

Unit 3. Instruments and tools in Construction Engineering

1. Vocabulary: construction equipment

Construction equipment can be categorized in 4 main sections based on their purpose and use:

- **Earth moving equipment**

- **Excavators**

An excavator is an engineering vehicle that is used for **digging** or **refilling** of big holes. The basic structure of an excavator comprises of the **arm**, the **bucket** and **tracks**. The **drive** and **power source** of the excavator is one of the major components of this equipment.



- **Graders**

A grader, also commonly referred to as a road grader, a blade, a maintainer or a motor grader, is an engineering vehicle with a large blade used to create a flat surface.

In civil engineering, the grader's purpose is to "finish grade" (refine, set precisely) the "rough grading" performed by heavier construction plant such as motor scrapers and bulldozers.

Graders can produce inclined surfaces and surfaces with cambered cross-sections for roads.

Graders are commonly used in the construction and maintenance of dirt roads and gravel roads.

– **Loaders**

A loader is a heavy equipment machine frequently used in construction industry, mainly used to load material (such as demolition waste, feed, gravel raw minerals, used material, rock, and plywood) into or onto another type of machinery (such as a dump truckload). Loaders have a very higher productivity and a lower maintenance cost unlike most of the other large scale construction machines. The Loader has a large bucket with a shorter moving arm. Large quantities of material such as soil, construction material, etc. can be moved from this. The loader consist of four large wheels for its movement. Loaders are best suited for earth moving, road construction, agricultural purposes, and also in large and small scale constructions which include marine structures.

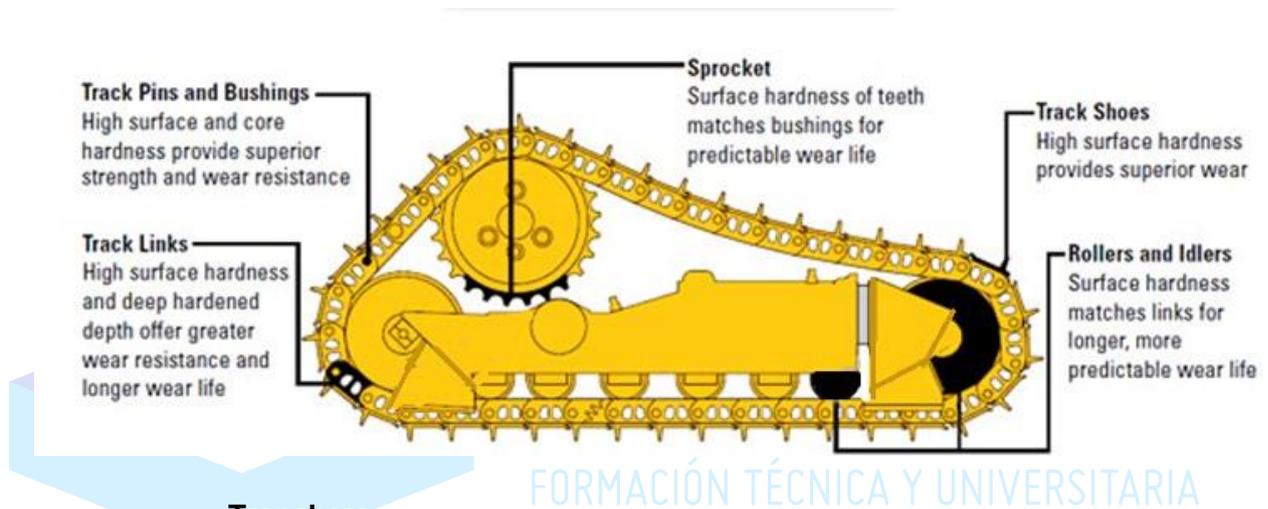
There are different types of loaders:

- a) **Wheeled loader:** wheeled loaders can be used to move material from ground level and place them onto a dump truck or open trench for excavation.
- b) **Track loader:** this is an equipment that comes engineered with a tracked chassis and a loader that is used in digging and loading materials.
- c) **Skid Steer loader:** this is regarded as an all-purpose heavy construction machinery. This machine comes in either a crawler version or a four wheel drive skid steer loader. Skid steers come engineered with different attachments that enables them to be converted into a snow blower, loader, mower, forklift, or a bulldozer in fraction amount of time. This benefits organizations in the sense that the company does not have to acquire all construction equipment because the skid steer loader can be converted and used in different ways.
- d) **Backhoe loader:** it is also referred to as the digger or loader backhoe. This is a heavy duty electromechanical equipment that comes fitted with a shovel on the front and a small back-hoe on its back.
- e) **Crawler loader:** The crawler loader combines the stability of the crawler tractor with the abilities of a wheel loader.

However, to construct a reliable crawler loader it requires more than simply attaching a loader bucket onto a crawler tractor.

– Bulldozers

A bulldozer is a crawler (continuous Tracked tractor) with a substantial metal plate used (known as blade) fitted to push large amounts of soil, sand, dirt or other materials when construction or remodeling and usually push on the back with a claw mechanism (known as ripper) to loosen densely-compacted materials.



– Trenchers

Trenchers (also called ditchers) are similar to excavators in the sense that they penetrate soil, break soil and rock. They differ from excavators in that the soil is removed in one continuous movement.

– Scrapers

The scraper is a large piece of equipment used in mining, construction, agriculture and other earth moving applications.

