Unit 5: Development of the UK Aviation Industry Since 1945

Unit code: M/504/2280

QCF Level 3: BTEC Nationals

Credit value: 8

Guided learning hours: 48

Aim and purpose

The aim of this unit is to give learners knowledge and understanding of the major milestones since 1945 in the development of aircraft, airlines, airports and regulation that have shaped the UK aviation industry.

Unit introduction

The unit starts by looking at the development of aircraft from the small propeller-driven DC3, that revolutionised air transport to the long-haul jets of today's skies. Similar strides have been made by airports and airlines. Croydon Airport used to be the envy of the world, but you could lose it many times over in the metropolis that is the UK's largest airport, London Heathrow. In this unit learners will examine all the major advances in aircraft, airlines and airports, and the development of general aviation operations.

It was apparent early in the life of civil aviation that it would need government regulation, both to ensure safety and to nurture a fledgling industry during its early years. The number of safety regulations has grown over the years, but many of the economic regulations put in place to protect the industry have now been removed to create more competition and cheaper fares for the customer. Learners will examine these changes and the impact they have had on the industry.

Learners will also examine other factors that have impacted on the aviation industry. Many of these factors, such as terrorism, are completely beyond the industry's control. Nevertheless, the aviation industry has to contend with the possibility of a terrorist threat on a day-to-day basis whilst striving for normality in its everyday operations.

The main focus of the unit is the UK but, given the international nature of aviation, there are many references to key international developments and organisations.

Learning outcomes

On completion of this unit a learner should:

1 Know the major developments in commercial aircraft since 1945

2 Understand how UK airports have developed since 1945

3 Understand how UK airlines have evolved since 1945

4 Understand how general aviation in the UK has evolved since 1945

5 Understand how the regulatory framework for aviation has developed since 1945.

Unit content

1 Know the major developments in commercial aircraft since 1945

Significant commercial aircraft:

- DC3
- Constellation
- Comet
- Viscount
- Concorde
- Trident
- Boeing family
- Airbus family

Major developments in airframe design and propulsion:

- aircraft engines (piston, turbo prop, turbo jet, turbo fan)
- aircraft speed
- aircraft size
- aircraft range
- major aircraft and engine manufacturers, e.g. De Havilland, Vickers-Armstrong, Boeing, McDonnell Douglas, Airbus, Embraer, Rolls-Royce, Pratt and Whitney, General Electric

Developments current and future:

- development of existing commercial aircraft types
- new commercial aircraft designs

2 Understand how UK airports have developed since 1945

Airport development:

- significant airports, e.g. London Heathrow, London City, Manchester

Factors affecting airport development:

- aircraft development, e.g. size, weight, range
- passenger numbers
- cargo
- retail opportunities
- security
- general aviation operations
- environmental issues
- public concerns

3 Understand how UK airlines have evolved since 1945

Airline types:

- scheduled airlines – British European Airways (BEA) and British Overseas Airways Corporation (BOAC) to the modern British Airways (BA)
- charter airlines (Euravia to Thomson Airways)
- cargo, e.g. Flying Tigers, DHL, FedEx
- low cost, e.g. Ryanair, easyJet, Jet2.com

Major factors that have affected airline developments:

- privatisation
- alliances
- emergence of low cost carriers
- airline concentration, e.g. KLM/Air France, BA/Iberia
- growth of tourism

4 Understand how general aviation in the UK has evolved since 1945

Developments in the general aviation (GA) sector:

- post-war surpluses, e.g. aircraft, crew, airfields
- significant GA manufacturers, e.g. Cessna, Piper, Beech, Bombardier
- reasons for growth of GA, e.g. corporate ownership, shared ownership, status, recreation , oils support, emergency services
- support from operator groups and trade bodies, e.g. General Aviation Manufacturers Association (GAMA), British Business and General Aviation Association (BBGA), General Aviation Safety Council (GASCo), Aircraft Owners and Pilots Association (AOPA), Guild of Air Pilots and Navigators (GAPAN)
- regulators, e.g. Civil Aviation Authority (CAA), European Aviation Safety Agency (EASA) directives, self-regulation (eg British Parachute Association, British Gliding Association, Light Aircraft Association)
- recent developments, e.g. very light jet (VLJ), use of composites, microlight aircraft, licence changes, fractional ownership

