MATERIALS PROCESS ENGINEER (DEGREE)

Details of standard

This standard has options. Display duties and KSBs for:

All

Occupation summary

This occupation is found in a wide variety of Thermal Process related fields including Casting, Forging, Machining, Coating, Heat treatment and Surface Finishing processes. These specialist areas are also found in a wide range of industries where materials and their processes are fundamental to the technology . Industries as diverse as Medical, Defence, Energy, Oil and Gas, Aerospace and Nuclear all incorporate the skills of Materials Process Engineers.

The broad purpose of the occupation is to perform a role which is unique to the materials/manufacturing community, controlling and managing the complex manufacturing processes and support services that are applied to products for the automotive, aerospace, medical, energy and construction sectors. They do this by collecting and organising all the information needed to understand the whole problem, exploring it from all angles, and then finding the most appropriate solution for integration into a sustainable product life cycle. A Materials Process Engineer might typically work in either the problem definition or solution provider environments, making critical decisions in the process and utilities to produce high-quality, cost-effective parts and systems, then testing and accepting the designed solutions. They provide essential support to their associated businesses providing guidance and leadership in improving company metrics of quality, delivery, new product introduction and support key financial and business decisions.

In their daily work, an employee in this occupation interacts with all departments within the companies they work for and at a range of levels within the departments depending on the project in which they are engaged. Their main focus will be with the Engineering team and they will also have strong links in support of the Operations team. However to fulfil many of the projects, links to finance, supply chain and customer support will be a day to day occurrence and as the activities broaden there will be strong communication to the wider external customer base both in a sales support activity and during technical project discussions.

An employee in this occupation will be responsible for implementing new products and processes and for many cost reduction and process improvement initiatives. They have direct responsibility for defining the methods of manufacture of complex engineering systems and the asset base and services which are used to produce high value manufactured products. In many cases weekly and monthly reports will be required at both team level and to senior members of the company.

Typical job titles include:

Process engineer, Technologist, Fellow, Product engineer, Manufacturing engineer, Materials engineer, Coastings engineer, Surface treatement engineer, Casting engineer, Subject matter expert, Senior(domain specialist), Engineer e.g. Welding engineer

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Core Occupation duties

Duty	Criteria for measuring performance	KSBs
Duty 1 Lead multiple new product introduction or process improvement engineering projects working closely with the operations and engineering teams to prioritise projects in line with ever changing business / customer priorities	1 Adherence to employer polices and procedures 2 Work delivered to agreed timescales and cost 3 Compliance to Customer specifications	K1 K2 K3 K4 K5 K6 K27 S1 S2 S3 S4 S5 B1 B2 B3 B4 B5 B6
Duty 2 Takes responsibility for the creation of process rules that ensure product definition will be capable of being manufactured, assembled and repaired in line with project timescales	3 Compliance to Customer specifications 4 Productivity standards meet Customer requirements 5 Cost and quality standards meet Business requirements	K7 K8 K9 S1 S2 S3 S4 S6 S7 S8 B1 B6
Duty 3 Liaises directly with customers to fully establish working project requirements, status and action plans	1 Adherence to employer polices and procedures 2 Work delivered to agreed timescales and cost 3 Compliance to Customer specifications	K2 K4 K5 K10 K11 K12 S1 S2 S4 S9 B1 B3
Duty 4 Leads process improvement activities associated with new and existing manufacturing processes utilising latest techniques and practices by the collection and analysis of data using standard SPC analytical techniques	3 Compliance to Customer specifications 4 Productivity standards meet Customer requirements 5 Cost and quality standards meet Business requirements	K7 K8 K10 K13 K14 K15 K16 S1 S2 S3 S4 S10 S11 S12 B1 B5 B6
Duty 5 Performs, implements and reviews process risk and mitigation activities utilising tools such as PFMEA and value stream mapping to manage product quality and cost	5 Cost and quality standards meet Business requirements	K5 K9 K14 K17 K18 S1 S2 S3 S4 S13 S14 B2 B4 B6
Duty 6 Understand manufacturing engineering production methods, control strategies and quality issues related to the manufacture of products	3 Compliance to Customer specifications 4 Productivity standards meet Customer requirements 5 Cost and quality	K13 K17 K19 S1 S7 S12 S14 S16 B1 B6

