



Bar Bending & Concreting Level II

Learning Guide # 43

**Unit of Competence: Carry -out Concrete Bursting cut,
core and Crushing Operations**

**Module Title: Carrying-out Concrete Bursting
cut, core and Crushing Operations**

LG Code: EIS BBC2 M12 LO3 LG-43

TTLM Code: EIS BBC2 TTLM 10 19 v1

LO3: Burst and crush reinforced Concrete



Instruction Sheet

Learning Guide

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- 3.1 Operating mechanical equipment
- 3.2 Providing direction and assistance to equipment operators
- 3.3 Using measures to reduce dangerous and environmental hazards

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –

- 3.1 Operate mechanical equipment in accordance with manufacturer's specifications, standards and workplace procedures
- 3.2 Provide direction and assistance to equipment operators in accordance with workplace procedures
- 3.3 Use measure to reduce dangerous and environmental hazards such as fire, dust, noise and vibration in accordance with regulations, standards and workplace requirements

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 7.
3. Read the information written for each "Information Sheets given below
4. Accomplish the "Self-check after reading & understanding of each information sheet
5. If you earned a satisfactory evaluation from the "Self-check" proceed to "Operation Sheet
6. Lastly do the "LAP test
7. If you have any question ask your teacher



3.1 Operating mechanical equipment

Concrete is a man-made (artificial) stone or Concrete is a construction material composed of cement and other cementations materials such as fly ash and slag cement, aggregate (generally a coarse aggregate made of gravels or crushed rocks such as limestone, or granite, plus a fine aggregate such as sand), water, and chemical admixtures.

Types of concrete

- Plain and
- Reinforced Concrete

Plain Concrete– is an artificial stone as a result of mixing cement, fine aggregates, coarse aggregates, and water. .

Reinforced Concrete– is a concrete with reinforcement properly embedded i

Concrete Bursting

Concrete bursting, also known as hydraulic **bursting**, is a controlled method of demolition to separate large **concrete** structures into more manageable pieces



Fig.1 burst machine



fig.2 crushing machine



The selection and use of the appropriate size and type of construction equipment affect the needed effort and time of a project. It also highly affects jobsite productivity. Consequently, it's not only important to select the right construction equipment, it's also crucial to use it in the right way. Whether your construction project is paving, drilling, compaction and grading, excavation and loading etc doesn't matter. You must use the equipment in the way that it's supposed to.

Construction equipment can be classified into four main categories. The groups are based on use and purpose. They are:

- Construction vehicles
- Earth moving equipment
- Construction equipment
- Material handling equipment

A heavy equipment operator drives or controls construction equipment, including bulldozers, forklifts, backhoes, dump trucks, cargo trucks, and hydraulic truck cranes. They operate this equipment to assist in the construction of structures, including bridges, roads, and buildings.

Heavy equipment operators usually specialize in one of three areas. Construction equipment operators, also called operating engineers, handle loading and excavation machines. They use these machines to dig and lift sand, gravel, or earth. Paving and surface equipment operators use machines to spread concrete and asphalt during the construction of roadways. Pile-driver operators control equipment to hammer heavy beams of wood, concrete, and steel, called piles, into the ground.

Heavy Equipment Operator Duties & Responsibilities

Exact duties can depend on a heavy equipment operator's specialization. Some common responsibilities include:

- Operate heavy equipment in compliance with the company's operating safety policies and procedures.
- Provide recommendations for maintaining and improving environmental performance.
- Load and unload equipment from vehicles and trailers.



- Ensure company equipment, material, and the work site are maintained, kept clean, and stored in a safe manner. Collect and dispose of scrap, excess materials, and refuse.
- Observe distribution of paving material to adjust machine settings or material flow, and indicate low spots for workers to add material.
- Complete required paperwork, reporting, and other documentation

The Use and Maintenance of Construction Safety Equipment

Equipment maintenance is any process used to keep a business's equipment in reliable working order. It may include routine upkeep as well as corrective repair work. Equipment may include mechanical assets, tools, heavy off-road vehicles, and computer systems.

