

Course Objectives for C201

Excavator 180° Below 5 tonnes - Experienced

It is envisaged that by the end of this course of training the learner will be able to answer questions on and perform the following:

- Explain the factors that help maintain a safe working environment in the construction industry, and their responsibilities as a 180° excavator operator
- Identify and extract information from the manufacturers' handbook / operator's manual, and other information sources including digital
- Locate and identify the major components, signs, decals, and all controls of the excavator and explain their functions
- Conduct all pre-operational checks in accordance with manufacturers and legislative requirements
- Identify and maintain personal protective equipment (PPE) and appropriate safety control equipment for excavator use
- Safely get into and out of the 180° excavator
- Prepare and configure the 180° excavator for site travel
- Travel and manoeuvre the 180° excavator safely across varying terrain and inclines
- Travel and manoeuvre in areas of restricted space
- Attach and remove buckets, using quick hitch couplers
- Conduct all necessary safety checks at the work area
- Configure and set up for excavating and loading duties
- Explain actions required for hazards, underground and overhead services
- Excavate different types of excavations in various types of ground to given dimensions
- Place materials into transporting vehicles and hoppers
- Reinstatement excavation – grade, spread and level ground and materials
- Explain environmental considerations of machine use
- Explain loading/unloading procedures for machine transportation
- Carry out all end of work and shut down procedures

Learning Outcome	Instructor Notes
<p>Explain the factors that help maintain a safe working environment in the construction industry, and their responsibilities as a 180° excavator operator</p>	<p>Explain why the industry has many hazards and why safe working practices must be adopted and maintained – Explain why personal health and safety is not just physical injury and can include the effects of noise and vibration. All of which can lead to lost time, lost income, expense for the employer, fines, custodial sentences etc. Explain requirements of the Health & Safety at Work etc. Act 1974, Provision and Use of Work Equipment Regulations (PUWER), Management of Health and Safety of Work (MHSW) Regulations, Construction (Design & Management) Regulations (CDM), Vibration at Work Regulations, Road Traffic Act, HSG144, HSG47 etc. in accordance with risk assessments, method statements, codes of practice and other relevant legislation, regulations, and industry good practice – Explain operators' moral obligations, legal obligations, and environmental obligations – Explain reporting structures, the importance of good communication on site (colleagues, management, and other workers on site) - previous incidences involving relevant plant and pedestrians - working with other related roles e.g., marshallers, supervisors, other plant operatives, other occupations, and support workers - awareness of the limits to their personal knowledge, skills, and experience and when situations exceed these limits the need to stop and seek further advice from supervisors</p>
<p>Identify and extract information from the manufacturers' handbook / operator's manual, and other information sources including digital</p>	<p>Explain the use of the operator's manual (for the specific machine) during the practical elements of training to identify key preparation, operational and safety aspects of the machine including types of information sources and machine control systems</p>
<p>Locate and identify the major components, signs, decals, and all controls of the excavator and explain their functions</p>	<p>Explain the purpose of principal components, the basic construction, controls, and terminology - how correct and sympathetic use of the controls can ensure efficiency and safety of the machine and help prolong machine life by reducing wear and tear - purposes of Roll Over Protection Systems (ROPS) and Falling Objects Protection Systems (FOPS) and other protection systems - machine control systems – efficiencies, GPS</p>
<p>Conduct all pre-operational checks in accordance with manufacturers and legislative requirements</p>	<p>Complete all pre-start and running checks before any activity takes place, including visual checks for damage, functionality, and effectiveness - checking all componentry systems are fully functional, including mechanical, hydraulic, pneumatic, electrical, and electronic etc. - replenish fuels, fluids, and lubricants, and undertake grease-based lubrication activities -</p>

