Crawler - Tractor/dozer

Note: *It is recommended that you read the Supporting Information page before you read this factsheet.*

Preparation and completing work *(Preparation)*

- Tracked dozers undertake a variety of tasks associated with earthworks operations but are also used, in other sectors, for levelling and compacting, clearance or ground-breaking work, which naturally needs to be undertaken safely and efficiently.
- Correct and proper checks and preparation are essential. Manufacturers provide guidance in the operator's manual or in other ways, such as in decals on the machine that show the regular checks that need to be carried out. These need to be complied with; otherwise the dozer could be unsafe to work. Failure to properly check the dozer before work could cause injuries because faults can affect the performance and safety of the machine.
- Any defects noted by a dozer operator, even if they consider them to be insignificant, must be reported immediately, otherwise the fault could get worse during the working day.
- The operator could incorrectly diagnose what they consider to be a minor fault, such a small leak from one of the drive motors, when in fact it could become severe and possibly cause a near miss or injury as the machine's performance may significantly deteriorate or a component may fail.
- Many dozers are equipped with a reversing alarm. This is an essential safety item and, before starting work, both its function and effectiveness should be checked, particularly the volume of the alarm. Incidents have occurred when the volume or loudness was insufficient to warn those in the path of a reversing dozer.
- Good visibility is naturally a key area for safe operations and regular cleaning of the cab glass should be undertaken before work starts. On some dozers, some of the cab glass is at difficult to reach areas, particularly the rear screen.
- Before attempting to clean any glass, the task needs to be planned as this can be considered working at height and to minimise a fall, access to hard to reach areas, such as using proper guardrail-equipped access steps should be considered.
- This also applies when checking the machine for work, as some checks may require the operator to climb onto parts of the machine, such as the rear ripper or blade, and again a slip or fall could occur.
- Dozers occasionally use equipment such as a towed roller. To avoid past issues where the roller has moved after becoming detached from the dozer following work, it should be parked on firm, level ground and chocked to prevent unplanned movement before the towing pin is removed. The roller manufacturer's recommendations should be followed accordingly.
- This also applies when a front blade is removed – the blade should be resting on the ground before the linkage pins are removed and chocked, again, to prevent any movement.
- As with any tracked machine, working in cold and wintry weather requires further consideration. At the end of the working day, the machine should be parked in a dry area and the tracks cleared of any mud. Frozen tracks can prevent the machine moving the following day.

Working safely and with others *(Working safely)*

- To access the cab access of most dozers, the operator needs to climb up and onto a track then walk up the track to the cab door. Care must be taken by the operator as slips and trips, and resulting injury have occurred.
- Manufacturers are required to ensure that noise levels are below a set threshold to minimise operators having any long-term hearing issues but these noise levels only apply when the cab is sealed, that is, when the doors and windows are shut. As it is common practice for dozer operators to work with the cab doors or windows open, they should wear ear defenders if they choose to leave a door or window open, otherwise this can be the cause of long-term health effects.

- As dozers travel and work in areas where other vehicles and pedestrians are moving about, the planning of any travel routes needs to take into account pedestrian movement. Pedestrians should be segregated from the dozer's travel route to avoid any contact.
- Planning should also take into account changes in the type of ground being travelled and worked on, particularly in wet weather as firm ground can turn very quickly into soft ground.
- Dozers commonly and are capable of working on steep inclines and gradients. However, the limitations and maximum angle the dozer can work on, both sideways as well and up and down, must be checked in the operator's manual, or in other official sources.
- Where work may take place near to overhead power lines, for example when working on stockpiles, a minimum distance must be kept. Guidance issued by the energy networks utilities indicates what minimum distances must be kept and the higher the voltage in the power line, the greater the distance that must be kept. This is to reduce the danger of arcing if the dozer comes close to but not actually touching the power line.
- Attachments such as rippers are used to break up ground with the tines penetrating below ground level. Before any below ground work can take place, a permit to work must have been issued following a check of the working area for underground services and hazards.
- Tracked dozers are sometimes used to extract stuck vehicles but which has resulted in injuries and deaths when not properly planned and co-ordinated.
- Before any stuck vehicle is recovered, a specific risk assessment and safe system of work must be devised so that all risks are taken into account, control methods are applied and the plans communicated to all those involved in the recovery operation.
- When the dozer is being reversed up to the stuck machine or vehicle, all personnel must be clear of the reversing path of the dozer, particularly when the towing chain or wire rope is being attached to each machine. When the stuck vehicle is being pulled, before any strain is taken by the dozer, the operator must ensure that all personnel are well clear of the potential chain or rope strike area in case of a failure.
- If a dozer is within a work area near to the edge of an embankment, a suitable barrier or earth bund should be provided that is sufficiently capable of preventing the machine from going over the edge.
- To prevent the dozer overturning when a load needs to be pushed over an edge, a wall of material should be formed and pushed over the edge, eliminating the need for the dozer to travel to the very edge of the trench or slope.