The scraper can carriage its load to the fill area where the blade is raised, the back panel of the hopper, or the ejector, is hydraulically pushed forward and the load tumbles out. Then the empty scraper returns to the cut site and repeats the cycle.

2. Exercises:

A. Describe the following construction material and answer the question:

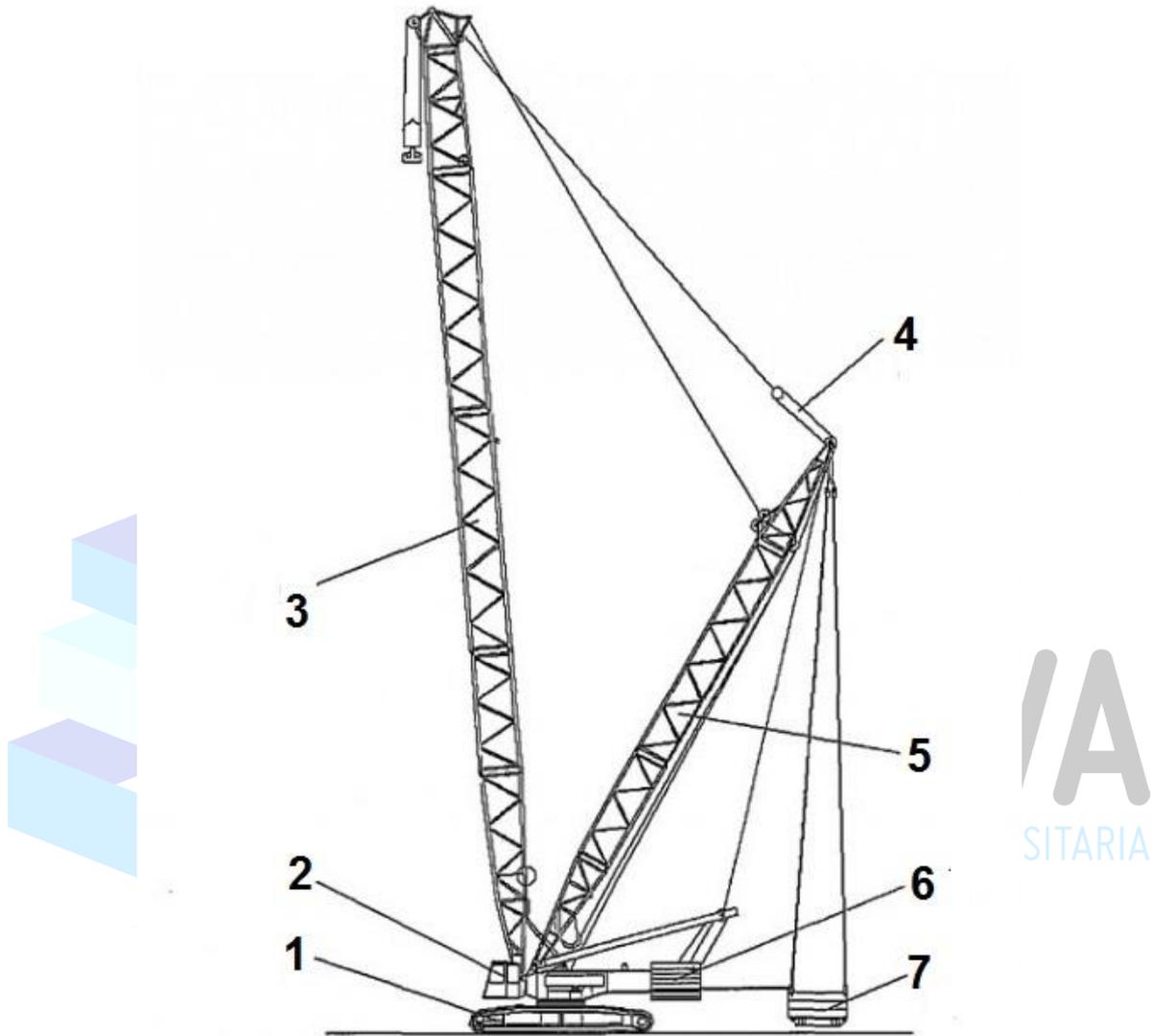
Why are this machines used in construction?

Which are their main characteristics?

What are they used for?

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B. Name the main parts of the following mobile crane:



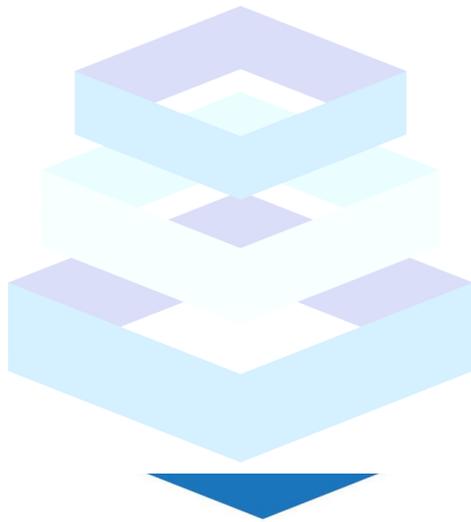
- 1. _____
- 3. _____
- 5. _____
- 7. _____

- 2. _____
- 4. _____
- 6. _____

- What does a crawler do?

- Do you know any other part of this machine?

- How many types of mobile cranes do you know?



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