	standards meet Business requirements	
Duty 7 Identify, implement and share best practices across multiple cells and sites by development of global methods and systems to support design, cost and quality targets	4 Productivity standards meet Customer requirements 5 Cost and quality standards meet Business requirements 6 Positive relationship with peers	K1 K3 K8 K9 K16 K20 S1 S2 S3 S4 S5 B1 B2 B3 B4
Duty 8 Provide expert materials advice to inform and guide commercial [team] decision making	2 Work delivered to agreed timescales and cost	K2 K3 K10 K12 K18 S1 S2 S3 S4 S14 B1 B4 B6
Duty 9 Evaluate the latest technological advances and provide a critical analysis of their short and long term implications for the business	1 Adherence to employer polices and procedures 7 Excellent interpersonal skills	K6 K8 K10 K12 K15 K18 S1 S2 S4 S8 S9 S14 B1 B3 B5 B6
Duty 10 Accurately review customer drawings and specifications and ensure compliance when creating work instructions and other internal documentation	3 Compliance to Customer specifications	K5 K7 K8 K9 K12 S1 S2 S4 S7 S8 S9 B1 B2 B5 B6
Duty 11 Work with all stakeholders to ensure compliance with quality, environmental and Health and Safety policies	1 Adherence to employer polices and procedures	K5 K8 K10 K11 K15 S1 S2 S4 S12 B1 B3 B6
Duty 12 Create the detailed process instructions including inspection requirements, design and procure tooling and fixtures in aid of production activities or to improve productivity	1 Adherence to employer polices and procedures 3 Compliance to Customer specifications 4 Productivity standards meet Customer requirements 5 Cost and quality standards meet Business requirements	K5 K8 K15 K18 K19 K21 S7 S8 S12 B1 B5 B6
Duty 13 Deliver stable and capable processes to	1. Adherence to employer	K5 K8 K9 K13 K14

an agreed customer specification and that there are actions in place to support equipment improvement and associated maintenance schedules to ensure capable process continuation	polices and procedures 3 Compliance to Customer specifications 4 Productivity standards meet Customer requirements 5 Cost and quality standards meet Business requirements	K15 K16 K17 K22 S1 S6 S7 S8 S9 S10 S11 B1 B3 B5 B6
Duty 14 Produce technical reports as required during interim phases and at completion of project work	7. Excellent interpersonal skills 8. Successful review of technical reports	K23 K24 S2 B2 B4
Duty 15 Market and represent the company at customer technical meetings and at local/international conferences and events	7 Excellent interpersonal skills 9. Presentation Skills	K8 K9 K11 K12 K23 S2 S4 B1 B3 B5
Duty 16 Lead, mentor and manage teams highlighting the importance of networking, communication and taking personnel responsibility in delivering products to a customer	7 Excellent interpersonal skills	K1 K3 K19 K20 K21 K25 S1 S2 S4 S5 B2 B3 B4

Option Duties

Casting duties

Duty	KSBs
Duty 17 Ensure the safe and reliable operation, control of the process and close out of quality, process and business improvements in a castings environment	K26 S16 B1 B2 B3 B4 B5 B6
Duty 18 Lead the end to end process for casting operations, for example digital systems, emerging process technologies, alignment of services and specifications and methods and techniques for maintenance. Interface with operations assets and laboratory functions and understand links between business critical departments	K26 S16 B1 B2 B3 B4 B5 B6

Duty 19 Ensure casting is integrated in the end to end process for the product lifecycle for example product verification, design proving, material applications and methods related to conformance to customer specification	K26 S17 B5 B6

