water temperature gauge should move from zero and increase gradually. If there is no gauge, the temperature warning light should go off. If there is an oil temperature gauge, it should also gradually rise to the normal operating range. The air pressure gauge should indicate steadily increasing pressure. Low-air warning lights and buzzers should be on until the pressure passes 60 psi. The compressor should cut off at about 125 psi. After air pressure builds, check the air horn. Next, check the vehicle controls. The steering wheel should have less than ten degrees of play, or about two inches of free movement. More play in the wheel makes it hard to steer and frequently indicates damage to the steering control system. The clutch pedal should have one to two inches of free-play before tension of the pressure plate separating from the clutch throw-out bearing is felt. Depress the clutch and check that the transmission shifter moves smoothly. The accelerator pedal should be firm. If it is mushy or does not return to its original position, check the throttle-return spring. Test the inter-axle differential lock switch, if the truck has one. The inter-axle lock dashboard light should come on. Make sure the windshield wipers and washers work. Check that the heater and defroster work. The following light controls should be checked: headlights, high beam dimmer switch, turn signals, four-way hazard flashers, and any additional clearance or marker light switches. Check the mirrors and windshield. Make sure they are clean and not cracked. Appropriate vehicle inspection and tax stickers should be current and in place on the windshield. There should be no outdated stickers or obstructions. Adjust all the mirrors. Make sure the vehicle has all the proper emergency equipment and that it is in good condition. An emergency signal kit is required by DOT for all vehicles over 10,000 GVW whether they travel more than 50 miles from their home base or not. At a minimum, the truck must have spare electrical fuses (unless the truck has circuit breakers), three red, reflective warning triangles; and a properly charged and rated fire extinguisher. A first-aid kit is also recommended. Check that the seat belt is securely mounted, and that it adjusts and latches correctly.

**Step 4 – TURN OFF ENGINE AND CHECK LIGHTS** The CDP should now turn off the engine and keep the key on his or her person. Turn on the headlights and the four-way hazard flashers. Get out of the cab and go to front of the vehicle. Check that both headlights are on and that both of the four-way flashers are working. Push the high beam dimmer switch and check that both high beams work. Turn off headlights and four-way hazard flashers. Next, turn on all parking, clearance, side-marker and identification lights. Turn on the right-turn signal.

**Step 5 – WALK AROUND INSPECTION** The purpose of the walk-around inspection is to focus attention on components on all sides of the vehicle, beginning at the left front of the truck. All lights, reflectors and glass should be cleaned as the CDP walks around the truck. During the walk-around inspection the windshield should be cleaned and the windshield wipers inspected. Wiper arms should have proper spring tension and the blades should be properly attached and in good condition. Start the walk-around inspection by cleaning the driver's door glass. Check that the door latch and the lock work properly. Next, check the condition of the left front wheel and rim. Look for missing, bent or broken studs, clamps and lugs. Look for rust around the lug nuts, often the first indicator that the nuts are loose. Check the wheel hub oil level and look for leaks. Look at the wheel and tire treads wear for signs of misalignment. Check the condition of the left front tire. Make sure it is properly inflated. Look for serious cuts, bulges or tread wear: Steering tires must have tread depth of at least 4/32 of an inch in the deepest groove. Check the valve stem condition and make sure that the cap is on. Next, check the left front wheel's suspension. Look for cracked, broken, or shifted leaf springs. Check the condition of spring hangers, shackles, and u-bolts.

Now, proceed to the front of the vehicle. Check for damage to the front axle. If the vehicle has a front mounted power take off unit (PTO), visually inspect the driveline and check that the hydraulic hoses and connections are not leaking, loose, or worn. Check the hydraulic oil tank for proper fluid level and leaks. For trucks equipped with rear PTOs, check these lines from the right side of the truck. Look over all lights. The parking, clearance and identification lights should be clean and operating. The right front turn signal light should be operating and clean.

Move around to the right front side of the truck. Check the wheel, tire, and suspension, as already done to the left front. Clean the right side window. For cab-over-engine models, check that the cab safety locks are engaged. Check the condition of all components visible from the front right side. Make sure nothing is leaking from the rear of the engine or transmission. The exhaust system should be secure and not be in contact with any wires, fuel or air lines. Check the frame and cross members for bends or cracks. Make sure that concrete chutes are properly secured and are in good condition.

