Institution of Engineering Designers (IED)

The Chartered Technological Product Designer (CTPD) Standard

The Competence and Commitment Standard for Chartered Technological Product Designers

IED Definition of Product Design – Product design is a structured process which produces a creative three dimensional object solution that encompasses technical and humanistic considerations with a clearly defined user and commercial viability to answer a specific problem.

CTPD
For admittance to the grade of Chartered Technological Product Designer a candidate should be able to demonstrate the following, supported by an evidence base, typically in the form of an Illustrated Report and a portfolio.

Thus a CTPD candidate should be able to demonstrate that they:

A. Use technical knowledge and humanistic design understanding to optimise application of latest advances, including,

   A1 Recognition by the product design profession of at least one product design undertaken by the candidate as being significant

   A2 Critical evaluation of historical and latest trends in design thinking and their appropriate application,

   A3 An ability to challenge and/or create a client brief.

B. Apply a range of creative and scientific design methods to solution of product design problems, including;

   B1 Analytical and creative thought processes,

   B2 Understanding and/or reasonable usage of the functionality and capabilities of a CAD system or visualisation systems,

   B3 Use of simulation or prototyping to explore and prove innovative solutions for complex design problems,

   B4 Solution of design problems during the development of a substantially new product,

   B5 Solution of design problems during the modification/improvement of an existing product,

   B6 A holistic view of the design process encompassing understanding and application of marketing, aesthetics, ergonomics, manufacturing, materials, commercial and technical aspects,

   B7 Development of products encompassing the whole of the design process from initial brief to manufacture of production prototype,

B8 The ability to evaluate complex design solutions against conflicting constraints.

C. Leadership, including demonstrating;

C1 A variety of substantially new product designs for which they have taken responsibility,

C2 Complete project management of a medium to high complexity project including management of budget and personnel,

C3 Leadership of teams and development of personnel to meet changing technical and managerial needs,

C4 Bring about continuous improvement through structured evaluation.

D. Effective Interpersonal Skills, including;

D1 Appropriate personal and social skills,

D2 The presentation and discussion of product design briefs, specifications and concept design proposals,

D3 Appropriate communication with others at all levels.

E. Commitment to professional standards, obligations to society and the environment, including;

E1 Compliance with relevant codes of conduct,

E2 Management and application of safe systems of work,

E3 Consideration of sustainable design practices,

E4 Continuing professional development necessary to maintain and enhance competence in own area of practice,

E5 Exercise responsibilities in an ethical manner.

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Product Design Specific Learning Outcomes for Accredited Degree Programmes

Commentary

Graduates from IED accredited undergraduate and postgraduate degree programmes in Product Design must achieve the following respective learning outcomes incorporating the key skills of knowledge and understanding, intellectual abilities, practical skills, and general transferable skills. The learning outcomes are expressed in terms of design; economic, social and environmental context; underpinning science and mathematics and associated disciplines; design analysis and design practice.

	Learning outcome - Bachelors degree **For courses leading to MIED accreditation**	**Learning outcome – Masters degree** **For courses leading to CTPD accreditation**
1. Design (D)		
D1p	• Ability to evaluate design solutions against relevant constraints and criteria	• Ability to evaluate complex design solutions against conflicting constraints
D2p	• Ability to address human needs through the use of research, anthropometric data and ergonomic principles and provide design solutions according to customer and user requirements. Ability to generate a product design specification (PDS) by defining requirements as separate criteria including other factors such technical aspects and legislative demands.	• Ability to address human needs through the use of research, anthropometric data and ergonomic principles and provide design solutions according to customer and user requirements. Ability to generate or challenge a product design specification (PDS) by defining requirements as separate criteria including other factors such technical aspects and legislative demands.

D3p	• Ability to recognise product design cost drivers for both recurring and non-recurring costs and to appreciate the cost implications of differing production volumes	• Ability to apply cost drivers for both recurring and non-recurring costs and to design for the cost implications of differing production volumes.
D4p	• Ability to generate a wide range of design ideas, concepts and proposals independently and in teams in response to set or self generated design briefs	• Ability to generate and evaluate a wide range of design idea, concepts and proposals.
D5p	• Ability to select, test and exploit materials and manufacturing processes in the synthesis of product design solutions	• Ability to select, test and exploit materials and manufacturing processes in the synthesis of product design solutions
D6p	• Ability to apply creative and logical thinking processes as well as design methodologies to the creation of design solutions	• Ability to apply and reflect upon a wide range of creative and logical thinking processes as well as design methodologies in the creation of design solutions to complex problems
D7p	• Ability to select and use the appropriate manual drawing / construction / CAD, communication and technological media in the realisation of design ideas	• Ability to select and use the appropriate manual drawing / construction / CAD, communication and technological media in the realisation of design ideas
D8p	• Ability to demonstrate visual literacy and drawing ability appropriate to the practice of product design	• Demonstration of complex visual literacy and advanced communication tools appropriate to the practice of product design
D9p	• Ability to develop concepts sufficiently to provide manufacturing instructions and specifications	• Ability to develop and evaluate concepts sufficiently to provide manufacturing instructions and specifications
D10p	• Ability to employ materials, media, techniques, methods, technologies and tools associated with product design through drawing, modelling and computer visualisation using skill and imagination	• Ability to employ materials, media, techniques, methods, technologies and tools associated with product design through drawing, modelling and computer visualisation using skill and imagination
D11p	• Ability to integrate Industrial Design aspects including form, texture and colour	• Ability to synthesise a broad range of design aspects

