REGISTRATION AUTHORITY
FOR CHARTERED PROFESSIONAL ENGINEERS

Asset Management Engineering

Definition

Asset Management involves evaluating multiple complex factors to predict, assess and manage asset condition, performance, maintenance, and renewals, with a view to balancing cost, performance and risk. It encompasses cross-disciplinary expertise and deals with complex engineering issues.

Asset Management Engineering differs from general Asset Management, as it requires a deeper technical understanding of complexity and risk, engineering materials, structural performance, and systems behaviour over time. It also relies on interdisciplinary collaboration and long-term financial planning, particularly within climate adaptation and sustainability frameworks, to support robust lifecycle decisions.

The field is guided by internationally and locally recognised standards and practice guidance such as the Āpōpō Guide, the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines, the Global Forum on Maintenance and Asset Management's (GFMAM) Asset Management Landscape V3, the ISO 55000 suite, the International Infrastructure Management Manual (IIMM), and the International Infrastructure Financial Management Manual (IIFMM), which are widely adopted as best-practice references.

Key performance indicators

Engineering Knowledge

CPEng Competence Elements

- *Comprehend, and apply their knowledge of accepted principles underpinning:*
  - *widely applied good practice for professional engineering; and*
  - *good practice for professional engineering that's specific to New Zealand.*
- *Maintain the currency of their professional engineering knowledge and skills.*

PERFORMANCE INDICATORS FOR ENGINEERING KNOWLEDGE IN ASSET MANAGEMENT ENGINEERING

- Applies engineering principles and accepted technical standards in asset management decisions, ensuring adherence to engineering best practices while aligning with industry and ensuring compliance with ever-evolving regulatory requirements.
- Considers technical, behavioural and work values within an asset management context.
- Applies deterioration modelling and scenario analysis techniques to support long-term asset strategies.
- Where relevant, considers and integrates te ao Māori principles and other cultural factors into engineering decision-making processes, applying culturally informed technical solutions to asset management.
- Commits and agrees to annual CPD requirements for maintaining CPEng registration: **https://www.registrationauthority.org.nz/cpd-requirements**.
- Actively engages in lifelong learning and professional development relevant to asset management engineering, including changes in standards, tools, and global best practice.
- Maintains awareness of internationally recognised and locally relevant competency frameworks (e.g Āpōpō – Infrastructure Asset Management Professionals. World Partners in Asset Management - WpiAM, Global Forum on Maintenance and Asset Management – GFMAM, Institute of Asset Management – IAM, and ISO 55001) and reflects them in practice.
- Demonstrates underlying fundamental knowledge of the assets under their care, their physical characteristics, technical capabilities and limitations, current performance and condition, and the technical and customer levels of service required from those assets.

Managing Engineering Work

CPEng Competence Elements

- *Exercise sound professional engineering judgement.*
- *Be responsible for making decisions on part or all of one or more complex engineering activities.*
- *Manage part or all of one or more complex engineering activities in accordance with good engineering management practice.*

- *Identify, assess, and manage engineering risk.*

PERFORMANCE INDICATORS FOR MANAGING ENGINEERING WORK IN ASSET MANAGEMENT ENGINEERING

- Applies engineering knowledge to capital investment and maintenance management decision-making activities, including but not limited to: business case development, prioritisation, optioneering, and lifecycle analysis and operations, optimised decision-making, financial analysis and forecasting expenditure based on asset performance and lifecycle costs.
- Integrates asset management system knowledge with engineering processes, including design frameworks, procurement, and resource management, ensuring alignment with organisational service levels and objectives.
- Applies knowledge of the asset management activities usually assessed and/or evaluated that contribute to achieving Asset Management objectives and organisational objectives to meet stakeholder needs and expectations. Describes quantitative and qualitative metrics for monitoring asset health, performance of the Asset Management system, and the effectiveness of Asset Management overall.
- Applies knowledge of typical risk management processes within operational, tactical and strategic asset management activities and is able to describe a basic risk framework including how to identify, quantify and mitigate risks within an asset management context and can include examples of operational, tactical and strategic level risks.
- Aligns asset management activities with organisational strategic goals, ensuring technical solutions meet organisational service levels and infrastructure needs.
- Leads the integration of engineering strategy with governance frameworks, ensuring asset management decisions align with long-term infrastructure sustainability and organisational objectives.
- Coordinates asset management planning to ensure engineering decisions align with risk appetite, financial frameworks, and strategic objectives.
- Collaborates with designers to optimise infrastructure solutions, ensuring engineering designs support long-term asset performance, sustainability, and service level expectations.
- Applies internationally recognised and locally relevant asset management frameworks (e.g. Āpōpō, ISO 55001, GFMAM, WPiAM) within the engineering context, ensuring that global best practices are adapted to organisational needs and the New Zealand context.
- Balances reliability targets with cost, risk, safety and service level objectives, using engineering judgment to optimise decision-making frameworks and asset performance.