5 Understand how the regulatory framework for aviation has developed since 1945

Regulatory framework development since 1945:

- CAA publications, e.g. Air Navigation Order, Air Navigation Regulations
- aviation security acts
- key ICAO international conventions and protocols, e.g. Warsaw, Chicago, Tokyo

Major factors that have affected regulatory framework development:

- bilateral agreements
- domestic deregulation, e.g. US, UK
- multi-lateral agreements (European, trans-Atlantic)
- international security

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 Identify the timing of significant commercial aircraft developments since 1945 [IE]	**M1** Justify why a specific commercial aircraft has significantly impacted on the development of the aviation industry	**D1** Evaluate the developments and factors that have had the most impact on the aviation industry
P2 Explain the major factors that have affected commercial aircraft developments [IE]		
P3 Outline planned commercial aircraft developments		
P4 Summarise airport developments since 1945 [IE]		
P5 Assess the major factors that have affected airport developments [IE]		
P6 Summarise airline developments since 1945 [IE]		
P7 Assess the major factors that have affected how airlines have evolved since 1945 [IE]		
P8 Identify the key developments of the general aviation sector		
P9 Explain how the general aviation sector has evolved since 1945		
P10 Outline regulatory framework development since 1945 [IE]	**M2** Explain the effects of economic regulation and deregulation on the aviation industry	
P11 Discuss the major factors that have affected regulatory framework developments [EP]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers CT – creative thinkers	RL – reflective learners TW – team workers	SM – self-managers EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit should chart the development of UK aviation to give learners an understanding of how the industry has matured and developed into its present format.

Learning outcome 1 deals with the development of civil aircraft since 1945. Military aircraft aside, this topic has generated more DVDs, books, column inches and websites than any other part of the aviation industry. There is so much good reference material and so much debate that tutors might prefer to suggest to learners how they might channel their research. A good starting point would be a visit to an aviation museum or visitor centre. The choice of study areas has been left flexible and, once the scene has been set, tutors might like to break learners into groups to research their own favourite aircraft.

Learning outcomes 2 and 3 deal with the development of airlines and airports and, as with learning outcome 1, a wealth of reference material is available. Learners will require some guidance on where they should channel their research, but can again be split into groups to research different airlines, airports and present their findings. Tutors might like to contact their local aviation society and invite suitably qualified members to talk about the development of their local airport, an airline or a significant aircraft.

Learning outcome 4 seeks to develop learners understanding of how general aviation (GA) has reached the scale it enjoys today by studying its evolution. An overview of how a surplus of redundant aircraft, aircrew and former RAF airfields after World War 2 provided the raw material for the expansion of privately funded enterprises will help to explain the current GA network. More recently, the development of new improved designs from the main recreational and executive aircraft manufacturers complemented by adaptations from large aircraft producers, has expanded the sector beyond recognition. Specialist sectors have also developed as industry and national needs change (for example oil support, emergency services).

Learning outcome 5 investigates key laws and regulations that have shaped the aviation industry. The first part concentrates on safety and tutors might find it easier to approach this topic by explaining the rationale behind the development of certain laws and international protocols. The latter part of learning outcome 5 deals with economic regulation; this is a broad and complex topic that learners sometimes find difficult to comprehend. It is, however, the topic that has probably had the greatest influence on the development of the industry, and needs to be explored and understood by learners if they are to appreciate many of the issues facing the industry today. This is not a topic that lends itself easily to individual research. Although there are excellent books available, many of them are set at graduate level. It may be easier to break down the information from these textbooks, and deliver it through a lecture. This is also a dynamic topic and there are likely to be several significant regulatory developments during the life of this unit. Learners are expected to keep up to date with the latest developments affecting the UK.