Here are five top tips for machinery maintenance:

1. Stay on top of large machinery operator training. ...
2. Add and test lubricants frequently. ...
3. Check for signs of wear. ...
4. Keep large machinery clean, and maintain a clean environment. ...
5. Have maintenance and repair schedule, and keep good records.





Fig.3 bursting concrete



Self-check 1

True or False

Instruction: say true or false

1. Use of the appropriate size construction equipment needed to work.
2. Equipment maintenance is any process used to keep equipment
3. Safety is necessary practice when the time of operator
4. **Concrete is natural stone**
5. **Plan concrete is non-reinforced bar concrete**

Note: Satisfactory rating - 2 points Unsatisfactory - below 2 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Answer sheet

- 1.True
- 2.True
- 3.True
- 4.False
- 5True



Information Sheet 2

Providing direction and assistance to equipment operators

3.2 Providing direction and assistance to equipment operators



A heavy **equipment operator** drives or controls construction **equipment**, including bulldozers, forklifts, backhoes, dump trucks, cargo trucks, and hydraulic truck cranes. They operate this **equipment** to assist in the construction of structures, including bridges, roads, and buildings. The clarification was issued to improve the training of operators. By improving the regulations, it is hoped that there will be a reduction in the number of injuries and deaths that occur as a result of inadequate operator training. The changes apply to both general industry and the construction industry.

The training should be based upon:

1. The operator's prior knowledge and skill
2. The types of powered industrial trucks the operator will operate in the workplace
3. The hazards present in the workplace
4. The operator's demonstrated ability to operate a powered industrial truck safely

The duty of equipment operator

- Provide support to successful completion of construction and engineering work



- Operate all heavy equipment like cranes, earth movers, bulldozers, front-end loaders, and other related equipment.
- Operate the equipment in the right direction and angles to prevent accidents and damage of property.
- Ensure and manage the machines or equipment in a safe and secure way.
- Perform periodical safety, maintenance or servicing checks to ensure proper functioning of the equipment.
- Drive and control the equipment
- Perform road work, excavation work, lifting work, etc.
- Operate the equipment manually and also through the use of electronic or technical methods of operation.
- Work in adherence to safe practices, procedures, and work site or traff

- Conducting preventive maintenance on all equipment, reporting any malfunction to the Construction Manager:
- Performing daily safety and maintenance checks, keeping equipment clean and in excellent conditions.

- Using heavy equipment to load, move, or spread different materials (e.g. earth and rock) or to help erect or demolish structures:
- Locating underground pipes and wires, prior to beginning any excavation work;
- assembling equipment and joining attachments on machinery; and
- Ensuring that all heavy equipment is used in accordance with all safety standards and legal regulations.

- Starting up and shutting down all equipment safely, following start-up and shutdown procedures at all times:
- Practicing workplace safety at all times and respecting all traffic regulations while driving any heavy equipment;
- knowing how to use the equipment in advance in order to prevent any situation that could threaten a person's safety or that could affect the current work; and
- ensuring that all equipment is safely and securely stored at the end of each work day.



- Clearing construction areas from debris and other hazardous materials before starting a project.
- Performing maintenance and construction activities when not operating vehicles:
- Installing and repairing guide rails and fences;
- ensuring construction sites are well-maintained (e.g. litter cleaning, grass cutting, and weed trimming); and
- assisting coworkers in various functions (e.g. loading and unloading of materials and pushing other equipment when extra traction/assistance is required).
- Advising the Construction Manager on any requirements for maintenance or



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| Self-check 1 | True or False |
|--------------|---------------|

Note: Satisfactory rating - 2 points Unsatisfactory - below 2 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

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| Score = _____ |
| Rating: _____ |



Information Sheet 3

Using measures to reduce dangerous and environmental hazards

3.3 Using measures to reduce dangerous and environmental hazards

Heavy equipment operation can be a dangerous job. Construction sites are full of hazards, and heavy equipment can cause injuries to yourself or others at the jobsite. Communicating effectively with everyone in the area can reduce the number of accidents and injuries. While communication is necessary for everyone's safety, there are additional steps that heavy equipment operators must take. These are some safety tips heavy equipment operators use before, during and after using heavy equipment at a construction site

. Safety Equipment

Generally, safety equipment is the protection that is used by workers to avoid injuries, casualties, life threatening situations etc. Different types of safety equipment are used by workers depending upon the nature of risk involved in the work. For example, in a welding operation the dark welding helmets are used as a piece of safety equipment. In construction operations, hard hats, foot gear and coveralls are considered safety equipment.