Identify and maintain personal protective equipment (PPE) and appropriate safety control equipment for excavator use

manufacturers periodic checks and operator level maintenance requirements
- Explain defect reporting requirements - carry out routine adjustments
safety systems functions including emergency stop - health and safety requirements when undertaking basic maintenance activities including personal protection equipment (PPE) – check the condition and function of seatbelt and any other restraining equipment – check the condition and function of any lighting and warning systems – Explain the requirements for dealing with fluid spills including prevention and clean-up methods

Explain what safety control equipment / PPE should be worn/used for machine operations and include the following: suitable safety footwear, ear defenders, face/eye protection, dust mask, suitable gloves, overalls, hard hat, respiratory protective equipment (RPE), protective clothing etc. appropriate use of local exhaust ventilation (LEV), i.e., in confined spaces - why weather conditions, including heat and cold, can determine what PPE is worn when using specific machine and the personal effects of incorrect equipment

Safely get into and out of the 180° excavator

Explain and demonstrate working at height requirements - safe use of all hand holds and steps - facing the machine when getting in to and out the excavator cab for operational and maintenance purposes - effects of continually getting in to and out of the 180° excavator e.g., fatigue, increased risk of falling etc. - safe areas to get in to and out of the 180° excavator e.g., ground location, other vehicle movements etc. - procedures for accessing the 180° excavator when carrying out adjustment and maintenance activities

Prepare and configure the 180° excavator for site travel

Explain and demonstrate use of seatbelts and other restraining equipment - adjustment of seating position and mirrors - undercarriage checks - isolation controls - starting and stopping procedures including cold starting and those for turbochargers - procedural requirements for exhaust particulate filter cleansing activities - types of visibility aids and what factors can affect effective vision - where and why effective vision is very important - where issues can arise where vision is limited during operation - ensuring warning and safety systems are operable - legislative requirements and restrictions for being on the public highway - 180° excavator configuration for site travel - carrying of passengers/non-authorised personnel- use of travel controls and speed modes

Learning Outcome	Instructor Notes
Travel and manoeuvre the 180° excavator safely across varying terrain and inclines	Explain and demonstrate how travel speeds affect 180° excavator stability, safety, and emissions - issues which can occur if departing from designated travel routes and work areas/restricted zones - types of underground services and the effects of travelling near to/over services - effects of travelling close to edges, embankments, structures, and trenches - travelling over various types of terrain - travelling up, down and across inclines - how certain types of surfaces can affect traction, particularly on inclines - how uncompacted surfaces and inclines affect machine stability - precautions when working on stockpiled materials - effects due to changes of centre of gravity when on inclines - machine configuration when travelling on and across steep inclines - direction of travel - precautions and obstructions on travel routes including overhead utilities - regulative requirements for travelling near to or under overhead power lines
Travel and manoeuvre in areas of restricted space	Explain and demonstrate precautions to be taken when manoeuvring in areas of restricted space - requirements when working alongside highways, railways, and public areas - height and slew restriction limiters - checking machine size including height, width and working radius relevant to working area - lighting requirements and issues that may occur due to poor light
Attach and remove buckets, using quick hitch couplers	Explain and demonstrate the types of excavating and grading buckets - removal and attachment of buckets / attachments - classifications of quick-hitch couplers - procedures for the removal and fitting of attachments using manual and hydraulically operated quick-hitch couplers, including coupling, securing, and checking to ensure safe attachment - relevant health and safety legislation and legal duties - risks associated with quick-hitch couplers - visual inspections - maintenance and storage
Conduct all necessary safety checks at the work area	Explain and demonstrate the necessary safety checks that must be carried out to ensure the excavation area is clear of hazards - communication and relationship requirements and methods with other machine operators and support workers - requirements for sufficient manoeuvring area for manoeuvring between work areas - ground conditions for excavating and maintaining stability - overhead obstructions and nearby proximity hazards - awareness of other machines and workers - restricted, segregation and exclusion zoning requirements - people/plant interface, procedures, and

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Configure and set up for excavating and loading duties

dangers of allowing others near to a working machine - danger zones of a working excavator - working in hours of darkness and lighting requirements