Reversing and visibility *(Travelling)*

- The reversing of vehicles is still a significant factor in accidents, injuries and fatalities in the workplace. Guidance recommends that any reversing of plant is, as the first course of action, eliminated.
- Only when this is not reasonably practicable such as in the case of dozer operations, then other measures may be taken with the next step being the restriction of dozer operations to within a segregated, controlled area.
- Dozers however by the nature of their work can spend a high proportion of time reversing, sometimes within tight, confined areas where the movement of other plant and people can occur.
- Because of the design of a dozer, there can be limited vision from the operator's seat. Additional vision aids, such as mirrors and CCTV systems, can provide some assistance in providing all-round vision. However, each vision aid can have limitations and although CCTV systems are commonly used, can be ineffective in strong sunlight.
- Certain CCTV systems indicate the range of distance from an object, but this can be distorted if the correct vision mode is not selected. Some systems require settings to be changed to the reversing mode when reversing is to take place. Irrespective, operators must use all aids that are available at all times and not rely on a single system.
- Operators must also ensure before reversing after each pass that the path to be taken is clear of other vehicles, plant and personnel.

Working practices and attachments *(Working tasks)*

- Dozers are, in many cases, high production machines and running costs form a major part of operating overheads. The operator can minimise the fuel used by working the machine efficiently without using maximum engine speed.
- In nearly all cases, manufacturers indicate in both the operator's manual and on the machine's rev counter the optimum engine speed or range that should be maintained to ensure efficient running of the engine, transmission and hydraulic systems.
- When the operator leaves the cab of the dozer, they must switch off the engine (unless there are specific operational reasons not to do so) which makes the machine safe, and prevents fuel from being wasted.
- Where a towed roller is being used, when approaching the end of the run, the operator needs to check that any umbilical cord between the dozer and roller will not be trapped when making a turn at the end of the pass.
- For efficient working, it is normal when working on a diagonal side hill cut to angle and tilt the blade so that the leading edge is facing towards the hill, allowing the material to be cast downhill.
- The use of slot dozing can aid working efficiency during earthmoving operations by minimising material from being spilled over each side of the blade, so that more material to be pushed on each pass.
- Back blading, or dragging material when reversing, should be limited to light levelling or cleaning type operations as excessive use can cause wear on the non-wearing parts of the blade and/or frame.
- Winches are occasionally used on dozers. As with towing, the task should be properly planned before winching work begins, with reference made to the winch manufacturers' manual.
- The wire rope and winch, plus any accessories, need to be certificated and in date. The safe working load of the winch and rope must be established so that, when any load is winched, loads will not snag or be higher than expected, which may overload the rope and winch.

Sample questions

The following questions are based on the text within this factsheet and indicate how the questions and answers are structured. Based on the factsheet, there is only one correct answer. The correct answer to each question is indicated at the end of this factsheet.

Q1. How should material be pushed over an edge in order to prevent an overrun of the dozer?

A. By using only half of the capacity of the dozer blade

B. By keeping to the lowest gear

C. By forming and pushing a wall of material but keeping a distance from the edge

D. By keeping the blade tilted down and at least 300mm above ground height

Q2. If recovering a stuck or disabled machine, what precaution should be taken before taking any strain on the recovery rope or chain?

A. That at least three lines of chain or rope are used

B. That all personnel are clear of the rope or chain strike area in case a failure occurs

C. That a signaller can clearly see the full length of the rope of chain

D. That the horn of the dozer is sounded

Study checklist

This checklist aims to act as a study aid to ensure that the reader has identified and understood the relevant parts of this factsheet.

Do you know?

1. Where the information for the carrying out of pre-use checks can be found.
2. Why the effectiveness or loudness of the reversing warning alarm should be checked before work starts.
3. What the hazards can be when cleaning the cab glass.
4. What should be taken into account before detaching a component or implement, such as a blade or towed roller.
5. Why the machine should not be parked in muddy conditions, particularly in wintry conditions.
6. What is an effect on the operator if operating with the cab doors and windows open.
7. Why travel routes need to be planned.
8. What should be taken into account before ground engaging tools such as rippers are used.
9. What the dangers are when using the dozer to extract stuck vehicles.
10. What procedures should be in place before extracting stuck vehicles with the dozer.
11. How overruns can be reduced when working near to an edge of an embankment or deep excavation.
12. The procedures that can help in minimising accidents with reversing dozers .
13. How additional driver visibility aids can help the operator.
14. What the limitations are of driver visibility aids.
15. How the fuel efficiency of the dozer can be improved.
16. What to take into account if using a towed roller.
17. Why care needs to be taken if using the back of the blade.
18. What the procedures are when using a winch fitted to a dozer.

Answers to sample questions: Q1: C and Q2: B