Coatings duties

Duty	KSBs
Duty 20 Ensure methods and techniques for safe and reliable operation, control and close out of quality, process and business improvements in a coatings environment	K28 S16 B1 B2 B3 B4 B5 B6
Duty 21 Lead the end to end process for coating operations, for example digital systems, emerging process technologies, alignment of services and specifications and methods and techniques for maintenance. Interface with operations assets and laboratory functions and understand links between business critical departments	K28 S16 B1 B2 B3 B4 B5 B6
Duty 22 Ensure Coatings are integrated in the end to end process for the product lifecycle for example product verification, design proving, material applications and methods related to conformance to customer specification	S17 B5 B6

Welding duties

Duty	KSBs
Duty 23 Ensure the safe and reliable operation, control and close out of quality, process and business improvements in a welding environment	K29 S16 B1 B2 B3 B4 B5 B6
Duty 24 Lead the end to end process for welding operations, for example digital systems, emerging process technologies, alignment of services and specifications and methods and techniques for maintenance. Interface with operations assets and laboratory functions and understand links between business critical departments	K29 S16 B1 B2 B3 B4 B5 B6
Duty 25 Ensure Welding is integrated in the end to end	S17

process for the product lifecycle for example product verification, design proving, material applications and methods related to conformance to customer specification	B5 B6

Brazing duties

Duty	KSBs
Duty 26 Ensure the requirements, methods and techniques for safe and reliable operation, control and close out of quality, process and business improvements in a brazing environment	K30 S16 B1 B2 B3 B4 B5 B6
Duty 27 Lead the end to end process for brazing operations, for example digital systems, emerging process technologies, alignment of services and specifications and methods and techniques for maintenance. Interface with operations assets and laboratory functions and understand links between business critical departments	K30 S16 B1 B2 B3 B4 B5 B6
Duty 28 Ensure Brazing is integrated in the end to end process for the product lifecycle for example product verification, design proving, material applications and methods related to conformance to customer specification	S17 B5 B6

Heat Treatment duties

Duty	KSBs
Duty 29 Ensure the requirements, methods and techniques for safe and reliable operation, control and close out of quality, process and business improvements in a heat treatment environment	K31 S16 B1 B2 B3 B4 B5 B6
Duty 30 Lead the end to end process for heat treatment operations, for example digital systems, emerging process technologies, alignment of services and specifications and methods and techniques for maintenance. Interface with operations assets and laboratory functions and understand links between business critical departments	K31 S16 B1 B2 B3 B4 B5 B6
Duty 31 Ensure Heat Treatment is integrated in the end to end process for the product lifecycle for example product	S17

verification, design proving, material applications and methods related to conformance to customer specification	B5 B6

Surface Treatment duties

Duty	KSBs
Duty 32 Ensure the requirements, methods and techniques for safe and reliable operation, control and close out of quality, process and business improvements in a surface treatment environment	K32 S16 B1 B2 B3 B4 B5 B6
Duty 33 Lead the end to end process for surface treatment operations, for example digital systems, emerging process technologies, alignment of services and specifications and methods and techniques for maintenance. Interface with operations assets and laboratory functions and understand links between business critical departments	K32 S16 B1 B2 B3 B4 B5 B6
Duty 34 Ensure Surface Treatment is integrated in the end to end process for the product lifecycle for example product verification, design proving, material applications and methods related to conformance to customer specification	S17 B5 B6

KSBs

Knowledge

K1: Theories of team working

K2: Principles of programme management

K3: Understanding the importance of conflict management

K4: Risk management theories and practice

K5: Principles of Quality Management Systems and implementation in factory environments

K6: New product introduction and technology management - theory

K7: Importance of design for manufacture and assembly

K8: Principles and practices of engineering standards

K9: Principles of process risk management including Process Failure Modes and Effects Analysis (PFMEA)