At the right rear of the truck, again check the condition of the wheels and tires. All non-steering tires must have tread depth of at least 2/32 of an inch in the deepest groove. Make sure that paired tires are not rubbing against each other and that nothing is stuck between them. The spacer between the dual wheels should be centered, keeping the tires evenly spaced. Paired tires should be evenly matched for height as well. The tires must be the same type, meaning radials and bias ply tires should not be mixed on the same axle. Make sure the axle seal is not leaking.

Pay particular attention to the rear suspension. It takes a beating due to heavy loads and tough off-road conditions. Depending on the type of suspension, a variety of components need to be checked. Look for cracks in the brackets and mounting hardware. Inspect the condition of the walking beam and check the load cushions for distortion or damage. With leaf-spring suspensions, check the leaves for cracks, breaks and shifting as was done with the front suspension. Rear suspension problems are usually first noticed by the CDP experiencing serious handling problems. Make sure that the axle is not leaking gear oil. Next, check the condition of the brake drums, pads, or shoes. Make sure that none of the brake lines show any wear due to rubbing.

Check the lights and reflectors. Side-marker lights must be clean and operating. Side-marker reflectors must be in place and clean. At the rear of the vehicle, check the lights and reflectors. Tail, clearance, and identification lights must be clean and operating. Rear reflectors must be in place and clean. The right rear turn signal should be operating properly. Check that the license plate is in place, clean and secured. The mud flap must be in place, undamaged, properly fastened and not dragging on the ground or rubbing tires.

Make sure the chutes are in good working order. Check that the chute lock is functioning properly and is not loose. Unlock it and make sure the chute swings easily. Re-lock the chute and make sure the fold down chute lock is undamaged and latched.

At the left rear of the truck, check the wheels, tires, and suspension, as you did on the right side. Check the truck's water tank. Make sure it is securely mounted, that the flap seal is in good shape, and that the air and water lines are undamaged. Check that all drain valves are closed and make sure the sight gauge is in good condition.

Move on to check the fuel tank. It should be securely mounted, undamaged and free of leaks. Visually check that the tank is full. **DO NOT DEPEND ON THE FUEL GAUGE!** The fuel tank cap must have a rubber gasket and be tight. The battery box must be firmly mounted to the vehicle, with a secure cover. Make sure the battery is secured against movement. Batteries must not be cracked or leaking. Unless it is a maintenance-free battery, check that the fluid is at the proper level and that the cells caps are in-place and tightened. Battery connections should be tight and free of corrosion.

**Step 6 – CHECK THE SIGNAL LIGHTS** The CDP should get in the cab and turn off any lights left on for step 5. Apply the brake pedal and have a co-worker check that both brake lights are working. Turn on the left-turn signal. Get back out of the cab and go to the front of the vehicle. The left front turn signal light should be clean and operating. Go to the back of the truck and check and clean the left rear turn signal light as well.

The back-up alarm should also be checked at this time. While checking the brake lights, the CDP should put the truck in reverse and make sure that either the driver or a co-worker can hear the back-up alarm.

**Step 7 – START ENGINE AND CHECK BRAKE SYSTEM** Get back in the cab of the truck and turn off any lights not needed for driving. Check for all the required vehicle papers and permits, and secure all loose articles in the cab. Start the engine and prepare for the air brake system test.

The brake check is a critical part of the pre-trip inspection and should be done with particular care. First, allow the air pressure to build up to 100 to 125 psi, at which point the air compressor should cut off. Next, fully depress the brake pedal and hold it down. After an initial pressure drop, the pressure should not decrease by more than 3 psi in one minute. Release the parking brake. Next, fan the brake continuously and make sure that the low-air warning device activates before the pressure drops below 60 psi. Continue fanning the brake to relieve the air pressure. At about 40 psi, the parking brake valve should pop out. If the truck is equipped with an engine braking system (Jake brake), turn the switch on, then depress and release the accelerator. The CDP should hear the engine brakes engage. Turn the switch back off.

Now, test the service brake stopping action. Allow the air pressure to build again. Release the parking brake and drive forward at 3 to 5 miles per hour. Apply the brake pedal firmly. The vehicle should stop immediately. Be alert for pulling to one side, any unusual brake pedal feel, or delayed stopping action.

Test the parking brake. With the vehicle fully stopped, apply the parking brakes only. Make sure it holds the vehicle when the truck is shifted into low gear and gently pull against the brake at idle speed.

### **CHAPTER 3 – STARTUP PROCEDURES AND JOBSITE OPERATIONS**

After studying this chapter, the CDP should be able to:

- Identify proper startup procedures and truck/mixer operation under normal conditions.
- Understand the effects of weather and temperature on start-up and operation of truck mixer.
- Describe proper techniques for entering and maneuvering on jobsites with truck mixer, and how to make the unloading process go as efficiently as possible.