Locating information can be difficult, and learners should be given guidance on where to find information, how to select the most appropriate content and how to synthesise information coherently. This could be from feedback given at the end of learner presentations, through group discussions or through individual tutorials. To ensure learners use the information they have researched effectively, tutors should discuss outcomes with them to ensure they have met the learning objectives.

The development of communication skills will be critical to achieving this unit. Learners will be expected to produce a range of written material which should be presented to appropriate industry standards. All learners should be prepared and encouraged to achieve the higher grades. Teaching should, therefore, not just focus on a description of research undertaken. Learners should be encouraged to interpret the information they have researched and consider how this may have affected an organisation or the industry. They should be asked challenging and stimulating questions regarding the data they have obtained through research. Questions, and the answers given, can be documented as evidence.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way of planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction and overview of the unit and the five learning outcomes.
A review of the unit assessment methods, along with timescales and hand-out and hand-in dates.
Discussion about the timing of significant commercial aircraft.
DVD *Story of Concorde: The Greatest Aircraft Ever Built* followed by a class discussion.
Investigation into the major factors that have affected the development of civil aircraft.
Learners produce a table charting developments and the impact on aircraft performance and productivity, e.g. speed, passenger capacity, range.
DVD selected chapters from *The Story of Flight 1903-2003*.
Visit to Duxford Aviation Museum or another aviation history museum.
Investigation into planned civil aircraft development.
Assignment workshop to research P1, P2, P3.
Preparation for assignment **Assignment 1: The Story of Aviation: A Documentary on the Development of Civil Aircraft** (P1, P2, P3) **Feedback on assignment**
Investigation into the development of airports and significant airports.
Class discussion on major factors that have affected airport development.
DVD *British Civil Aviation: Heathrow, The Early Years.*
Assignment workshop to research P4, P5.
Preparation for assignment **Assignment 2: The Story of Aviation: A Documentary on the Development of Airports** (P4, P5) **Feedback on assignment**
Investigation into the development of scheduled airlines, charter airlines, cargo, low-cost scheduled airlines.
Discussion on BA and its history, e.g. BEA, BOAC, privatisation, Lord King.
Guest speaker from a local aviation society on a significant airline's history.
Investigation into the major factors that have affected airline development.
Class discussion on how and why BA became the largest and most significant airline in the UK.

Topic and suggested assignments/activities and/assessment
Assignment workshop to research P6, P7, M1.
Preparation for assignment **Assignment 3: The Story of Aviation: A Documentary on the Development of Airlines** (P6, P7, M1) **Feedback on assignment**
Tutor input and class research – select the key components that define the evolution of GA since 1945. This may be constructed as a timeline and should include elements from the unit content. The completed assignment can be used to support P7.
Tutor input and class research – this can be researched in conjunction with P6. The assignment requires an explanation of how key elements listed in P6 have contributed to the evolution and diversification of GA since 1945. This must include the immediate post-war legacy of aircraft, crew and airfields, developments in aircraft manufacture and expansion of the recreation market.
Preparation for assignment **Assignment 4: How General Aviation (GA) has Evolved** (P8, P9) **Feedback on assignment**
Investigation and practical workshop into the development of the regulatory framework.
Investigation into the major factors that have affected regulatory framework development.
Guest speaker from the CAA to talk about the history of the organisation and the key milestones.
Investigation into economic regulation, liberalisation and deregulation.
Practical workshop on the effects of deregulation and liberalisation on the aviation industry.
Assignment workshop to research P10, P11, M2.
Preparation for assignment **Assignment 5: The Story of Aviation: A Documentary on the Development of Aviation Regulation** (P10, P11, M2) **Feedback on assignment**
Investigation into the developments and factors that learners believe to have had the most impact on the aviation industry.
Assignment workshop to research D1.
Preparation for assignment **Assignment 6: The Story of Aviation: A Documentary on the Developments and Factors That Have Had the Most Impact on Civil Aviation** (D1) **Feedback on assignment**
Review of the unit

Assessment

A variety of assessment methods could be used for this unit.