- **Type of safety.**

- ✓ ***Personal Protective Equipment (PPE)***

Properly wearing the right personal protective equipment when operating heavy equipment helps protect your body on the job use PPE always and anywhere where necessary. Observe the instructions for use, maintain them well and check regularly if they still offer sufficient protection.

These 7 tips will help you on your way.



1. Safety for the head: Wearing a helmet offers protection and can prevent head injuries.



Fig.1 helmet

2. Protect your eyes: The eyes are the most complex and fragile parts of our body. Each day, more than 600 people worldwide sustain eye injuries during their work.



Fig.2 Google

3. Hearing protection: Ear plugs are very comfortable, but earmuffs are convenient on the work floor as you can quickly put these on or take them off.



Fig. Earmuffs

4. Maintain a good respiration: Dust masks offer protection against fine dust and other dangerous particles to protect the nose and mouth against harmful pollution



Fig Dust masks

5. Protect your hands with the right gloves: Hands and fingers are often injured, so it is vital to protect them properly. Depending on the sector you work in, you can choose from gloves for different applications:

- protection against vibrations
- protection against cuts by sharp materials
- protection against cold or heat
- protection against bacteriological risks
- protection against splashes from diluted chemicals



Fig.5 gloves

6. **Protection for the feet: Safety shoes and boots** are the ideal solution to protect the feet against heavy weights



Fig.6 Safety shoes

7. **Wear the correct work clothing:** Preventing accidents is crucial in a crowded workshop



Fig.7 Over coat

**Self-check 1****Multiple Choice**

Instruction: choice the following question (2point)

1. Wearing a helmet offers protection and can prevent head injuries

A Safety shoes B gloves C. Hearing protection D clothing

2. Protection against cuts by sharp materials

A Safety shoes B gloves C. Hearing protection D clothing

3. Protection against fine dust and other dangerous particles to protect the nose

A Safety shoes B gloves C. Mask D clothing

4. Protect eye injuries during their work

A Safety shoes B gloves C. Glass D clothing

5. Wearing a helmet offers protection and can prevent head injuries..

A Safety shoes B helmet C. Glass D clothing

Note: Satisfactory rating - 2 points Unsatisfactory - below 2 points

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____



Fig.1 cement plant

Environmental Hazards

Introduction

Construction is not an inherently environmentally friendly industry and much research has linked it to environmental disruption and pollution. Construction is one of the major contributors to environmental impacts carrying pollution risks, typically classified as air pollution, waste pollution, noise pollution, and water pollution. Activities in construction are complex, highly dispersed, and resource-demanding.

The industry contributes to the loss of important natural assets and imposes severe impacts and stress on the environment. Construction activities and practices that fail to control risks to the environment can cause damage to rivers, lakes, sensitive ecosystems, and aquatic life, including.



Fig.2 Environmental hazarded



Environmental Risks of Construction

➤ Risk of Land Degradation

Large projects usually entail extensive land disturbance involving the removal of vegetation and re shaping of topography. Such activities make the soil vulnerable to erosion. Soil removed by erosion may become airborne and create dust problem or be carried by water into natural waterways, thereby polluting them. Due to the soil erosion of the exposed and loose earth, there will be a deterioration of water quality in the surrounding water bodies due to siltation. This can result in mud floods and flash floods in immediate or downstream areas during heavy downpours. Landslides and slope failure can occur on unstable slopes or when the soil is saturated with water during heavy rain falls.