### **CHAPTER 4 – POST-TRIP INSPECTION, CLEANING AND MAINTENANCE**

After studying this chapter, the CDP should be able to:

- Identify the steps in post-trip inspection and proper documentation.
- Describe the value of proper truck mixer cleaning and housekeeping practices.

After the CDP completes delivery for the day, there are a number of tasks that he or she must complete before going home. This will ensure that the truck mixer is ready for service without delay for the following day.

- Fuel the truck mixer even though it might only require a few gallons. This prevents delay during startup the next morning, and a full tank is less likely to have condensation buildup. Be careful not to get the fuel nozzle or fuel cap dirty, which might lead to fuel contamination. Exercise caution when fueling to keep fuel spills or leaks to a minimum. Promptly clean up any spilled fuel.
- Make sure the drum is clean and that there is no water or slurry in the drum by driving to the appropriate waste discharge location at the plant and reversing the drum for several revolutions.
- Drain all water tanks and lines, especially in cold weather.
- Park the truck in the designated area. Before shutdown, idle the truck for a minute at 1000 rpm, then at a lower speed for a few more seconds. This allows the engine to properly cool down.
- Lower the booster axle or pusher axle if the truck is equipped with one.
- Open all air petcocks and drain all air tanks to remove any dirt or sludge accumulation.
- Check underneath truck for any leaks, hanging wires or other truck damage.
- Place the mixer controls in neutral.
- If the truck is parked on a steep grade, place chocks or other wheel blocks behind the wheels.
- Set the parking brake.

There may be additional procedures that each concrete producer requires at the end of each day. If the producer is using a wash water additive or concrete reclaiming chemical to recycle concrete or water, the CDP must use special care and attention in following the correct procedures.

Make sure that any required paperwork is completed in a neat, clean, and legible manner. Review all delivery tickets, note any problems or observations from the job and turn them in, along with any other required company paperwork. Complete the post-trip inspection report, as required by the company and DOT regulations. Make special note of any deficiencies or problems that require repair. These forms are usually in several parts. Leave one part with the truck for the next day and turn the other part into the shop.

If logbooks are required, the CDP should complete the logbook with a record of deliveries and hours as necessary. This information is also used to help determine compliance with DOT hours or service regulations.

## **GLOSSARY AND RELATED TERMS FOR ALL MODULES**

**Accelerator:** A chemical which, when added to concrete, shortens the time of set and increases the early stages of hardening and strength development.

**Admixture:** A material other than water, aggregates or hydraulic cement used as an ingredient of concrete. Most commonly used admixtures are chemical solutions that are carefully metered into concrete batches to lend or enhance a specific property of the concrete.

**Agent:** A general term for a material that may be used either as an addition to cement or an admixture in concrete, for example, air-entraining agent; sometimes called an additive.

**Aggregate:** Granular material such as sand, gravel, crushed stone or slag which, when blended with cement and water, makes concrete.

**Air Content:** The volume of the air voids in concrete, expressed as a percentage of total volume of the concrete.

**Air-Entraining Agent:** An admixture which causes microscopic air bubbles to be incorporated in the concrete during mixing; usually to increase its workability and freeze/thaw resistance.

**American Concrete Institute (ACI):** An engineering organization responsible for writing and publishing codes and standards for concrete construction.

**American Society for Testing and Materials (ASTM):** An organization that writes and publishes test methods and standard specifications for a wide variety of materials.

**Axle Load:** The portion of the gross weight of a vehicle transmitted to a roadway through the wheels supporting a given axle.

**Bag of Cement:** A quantity of Portland cement equivalent to a loose cubic foot of the bulk material; Equals 94 lb. in the United States; also called Sack of Cement.

**Barrel of Cement:** A quantity of Portland cement equal to 4 bags or 376 lb.

**Batch:** The materials in or the concrete produced from a single mixing cycle or load of concrete

**Batch Plant:** The equipment required for batching and mixing concrete including bins, silos, hoppers, conveyors, weigh-batchers, etc.

**Bleeding:** The movement of mixing water to the surface of freshly placed concrete caused by the settling of solid materials in the concrete.

**Bonding Agent:** A coating applied to an existing surface to create a bond between it and a succeeding layer, for example, between a concrete subsurface and a terrazzo topping.