2. Economic, Social and Environmental Context (S)		
S1p	• Understanding that positive ethical and professional conduct underpins design practice.	• Application of a positive ethical professional conduct underpinning design practice.
S2p	• Knowledge and understanding of risk issues, including health and safety, environmental and commercial risk, and of risk assessment and risk management techniques.	• Knowledge and understanding of risk issues, including health and safety, environmental and commercial risk, risk assessment and risk management techniques and an ability to demonstrate their effective evaluation.
S3p	• Awareness of legal requirements governing design activities, including personnel, health and safety, product liability and safety.	• Awareness and appropriate application of legal requirements governing design activities, including personnel, health and safety, product liability and safety in familiar and unfamiliar situations.
S4p	• Knowledge and understanding of the management of the design process.	• Demonstrate application of design process management
S5p	• An awareness of financial, economic, social legislative and environmental factors of relevance to product design.	• Demonstrate the application of financial, economic, social legislative and environmental factors to product designs.
S6p	• Awareness of the social and environmental impact and the application of sustainable design principles.	• Application of the social and environmental impact analysis and the application of sustainable design principles.
3. Design Practice (P)		
P1p	• Ability to create new processes or products through synthesis of ideas from a wide range of sources using a broad knowledge of material and material selection principles	• Ability to create new processes or products through synthesis of ideas from a wide range of sources using a broad knowledge of material and material selection principles
P2p	• Ability to practise collaborative and independent work to realise a range of practical, creative and theoretical projects	• Critical evaluation of historical and latest trends in design thinking and their appropriate application.

P3p	• Ability to meet deadlines, liaise with industrial collaborators, make presentations, research and collate information, produce reports and evaluate the design and research work of self	• Ability to initiate projects, meet deadlines, liaise with industrial collaborators, make presentations, research and synthesise information, produce reports and evaluate the design and research work of self and others
P4p	• Ability to analyse problems of a creative nature and to provide appropriate solutions	• Ability to analyse complex problems of a creative nature and to provide appropriate solutions
P5p	• Understanding and application of intellectual property rights (IPR) including patent search and principles of copyright and design registration.	• Understanding and application of intellectual property rights (IPR) including patent search and principles of copyright and design registration.
P6p	• Understanding of specific design codes of practice and industry standards, with some knowledge of design factors and requirements for safe operation.	• Application and development of specific design codes of practice and industry standards, with knowledge of design factors and requirements for safe operation.
P7p	• Awareness of management and quality assurance issues in product design.	• Application of management and quality assurance issues in product design.
P8p	• Working effectively as part of a group with respect for the dignity, rights and needs of others.	• Working effectively as part of a group with respect for the dignity, rights and needs of others and to develop an understanding of leadership.*
P9p	• To develop skills associated with professional practice; time management, project management, professional level communication, self promotion, interview techniques, information gathering and use of information and communication technology as appropriate	• To demonstrate skills associated with professional practice; time management, project management, professional level communication, self promotion, interview techniques, information gathering and use of information and communication technology as appropriate
P10p	• Ability to evaluate technical risks and address risk in design methodology	• Ability to evaluate technical risks and address risk in design methodology
P11p	• Ability to write a PDS, design reports and present design ideas in a rational and coherent manner	• Develop and critique a PDS, design reports and present design ideas in a rational and coherent manner

4. Underpinning Science and Mathematics (US)		
US1p	• Ability to consider and apply the appropriate mathematical and engineering principles to a particular product design problem	• Ability to consider and apply the appropriate mathematical and engineering principles to a particular product design problem
5. Design Analysis (E)		
E1p	• Ability to research, select, evaluate, manipulate and manage information relevant to the analysis and synthesis of product design solutions	• Ability to research, select, evaluate, manipulate and manage information relevant to the analysis and synthesis of product design solutions
E2p	• Ability to apply analytical skills in relation to designed objects including the ability to undertake visual analysis and to analyse designed objects in relation to their context	• Ability to apply analytical skills in relation to designed objects including the ability to undertake visual analysis and to analyse designed objects in relation to their context
E3p	• Ability to apply a systematic approach to problem solving using appropriate design tools and techniques	• Ability to apply a systematic approach to problem solving using appropriate design tools and techniques

*This potentially requires a group project as part of the Masters programme.