P1 – P2 – P3

P1 deals with the timing of significant aircraft and P2 asks learners to outline the major factors that have affected aircraft development. P1 and P2 could, initially, be combined in a table that shows significant factors, for example year of introduction into service, maximum speed, payload. This in itself would not be sufficient to achieve P2 but the table could be supported by written text that explains the factors that have affected development in more depth. P3 asks learners to outline future developments and, whilst information is available on the aircraft manufacturers' websites, learners will need to explore and research beyond Boeing and Airbus.

P4 – P5

To achieve P4, learners need to summarise airport developments. Two examples are sufficient, one should focus on a major airport, and it is recommended that learners look at London Heathrow, and one should be another major or a regional airport. P5 can be achieved by assessing the major factors that have led to airport development, with examples. The factors are listed in the unit content.

P6 – P7

To achieve P6, learners need to summarise airline developments since 1945. They need to summarise why each airline type evolved followed by a short case study. Learners may select their own airlines for these case studies, however it is recommended that for scheduled airlines learners look at British Airways (BA). Learners must summarise the development of their chosen airlines from start-up. P7 requires learners to assess the major factors that have affected airline development and whilst all the items listed in the unit content must be covered learners do not need to explain all the factors for each topic; they only need cover the main ones.

M1

To achieve M1, learners will need to reflect on their research and select an aircraft that, in their opinion, had the greatest impact on civil aviation and build up a case of evidence to support their claims. Learners should draw from P1 to P7 in their explanation, for example if B757 was chosen, learners should include the expansion of the fleets for airlines and the growth of airports and the growth in passenger numbers.

P8 – P9

To achieve P8, learners must identify key developments in the general aviation (GA) sector since World War 2. This must include a reflection of the historical perspective together with current factors that are shaping the industry. This may be produced as a timeline.

For P9, learners must explain how the key events identified in P8 have contributed to the expansion and diversification of GA. This must cover all items of the unit content including the post-war aircraft, crew and airfield legacy, significant aircraft types and the growth in leisure aviation. This may be delivered as a presentation in conjunction with P8.

P10 – P11 – M2 – D1

To achieve P10, learners need to outline how the safety and economic framework of regulation evolved. The safety regime has developed considerably since the formation of the ICAO in 1944, safety is paramount and rules and regulations designed to ensure safety and security cover every aspect of the industry.

The main emphasis of P11 is on economic regulation, initially introduced to protect and nurture a fledgling industry; it is in the process of being stripped away as the industry matures. Learners will need to demonstrate that they understand these issues by giving an overview of all items listed in the unit content. P11 should conclude with a review of how terrorism has impacted on the regulatory framework.

To achieve M2, learners should explain the system of economic regulation that stipulated which airline could operate on which route and set the minimum fare an airline could charge for a ticket. Learners will also need to explain the impact of removing these economic regulations. Learners should start with the deregulation of the US domestic market in 1978 and the aftermath, and chart developments to the present day. The consequences of deregulation have been consistent, falling airfares and more choice for the passenger coupled with increased competition for airlines.

To achieve D1, learners must evaluate the developments and factors, from any of the five learning outcomes, that they believe have contributed most to aviation. Learners must explain why they have chosen these developments or factors, evaluate their impact on the industry and justify their inclusion with factual evidence. This must be a detailed analysis supported by illustrations, articles, charts, diagrams or data.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1	Assignment 1: The Story of Aviation: A Documentary on the Development of Civil Aircraft	A three-part TV documentary has been commissioned by the BBC on the development of aircraft, airlines and airports in the UK. Working for a major airport operator, your job is to give researchers for the programme an initial presentation on the development of civil aircraft for part one of the series.	Presentation
P4, P5	Assignment 2: The Story of Aviation: A Documentary on the Development of Airports	A three-part TV documentary has been commissioned by the BBC on the development of aircraft, airlines and airports in the UK. Working for a major airport operator, your job is to give researchers for the programme an initial presentation on the development of airports for part two of the series.	Presentation