➤ Risk to Flora and Fauna

The biological environment includes various species of animal and plant life, and their habitats. Unfortunately, however, loss of flora and fauna is likely in any development. Planning is essential to ensure minimal losses during the implementation stages and steps must also be taken later to ensure that the losses are “replenished.” This is crucial especially when development is in the vicinity of a protected or animal sanctuary, a forested area, or a catchment area. Ecological losses should be minimized and suitable protection put in place for the conservation of flora and fauna.

➤ Risk of Water Pollution

Water quality is important for economic, ecological, aesthetic, and recreational purposes. Changes in water quality may affect its aesthetic value or even prevent some uses of the water. During construction, the potential for soil erosion and risk to water quality is greatest when removal of vegetation for initial clearing and grading activities exposes soil and makes it susceptible to erosion. The impacts and risks are greatest during the rainy season where extensive land clearing can increase sediment load into the rivers from erosion of the exposed soil.

➤ Risk of Air Pollution

Activities of major concern for air quality are the burning of waste, the emission of fumes and smoke, and the release of chemical impurities such as heavy metals, acid and other toxic bases. Air quality impacts from construction include increased dust particulates in the atmosphere caused by grading, filling, removals, and other construction activities. Air quality may also be impacted by emissions from construction equipment and vehicles.

➤ Risk from Noise and Vibration

Noise and vibration can be generated by various activities and equipment used in construction projects. Noise and vibration levels due to construction activities in the project area vary depending on the types of equipment used, the location of the equipment, and the operating mode. Adverse impacts resulting from

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construction noise and vibration are generally limited to areas adjacent to the project, and are temporary in nature

Limit the environmental Impact of Construction

Construction contributes to environmental damage both on a global scale, as well as locally. It is important to learn what impact construction causes in order to scale back damage. Here are five ways to help limit environmental impact during your construction project.

➤ Limit Fuel Usage

Construction firm's biggest negative impact on the environment is caused by the burning of fossil fuels, like gas and diesel. Every construction project results in these gas emissions of carbon dioxide, methane and other waste products that pollute the air and are believed to contribute to global warming. In order to limit fuel usage:

- Minimize haul distances
- Reduce vehicle idling time
- Use *greener*, alternative fuel sources
- Use hybrid equipment

By striving to limit your construction project's fuel usage, you can help decrease negative emission and pollutants and improve air quality.

➤ Reduce Noise

Construction noise is a major source of noise pollution. Most of this noise is produced by machinery in site preparation, demolition, and landscaping. Many construction sites are located near homes and businesses and can noise complaints might be likely. Be sure, when beginning a construction project, to be considerate and adhere to any local construction time restrictions.

➤ Properly Dispose of Waste

In 2014, there was over 534 million tons of construction material waste in the United States. Demolition waste makes up 90% of total debris, and much of this waste is disposed of in landfills or through incineration. Both these methods harm the environment. By salvaging, reusing and recycling existing materials, you can cut down on materials harming our precious earth. Hardware, appliances, and fixtures can be recycled or reused. These can be used on future projects or donated to those who need them. Brick and concrete can be recycled and used as fill or driveway bedding, and metals and wood are valuable commodities that can be recycled.

➤ Utilize Reusable Technology

There are a lot of *green* building options that help you decrease a negative environmental impact. They are easier to install and environmentally friendly by using existing water already on your worksite.

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➤ Expedite Your Project

By accelerating your construction project, you reduce traffic disturbances and also reduce associated emissions and fuel costs. Establish firm completion goals and implement these measures to stay on track. Expediting the construction process helps reduce noise pollution, as well as cutting back on traffic duration and improves safety zones.

| Self check 2 | True or False |
|--------------|---------------|
|--------------|---------------|

Instruction: Say true or False (2point)

1. Construction noise is a major source of noise pollution
2. *Green* building options that help you decrease a negative environmental impact
3. Construction is an inherently environmentally friendly industry

Note: Satisfactory rating - 2 points Unsatisfactory - below 2 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

| |
|--------------------------------|
| Score = _____ Rating: _____ |
|--------------------------------|