**Broom Finish:** The surface texture obtained by stroking a broom over freshly placed concrete.

**Buggy:** A wheeled hand or motor-driven cart, usually rubber tired, for transporting small quantities of concrete from hoppers or mixers to forms.

**Bull Float:** A tool with a large, flat rectangular piece of aluminum, magnesium, or wood with a long handle. It is often used to smooth large areas of a slab immediately after the concrete is struck off with a screed.

**Bush-Hammer Finish:** A decorative finish on concrete obtained by chipping off the surface mortar.

**Cement:** See Hydraulic Cement and Portland Cement.

**Cement Balls:** Tennis ball to volleyball-sized lumps of cement, sand and coarse aggregate that form in the truck drum during loading and mixing. Cement balls generally break free from the head of the drum and roll down the chute when concrete is discharged.

**Cement Content:** Quantity of cement contained in a cubic yard of concrete, expressed as a weight. For example, 500 lb. per cu. yd.

**Cement, Expansive:** A special cement, which causes concrete to expand slightly, rather than shrink, at an early age.

**Cement, High-Early Strength:** Cement characterized by producing higher early strength in concrete than regular cement. Called Type III in the United States.

**Central Mixed Concrete:** Concrete completely mixed in a stationary mixer and then transported to the jobsite.

**Chute:** A rounded, sloping trough or tube for moving concrete from a higher to a lower point.

**Compressive Strength:** The measured maximum resistance of a concrete specimen to compressive loading expressed in pound per square inch (psi). A typical 6 inch diameter concrete cylinder, equivalent to roughly 3000 to 6000 psi, will support a load of 40 to 80 tons.

**Concrete:** A heavy, versatile building material made from combining coarse and fine aggregate, hydraulic cement and water.

**Concrete, Lightweight:** Concrete made with lightweight aggregates, typically weighing 75 to 80% as much as normal weight concrete.

**Concrete, Plain:** Concrete without any steel reinforcing bars.

## **GLOSSARY AND RELATED TERMS FOR ALL MODULES (continued)**

**Concrete Plant Manufacturers Bureau (CPMB):** An organization of concrete plant manufacturers that publishes standards for concrete plants. Most concrete plants have a CPMB rating plate showing its maximum rated load size.

**Concrete Pump:** A machine which conveys concrete to the point of placement via a pipeline and/or hose.

**Concrete, Reinforced:** Concrete with steel reinforcing bars or mesh.

**Confined Space:** A space that is: (1) difficult to enter or exit, (2) not designed for people to stay in, and (3) has certain hazards. A truck mixer drum is a confined space.

**Construction Joint:** A joint where two adjacent placements of concrete meet. The joint may be keyed, bonded or reinforced.

**Contraction Joint:** A formed, tooled or sawed groove in a concrete structure, floor slab, or pavement to regulate the location of cracks in the concrete.

**Conveyor:** A continuous belt for moving materials.

**Core Test:** A compression test on a concrete sample drilled from hardened concrete.

**Corrosion:** Destruction, or deterioration of concrete reinforcement by chemical, electrochemical or electrolytic reaction. Often results in the rusting/deterioration of reinforcing steel and frequently caused by from deicing salt applied to the concrete or salts from seawater in a marine environment.

**Coulomb Test:** A "Rapid Chloride Permeability" test of hardened concrete to measure the resistance of concrete to the penetration of chlorides (salt) that will cause reinforcing steel to rust.

**Crack:** A complete or incomplete separation of the concrete into two or more parts caused by breaking or fracturing.

**Craze Cracks:** Fine, shallow, random cracks or fissures in a concrete surface.

**Crazing:** The development of craze cracks, or the pattern of craze cracks in a concrete surface.

**Cubic Meter:** Unit of measure in the metric system equal to 1.3 cubic yards; written as m<sup>3</sup>.

**Cubic Yard:** Unit of measure of concrete volume in the United States, written as cu. yd. or yd<sup>3</sup>; equal to 27 cubic feet.

**Curing:** The maintenance of favorable moisture and temperature conditions for freshly placed concrete during its early stages so that the concrete can develop strength and other properties.

**Cylinder, Concrete:** A strength test specimen. Molded by placing concrete in a plastic, metal, or cardboard mold which is usually two times its diameter in height. In the United States, 6" by 12" is the standard test cylinder size.

**Darby:** A hand-held straightedge, 3 to 8 ft. long, used to smooth and level concrete in the early stage of finishing.

**Drum Speed (rpm):** The rate of rotation of the mixer drum when used for charging, mixing, agitating or discharging concrete. Maximum drum speeds must be shown on the mixer rating plate.

