THROUGH LIFE ENGINEERING SERVICES SPECIALIST (DEGREE)

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Reference Number: ST0740

Details of standard

Occupation summary

This occupation is found in the engineering sector, working in industries where there is a strong dependency on long life, high reliability assets, with high support costs such as aerospace, defence, space, machine tools, transportation and built environment (buildings and infrastructure) etc. Assets may include helicopters, aircraft, engines, trains, ships, buildings etc. This occupation is found within asset manufacturers, asset support providers and asset user organisations.

The broad purpose of the occupation is to develop and deliver the support services that keep engineered assets working better, for longer at lower net cost of ownership. These services include asset design optimisation and upgrade, maintenance planning and provisioning, operational health monitoring, installed maintenance (reactive and preventative), fault finding and isolation, installation and removal, inspection, overhaul and repair, safety testing and ongoing safety compliance assurance, transportation, spares provisioning, support resource logistics and decommissioning TES-Specialists will undertake activity that spans the full scope of TES as defined in BSI publication PAS-280. This includes:

1) innovation of business strategy, proposals and commercial arrangements for viable TES offerings

2) creation and implementation of engineering services spanning avoidance of asset wear and tear, containment of operational impacts from asset deterioration, recovery of asset performance, health and useful life (maintenance and repair) and operational optimisation based upon asset performance monitoring

3) implementation and operation of the engineering support services created in 2) and

4) eventual retirement of those services.

In their daily work, an employee in this occupation interacts with asset designers, manufacturers, owners (e.g. leasing companies), regulators, users and maintainers to deliver effective and commercially viable support services, ensuring safe, available, reliable and affordable long term asset operation. They may be office based, providing remote technical support, factory based providing operational maintenance services or customer based providing technical or physical services at the assets location.
An employee in this occupation will be responsible for leading, coaching or supporting teams in the development, implementation and operation of complex engineering services. Developing and selling business cases for diverse stakeholders within supplier, integrator and customer organisations. Negotiating and managing budgets and resources. Technically leading programmes of work. Managing regulatory compliance including safety accountability.

**Typical job titles**

Typical job titles include support service designer, support service engineer, service engineer, service manager, service specialist, service analyst, service value manager, asset value manager, life cycle engineer, maintenance specialist.

**Entry requirements**

Typically a Degree in a science, engineering, business or management discipline (2:1 or higher), or a minimum of two years relevant practical experience in a TES related area and/or industrial or other professional body qualifications.

**Occupation duties**

<table>
<thead>
<tr>
<th>Duty</th>
<th>Criteria for measuring performance</th>
<th>KSBs</th>
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<tbody>
<tr>
<td>Duty 1 Select optimal Through Life Engineering Service (TES) solutions to maximise asset capability, reliability, availability and sustainability at minimum capital and operational cost</td>
<td>Business Case Value (gross value versus costs)</td>
<td>K1 K2 K3 K4 K6 K9 K11 K12 K13 S1 S2 S3 S4 S5 S6 B1 B2 B3 B4 B5</td>
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<tr>
<td>Duty 2 Select optimal business models, revenue models and contractual models for effective delivery and risk management of sustainable, profitable services</td>
<td>Realizable economic value created; commercial viability for all stakeholders</td>
<td>K1 K2 K3 K8 K9 K10 K11 K12 K17 K18 S1 S2 S3 S4 S10 S12 B1 B2 B3 B4</td>
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<td>Duty 3 Establish TES contracts for service delivery including risk and reward sharing (setting objectives, constraints, key performance measures and penalty clauses to ensure effective collaborative working across the whole delivery eco-system)</td>
<td>Delivery performance: negotiation skills, equitable net value distribution</td>
<td>K1 K2 K3 K4 K8 K9 K10 K13 S3 S6 S12 B2 B3 B4 B5 B6</td>
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<tr>
<td>Duty 4 Design TES supply chains for service delivery (integrating component, system, owner, operator and consumer interactions for optimum value in use outcome per unit of support cost)</td>
<td>Delivery performance: viability and sustainability</td>
<td>K1 K2 K3 K4 K6 K7 K8 K9 K10 K13 S3 S7 S8 S9 S10 S12</td>
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<tr>
<td>Duty 5</td>
<td>Prepare organisations for TES delivery (or receipt) including organisational design (scenario planning, capacity testing, risk mitigation etc)</td>
<td>Delivery performance: robustness of preparation, residual risk levels</td>
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<tr>
<th>Duty 6</th>
<th>Deliver TES education and training (preparing suppliers and customers throughout the supply chain for collaborative, outcome based contracting rather than transactional contracting)</th>
<th>Delivery performance: credibility &amp; impact with target audience</th>
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<tr>
<th>Duty 7</th>
<th>Implement technology and methods to enable the capture and analysis of data to provide exploitable TES insight</th>
<th>Improvement opportunity identification rate</th>
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<tr>
<th>Duty 8</th>
<th>Plan TES asset and service delivery (demand forecasting, capacity planning and project management)</th>
<th>Delivery performance: robustness of plan and delivery performance</th>
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<tr>
<th>Duty 9</th>
<th>Design the integrated TES asset and service (create verified and validated service and product integrated designs)</th>
<th>Delivery performance: design robustness and residual risk prediction</th>
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<tr>
<th>Duty 10</th>
<th>Prepare and implement product and service delivery systems</th>
<th>Delivery performance: maturity / readiness levels prior to service delivery</th>
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<td></td>
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<td>K1 K2 K7 K8 K9 K14</td>
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Duty 11 Manage product and service operational delivery