Professional Acumen

CPEng Competence Elements

- *Conduct their professional engineering activities to an ethical standard at least equivalent to the Code of Ethical Conduct.*
- *Recognise the reasonably foreseeable social, cultural, and environmental effects of professional engineering activities generally.*
- *Communicate clearly to other engineers and others they are likely to deal with in the course of their professional engineering activities.*

PERFORMANCE INDICATORS FOR PROFESSIONAL ACCUMEN IN ASSET MANAGEMENT ENGINEERING

- Agrees to the CPEng Code of Ethical Conduct and understands and applies in asset management engineering activities.
- Applies knowledge of the types of stakeholder management activities an organisation may use within an asset management context, including but not limited to: identification of stakeholders, communications and engagement planning, how stakeholder feedback is collected and used, differing consultation methods, ongoing management of stakeholders within an asset management context.
- Manages ethical challenges in asset management, balancing short-term financial constraints with long-term asset sustainability through engineering solutions that prioritise longevity and performance.
- Makes engineering decisions that consider intergenerational equity, ensuring asset management strategies promote the long-term wellbeing of communities and future generations through sustainable engineering practices.
- Communicates the engineering implications of underinvestment or deferred maintenance, highlighting the technical risks and long-term consequences to leadership and stakeholders in clear, actionable terms.
- Leads initiatives to enhance organisational asset maturity by mentoring engineers, contributing to strategy development, and fostering a culture of continuous improvement through technical knowledge sharing.
- Integrates sustainability objectives—including carbon reduction, resource efficiency, and environmental impact minimisation—into asset management strategies and decision frameworks.
- Incorporates climate change considerations into engineering planning, evaluating the impacts on infrastructure systems and embedding adaptation strategies into asset management investment decisions.
- Advocates for resilient asset solutions that align with long-term environmental, social, and governance goals.

Developing Technical Solutions

CPEng Competence Elements

- *Define, investigate, and analyse complex engineering problems in accordance with good practice for professional engineering.*
- *Design or develop solutions to complex engineering problems in accordance with good practice for professional engineering.*

PERFORMANCE INDICATORS FOR DEVELOPING TECHNICAL SOLUTIONS IN ASSET MANAGEMENT ENGINEERING

- Applies knowledge of engineering operations management, as part of asset management lifecycle activities. Addresses factors usually contained within an operations strategy or plan including but not limited to: asset design, maintenance, operational, reliability, safety, environmental and legal parameters and how operational risk will be managed.
- Design, develop or review an asset management system for an organisation, including but not limited to the elements of people, processes, policy, strategy, asset management planning, improvement planning and asset management information systems, commensurate with the asset management maturity level required by the organisation.
- Evaluates and integrates digital tools and technologies (e.g., GIS, asset data systems, digital twins) into engineering practise to support evidence-based asset decisions.
- Demonstrates expertise in either specific asset operations or strategic system-wide management, understanding how individual assets or systems interrelate within the broader asset management framework.
- Uses asset data and analytics to inform renewal and maintenance programmes and optimise lifecycle performance.
- Applies evolving digital technologies (e.g., predictive analytics, IoT-enabled monitoring, digital twins) to improve asset insight and decision-making.
- Assesses the value and impact of adopting emerging technologies within the asset lifecycle, evaluating organisational readiness and the technical feasibility of integrating these innovations into existing systems.
- Demonstrates the ability to integrate international standards and locally relevant guidance (e.g. the Āpōpō Guide and ISO 55001) into the development of asset management systems, processes, or tools.
- Applies reliability engineering principles (e.g., failure mode and effects analysis, reliability-centred maintenance) to optimise asset performance. Uses historical failure data, condition assessments, and predictive tools to evaluate and improve asset reliability over time.
- Integrates reliability modelling into lifecycle analysis, maintenance strategies, and renewal planning.
- Demonstrates systems-level thinking in the development of asset strategies, focusing on whole-of-life performance and ensuring that engineering solutions account for the interdependencies between systems and assets.
- Integrates network-wide considerations (e.g., asset interdependencies, future demand, condition trends) into technical decision-making to ensure asset management strategies are aligned with organisational goals and long-term infrastructure needs.

Areas an Asset Management Engineer might work in

Asset Management Engineers operate across a diverse range of engineering domains and industries, where their expertise ensures infrastructure and assets are maintained efficiently and sustainably. The key domains include:

1. **Infrastructure & Transportation**

- Roading, bridges, and tunnels
- Rail networks and public transport systems
- Airports and aviation infrastructure
- Ports and maritime facilities

2. **Water & Environmental Management**

- Three Waters (drinking water, wastewater, and stormwater)
- Dams and reservoirs
- Irrigation and flood protection systems
- Environmental sustainability projects
- Waste management and processing infrastructure e.g. sanitary landfills, material recycling facilities (MRFs)

3. **Energy & Utilities**

- Power generation (thermal, hydro, wind, solar)
- Transmission and distribution networks

- Substations and power plant management
- Gas and fuel infrastructure
- Telecommunications infrastructure

4. Buildings & Facilities Management

- Commercial and residential property portfolios
- Hospitals and healthcare facilities
- Educational institutions (schools and universities)
- Government and civic buildings

5. Manufacturing & Industrial Assets

- Production plants and processing facilities
- Heavy machinery maintenance and lifecycle management
- Logistics and warehousing assets

6. Local and Central Government

- Policy development and regulation of asset management including managing compliance within this framework
- Strategic planning for national infrastructure projects
- Public asset maintenance programs
- Defence forces
- Department of Conservation

7. Technology & Digital Infrastructure

- Asset information systems and digital twin technologies
- Smart cities and IoT-based infrastructure monitoring
- Data analytics for predictive asset maintenance
- Consultancy Services supporting all of the above sectors