**Drying Shrinkage:** Contraction cracks caused by moisture loss from hardened concrete sometimes resulting in cracks in the concrete occurring days, weeks, or months after placement.

**Dusting:** The appearance of powdered material at the surface of hardened concrete.

**Early Strength:** The strength of concrete as measured in the first three days or earlier after placement.

**Efflorescence:** A deposit of salts (usually white compounds) formed on a hardened concrete surface.

**Entrained Air:** Microscopic air bubbles intentionally incorporated in concrete (using an admixture) during mixing to improve freeze/thaw durability and workability.

**Entrapped Air:** Air voids in concrete which are not purposely entrained. Entrapped air voids are larger than entrained air bubbles and offer little protection from freeze/thaw cycles. They often result from incomplete vibration or compaction.

**Expansion Joint:** A separation between pavement slabs on grade, or between adjoining parts of a structure that allow room for the concrete to move or expand; usually filled with a compressible material.

**False Set:** Premature rapid stiffening of fresh concrete. False-setting concrete can usually be remixed without additional water to become workable again. See flash set.

**Field-Cured Cylinder:** Test cylinders cured in the same way as the concrete in the forms to indicate when the forms may be removed, when construction may continue or when the structure may be put in service.

**Final Set:** A degree of stiffening of concrete after initial set, such that it will support a weight to an established level.

**Finishing:** The process of leveling, smoothing, compacting, and otherwise treating the surface of fresh concrete.

**Flash Set:** Premature rapid stiffening of fresh concrete. The concrete usually requires remixing with additional water to become workable again.

**Flexural Strength:** The ability of concrete to withstand bending. Measured by breaking a test beam molded from the concrete.

### **GLOSSARY AND RELATED TERMS FOR ALL MODULES (continued)**

**Float:** A small, handheld tool, made of wood, aluminum or magnesium, used in finishing immediately after placement and strike off of a fresh concrete surface.

**Fly Ash:** The fine ash resulting from burning coal in electric utility plants. Used as a mineral admixture or pozzolan in concrete.

**Groover:** A hand tool used to form grooves or joints in concrete slabs to control the location of cracks. Also called a jointing tool.

**Gross Vehicle Weight:** The total weight of a vehicle, e.g., the empty weight of a vehicle plus the weight of the payload.

**Grout:** Cement and water, with or without aggregates, mixed to be pourable. Used to fill cracks and voids in concrete or to prime concrete pumps.

**Hairline Cracks:** Small, barely visible cracks in a concrete surface. See craze cracks.

**Hardener:** A chemical applied to concrete floors to reduce wear and/or dusting.

**Heavyweight Aggregate:** Aggregate of high density, such as iron or steel shot, used for making heavyweight concrete.

**High-Strength Concrete:** Concrete with a 28-day design strength of 6000 psi or greater.

**High-Range-Water-Reducing Admixture:** A water reducing admixture that markedly increases the slump of fresh concrete and greatly enhances its flowability; also called a super-plasticizer.

**High-Early-Strength Concrete:** Concrete made with a special cement(s) or admixture(s) that reaches a specified strength at an earlier age than normal concrete.

**Hydration:** The chemical reaction between hydraulic cement and water.

**Hopper:** A funnel-shape box or tank from which or through which material can be discharged evenly.

**Hydraulic Cement:** Cement that sets and hardens via a chemical reaction with water, such as Portland cement.

**Initial Set:** A degree of stiffening of concrete, less than final set, such that it will support a weight to an established level, e.g., the weight of a finisher standing on a concrete slab. See final set.

**Joint:** A physical separation or break in cast-in-place concrete.

**Lightweight Aggregates:** Aggregate of low density such as expanded clay or shale, slag, pumice, etc. Used for making lightweight concrete.

**Lock Out:** Mechanically and/or electronically disabling a piece of equipment so that it cannot start or become energized. See, also, tag out.

**Material Safety Data Sheet (MSDS):** A document providing information on a product's potential safety or environmental hazards and precautionary measures for those who use the product.

**Mineral Admixture:** A fine powdered material such as fly ash or slag cement which may be used to improve the workability, strength or durability characteristics of concrete. See pozzolan.

**Mixer Capacity:** The volume of concrete permitted to be mixed or carried in a truck mixer.

**Mortar:** A mixture consisting of cement, water and fine aggregate.

**National Ready Mixed Concrete Association (NRMCA):** The national trade association for ready mixed concrete producers, dedicated to lobbying, promoting research and training on behalf of the industry.

