AI 3401 TRACTORS AND ENGINE SYSTEMS

UNIT V NOTES

Bulldozer

Bulldozers are strong construction vehicles that mainly assist with pushing, digging, excavating, demolition and leveling materials like soil and debris at a work site. They come with large, heavy blades in the front that push material. Specialized bulldozers come with other modifications, like rippers in the rear, to help break down tough ground.

Types

Crawler tractor

A crawler is sometimes referred to as a track bulldozer and looks most similar to a tractor. This heavyweight machine is great for moving heavy materials from one area to another. This bulldozer is ideal for traversing dense and irregular terrain since the tracks give it great traction. Larger crawlers have rippers that assist with crushing and clearing dense terrain.

Wheel Bulldozer

This machine is sometimes referred to as a tire bulldozer and is normally larger than a crawler. A wheel dozer is more maneuverable than a crawler since its tires offer better overall handling. It also has completely articulated hydraulic steering and moves on a smaller axis. This machine is ideal to use for soft or sensitive ground since the tires are gentler than tracks.

Shiphold Bulldozer

A shiphold dozer is for moving cargo in and out of commercial vessels. They are designed with a compact size and high maneuverability, so they can easily operate in small spaces. These bulldozers are especially useful for loading and unloading bulk cargo shipped overseas, such as coal. These bulldozers are often made with rust-resistant materials, making them more suitable for maritime worksites.

Mulcher Bulldozer

A mulcher dozer is specialized for clearing land. Its mulching attachment easily shreds, grinds and clears large pieces of land. These dozers can clear trees, brush and shrubbery to prepare the land for development. The mulcher attachment allows the bulldozer to clear the land while acting as a wood chipper to grind the vegetation into smaller pieces.

Hybrid Bulldozer

Hybrid bulldozers are ideal for construction and other tasks where emissions and fuel consumption is a concern. While fairly new to the market, hybrid bulldozer engines use traditional internal combustion engine technology combined with electric components — leaving a smaller carbon footprint. These machines are as powerful as your traditional bulldozer and extremely versatile.

Mini Bulldozer

This smaller bulldozer is also known as a compact bulldozer. A mini dozer is great for projects that require more maneuverability and versatility than larger machinery. Thanks to its small size, a compact bulldozer can perform well in different projects that require tasks like grading and clearing lots.

Different Bulldozer Blades

The above bulldozer types can be further classified based on the blades used. Different blades serve different purposes, can handle different types of materials and can handle a range of load weights.

Straight Blades (S-Blade)

An S-blade is the shortest type of blade a dozer can use and does not have side wings. This blade attaches to the arm in the lower back corners of the blade. Thanks to its shape, the straight blade is best for fine-grained and medium- to hard-density materials. The drawback is that its straight shape limits the dozer's lifting and carrying capabilities. Some of the best tasks for S-blades include stumping, backfilling, grading and evening soil.

Universal Blade (U-Blade)

A U-blade has large side wings and a curved shape that makes it ideal for pushing materials across long stretches of land. The wings keep material from spilling over when in motion. Like S-Blades, they also attach to the lower back corners of the blade. It's the largest blade type in both height and width and is best used with soft- to medium-density soil. Some of the best tasks for U-blades include ditching, hauling, pushing and crowning.

S-U- (Semi-U) Blade

This blade combines features from the S-blade and the U-blade to give it stronger penetration and better overall versatility. It's narrower, less curved and has side wings smaller than a normal U-blade. This design makes it ideal for pushing soil across long distances. This blade attaches in the lower back of the blade using angled stabilizing braces and either one or two hydraulic tilt cylinders. It's best for pushing soft- to medium-density sand and soil. Some of the best tasks for an S-U-blade include crowning, moving heavy material, stumping and ditching.

Angle Blade

This type of blade attaches to the center of the bulldozer's panel. Its location is useful for moving debris to the side since it can angle close to 30 degrees left or right. Due to this, an angle blade is considered a two-way blade. Keep in mind that this blade can spill since it does not have side wings. It's a great choice for projects involving soft- to medium-hard-density soils, snow and gravel. Some of the best tasks for angle blades include stumping, shaping, stripping and ditching.

Power-Angle-Tilt (PAT) Blade

The PAT blade is one of the most versatile blades thanks to its easy maneuvering and multifaceted motions. The driver controls the blade from the cabin and can angle, tilt and lift in almost all directions. Like angle blades, these blades are mounted in the center of the panel. It's also similar to the angle blade in that it's best to use with soft- to medium-hard-density soils. Some of the best tasks for PAT blades include scraping, land clearing, leveling, backfilling and grading.

Bulldozer Parts and Functions

Rippers

A ripper is the extended attachment located at the rear of the bulldozer that resembles a claw. Rippers are used to break up land to allow agriculture to grow or break down rock and earth to be moved. You can find both single-shank rippers and multi-shank rippers depending on your project needs.

Final Drive

A bulldozer's final drive is likely the most used and most replaced part of a bulldozer. Modern final drives distribute the load over multiple gear teeth and lift the drive motor away from suspension.

Cab

The bulldozer's cab is an important part of this machine since it's where the operator controls this machine. There are different features for some cabs that increase both their level of comfort and safety. You should check to see if your cab reduces sound and absorbs impact while you're moving around the work site. These are crucial since operators can spend hours at a time inside the cab.

Tracks/Tires

Tracks and tires greatly impact a bulldozer's mobility. Tracks are great for navigating hard, uneven terrain, while tires are better suited for soft ground

Engine

Bulldozers generally require high-powered engines since they move loads of heavy materials around the work site. Different types of engines fulfill different needs. For example, some newer engines produce fewer emissions compared to older engines to comply with certain EPA requirements.

Push Frame

The push frame is essential when positioning materials for different tasks. This bulldozer part is responsible for moving the blade.

How to Choose a Bulldozer

Purchasing or renting a bulldozer for your project can improve the efficiency of the project if the right one is selected

Identify its purpose. Are you leveling the ground? Pushing material?

Analyze the work site. Do you need to maneuver in tight spaces?

Consider the terrain. Are you working on a hard or soft surface?

Pinpoint material types. What type of earth are you moving? What's its density?

ZERO/MINIMUM TURNING?

A zero turn if taken literally means that the tractor should be able to rotate about a stationary pivot point/axis. A minimum turn radius means that the turn envelope of the tractor should be as small as could possibly be achieved. In other words the minimum wall to wall distance within which the vehicle can turn should be as small as possible

Track mechanism of tractor

A tractor's movement is typically provided by the rear wheels or tracks. Power controls the rotation of the wheels through the differential. Accessories such as a tow ring or tow bar attached to the rear axle allow the tractor to pull another vehicle or move machinery.