Delivery performance: Key Performance indicators (including financial performance of service offering)

K1 K2 K5 K6 K7
K8 K9 K11 K12
K14 K15 K16
K17

S3 S6 S8
B2 B3 B4 B5 B6

Duty 12 Undertake product and service decommissioning

Delivery performance: end of life financial performance of the service, risk management, customer satisfaction measures

K1 K2 K6 K19
S1 S2 S3 S5 S6
S8 S9 S10 S11 S12
B1 B2 B3 B4 B5 B6

Duty 13 Undertake asset design and upgrade (for optimal operational life and supportability)

Delivery performance: product uptime versus down time, product cost of ownership

K1 K2 K3 K5 K6
K7 K8 K9 K10
K11 K12 K13
K14 K15 K16
K17 K18 K19

S1 S2 S3 S4 S5
S6 S7 S8 S9 S10 S11 S12
B1 B2 B3 B4 B5 B6

Duty 14 Undertake asset operational support (technical issue investigation, management and logistics support to maximise asset operational availability)

Delivery performance: service value delivery / cost of delivery

K1 K2 K3 K5 K6
K7 K8 K9 K10
K11 K12 K13
K14 K15 K16
K17 K18 K19

S1 S2 S3 S4 S5
S6 S7 S8 S9 S10 S11 S12
B1 B2 B3 B4 B5 B6

Duty 15 Undertake asset monitoring and surveillance (health prediction, monitoring and management for minimum operational disruption risk)

Delivery performance: disruptive events prevented versus disruptive events incurred

K1 K2 K3 K5 K6
K7 K8 K9 K10
K11 K12 K13
K14 K15 K16
K17 K18 K19

S1 S2 S3 S4 S5
S6 S7 S8 S9 S10 S11 S12
**Duty 16** Undertake asset maintenance planning and execution (implement policies and capabilities to maximise asset health recovery / cost)

**Duty 17** Innovate and implement processes, tools and methodologies to enable effective TES delivery

**KSBs**

**Knowledge**

**K1:** Through life Engineering Service (TES) framework: the capabilities and activities that comprise a full TES delivery system as described in British Standards Institute PAS 280.

**K2:** TES value and risks: from the viewpoint of all parties in the supply chain, including increased value in use, decreased cost of use and risk transfer.

**K3:** Service models and business constructs: the wide variety of service models from basic spares services through to advanced pay for outcome services, including when and where they are applicable.

**K4:** Servitisation as a journey: the process steps, methods, risks and success factors involved in the journey from a product focus to a service focus.

**K5:** The fundamentals of deterioration and obsolescence: the physical initiators, drivers and consequences of deterioration. Deterioration prediction and detection methods. Deterioration recovery (repair) methods. The significance of product deterioration as the driver for the core through life services. The significance of managing product deterioration as a driver for sustainability and reduced carbon footprint throughout the life of an asset.

**K6:** Service value streams: their component service elements (avoid, contain, recover, convert) and how to configure them to meet differing needs depending upon the sector, product and business context.

**K7:** Product and Service life cycle: the life cycle of a product and service combination and the activities involved in the processes of planning, developing, preparing, utilising and retiring them.
K8: Supply chain design: the dynamics, interactions, mind-sets, motivations and incentivisation methods of complex networks of organisation's involved in overall service delivery and consumption.

K9: Constraints: legal, commercial and other constraints that impact service design and delivery, including export control, intellectual property, health & safety and environmental.

K10: Contracting methods: alternative contracting arrangements [e.g. customer/supplier, risk and revenue sharing] and how they may be reformulated for different service and engineering product contexts.