Explain and demonstrate the working radius – minimum to maximum - required configuration for intended activity - methods of relaying and interpreting excavation work specification - visual reference points for excavation work - temporary works requirements and efficiencies of working safely on raised platforms - where spoil can and should not be placed - why segregation of materials should be maintained - positioning of excavator and vehicles for loading - use of front shovel to maintain stability - selection of correct bucket to meet work specification

Explain actions required for hazards, underground and overhead services

Explain the regulatory requirements for working near to or under overhead services - types of services, including buried and surface laid, and the various methods on how they are identified - emergency and reporting procedures if contact is made with services - minimum clearances when near to services - permit to break ground requirements

Excavate different types of excavations in various types of ground to given dimensions

Explain and demonstrate the typical types of excavations able to be undertaken by 180° excavators - how soil types determine excavation types and methods - methods of minimising excavation collapse including benching, trench boxes, other shoring, and support methods etc. - causes of excavation collapse - method statements, job specifications, risk assessments, placement or disposal of spoil - segregation of excavated materials - typical excavation tolerances - reasons for excavation dimensions and effects of not conforming to given tolerances - methods of efficient excavation techniques for different types of ground and support requirements - carrying out a range of excavating activities following given dimensions and tolerances - working near to edges and deep excavations - required control methods for open excavations - methods of establishing excavation dimensions and tolerances - establishing and maintaining visual contact with dedicated supporting workers

Place materials into transporting vehicles and hoppers

Explain and demonstrate the types of transporting vehicle typically loaded by 180° excavators - visibility requirements for loading purposes including raised platforms - transporting vehicle positioning for loading and how this varies with type - communication methods – signals etc. - positioning of excavator for loading - maintaining safety and stability of transporting vehicle during loading - sequence of loading a vehicle how incorrect loading can cause stability issues for transporting vehicle - effects of overloading a

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	<p>transporting vehicle - vision issues of overloading front-facing skip/body types - safe positioning of loading vehicle driver prior to loading - efficient methods of loading vehicles to capacity - carrying out loading activities to capacity of various transporting vehicle types</p>
Reinstate excavation – grade, spread and level ground and materials	<p>Explain and demonstrate the importance of ground compaction and settlement methods of grading and spreading various types of soil - use of grading buckets and front shovel - method statements, risk assessments for grading and levelling purposes - types of attachments for grading and levelling activities - methods of establishing grading and levelling dimensions and tolerances - carrying out grading and levelling activities following given dimensions and tolerances</p>
Explain environmental considerations of machine use	<p>Explain health and social reasons to reduce machine emissions - government industry zero emission initiatives - what 'tailpipe' emissions are caused by IC (diesel) engines - air quality and the component gases of air - how engine emissions, including particulate matter, affect air quality and the effects on human and environmental wellbeing - measures to reduce emissions during operations including alternative/low emission fuels, fuel treatments and particulate filtration systems etc. - efficient use of the machine and when and how minimising engine use can aid air quality and fuel savings - eco-friendly oils, fluids, and lubricants - fuel-saving techniques for specific item of plant - appropriate disposal of waste - spillage procedures</p>
Explain loading/unloading procedures for machine transportation	<p>Explain procedures for preparing the machine for loading onto a transporter - traction and surface preparation requirements - understanding of agreed methods of communication between the plant operator and others - working at height requirements when driving onto or off a transporter bed</p>
Carry out all end of work and shut down procedures	<p>Explain and demonstrate types of safe locations, areas, and ground/terrain types where a 180° excavator may be parked and should not be parked - reasons for ensuring safe parking and unintentional movement and ground support requirements - carrying out parking, shut down and isolation requirements according to manufacturer's instructions - reasons for machine isolation including security and non-authorised use by others - use of anti-vandalism equipment</p>

**The learning outcomes listed should not be considered in isolation and may be added to in order to accurately reflect the learner's duties and working environment*