

Machine Control Guidance (MCG) Technician

Preliminary Task Profile

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This profile details the tasks that an MCG Technician would typically perform in their day-to-day work. This list is based on industry consultations. We welcome feedback and input from all stakeholders, particularly for any core MCG Technician competencies or functions we may have missed. This is an initial draft of our findings from the Workforce Functional Analysis (WFA) of the MCG technician role, outcomes from this phase of the project will inform the training product development phase.

Tasks

MCG Technicians' day-to-day tasks overlap with four Vocational Education and Training (VET) skill areas, including: basic surveying and positioning, data linkage and networks, aspects of electrotechnology, and inertial measurement and related navigational systems.¹

Surveying and positioning

- Collect spatial data using Global Navigation Satellite System (GNSS) receivers on site
- Set up and conduct GNSS surveys, including base station configuration and corrections
- Operate general surveying equipment, including total stations, levels and GPS
- Collect basic surveying data and perform simple surveying and spatial computations
- Establish and check horizontal and vertical control locations like large mine sites (e.g., using Geocentric Datum of Australia (GDA2020) and the Australian Height Datum (AHD))
- Translate survey outputs into the correct blade or bucket orientation on the machine
- Diagnosing instruments and warning systems (relevant to guidance display diagnostics)
- Conduct geodetic surveys as an alternative or complement to simple surveying and spatial computations
- Install, calibrate and interpret sensor data (e.g., across GNSS, LiDAR, and radar) for terrain scanning and proximity detection
- Operate laser scanning/receiver systems (rotary laser planes, PZS-style height/slope sensors) used alongside GNSS for blade/screed control.

¹ For the development of a training product, which provides for delivering all the competencies for each task, a technical committee will decide the final number, mix, inclusion, or adaptation work for all new units; alongside any carry-over of content from existing Original Equipment Manufacturer (OEM) or third-party training. At present, such training is typically provided in only some of the above skills areas, over a period of 1-2 weeks in-person and online, with recruitment taking place continuously to sustain a workforce of around 1,500-2,000 MCG Technicians.

Data linkage and networking

- Install, connect and test Internet of Things (IoT) devices and networks (e.g., telematics, sensors)
- Design and validate more complex sensor and telemetry systems where integration is not plug-and-play
- Install and test radio frequency ID systems to tag and track mobile plant and related equipment
- Transmit files and GNSS corrections between base stations, receivers and mobile plant units
- Wiring harness and loom repair (relevant to sensor/telemetry cabling)
- Installing vehicle lighting and wiring systems (relevant to sensor/device installation)
- Installing ancillary electronic systems and components (relevant to telematics/MCG add-on kits)
- Diagnosing electronic body management systems (relevant to networked control diagnostics)
- Integrate multi-sensor fusion systems (LiDAR, radar, camera) feeding a single perception/guidance platform.

Electrical and electronics

- Conduct quality and functional tests on assembled electronic apparatus
- Commission electronics and communications systems
- Diagnose and solve faults in electronic communications systems and digital sub-systems
- Follow scheduled and preventative maintenance program processes
- Develop, enter and verify discrete control programs for Programmable Logic Controllers (PLCs)
- Calibrate, adjust and test measuring instruments
- Work within any licensing requirements (e.g. below 50V AC or 120V DC)
- Foundational automotive electrical circuits and wiring knowledge
- Use and maintenance of electrical test equipment
- Basic electrical circuit testing and fault repair
- Soldering electrical wiring and circuits
- Diagnosing automotive electrical systems generally
- General diagnostic test strategy development.

Inertial systems (emerging, not yet a formal unit)

- Install, check and interpret Inertial Measurement Units (IMUs), gyroscopes and accelerometers
- Perform drift and bias calibration on inertial navigation systems
- Compute and verify pitch, roll and heading for machine guidance
- Understand axes and degrees of freedom relevant to inertial measurement and navigation systems.

Cross-cutting

- Can involve operating in an OEM- or machine-agnostic way across different manufacturers' MCG units
- Work within the boundaries of the MCG Technician role relative to Mobile Plant Mechanics, Automotive Electricians and related licensed electrical trades (if any)
- Operate within remote-controlled, semi-autonomous, and fully autonomous MCG systems
- Maintain working familiarity with dominant OEM platforms (e.g., Minestar and Trimble) while operating in an OEM-agnostic manner
- Identify and use available Recognition of Prior Learning (RPL) pathways and elective options within AUR30320 and AUR31220.

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