**Paste:** The portion of concrete consisting of cement and water.

**Peeling:** Thin flakes of mortar breaking away from a concrete surface. See scaling, spalling

**Plastic Shrinkage Cracks:** Cracks which appear in fresh concrete soon after placing and finishing while the concrete is still plastic.

**Preventive Maintenance (PM):** Scheduled, periodic vehicle maintenance that follows a prescribed routine. Preventive maintenance includes inspecting, adjusting, testing, clamping, tightening, cleaning, draining, flushing, adding fluids and lubricants and replacing filters.

**Portland Cement:** General, all-purpose, hydraulic cement. Manufactured by fusing several minerals together in a large kiln and grinding the resultant cement clinker into a fine powder. The active ingredient in concrete that causes it to set and gain strength.

**Pozzolan:** Naturally occurring or man-made materials which chemically react in concrete to form compounds which have some cementing properties. Pozzolans such as fly ash and slag cement are sometimes referred to as mineral admixtures.

**Rebound Hammer:** A non-destructive testing device used to quickly estimate the in-place compressive strength of hardened concrete.

**Reinforcement:** Steel bars or wire mesh used in concrete to strengthen a structure.

**Retarder:** An admixture which delays the setting time of concrete. Also called a set-retarder.

## **GLOSSARY AND RELATED TERMS FOR ALL MODULES (continued)**

**Sand Streaks:** Streaks of exposed sand in formed concrete surfaces, often due to inadequate mixing of the concrete

**Scaling:** Flaking or peeling of the top surface of hardened concrete. See peeling, spalling.

**Screed:** A tool, sometimes a long board, used for striking off the concrete surface.

**Sedimentation Pit (or pond):** A washout pit or series of pits, often with separate chambers or basins, designed to allow solids to settle out of concrete wash water. Sedimentation pits may be concrete lined structures or earthen ponds.

**Segregation:** Separation of the coarse aggregate from the mortar portion of the concrete.

**Shrink-Mixed Concrete:** Ready mixed concrete partially mixed in a plant mixer and then discharged into a truck mixer where its mixing is completed.

**Silica Fume:** A very fine powdered material with particles about 100 times smaller than Portland cement particles. Used for making high strength, low permeability concrete.

**Slag, ground:** A by-product of steel mills, ground to a fine powder and used as a pozzolan in concrete. Also known as Ground Granulated Blast-furnace slag. See pozzolan.

**Slump:** A measure of the consistency of fresh concrete.

**Slump Cone:** A cone shaped mold with an 8-inch base diameter, a 4-inch top diameter, and 12-inch height, used to test the slump of fresh concrete.

**Slump Meter:** A gauge on the hydraulic system of the truck mixer which measures the approximate slump of the concrete in the revolving drum.

**Slurry:** A mixture of water and cement.

**Spalling:** Chipping, flaking or peeling of concrete fragments from a hardened concrete surface. See peeling, scaling.

**Stamped Concrete Finish:** The surface texture obtained by using a stamp to imprint a design in the surface of a concrete slab during finishing.

**Strength:** Generic term for concrete's ability to resist strain, stress, or breaking.

**Super-plasticizer:** A high-range-water-reducing admixture (see definition).

**Tag Out:** Placing a tag or notice on a piece of equipment indicating that it is out of service. See locked out.

**Topping:** A layer of concrete placed to form a floor surface over a concrete base.

**Trowel:** A steel, flat, hand tool used in finishing to achieve a smooth, hard, dense surface on a concrete slab.

**Trowel Finish:** A smooth finish obtained by using a steel hand trowel or power trowel on a concrete slab.

**Truck Mixed Concrete:** Ready mixed concrete mixed in a truck mixer. Also called transit-mixed concrete.

**Truck Mixer Manufacturer's Bureau (TMMB):** Organization of truck mixer body manufacturers that writes and publishes standards for concrete truck mixers. Most truck mixers have a TMMB rating plate showing the maximum rated volume of the drum.

**Unit Weight:** The weight of concrete per unit volume. Usually expressed in pounds per cubic foot (abbreviated as lb./cu. ft., e.g., 147.50 lb./cu.ft.

**Water-Cement Ratio:** A ratio of the weight of water to the weight of cement, in concrete, expressed as a decimal, e.g., 0.45.

**Water-Reducing Admixture:** A liquid admixture that increases the slump of fresh concrete without increasing the water content or maintains the slump with a reduced amount of water.