K11: Value analysis: the alternative methods for value analysis, including value opportunity identification, value ranking, value realisation potential and competitive advantage analysis.

K12: Accounting and business cases: service accounting methods (e.g. International Financial Reporting Standard IFRS15) and their impact on service business valuation and financing options.

K13: Requirements management: service requirements of outcome, quality, quantity, timeliness, responsiveness, cost, data flows and how they can be translated into product requirements.

K14: Logistics management: techniques in product support services, including forecasting, provisioning, warehousing, transportation etc.

K15: Data capture: methods for acquisition of equipment utilisation & health data including Equipment Health Monitoring (EHM), inspection, maintenance and Internet of Things (IoT) technologies.

K16: Capability - Data Management: data management techniques for product service data flows ('as designed', 'as made', 'as configured', 'as operated', 'as maintained'), including the impact of big data (cloud) computing capability; cyber security considerations; data storage options.

K17: Data Analysis: service data mining, visualisation and analytics capabilities, e.g. reliability, sentiment, cost, correlation, causal factor, anomaly detection, statistical characterisation, trend analysis etc.

K18: Modelling and simulation: service modelling and simulation methods e.g. variability & sensitivity analysis, scenario modelling, simulation and artificial intelligence etc.

K19: Capability - Decision support: optimisation techniques and their applicability to supporting the human decision making process at the key decision points in the engineered product/service life cycle. For example intervention timing, logistics optimisation, life-cycle cost optimisation.

Skills

S1 Critical evaluation of Service solutions: research options and select optimal solutions within complex business contexts.

S2 Systems thinking: understand and integrate service system elements to achieve an optimised overall solution.

S3 Opportunity recognition: identify and prioritise opportunities to increase value or reduce risks and costs in the context of current or future products and services.

S4 Business model design: design business models and commercial constructs that enable effective, profitable and sustainable service delivery networks within complex business contexts.
S5 Recommendation and Decision making: optimise recommendations & decisions at significant points in the product/service lifecycle.

S6 Technical and commercial communication: use appropriate methods and means to facilitate communications between and within engineering and commercial stakeholder groups, ensuring effective integration of activity across the technical / commercial interfaces.

S7 Service Design: design an engineered product/service offering from requirements capture through to verification/validation.

S8 Service Delivery: manage and optimise delivery of the service to a defined process and monitor the service delivery metrics to identify both risks and opportunities.

S9 Service Data management: use specialist skills to define data requirements, acquire data and manage data flows within and between organisations within a complex service ecosystem.

S10 Service analysis and prediction: derive insight from available data, apply appropriate methodologies and approaches within the engineering and commercial domains to understand, model and predict causes and effects.

S11 Technical Issue management & engineering problem solving: use specialist knowledge, methodologies and approaches in the process of issue investigation, failure mode & root cause analysis, issue mitigation and solution implementation.

S12 Service change Management: plan and execute a programme of change within a complex service delivery system.

**Behaviour**

B1: Entrepreneurial mind-set: for example, a big picture and strategic thinker, willing to critically analyse the current state, identify opportunities and propose beneficial change.

B2: Value focused: clearly seeking value for the total service system, yet responsive of the needs for all parties to achieve a local value return.

B3: Pragmatic: a practical thinker, aware of and responsive to facts and evidence but willing to take managed risk where appropriate.

B4: Ethical: always operates in an ethical manner, respecting the rights and opinions of others and always seeking the zero harm outcome and approach. Personal commitment to professional standards recognizing obligations to society, the profession and the environment.

B5: Leader, champion & influencer: an enthusiast for services in the right context; willing to educate and support others on their journey to service value delivery.

B6: Integrator: encourages integrated activity to develop and deliver services.

**Qualifications**

**English and Maths qualifications**

Apprentices without level 2 English and maths will need to achieve this level prior to taking the End-Point Assessment. For those with an education, health and care plan or a legacy statement, the apprenticeship's English and maths minimum requirement is Entry Level 3. A British Sign Language (BSL) qualification is an alternative to the English qualification for those whose primary language is BSL.
Other qualifications

Mandatory qualification 1: Through-Life Engineering Services Masters

Level of qualification: 7 (integrated degree)

Basis for mandatory qualification: Professional body requirement

Type of qualification

Type 1 qualification that accredits occupational competence

University 1

The name of all the Universities delivering the integrated degree

Cranfield

Regulatory or professional body

Professional recognition

The Institution of Mechanical Engineers / CEng

The Institution of Engineering and Technology / CEng

Additional details

Occupational Level: 7

Duration (months): 24

Review

This standard will be reviewed after three years.