K10: Principles of Stakeholder management

K11: Importance of working within a regulatory framework

K12: Importance of Intellectual Property, Patents and Export Control

K13: The function of Quality Techniques Systems and Standards

K14: The principles of statistical process control and application techniques (e.g PFMEA)

K15: Change management principles

K16: Principles and practices of knowledge based systems

K17: Principles of Lean Manufacturing

K18: Cost based engineering (including estimating, cost control, cost forecasting, investment appraisal and risk analysis)

K19: Principles of Operations management

K20: Principles of Leadership in Operations Management

K21: Principles of Supply Chain Management

K22: Principles of Asset Management

K23: The principles of effective presentations (including planning, structuring, how and when to engage with the audience,using visual aids, presenting data)

K24: Art of technical report writing

K25: Principles of mentoring people

K26: Fundamentals of casting process and technology

K27: Fundamentals of the product life cycle

K28: Fundamentals of coating processes and technology

K29: Fundamentals of welding processes and technology

K30: Fundamentals of brazing processes and technology

K31: Fundamentals of heat treatment processes and technology

K32: Fundamentals of surface treatment processes and technology

Skills

S1: Work within a team environment. This may include acting as a team leader with people management skills. They undertake risk analysis and problem solving on behalf of the team.

S2: Communicate and present information appropriately and effectively taking account of target audience

S3: Apply appropriate programme management tools. Typically this would include a RACI chart, Project Plans, Load and Capacity analysis and cost analysis.

S4: Actively listen and explain clearly and appropriately to target audience

S5: Mentor and support others using coaching skills and actively support continuous professional development.

S6: Use Process Failure Mode Effect Analysis tool kit appropriately

S7: Operate and control process equipment using continuous improvement methodologies

S8: Apply process control procedures correctly and effectively

S9: Apply appropriate negotiation techniques effectively

S10: Make appropriate use of statistical tools eg Minitab, excel, DMAIC

S11: Make appropriate use of problem solving tools eg 8D, 5 whys

S12: Apply change control tools and practices

S13: Apply risk management tools and techniques

S14: Demonstrate correct application of Value Stream Mapping tools

S15: Apply production control methods eg planning and project management

S16: Correct use of specialist equipment and process knowledge

S17: Correct use of product life cycle concepts

Behaviours

B1: Working collaboratively - is comfortable in working in teams and being a team leader to agreed goals

B2: Professional Commitment - Commitment to corporate values and behaviours through the demonstrating a personal , ethical and professional commitment to society, their profession and the environment, adopting a set of values and behaviours that will maintain and enhance the reputation of the profession as well as their organisation

B3: Commitment to leadership - Taking personal responsibility for their actions, managing projects including resource management within their remit and able to mentor and instruct others in associated standards and best practice

B4: Commitment to the profession Contributing proactively to the continuing development of engineering within their domain

B5: Curiosity and Innovation Utilising own and others creativity to Improve the industry through embracing new technology and the digital world

B6: System Thinking Seeing whole systems and parts and how they connect recognising interdependencies and integration

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Qualifications

English & Maths

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 mandatory qualifications

Manufacturing Technology and Management MSc

Level: 7 (non-degree qualification)

Professional Recognition

This standard has professional recognition.

Body	Level
Institute of Materials, Minerals and Mining	C.Eng
Institution of Mechanical Engineers	C Eng
Chartered Society of Designers	Chartered Designer
Institute of Metal Finishing	Chartered and Incorporated Engineers
Institute of Cast Metal Engineers	Chartered and Incorporated Engineers
NSIR	CEng

Additional details

Occupational Level:

7

Duration (months):

24

Review

This standard will be reviewed after three years.

Find an apprenticeship

Postcode (optional)

Version log

VERSION	DATE UPDATED	CHANGE	PREVIOUS VERSION
1	17/12/2019	Updated structure	Previous version
1	03/03/2019	Funding band first published	Not available
1	11/02/2019	Assessment plan first published	Not available
1	01/02/2019	Standard first published	Previous version
1	29/01/2018	Initial creation	Not available