Criteria covered	Assignment title	Scenario	Assessment method
P6, P7, M1	Assignment 3: The Story of Aviation: A Documentary on the Development of Airlines	A three-part TV documentary has been commissioned by the BBC on the development of aircraft, airlines and airports in the UK. Working for a major airport operator, your job is to give researchers for the programme an initial presentation on the development of airlines for the final part of the series.	Presentation
P8, P9	Assignment 4: How General Aviation (GA) has Evolved	Working for a transport trade journal, you are to write an article investigating how the GA sector has evolved.	Timeline and presentation/discussion
P10, P11, M2	Assignment 5: The Story of Aviation: A Documentary on the Development of Aviation Regulation	As a follow up to their acclaimed three-part TV documentary, the BBC is considering other documentaries on aviation. One will probably be on the development of aviation regulation. Working for a major airport operator, you have been asked to research the topic and produce a report to see if a programme is feasible.	Written report
D1	Assignment 6: The Story of Aviation: A Documentary on the Developments and Factors That Have Had the Most Impact on Civil Aviation	The BBC's final programme on the development of aviation will focus on the issues that have had most impact on its development. Working for a major airport operator, your job is to give the writers, producers and directors on the developments and factors that you feel have had the most impact on civil aviation.	Presentation

Links to other BTEC units

This unit forms part of the BTEC aviation sector suite. This unit has particular links with the following unit titles in the aviation suite.

Level 2	Level 3	Level 4
n/a	Unit 1: The UK Aviation Industry Unit 4: Inter-relationships Within the UK Aviation Industry	Unit 18: Researching Current Issues in Aviation

Essential resources

Learners must have access to published resources and the internet.

Employer engagement and vocational contexts

It would help learners if they were able to listen to and question a number of guest speakers who have expertise in the development of the aviation industry, for example museum staff, aviation societies, senior tour operators.

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	exploring the timing and factors that have affected significant commercial aircraft, airport and airline, and regulatory framework developments since 1945
Effective participators	discussing the major factors that have affected regulatory framework developments including the impact of international security.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Reflective learners	connecting aircraft, airline, airport, general aviation and regulatory developments throughout the different learning outcomes
Team workers	collaborate with peers to share research and connect findings in order to meet the assessment requirements and contributing to discussions
Self-managers	preparing and adhering to a research plan.

Functional Skills — Level 2

Skill	When learners are …
ICT — Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching and sorting aviation industry developments into chronological order in order to meet the requirements of the assessment criteria
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	planning and researching the developments using the internet and bookmarking useful websites for future use
Manage information storage to enable efficient retrieval	saving documents and referencing sources in order to retrieve and add to ongoing work
Follow and understand the need for safety and security practices	ongoing practice of using passwords and trusted sources
Troubleshoot	as required.
ICT — Find and select information	
Select and use a variety of sources of information independently for a complex task	researching the aviation industry developments through a range of aviation, electronic journals and news websites
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	using appropriate search criteria in order to source relevant and accurate aviation industry developments.
ICT — Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	illustrating the key aircraft, airline, airport, general aviation and regulatory developments in chronological order in a variety of forms such as a timeline, diagrams, images and text
Bring together information to suit content and purpose	collating research on aviation industry developments into a chronological order and presenting it in a visually appealing manner
Present information in ways that are fit for purpose and audience	presenting information in a visually appealing manner for a presentation
Evaluate the selection and use of ICT tools and facilities used to present information	selecting the most appropriate ICT tools to present the information visually
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	e-mailing links to sources, e-mailing and uploading the presentation for assessment purposes.

Skill	When learners are ...
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	discussing the major factors that have affected regulatory framework developments
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching key developments and major factors affecting the development of the aviation industry
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	writing a report on the development of aviation regulation including coherent communication of the complex factors of bi-lateral, multi-lateral agreements, domestic deregulation and international security.